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PICMET ’07

PICMET

Dear PICMET Guests:

It is a great pleasure for us to welcome you to PICMET ’07.

As new technologies continue to emerge at a rapid pace, we are observing two parallel phenomena that are shaping the world in the “Technology Era”. One is the convergence of the new technologies; the other one is the rise of the service sector enabled by technology toward becoming the dominant force in the global economy. As information technology, nanotechnology and biotechnology start converging, new concepts and products that were not even imaginable just a few years ago are being developed in the manufacturing, energy, health, transportation, agriculture, government and educational systems, among others, and approaching the point of developing permanent solutions to age-old problems that have been plaguing the social and industrial rubric of the society for centuries. While technological capabilities are increasingly being channeled to the betterment of humankind, an enormous shift is also taking place toward the service economy in industrialized countries. With services representing 75 percent of the U.S. economy today, it is not surprising that the entire Chinese economy is only as large as the health sector in the U.S.

With these two major forces, namely the technologies starting to converge, and technologies starting to enable the service sector toward dominating national economies, it is more critical than ever to harness the energy of the existing and emerging technologies to make sure that the future will be to our liking. The only way to do that is to be innovative, and to remain ahead of the curve.

We see innovation as the key to success in the future shaped by the convergence of technologies and the move toward service-dominated economies. Consequently, we see a tremendous opportunity for technology management to make a significant impact on the world economy by shaping that future. That is a big challenge for the leaders and emerging leaders in the technology management field.

Recognizing this emerging challenge, the PICMET ’07 Conference took a bold step and examined the role of technology management in the convergence of technologies and the emergence of the service economy as a dominant force.

PICMET, in its 16th year now, is the largest conference on technology management in the world. Approximately 670 papers were submitted to PICMET ’07. After they were reviewed by at least one referee from the 91-member Program Committee in a double-blind refereeing process, 357 were accepted for inclusion in the conference. The referees were from universities, industrial organizations and government agencies from around the world. The authors represent more than 320 organizations in 40 countries.

The PICMET ’07 Conference has two publications:

This *Bulletin* includes an abstract of each paper to enable the participants to select the sessions to attend and the presentations to follow. The *Proceedings* includes all the papers presented on CD-ROM with unique page numbers and is intended as a reference book for an overview of the field, in general, and the conference, in particular.

The papers scheduled for presentation in the conference are clustered into 39 major tracks, alphabetically listed below:

Accelerated Radical Innovation
Competitiveness
Convergence of Technologies
Decision Making
E-Business
Emerging Technologies
Entrepreneurship/Intrapreneurship
Global Issues in Technology Management
Information Management
Innovation Management
Knowledge Management
Manufacturing Management
New Product Development
Outsourcing/Offshoring

(continued on next page)

PICMET ’07

Productivity Management
Project/Program Management
R&D Management
Science and Technology Policy
Software Process Management
Strategic Management of Technology
Strategic Value of Technologies
Supply Chain Management
Technical Workforce
Technology Adoption
Technology Assessment and Evaluation
Technology Diffusion
Technology Forecasting and Planning
Technology Management in Biotechnology
Technology Management Education
Technology Management in Electronics Industry
Technology Management in the Health Sector
Technology Management in Nanotechnology
Technology Management in the Public Sector
Technology Management in the Service Sector
Technology Management for Sustainability
Technology Management in Telecommunications
Technology Management Framework
Technology Marketing
Technology Roadmapping

Hundreds of people participated in planning and organizing PICMET ’07. The International Advisory Council, whose members represent the leading educational institutions, industrial corporations and government agencies around the world, helped to define the critical issues to be addressed by the conference. The Board of Directors provided strategic directions. The Program Committee conducted the double-blind reviews of the submissions. The Country Representatives, under the leadership of Kiyoshi Niwa of the University of Tokyo in Japan and Dilek Cetindamar of Sabanci University in Turkey, provided linkages between PICMET and the regions they represent. The Program Committee reviewed the papers and provided valuable assistance to assure the highest quality of presentations.

Ann White coordinated the overall planning for the Conference; Liono Setiowijoso designed, maintained and managed the information systems, and formatted the papers for the Proceedings and the Bulletin; Donna Koch managed the registration process; Debbie Hutchins coordinated the on-site activities; and Jeff Birndorf of endesign developed graphic arts for PICMET ’07.

Finally, the Organizing Committee, including our students in the Department of Engineering and Technology Management at Portland State University, took on major responsibilities in every aspect of the work involved in putting together PICMET ’07. We acknowledge the individuals and organizations which supported PICMET, and extend our deep gratitude and thanks to every one of them. We also offer special thanks to Portland State University, particularly President Daniel Bernstine, Interim President Michael Reardon, and Dean Robert Dryden for their continuous support and encouragement.

We hope that the ever-increasing enthusiasm of all these people and organizations has resulted in a conference that will be a truly rewarding experience for our guests.

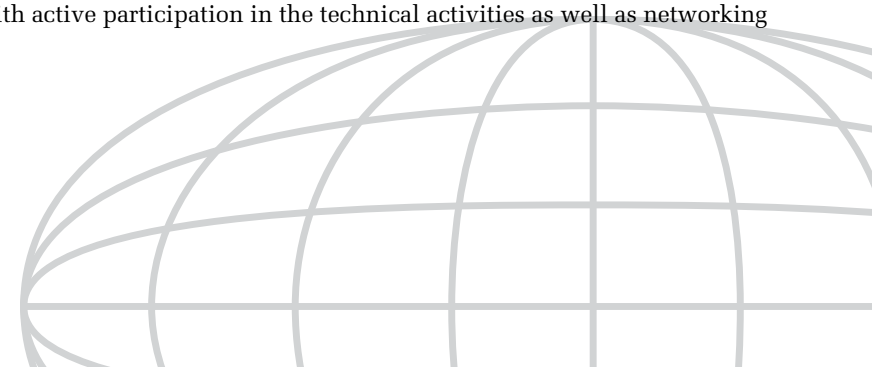
We are pleased and proud to hear from the participants that every PICMET Conference is better than the previous one in terms of its contents and quality and the impact it is making on the technology management field.

We believe PICMET ’07 will have a major impact on the growth of the field and will contribute significantly to research, education and implementation of Technology Management. We hope you will find it beneficial and enjoyable.

All of us at PICMET wish you a productive week, with active participation in the technical activities as well as networking opportunities throughout the Conference.

Sincerely,

Dundar F. Kocaoglu
President and CEO



STATE OF OREGON

PROCLAMATION

OFFICE OF THE GOVERNOR

WHEREAS: The engineering and technology sector of the economy of the State of Oregon is essential to the State's continued economic growth; and

WHEREAS: The effective management of engineering and technology processes, programs, and projects is necessary to assure the fullest benefits; and

WHEREAS: The field of engineering and technology management is international in scope and constantly changing; and

WHEREAS: The Department of Engineering and Technology Management at Portland State University, in cooperation with the IEEE Oregon Section and INFORMS Technology Management Section, have convened the Portland International Center for Management of Engineering Management (PICMET) Conference, August 5-9, 2007, to provide a forum for the exchange of information and ideas among practitioners in this important field.

NOW, THEREFORE: I, Theodore R. Kulongoski, Governor of the State of Oregon, hereby proclaim **August 5-9, 2007** to be

TECHNOLOGY MANAGEMENT WEEK

in Oregon and encourage all Oregonians to join in this observance.

IN WITNESS WHEREOF, I hereunto set my hand and cause the Great Seal of the State of Oregon to be affixed. Done at the Capitol in the City of Salem in the State of Oregon on this day, July 23, 2007.

Theodore R. Kulongoski, Governor

Bill Bradbury, Secretary of State

GORDON H. SMITH
OREGON

United States Senate

WASHINGTON, DC 20510–3704

COMMITTEES:
FINANCE
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RANKING MEMBER, SPECIAL COMMITTEE ON AGING

August 2007

Portland International Center for
Management of Engineering and Technology
Portland State University
Department of Engineering and Technology Management
PO Box 751
Portland, OR 97207

Dear Friends:

Welcome to the Portland International Center for Management of Engineering and Technology 2007 Conference. As you complete your important work discussing technology management, I hope you also have the opportunity to enjoy all that scenic Oregon has to offer.

Technology is the bridge from today's problems to tomorrow's solutions. Harnessing its potential requires effective management of the wealth of information and new tools created by science. I hope this conference helps further your efforts to apply the best in research and applied science to the issues facing us today.

I welcome you to Portland and wish you a successful conference.

Sincerely,

Gordon H. Smith
United States Senator

Congress of the United States
House of Representatives
Washington, DC 20515–3701

July 23, 2007

Dear Friends,

It is my pleasure and honor to welcome you to Oregon for the 2007 Portland International Center for Management and Engineering Conference.

This is my fifth term representing the 1st Congressional District - home to Oregon's Silicone Forest - providing a fitting backdrop for this event. PSU is also a fitting host for this organization as a truly urban research university.

As the chairman of the Technology and Innovation Subcommittee of the House Science Committee I have the opportunity to help further the cause of many issues that relate to the work you do every day and at this conference. Since the opening of the 110th Congress, I have led the committee to expand opportunities for innovation through the Small Businesses Innovation Research Grant Program, and just this month, held a hearing to examine possible improvements to the laws that govern technology transfer in the United States. Like you, I believe programs like these provide the seed corn to future innovation and economic development, vital to staying competitive in the global economy.

In the Science Committee, we also reauthorized the National Institute of Standards and Technology with new language for science scholarships to mathematics and science teachers. These scholarships will help to increase the number of skilled professionals entering this critical pipeline.

As a member of the Education and Labor Committee and in my role as vice chair of the Community College caucus, I also have worked to expand math and science and education that you all know is essential to preparing students to meet the needs of an increasingly technical and knowledge-driven workforce.

Your participation this week will create an important dialogue furthering the cause of science and technology that ultimately will make the United States a stronger competitor. On behalf of the First Congressional District, I would like to thank you for your dedication and hard work. I also sincerely hope you all enjoy your time in the city of Portland.

With warm regards,

David Wu

David Wu
Member of Congress

ACKNOWLEDGMENTS

PICMET '07 IS SPONSORED BY
Portland State University (PSU)
Department of Engineering and Technology Management (ETM)
Maseeh College of Engineering and Computer Science (MCECS)
PSU Office of Information Technology
American Indian Science and Engineering Society, PSU Chapter
National Science Foundation
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Portland Oregon Visitors Association (POVA)

COOPERATING SOCIETIES
IEEE Oregon Section
INFORMS Technology Management Section

PICMET '07

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Portland State University

PICMET '07

PROGRAM COMMITTEE

The Program Committee consisted of 91 researchers, educators, practitioners and students of technology management from around the world. The members of the Program Committee evaluated the abstracts, reviewed the papers, and made recommendations on the appropriateness of each presentation for inclusion in the conference.

John O Aje
Hacer Ansal
Elif Baktir
Nuri Basoglu
Roger A Baxter
Daniel Berg
Andre J Buys
Dilek Cetindamar
C. M Chang
Min-Jeong Cho
Darin G Colby
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Diane Keil
Jinho Kim
Jisun Kim
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Peerasit Patanakul
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Marthinus W Pretorius
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Jang W Ra
Avnish Rastogi
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Guillermo Rueda
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Leonardo P Santiago
Ozcan Saritas
Neslihan Sener
Siri-on Setamanit
Gerald B Sheblé
Kunio Shirahada
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Garry Summers
Patt Suntharasaj
Ethne Swartz
Ilda Tanoglu
Tarcan Tarman
Thien A Tran
Tom Triscari
Ad J van de Gevel
Cornelis C van Waveren
Charles M Weber
Gerry Williams
Clark E Wilson
Brent A Zenobia

PICMET '07

ADVISORY COUNCIL

The International Advisory Council provides advice and counsel on the strategic directions of PICMET and the identification of the critical issues of technology management that are addressed at the conference. The members are listed below.

Dr. Bulent Atalay, Professor, Univ. of Mary Washington and the Univ. of Virginia—USA

Dr. Daniel Berg, Professor and former President, RPI—USA

Dr. Frederick Betz, Adjunct Professor, Portland State University—USA

Dr. Joseph Bordogna, former Deputy Director, NSF—USA

Mr. Jim Coonan, Chairman and CEO, Phoenix Gold Audio Source—USA

Dr. Youngrak Choi, Chairman, Korea Research Council of Public Science & Technology—Korea

Dr. Joseph W. Cox, Oregon University System Distinguished Service Professor—USA

Dr. Robert D. Dryden, Dean, Maseeh College of Engineering & Computer Science, Portland State University—USA

Dr. Gunnar Hambraeus, Royal Swedish Academy of Engineering Sciences—Sweden

Dr. Kathryn J. Jackson, Royal Swedish Academy of Engineering Sciences—Sweden

Mr. Richard I. Knight, Former President and COO, Sarif Corp.—USA

Dr. Jay Lee, Eminent Scholar & L.W. Scott Alter Chair Prof., University of Cincinnati—USA

Mr. Thomas H. Lipscomb, Chairman, The Center for the Digital Future—USA

Mr. John McDougall, CEO, Alberta Research Council—Canada

Dr. Graham Mitchell, Director, Technological Innovation Program, University of Pennsylvania—USA

Dr. Kwan Rim, Chairman, Samsung Advanced Institute of Technology—Korea

Dr. Frederick A. Rossini, Former Provost, George Mason University—USA

Dr. Nam Suh,President, KAIST—Korea

Mr. Donald VanLuvanee, Former Chairman and CEO, ESI Corp.—USA

Dr. Nejat Veziroglu, Professor, University of Miami—USA

Dr. Eric von Hippel, Professor, MIT—USA

Dr. Seiichi Watanabe, Executive General Manager, Terumo Corporation—Japan

Dr. Rosalie Zobel, The European Commission—Belgium

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Donna Koch
Kenny Phan
Guillermo Rueda
Liono Setiowijoso
Tarcan Tarman
Charles Weber
Ann White

Student Paper Award

The number of students doing significant research in the area of Engineering and Technology Management was demonstrated by the number of nominations received. The selection of the award winner was difficult because of the excellent quality of all the submissions, but one paper stood out for its contributions to the field of Engineering and Technology Management.

AUTHOR

Seiko Arai

ADVISOR

David Barron

UNIVERSITY

Templeton College, University of Oxford, United Kingdom

PAPER TITLE

"Absorptive Capability of MNCs: Balance between Autonomy and Control of Foreign R&D Subsidiaries"

ABSTRACT

This paper analyzes the capability of Japanese and European multinational companies (MNCs) to absorb technological knowledge from the United States through their R&D operation in the US. Employing the notion of "absorptive capacity" [10], we define the capability of a firm to absorb technological knowledge from abroad as "absorptive capability (AC)." We examine the components of AC and their inter-relationships using patent and sales data in the context of R&D management of Japanese and European MNCs at home and in the US.

MEDAL OF EXCELLENCE

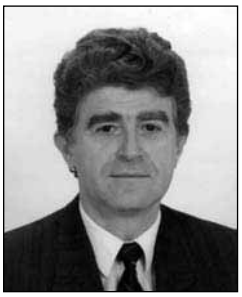
MEDAL OF EXCELLENCE

Initiated at PICMET '04 in Seoul, Korea, the Medal of Excellence award is given for extraordinary achievements of individuals in any discipline for their outstanding contributions to science, engineering and technology management. The 2004 recipients were Dr. Daeje Chin, Minister of Information and Coummunications, Seoul, Korea; Dr. Kiyoshi Niwa, Professor in the Department of General Systems Studies at the University of Tokyo, Japan; and Rosalie A. Zobel, Director of Components and Systems in the Information Society and Media Directorate-General of the European Commission. The 2005 recipient was Bob Colwell, President, R & E Colwell and Associates, and former Fellow, Intel Corporation. In 2006, the awardees were Dr. Frederick Betz, Former Program Officer, NSF; Dr. Fariborz Maseeh, Founder and President, The Massiah Foundation; and Dr. T. Nejat Veziroglu, Director, Clean Energy Research Institute, University of Miami.

PICMET '07 AWARDEE

Mihail C. Roco

National Science Foundation (NSF), National Nanotechnology Initiative (NNI), and International Risk Governance Council (IRGC)—USA



Dr. Mihail C. Roco is the Senior Advisor for Nanotechnology at the National Science Foundation (NSF) and a key architect of the National Nanotechnology Initiative. Dr. Roco is the founding chair of the U.S. National Science and Technology Council's subcommittee on Nanoscale Science, Engineering and Technology (NSET), and leads the Nanotechnology Group of the International Risk Governance Council. He also coordinated the programs on academic liaison with industry (GOALI). Prior to joining the NSF, he was Professor of Mechanical Engineering at the University of Kentucky (1981-1995) and held visiting professorships at the California Institute of Technology (1988-89), Johns Hopkins University (1993-1995), Tohoku University (1989), and Delft University of Technology (1997-98).

Dr. Roco is credited with 13 patents and has contributed over 200 articles and 15 books, including Nanotechnology: Societal Implications - Maximizing Benefits to Humanity (Springer Science, November 2006), significantly advancing the body of literature in the field. Dr. Roco coordinated the preparation of the U.S. National Science and Technology Council (NSTC) reports on "Nanotechnology Research Directions" (NSTC, 1999) and the "National Nanotechnology Initiative" (NSTC, 2000). Under his stewardship, the nanotechnology federal investment has increased from about $3 million in 1991 at NSF to $1.3 billion in 2005/2006. His research included experimental and simulation methods to investigate nanosystems. Dr. Roco was a researcher in multiphase systems, visualization techniques, computer simulations, and nanoparticles in the 1980s as a professor at the University of Kentucky. In 1991 he initiated the first federal government program with a focus on nanoscale science and engineering (on Synthesis and Processing of Nanoparticles at NSF in 1991). He formally proposed NNI in a presentation at the White House/OSTP, Committee on Technology, on March 11, 1999. Since 2002 he prepared a series of four volumes related to development and management of new technologies, beginning with Converging Technologies for Improving Human Performance in collaboration with W.S. Bainbridge.

Dr. Roco is a Correspondent Member of the Swiss Academy of Engineering Sciences, and a Fellow of ASME, of AIChE, and of the Institute of Physics. Forbes magazine recognized him in 2003 as first among "Nanotechnology's Power Brokers," and Scientific American named him one of 2004's top 50 Technology Leaders. In 2005, he received the AIChE Forum award "for leadership and service to the national science and engineering community through initiating and bringing to fruition the National Nanotechnology Initiative." He is the editor of several journals, including the Journal of Nanoparticle Research. He was honored as recipient of the Carl Duisberg Award in Germany, "Burgers Professorship Award" in the Netherlands and the "University Research Professorship" award in the U.S. Dr. Roco is a member of several honorary boards and was elected Engineer of the Year by the U.S. Society of Professional Engineers and NSF in 1999 and again in 2004.

LTM AWARDS

LEADERSHIP IN TECHNOLOGY MANAGEMENT AWARDS

PICMET's Leadership in Technology Management award recognizes and honors individuals who have provided leadership in managing technology by establishing a vision, providing a strategic direction, and facilitating the implementation strategies for that vision. Past recipients include Dr. Andrew S. Grove, CEO of Intel; Norman Augustine, Chairman of Lockheed Martin; Jack Welch, CEO of General Electric; Dr. Modesto A. Maidique, President of Florida International University; Carleton S. Fiorina, Chairman and CEO of Hewlett-Packard Co.; Donna Shirley, Manager of the Mars Exploration Program; Kwan Rim, Chairman of Samsung Advanced Institute of Technology (SAIT); Morris Chang, Founding Chairman, Taiwan Semiconductor Manufacturing Company Ltd. (TSMC); Prof. Dr.-Ing. Dr. Sc. h.c. Bacharuddin Jusuf Habibie, former President, Indonesia, and founder and chairman, The Habibie Center; Dr. Gunnar Hambraeus, member of the Swedish Royal Academy of Science and former President and Chairman, Royal Swedish Academy of Engineering Sciences; Dr. Pairash Thajchayapong, Permanent Secretary, Ministry of Science and Technology—Thailand; Dr. Eric von Hippel, Professor and Head of the Technological Innovation and Entrepreneurship Group, Sloan School of Management, Massachusetts Institute of Technology; Dr. Youngrak Choi, Chairman, Korea Research Council of Public Science & Technology (KORP); Dr. Tsuneo Nakahara, Adviser to CEO (past Vice Chairman) of Sumitomo Electric Industries, Ltd.; Dr. Mehmet Nimet Ozdas, Dept. of Mechanical and Control Engineering, Istanbul Technical University; and Dr. Edward B. Roberts, David Sarnoff Professor of the Management of Technology and Chair, Massachusetts Institute of Technology (MIT) Entrepreneurship Center.

PICMET '07 AWARDEES:

Harold A. Linstone

Editor-in-chief, Technological Forecasting and Social Change; University Professor Emeritus, Systems Science, Portland State University—USA

Dr. Harold A. Linstone earned his M.A. and Ph.D. degrees in Mathematics from Columbia University and the University of Southern California, respectively. He now holds the rank of University Professor Emeritus of Systems Science at Portland State University, Portland, Oregon, USA. From 1970 to 1977 he served as director of its Systems Science Ph.D. Program. His 22 years of industrial experience include positions at Hughes Aircraft Company and Lockheed Corporation, where he was Associate Director of Corporate Planning—Systems Analysis. He has been a visiting professor at the University of Rome, the University of Washington, and Kiel University. In 1993-94 he served as president of the International Society for the Systems Sciences, and in 2003 he won the World Future Society's Distinguished Service Award.

Dr. Linstone is editor-in-chief of the professional journal *Technological Forecasting and Social Change*, which he founded in 1969, and which is now in its 38th year. He is author or co-author of the books *The Delphi Method* (1975), *Futures Research: New Directions* (1976), *Technological Substitution* (1977), *Multiple Perspectives for Decision Making* (1984), *The Unbounded Mind* (1993), *The Challenge of the 21st Century* (1994), and *Decision Making for Technology Executives* (1999).

Yoshio Nishi

Director of Research of the Stanford Center for Integrated Systems; Director of the Stanford Nanofabrication Facility; and Research Professor in the Department of Electrical Engineering at Stanford University—USA

Dr. Yoshio Nishi is Director of Research of the Stanford Center for Integrated Systems, Director of the Stanford Nanofabrication Facility, and a Research Professor in the Department of Electrical Engineering at Stanford University.

He received his B.S. degree in metallurgy from Waseda University in 1962 and his Ph.D. degree in electronics engineering from the University of Tokyo in 1973. In 1962 he joined Toshiba Corporation, where he worked on silicon process research and development. From 1968 to 1969 he was a visiting Research Associate at the Stanford Electronics Laboratories, working on high-field transport in semiconductors and materials characterization of GaAs. In 1969 he returned to Toshiba and supervised the nonvolatile memory R&D activity, working on the development of the world's first MNOS nonvolatile static memories. In 1976 he was responsible

LTM Awards

for theoretical and experimental studies of short-channel MOSFETs in the MITI VLSI project, as well as management of the SOS technology group at Toshiba, developing the 16bitSOS processor for medical information processing. In 1979 he directed work on

VLSI process technology R&D for both memory and logic VLSI, where his team developed the world's first 1Mbit CMOS DRAM, 256kbit CMOS SRAM and 1M/4Mbit EEPROM, predecessor of Flash memory, which led Toshiba to become the leading manufacturer of DRAM and EEPROM in that era.

In 1986 Dr. Nishi joined HP Labs as Director of the Silicon Process Laboratory, where he led the team to build HP's first converged CMOS technology at 0.8 micron geometry used in HP RISC Processor, PA-RISC chip sets. In 1994 he established and became Director of the ULSI Research Laboratory. Dr. Nishi joined Texas Instruments in 1995 as Vice President and Director of Research and Development for the Semiconductor Group. In 1996, he was appointed Senior VP, responsible for R&D activities for digital signal processing solutions, semiconductor processes and devices, memory, as well as components and materials. His contributions throughout his tenure in industry cover not only leading-edge technology development, but also an R&D model and strategy for consecutive developments of technologies of multiple nodes with co-located R&D and manufacturing with two staggering teams and broad deployment of "precompetitive collaboration and benchmarking," which is now commonly accepted world-wide.

In 2002 Dr. Nishi joined Stanford University as a faculty member in Electrical Engineering, and, by courtesy, in Material Science and Engineering. His research and teaching interest at Stanford covers nanoelectronic materials and devices such as metal gate/high k/high mobility channel MISFETs, resistance change nonvolatile memory, nanowires and nanotube-based devices with his Ph.D. students. He serves several companies as either board member or technical advisory board member, and he is also guest professor of several universities such as Tsinghua University and Peking University.

Professor Nishi has published over 200 papers in international technical journals and conferences and has co-authored 12 books. He has been awarded more than 50 patents in the U.S. and Japan. He is a Fellow of the IEEE, and he is a member of the Japan Society of Applied Physics; Institute of Electronics, Communication Engineers of Japan; and the Electrochemical Society. He received the IECE Japan Award in 1972, and IR100 awards in 1982 and 1986 for nonvolatile memory productization. In 1995, he received the IEEE Jack A. Morton Award. He is also the 2002 Robert Noyce Medal recipient.

General Information

CONFERENCE FOCUS

Portland Hilton

As technology continues to be the dominant force in society, emerging technologies are starting to converge, and the world economy is starting to shift toward the service sector. Technology management is gaining increasing importance in making technology work for the betterment of humanity in that world. Those who are able to create new ideas, develop new technologies and harness the synergistic capabilities of multiple technologies to provide better service are setting the standards and leading the way for the rest of the world. Global leadership in every field is shifting toward innovative use and effective management of technology. The key to leadership is resting in the management of the process of nurturing creative ideas, creating new technologies, developing new products and commercializing them in existing and new markets. In short, the technology-driven world is being defined by the way technology is managed. Those who succeed in managing technology will be the global leaders; those who fail will cease to exist. Recognizing this enormous challenge, PICMET '07 takes a bold step and examines the two critical dimensions of our times: the management of converging technologies, and the application of technology management to the service sector.

WHO SHOULD ATTEND

Following the PICMET tradition, this high-impact symposium will set the stage for innovation management for decades to come. The world's leading experts from academic institutions, industrial corporations and government agencies will participate in the discussions. PICMET '07 is essential for

- Presidents and CEOs of technology-based corporations
- Vice presidents of engineering, R&D and technology in industrial organizations
- R&D managers
- Engineering, manufacturing, operations, quality and marketing managers in the technology-based organization
- Project and product managers
- Information systems managers in industrial and service organizations
- Technology management researchers
- Educators in engineering management, technology management, manufacturing management, technology marketing, software management, information systems management, project management, and technology-focused MBA programs
- Engineering and technology management program heads
- Students in engineering management, management of technology and related programs
- Government officials responsible for technology policy
- Government officials responsible for science and technology programs
- Engineers and scientists moving from technical specialty to management positions while maintaining their identity in technical fields

PROGRAM

The PICMET '07 program consists of

- A one-day Symposium, "Technology Management in the Service Sector," on Sunday, August 5, 08:00-17:00, immediately preceding the technical program of the PICMET '07 Conference (August 6—9, 2007). Key leaders in the field will present their ideas in the morning, leading to open discussions in the afternoon focused on identifying the critical research needs in Technology Management in the Service Sector.
- Ph.D. Colloquium, "Critical Stages and Career Paths for the Ph.D. Student," Monday, August 6, 10:30—14:00.
- Plenary sessions by global leaders from industrial corporations, academic institutions and government agencies
- Research papers by cutting-edge researchers
- Applications papers by researchers and practitioners working on industry applications
- Panel discussions with interactions between panelists and the audience
- Tutorials on select topics by authorities in the field

PUBLICATIONS

There will be two publications at PICMET '07

- The "Bulletin" containing the conference schedule and abstracts of each presentation
- The "Proceedings" containing all of the papers on CD-ROM

The publications will be available to PICMET '07 attendees at the registration desk.

General Information

REGISTRATION POLICY

All PICMET attendees, including speakers and session chairs, must register and pay the registration fee to have access to sessions and other events. The registration fee allows admittance to all technical session and social events.*

Name badges must be worn to all PICMET sessions, functions and events. If you attend workshops, site visits, or other events not covered by the registration fee, you will be required to pay an additional fee.

**The one-day and student registration fees do not include the evening social events. Site visits and the Wednesday evening dinner are not included in the registration fee. Tickets for these events may be purchased at the registration desk.*

SESSION AND PAPER DESIGNATIONS

Sessions are identified by a four-digit code as follows:

First digit shows the day	M: Monday T: Tuesday W: Wednesday H: Thursday
Second digit shows the time	A: 08:30-10:00 B: 10:30-12:00 C: 12:00-14:00 D: 14:00-15:30 E: 16:00-17:30
Third and fourth digits show the room	01: Pavilion-East 02: Pavilion-West 03: Broadway-I 04: Broadway-II 05: Broadway-III 06: Broadway-IV 07: Forum 08: Council 09: Directors 10: Studio 11: Galleria-1 12: Galleria-2 13: Galleria-3

Presentations in each session are given consecutive numbers following the session number. For example, paper TD-05.2 is the second paper on Tuesday at 14:00 – 15:30 in Broadway III.

PRESENTATION GUIDELINES

SESSION GUIDELINES

The sessions are 90 minutes long and include two, three, or four papers. Depending on the number of papers in the session, the time should be divided equally for each presentation, allowing about five minutes after each one for questions.

SESSION CHAIR GUIDELINES

If you are chairing a session, please follow the guidelines below:

- Contact the speaker before your session starts.
- Check the equipment in the room. If something does not work or if anything else is needed, contact the PICMET volunteer responsible for your room.
- Introduce each speaker.
- Coordinate the time allocated to each speaker so that each has about equal time, allowing about five minutes for questions from the audience.
- Fill out the Session Summary Form and leave it on the table in the room. (The form will be given to the session chair by the PICMET volunteer at the beginning of the session.)

SPEAKER GUIDELINES

If you are presenting a paper, please follow the guidelines below:

- Introduce yourself to your session chair, and provide him/her with a brief background statement that he/she can use in introducing you to the audience.
- Divide the 90 minutes by the number of papers in your session so that every speaker in the session has approximately the same length of time.
- Allow about five minutes for questions from the audience after your presentation.

AUDIO/VISUAL EQUIPMENT

Each session is equipped with an LCD projector and screen. The Plaza Suite on the Plaza Level is designated as the Authors Room. If you need information about anything else concerning the conference, volunteers in the registration area will try to help you.

E-MAIL

Computers with Internet connections will be provided on the Plaza Level in the Plaza Foyer to give you the opportunity to check your e-mail and to send messages. For those of you with laptop computers and Wi-Fi, we will have wireless access in a designated area on the Plaza Level.

PICMET VOLUNTEERS

PICMET Volunteers wearing white polo shirts with the PICMET logo will assist the participants throughout the conference. If you need help in locating the room where your session will be held or if there are equipment problems, for example, you can contact the PICMET Volunteers. They will do their best to help you. If you need information about anything else concerning the conference, a volunteer in the registration area will try to help you.

City of Roses

GETTING AROUND PORTLAND

Portland's public transportation is made up of the MAX (Metropolitan Area Express) train, Tri-Met buses, and the Portland Streetcar. All are free within the downtown area and across the Willamette River as far as the Lloyd Center stop. Outside this "Fareless Square," fares range from $1.70 to $2.00, less for seniors ("honored citizens"), the disabled and youths. Tickets are interchangeable and can be purchased aboard buses or from ticket machines along the MAX or Streetcar lines.

AIRPORT TRANSPORTATION

The pickup area for taxis and town cars is located in the center section of the airport terminal's lower roadway on the baggage claim and departure level. Most transportation providers serve downtown Portland, which is approximately 20-40 minutes from Portland International Airport, depending on traffic.

Portland Hilton

If you are traveling light and do not mind walking two blocks, you can board the MAX (Metropolitan Area Express) Red Line on the baggage claim level of the Portland International Airport. Get off the train at the Pioneer Square stop (between 6th Ave. and Broadway) in downtown Portland and walk two blocks south on 6th Avenue to the Hilton Portland and Executive Tower (921 SW 6th Ave., Portland, Oregon). One-way tickets are $2.00 ("all zone") and can be purchased at the ticket machine inside the airport close to the MAX line.

CLIMATE

The temperature in Portland generally varies between 56°F (13° C) in the evening to 80° F (27° C) during the day in July/August in Portland. The low humidity makes summer months very pleasant and comfortable. You may need a sweater or light jacket in the evening.

GRATUITIES

Informally known as tipping, in the United States tipping is voluntary. Tips are supposed to be rewarded for services performed as well as a supplement to an employee's income (gratitude). Following are recommended gratuities:

- For your hotel stay: housekeeping, $2.00 per day; bellman, $1.00 per bag and discretionary for above and beyond services provided for you.
- For a taxi ride: 10 – 15 percent of the fare
- For restaurant service: 15 – 20 percent of your total bill.

MAX Red Line

TRAVEL OREGON

Portland, otherwise known as "The City of Roses," is a robust and vibrant city with endless things to see and do. Frommer's Guidebooks declared Portland to be one of the world's top travel destinations for 2007. AARP The Magazine recently named Portland as one of the top five places to live in the U.S. Music, food and art festivals abound throughout the city during the summer months. Museums, art galleries, unique retail shops, and restaurants of all varieties are within walking distance of the Hilton.

The State of Oregon is famous for its award winning wineries, golf courses, breathtaking coastline, rivers and mountains. If you are into wine tasting, golfing, fishing, hiking, river rafting, mountain climbing, walking in an ancient forest, or simply taking in a spectacular view, all of these possibilities and many more are within a short drive of Portland. We hope you will venture out and experience Portland and the surrounding countryside while you are in Oregon.

Joan Sher of Joan Sher Travel Consultants, LLC, is PICMET's official travel agent for the conference. She will help you plan any aspect of your trip, including

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discounted airline reservations, car rentals, pre- and post-conference trips, and tours while in Portland. Joan will be at the PICMET hospitality desk daily. She can also be contacted by phone: 503-248-9870, or by e-mail at JoanZSher@aol.com.

The following is provided by the Portland Oregon Visitors Association (POVA), http://www.travel-portland.com/visitors/

PORTLAND EVENTS

CATCH THE WOODBURN OUTLET EXPRESS

Get on the bus to big name brands at outlet savings. A deluxe, climate controlled coach carries savvy shoppers south of Portland for 4 hours of tax-free shopping bliss at Woodburn Company Stores. With more than 85 stores representing big name brands, it is the largest outlet center in the Pacific Northwest. Your $20 fare includes round-trip travel, valuable coupons and loads of trunk space. The shuttle seats just 55, so make your reservation today by visiting www.shop-woodburn.com. Please arrive at your stop 10 minutes before scheduled departure.

Tuesday – Thursday:	**09:10** depart the Hilton (the bus will be on SW Salmon St.)
	10:00 arrive at Woodburn Company Stores (passenger drop only)
	14:00 depart Woodburn Company Stores (return trip
	15:00 arrive at the Hilton
Friday – Monday:	**09:10** depart the Hilton (the bus will be on SW Salmon St.)
	10:00 arrive at Woodburn Company Stores (passenger drop only)
	14:00 depart Woodburn Company Stores (return trip)
	15:00 arrive at the Hilton
	12:10 depart the Hilton (the bus will be on Salmon St.)
	13:00 arrive at Woodburn Company Stores (passenger drop only)
	17:00 depart Woodburn Company Stores (return trip)
	18:00 arrive at the Hilton

PORTLAND BEAVERS BASEBALL

(PGE Park, 1844 SW Morrison, Portland, 97205)

The Portland Beavers—Portland, Oregon's Triple-A affiliate of the San Diego Padres—will play against Nashville and Memphis at PGE Park, which is a short MAX (Metropolitan Area Express) ride from the Hilton. Tickets can be purchased at the PGE Park Box Office.

- Beavers vs. Nashville, Wednesday, August 1, 19:05
- Beavers vs. Nashville, Thursday, August 2, 19:05
- Beavers vs. Nashville, Friday August 3, 19:05
- Beavers vs. Nashville, Saturday August 4, 19:05
- Beavers vs. Memphis, Sunday August 5, 14:05
- Beavers vs. Memphis, Monday August 6, 19:05
- Beavers vs. Memphis, Tuesday August 7, 19:05
- Beavers vs. Memphis, Wednesday August 8, 12:05

FIRST THURSDAY GALLERY WALK

(Thursday, August 2)

"First Thursday" is an after-hours evening gallery walk that takes place on the first Thursday of each month. First Thursday takes place on August 2. You can stroll through galleries in the Pearl District or in the Skidmore District (roughly between Front and Fourth Aves. from SW Oak to NW Glisan St.).

MT. HOOD JAZZ FESTIVAL 2007

(Center for the Arts, 200 N.E. Hood Ave., Gresham, OR 97030; Friday, August 3, starts at 18:00; Saturday, August 4, starts at 12:30 p.m.; Admission: $10 Friday, $25 Saturday, discount weekend passes, $35 limited reserved seating; phone: 503.661.2700)

Calling all jazz lovers! The 26th Annual Mt. Hood Jazz Festival is one of the most revered summer jazz fests in the Northwest and is sure to captivate all ages. With a diverse line-up that includes both scorching national heavyweights and local all stars, this year's festival aims at bringing together jazz's past, present and future.

13TH ANNUAL BONES AND BREW FESTIVAL (A BENEFIT FOR THE OREGON ZOO)

(NW 15th and Flanders in the Pearl District; August 4, 11:00-21:00; August 5, 11:00-19:00; $2 admission)

The 13th Annual Bones and Brew Festival will be held on August 4-5 as a benefit for the Oregon Zoo. Held along three blocks in the historic Pearl District, over 5,000 people attended last year. This year's event is a celebration of everything summer: BBQ, small, traditional craft micro-breweries, and live Classic Rock.

City of Roses

Each street will be dedicated to a separate theme. The street of BBQ'ers will include My Brothers BBQ, Sellwood BBQ, Wildcard BBQ, Smokin Man BBQ, and more. The street of Microbreweries will include 25+ microbrews from the Northwest including Roots, Hair of the Dog, Eugene City Brewery, Old Lompoc, Issaquah Brewhouse, Laurelwood, Rogue Ales, and more. Live Classic Rock music will include local bands such as Afterburner, a ZZ Top tribute Band.

This is a family friendly event with buckets of chalk for street art, Italian Ice, Elephant Ears, and balloon artists to entertain the kids and the adults! $2 donations at the door go directly to the Oregon Zoo.

SATURDAY PORTLAND FARMERS MARKET

(South Park Blocks between SW Harrison & Montgomery; 08:30 - 14:00; Saturdays only)

This market, located at Portland State University, attracts a large crowd of people seeking the finest and freshest produce from local farmers as well as breads, cheese, flowers and more.

Wednesday Farmers Market

WEDNESDAY PORTLAND FARMERS MARKET

(South Park Blocks between SW Salmon and Main behind the Arlene Schnitzer Concert Hall; 10:00—14:00; Wednesdays only)

Local farmers provide fresh produce, flowers and other items to the business crowd and downtown residents.

WORLD MUSIC WEDNESDAY CONCERTS 2007 AT THE OREGON ZOO

(Oregon Zoo amphitheater; Wednesday, August 8; 19:00; $9.75 general admission; www.oregonzoo.org/Concerts/index.htm)

Wells Fargo Summer Concert Series on Wednesdays features a variety of jazz, folk and ethnic music. Visitors picnic on terraced lawns in the zoo's outdoor amphitheater. On Wednesday, August 8, Andy Palacio and the Garifuna Collective will perform. The group is a blend of indigenous Caribbean and West African rhythms from Belize's superstar.

THE BITE OF OREGON

(August 10-12; Gov. Tom McCall Waterfront Park, Portland; Admission $7; www.biteoforegon.com

If you love Food, Wine, Beer, Music and fun, you don't want to miss the 24th annual 2007 Bite of Oregon! Benefiting Special Olympics Oregon, this dynamic summer festival on the Portland waterfront features dozens of statewide restaurants, four stages of entertainment with more than 60 performances, a pavilion of Oregon's finest wines, and a wide selection of Oregon craft beers and American style lagers.

UNDERGROUND PORTLAND

(Hosted by Portland Walking Tours; daily at 14:00; meet at Pioneer Courthouse Square; 701 SW 6th Ave., Portland; Adults $15; Seniors/Youth $13; Children under 12 free of charge; call ahead for reservations; phone: 503 774-4522)

If you're looking for Portland's hidden, controversial, naughty, bawdy, corrupt, or scandalous activities – 100 years ago or just last week – you've found the right people. We supply the flashlights when we conclude below ground in a scary basement which once led to the 'Shanghai Tunnels'. No legends, rumors, or myths – just the true, shocking, dark and sordid side of Portland.

EPICUREAN EXCURSION

(Hosted by Portland Walking Tours; Fridays and Saturdays at 10:00; meet at Pioneer Courthouse Square; 701 SW 6th Ave., Portland 97205; Admission: $59; Call ahead for reservations; phone: 503 774-4522)

There's no better way to explore a city famed for its culinary hot spots and commitment to fresh, local and sustainable ingredients than by taste. Led by engaging tour guides brimming with colorful stories, anecdotes and fun facts about the city of Portland, the three-hour tour winds on foot through the Pearl District where the intimate group of 15 people samples many flavors.

PORTLAND ATTRACTIONS

ART GALLERIES

The Pearl District, loosely bordered by W. Burnside and NW Hoyt, and NW 13th and NW Park, represents a good share of the gallery arena and comes to serious

City of Roses

life on First Thursday each month with after-hours gallery scensters.

Galleries can also be found in fairly concentrated numbers in the Skidmore District (roughly between Front and Fourth Aves. from SW Oak to NW Glisan St.) and the city's downtown core. Not to be overlooked are galleries throughout the metro area as well.

OREGON HISTORICAL SOCIETY

(1200 S.W. Park Avenue, Portland, Oregon 97205; Museum Store: S.W. Broadway at Madison; phone: 503 222-1741; for hours and admission charge visit www.ohs.org)

In the heart of Portland's Cultural District, the Oregon Historical Society houses treasures of the Northwest, a priceless collection that tells the story of Oregon from its earliest people to the present day. Visit the interactive exhibit, Oregon My Oregon, see exquisite paintings in Oregon Art and learn about the Battleship Oregon in the Hayes Maritime Gallery. Exhibits are designed for visitors of all ages, with artwork, artifacts, photographs, audio/visual presentations and hands-on displays for children. The Oregon Historical Society Museum Store is Portland's premier spot for distinctive Northwest gifts, including jewelry, artwork, books and games.

Pioneer Square, Portland's Livingroom

OREGON MUSEUM OF SCIENCE AND INDUSTRY (OMSI)

(1945 S.E. Water Avenue, Portland, Oregon; 503 797-4000; www.omsi.edu)

Imagine a place where you can journey to the outer reaches of the galaxy, feel the power of an earthquake, climb aboard a real submarine, uncover a fossil, enter the world of virtual reality, or travel the globe in a five-story high IMAX® domed theater. You can also enjoy a view of the city while dining at the OMSI Market Café or find the perfect gift at the Science Store. With more than 200 hands-on exhibits, there is something for everyone in the family. Touch, explore, question and discover at the Oregon Museum of Science and Industry (OMSI), located on Portland's waterfront. Open year-round; hours vary.

The museum is currently exhibiting "BODY WORLDS 3: The Anatomical Exhibition of Real Human Bodies." Experience the human body in all its elegance and complexity in this first-of-its-kind exhibition. From entire bodies in dramatic poses to side-by-side comparisons of healthy and diseased organs, BODY WORLDS 3 is a stunning exhibition featuring over 200 authentic human specimens. See how your body's systems relate to one another and work together to help you function and survive. View firsthand how lifestyle choices impact your health and how muscles and joints work together during athletic performance.

PIONEER COURTHOUSE SQUARE

(701 SW 6th Ave., Portland)

Bricks and ambiance are the two main ingredients that make up Pioneer Courthouse Square. Bordered by 6th and Broadway and Yamhill and Morrison, this people-watching common place is host to not only year-round events, but also to everyday brown-baggers and those wanting simply to rest and take in their surroundings. Starbuck's and Powell's Travel Bookstore also can be found on this popular property recognized locally as Portland's living room.

PITTOCK MANSION

(3229 N.W. Pittock Drive, Portland, Oregon 97210; phone: 503 823-3623; for hours and admission charge visit www.pittockmansion.org)

Experience the charm of a lost era as you learn about Henry and Georgiana Pittock and the beautiful estate that symbolizes the growth of Portland. Admire remarkable antique furnishings and fine arts set in a 1914 National Historic Register property. Pack a picnic basket and enjoy a sweeping view of mountains, rivers and the city. And don't forget your camera. Located just five minutes from downtown Portland off West Burnside Street.

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PORTLAND ART MUSEUM

(1219 S.W. Park Avenue, Portland, Oregon, 97205; phone: 503 226-2811; for hours and admission charge visit www.portlandartmuseum.org)

Find out why the oldest museum in the Northwest, the Portland Art Museum, is internationally renowned for exciting art experiences. Located in the heart of downtown's cultural district, the Museum's campus includes an outdoor sculpture court and historical interiors. Tour the world and travel through history in magnificent permanent collection galleries, six stories of modern art and special exhibitions that include: Rembrandt and the Golden Age of Dutch Art (June 2–Sept. 16). Join us for lectures, tours, art making and activities for the whole family.

PORTLAND CLASSICAL CHINESE GARDEN

(Northwest 3rd Ave. at Everett Street, Portland, Oregon 97209; hours: 09:00—18:00; admission, $7; phone: 503 228-8131; www.portlandchinesegarden.org)

"Most cherished in this mundane world is a place without traffic; truly in the midst of the city, there can be mountains and forest."

—Wen Zhengming (1470–1559)

Portland's Chinese Garden

Transport yourself to ancient China as you enter Lan Su Yuan. The Portland Classical Chinese Garden is a harmonizing blend of water, architecture, stone and poetry set against a richly planted landscape. Located in Portland's Old Town/Chinatown, the "Garden of Awakening Orchids" is a collaboration with Portland's Chinese sister city, Suzhou.

PORTLAND SPIRIT

(Office: 110 S.E. Caruthers Street, Portland, Oregon 97214; phone: call for reservations and further information: 503 224-3900 or 1-800 224-3901; www.portlandspirit.com)

The Portland Spirit welcomes you aboard the Northwest's premier dining ship. Daily lunch and dinner cruises offer a perfect opportunity to surround yourself with unmatched views of the Portland skyline. Freshly prepared cuisine, full-service bars and live entertainment complete a river experience unlike any other.

POWELL'S CITY OF BOOKS

(1005 W. Burnside; phone: 503-228-4651; www.powells.com)

More than just a bookstore, Powell's is a Portland institution. The largest independently owned bookstore in the country, Powell's has more than one million volumes of new, used, rare and out of print books and covers a city block. Powell's map helps guide browsers from one room to the next. Call for hours.

TOM MCCALL WATERFRONT PARK

It's hard to believe this three-mile stretch along the Willamette River was once a busy expressway. Rather than impatient motorists, the park is now occupied with new types of movers—joggers, bikers and rollerbladers, as well as pedestrians in the mood for nothing more energetic than a stroll. Bordered by Front Ave., (Bill Naito Pkwy.), Tom McCall Waterfront Park is taken up during the warmer months with cultural and musical events, as well as overheated folks hoping to cool off in the Salmon Street Springs Fountain at the end of SW Salmon St. A cruise along the Willamette River on the Portland Spirit (conveniently docked by Salmon Street Springs Fountain) is another way to cool down while seeing Portland from a different vantage point.

WASHINGTON PARK

Washington Park is not only one of Portland's most beautiful sights, it also contains many of the city's favorite haunts. Lying within the park's expansive boundaries are not only the requisite children's play area, tennis courts and picnic areas, but such wonderful surprises as Metro Washington Park Zoo, Japanese Garden, World Forestry Center, Hoyt Arboretum and the International Rose Test Gardens. Washington Park has its own MAX (Metropolitan Area Express) stop, which lets you off right at the zoo entrance (at the Pioneer Square stop, take the west-bound Red Line or Blue Line trains marked "Beaverton" or "Hillsboro"). Read on for more information on these attractions.

OREGON ZOO

(Washington Park, 4001 S.W. Canyon Road, Portland, Oregon 97221; phone: 503 226-1561; for hours and admission price visit www.oregonzoo.org)

Trek through the tropics amid the sounds of birds, monkeys and other creatures. You're not in West

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Africa; you're in Portland at the zoo's African Rain Forest exhibit. After you've survived the steamy tropics, dry off in the savanna, where giraffes, rhinos and hippos graze. From the tundras of Alaska to the coastal waters of Peru, travel around the world in an afternoon. Open daily at 9 a.m.; closing hours are seasonal. Admission charged; children two and younger free. Five minutes from downtown on Hwy. 26 West, or take MAX light rail.

JAPANESE GARDEN

(Washington Park, Portland, Oregon 97205; hours: 10:00-19:00 (Monday opens at noon); Information: 503 223-1321; Tours: 503 223-9233; for admission price visit www.japanesegarden.com)

Nestled in the scenic west hills of Portland, the Japanese Garden is a haven of tranquil beauty which has been proclaimed one of the most authentic Japanese gardens outside of Japan. Encompassing five and one-half acres and offering five separate garden styles, the Garden includes an authentic Japanese Tea House, meandering streams, intimate walkways, and an unsurpassed view of Mt. Hood. Open daily, April 1–Sept. 30, 10 a.m. to 7 p.m. Open Mondays at noon. Offering events, workshops and cultural holiday celebrations. Four Seasons—Five Senses—One Extraordinary Experience.

WORLD FORESTRY CENTER

(Washington Park, 4033 S.W. Canyon Road, Portland, Oregon 97221; open daily 10:00-17:00; phone: 503 228-1367; for hours and admission price, visit www.worldforestry.org)

All new hands-on, interactive exhibits that are fun for the whole family are waiting to be explored at the Discovery Museum. You can get harnessed in and hoisted up 45 feet to see a bird's-eye-view of the forest, or take a wet-free raft ride in Class IV rapids. Climb underneath the forest to see the life below, or try your smoke jumping skills! Round out your adventure with video journeys to Siberia, China, South Africa and Brazil to learn about trees of the world. Come explore, discover and grow at the Discovery Museum! Five minutes from downtown Portland via Hwy. 26 or MAX light rail.

Downtown Portland and the Willamette River

HOYT ARBORETUM

(Washington Park, 4000 SW Fairview Blvd.; phone: 503 865-8733)

Hoyt Arboretum is a much beloved Portland open space, covering 185 ridge top acres about two miles west of downtown. It is home to a collection of trees representing more than 1,100 species gathered from around the world. Twelve miles of trails wind through this living exhibit. The Visitor Center, at the heart of the Arboretum, offers maps, trail guides, and information. Spiraling up the southwest corner of the arboretum is the Vietnam Veterans' Living Memorial, which honors Oregonians who died or are still missing from that conflict.

INTERNATIONAL ROSE TEST GARDEN

(Washington Park, 400 SW Kingston Ave.; phone: 503 823-3636)

Whether you want to take in spectacular scenery or the luscious smell of fragrant roses, the International Rose Test Garden offers both. Approximately 10,000 plants, among which are more than 400 varieties of roses, flourish high above a breathtaking city view. Established in 1917, the International Rose Test Garden is the oldest operating test garden in the country. Admission is free year-round.

WILLAMETTE JETBOAT EXCURSIONS

(1945 S.E. Water Avenue, OMSI Submarine Dock, Portland, Oregon 97214; phone: 503 231-1532; www.willamettejet.com)

See Portland's waterfront and more aboard the Willamette Jetboats. Enjoy the area's sights, history and scenic beauty while experiencing the fun and excitement found only in a jet boat. See giant ships, bridges, elegant riverfront homes, historic Oregon City and the majestic Willamette Falls. Two-hour excursions start at $31 for adults; lower prices for children. One-hour trips are also available in July and August. Reservations are highly recommended.

City of Roses

SHOPPING

SHOPPING PORTLAND'S DOWNTOWN

Nordstrom is famed for its emphasis on service and its upscale yet not stuffy fashion. Clothing offerings for men, women and children run the gamut from tres chic to tres trendy. (701 SW Broadway)

If you're looking for elegance—understated or otherwise—Saks Fifth Avenue is the place to shop. American and European designer wear for both men and women is spread over two levels, as is Saks' own line of clothing. (SW Fourth and Fifth Aves.)

PEARL DISTRICT

You can sample haute couture and hot cuisine in Portland's Pearl District, which has quickly become the place to see and be seen. The Pearl is composed of 50 city blocks of industrial warehouses turned sleek loft apartments, cutting-edge art galleries and vibrant international restaurants.

Though the neighborhood features outstanding brewpubs, delicious international cuisine and the world's largest independent bookstore, the soul of the Pearl is in its galleries. Check them out on the first Thursday of every month, when most galleries stay open late to showcase the talents of new and established artists.

PORTLAND'S MALL SCENE

Pioneer Place is four airy levels of glass, greenery and fountains. Saks Fifth Avenue anchors Pioneer Place's 80 specialty shops. (700 SW Fifth Ave.)

Just this side of the Columbia River is Jantzen Beach Center. It offers wonderful surprises including a 1921 C.S. Parker carousel. (1405 Jantzen Beach Center)

The nation's first major mall, Lloyd Center offers some 200 specialty shops in addition to familiar anchors. An ice rink offers entertainment. (Bordered by Multnomah and Broadway, 9th and 15th Streets)

Washington Square pulls shoppers into its many specialty shops with the help of several popular anchor stores. (9585 SW Washington Square Rd.)

Clackamas Town Center's 185 specialty shops and popular anchors are offset by an ice rink. (12000 SE 82nd)

Woodburn Company Stores, Oregon's largest outlet center, features 85 shops including Banana Republic Factory Store, Calvin Klein, Eddie Bauer, Great Outdoor Clothing Company, and Polo Ralph Lauren Factory Store to name a few. (I-5 South at the Woodburn exit)

Columbia Gorge Premium Outlets has your favorite brands at savings of 25 to 65 percent. The center's 45 stores include Adidas, Carter's, Eddie Bauer, Gap Outlet, Harry and David, Izod, Le Gourmet Chef, Liz Claiborne, Levi's, Mikasa, OshKosh B'Gosh, Samsonite, Zales Outlet and more. Columbia Gorge Premium Outlets is located just 15 minutes east of downtown Portland. (take I-84 east to Exit 17; 450 N.W. 257th Way, Troutdale, Oregon)

GUEST PROGRAM

There is a very attractive "Guest Program" for the spouses and guests of PICMET '07 participants. The guest fee ($250) includes:

- Admission to PICMET's evening social events (the Sunday evening reception, the Monday evening dinner, and the Tuesday awards banquet).
- Daily continental breakfast from 7:30 am to 9:30 am on Monday through Thursday (August 6 – 9) in Alexander's Lounge on the 23rd floor of the Hilton, where the view of Portland is spectacular.
- Three daily excursions (Monday, August 6 – Wednesday, August 8) described below.

(Please note that the value of this package is $445)

DAILY EXCURSIONS

MONDAY, AUGUST 6, 2007
9:00—9:30

Shawna Wellman, Convention Services Manager from the Portland Oregon Visitors Association (POVA), will give a short talk about Portland, highlighting local events and attractions.

10:00—12:00

BEST OF PORTLAND WALKING TOUR

This walk features all the best that Portland has to offer, including a plethora of artwork, bridges, architecture, parks, and fountains. You will learn the history of the fur trade, the Oregon Trail, and hear stories about early Portland as we stroll around downtown, the Cultural district, and Historic Yamhill.

Picmet Guests at Washington Park

While we walk along the riverfront, your guide will easily show you why Portland is known worldwide as Bridgetown.

This tour also features the stop that everyone loves—the world's smallest city park. Other sites along the way include:

- Bronze drinking fountains from 1912
- Two weather machines
- Over 30 public art pieces (including Portlandia)
- A controversial marble statue with a unique nickname
- The 1985 City Hall building
- A fountain that changes every 15 minutes
- A park that was for women only
- A free electric car charging station
- And a lot more!

(Tour fee included in PICMET Guest Registration)

TUESDAY, AUGUST 7, 2007
10:00—12:30

PORTLAND ART MUSEUM

The first stop will be the Portland Art Museum, located just a few blocks from the Hilton.

The first hour will focus on the museum's current exhibit, "Rembrandt and the Golden Age of Dutch Art, Treasures from the Rijksmuseum, Amsterdam." An audio tour will be provided.

This must-see exhibition, the ultimate collection of 17th-century Dutch masterpieces, makes its only West Coast appearance at the Portland Art Museum. During a major restoration and renovation project, the Netherlands' famed Rijksmuseum shares with American audiences 90 works of art. It is the first and only time that such a number of masterpieces for the core collection of the Netherland's national museum of art and history will travel abroad.

Beyond the 6 paintings and 8 master prints by the genius of the age Rembrandt van Rijn, a legion of great painters, including Frans Hals, Jan Steen, Pieter de Hooch, Gerrit Berckheyde, Jacob van Ruisdael, and Meindert Hobbema, among others, are represented in the exhibition, and complemented by a selection of ceramic, glass, and silver showpieces.

After a short break, a guided tour will be given of the Museum's collection of Native American art, which is housed in the Confederated Tribes of Grand Ronde Center for Native American Art. The collection, remark-

GUEST PROGRAM

able for both its depth and diversity, consists of more than 5,000 prehistoric and historic objects created by more than 200 cultural groups from throughout North America, as well as outstanding works by Native American masters such as Allan Houser, Charles Edenshaw and Maria Martinez in addition to regional contemporary artists such as Lillian Pitt, Joe Feddersen, Pat Courtney Gold, Rick Bartow, and James Lavadour.

The Center is located on the second and third floors of the Hoffman Wing in the Museum's Belluschi Building; each gallery is devoted to the art from a specific cultural region. On the second floor are galleries which focus on the Museum's world renowned collection of Northwest Coast art as well as galleries dedicated to the Arctic, Plains, Woodlands, Southwest and California regions. Also located on the second floor is the Phil and Sue Bogue Gallery dedicated to the display of the Museum's excellent collection of Pre-Columbian art from Meso and South America. Two additional galleries, featuring work from our own region, Western Oregon and the Columbia Plateau, are located on the third floor.

12:45—14:00

LUNCH AT SOUTH PARK RESTAURANT

The final stop will be the restaurant Southpark. Located in the heart of Portland's Cultural District in the South Park Blocks, Southpark Seafood Grill and Wine Bar draws upon the freshest northwest seafood and produce and the finest imported specialty foods to create dishes inspired by the culinary traditions of the Mediterranean.
(Art Museum entry fee and lunch are included in PICMET Guest Registration)

WEDNESDAY, AUGUST 8, 2007
10:00—12:30

WASHINGTON PARK INTERNATIONAL ROSE TEST GARDEN AND JAPANESE GARDEN

A trip to Portland, the City of Roses, would not be complete without visits to the Portland International Rose Test Garden and the Japanese Garden, both located in Washington Park. Guests will board MAX (Portland's light rail) for a short ride to Portland's West Hills for a wander through one of the most visited and cherished locations in the city.

Rose Test Garden

The Rose Test Garden is the oldest official, continuously operated public rose test garden in the United States. Although July is not the peak time for roses, there will be some varieties in bloom, the grounds (just over 5 acres) are gorgeous, and the incredible view of the city from the park makes this trip worth doing. Portland's internationally recognized Japanese Garden, open since 1967, represents a melding of Japanese traditional garden forms with American hurry.

13:00—14:00

PORTLAND FARMER'S MARKET

The second stop for this excursion will be the Portland Farmers Market, where you can purchase locally grown produce and other items being sold by vendors. Each week the market boasts organically grown produce, fresh-baked breads, seafood and seasonal flowers. All products offered for sale at the market must be grown, raised, produced, or gathered by the vendor in Oregon or Washington.

Portland Farmers Market

(Light rail ticket and Garden entry fee included in PICMET Guest Registration)

SOCIAL EVENTS

To facilitate the informal interaction of the participants, several social events have been scheduled during PICMET '07.

RECEPTION/BUFFET

DATE: SUNDAY, AUGUST 5

TIME: 19:00—22:00

LOCATION: HILTON PAVILION

DRESS: INFORMAL

Meet other conference attendees, renew old acquaintances and begin new friendships and collaborations at this opening reception/buffet in the Hilton Pavilion. Included in registration fee.*

DINNER IN THE PARK BLOCKS

DATE: MONDAY, AUGUST 6

TIME: 19:00—22:00

LOCATION: PARK BLOCKS
(ONE BLOCK WEST OF THE HILTON)

DRESS: INFORMAL

Enjoy a savory buffet of international dishes while you mingle and network with colleagues. A group of talented students from Portland State University's Dept. of Engineering & Technology Management and the RBJ Band will perform a variety of pop, country and international songs. Included in registration fee.*

AWARDS BANQUET

DATE: TUESDAY, AUGUST 7

CASH BAR: 19:00—19:30 (IN THE PLAZA FOYER)

BANQUET: 19:30—22:00

LOCATION: HILTON PAVILION

DRESS: BUSINESS ATTIRE

This is the premier social event of the conference. The PICMET '07 "Leadership in Technology Management," "Medal of Excellence" and "Outstanding Student Paper" awards will be presented at the banquet. Included in registration fee.*

One-day and student registration fees do not include the evening social events. Tickets for these events may be purchased at the registration desk.

Social Events

SALMON FEAST AT THE NATIVE AMERICAN CENTER

This year PICMET will have a special dinner at Portland State University's Native American Student and Community Center. PICMET's connection to the American Indian community is through the Program Chair, Dr. Tim Anderson. Professor Anderson is one of only 43 American Indian engineering faculty out of 21,581 engineering faculty nationwide (ASEE 2003). He is the Advisor for the PSU American Indian Science and Engineering Society chapter and an AISES Sequoyah Fellow.

The students and alumni of the PSU American Indian Science and Engineering Society are honored to to host this dinner on Wednesday, August 8, 2007, from 19:00 - 22:00. The Center is a gathering place, a home and a learning center for Native American, Alaskan Native, and Pacific Islander students. A rooftop garden will be accessible during dinner where you will see indigenous plants of the Pacific Northwest. For more information on the center, visit nativecenter.pdx.edu.

The menu for this event will feature wild salmon caught by local Native American Indian tribes, which will be prepared in the traditional method of the Pacific Northwest American Indians using cedar planks. The entree will be accompanied by locally grown organic vegetables and Native American fry bread.

Portland State University Native American student groups will provide a cultural education experience by performing traditional and competition style dancing and drumming.

Please join us in sharing the unique experience of celebration of the culture of North America's original inhabitants.

Note: A bus will begin boarding at 18:45 on SW Salmon St. by the Hilton. A PICMET volunteer will be in the hotel lobby by the 6th Ave. entrance to guide you to the bus. The bus will run continuously between the hotel and the Native American Center until 22:00.

Native American Student and Community Center
photos by Tim Anderson

If you prefer to walk, the Native American Center is located at 710 SW Jackson Street, which is 12 blocks south of the Hilton (walk south on Broadway until you come to Jackson Street. The Center is on the southwest corner of Broadway and Jackson).

COST: $65

Site Visits

Site visits to the following companies are offered during PICMET '07. Seating is limited, so sign up early ($40).

The times below include travel time; each tour will last approximately two hours. A bus will board passengers at 08:00 on SW Salmon St. by the Hilton. A PICMET volunteer will be in the hotel lobby by the 6th Ave. entrance to guide you to the bus.

XEROX

MONDAY, AUGUST 6, 08:00—12:00

This tour will take you through Xerox Corporation's Wilsonville site. Xerox is the world's leading document management technology and services enterprise. A $16 billion company, Xerox provides the document industry's broadest portfolio of offerings. Digital systems include color and black-and-white printing and publishing systems, digital presses and "book factories," multifunction devices, laser and solid ink network printers, copiers and fax machines. Xerox's services expertise is unmatched and includes helping businesses develop online document archives, analyzing how employees can most efficiently share documents and knowledge in the office, operating in-house print shops or mailrooms, and building Web-based processes for personalizing direct mail, invoices, brochures and more. Xerox also offers associated software, support and supplies such as toner, paper and ink.

FREIGHTLINER

TUESDAY, AUGUST 7, 08:00—12:00

Freightliner LLC is headquartered in Portland, Oregon. On this tour you will visit the corporate headquarters for a short presentation, which will be followed by a visit to the Wind Tunnel, North America's only wind tunnel for truck testing and design. The next stop will be Freightliner's Styling and Test Centers, which house the industry's most advanced engineering and design systems.

Freightliner LLC, a DaimlerChrysler company, is the largest heavy-duty truck manufacturer in North America and a leading producer of medium-duty trucks and specialized commercial vehicles. Freightliner LLC manufactures, sells and services several renowned commercial vehicle brands. Through the company's affiliates, Freightliner LLC is also a leading provider of heavy- and medium-duty diesel engines and other components. The company's strategic partners in the North American commercial vehicles market include DaimlerChrysler Services Truck Finance and TravelCenters of America.

TECHNICAL PROGRAM

PROGRAM OVERVIEW

The PICMET ’07 technical program consists of 122 sessions including 5 plenaries, 6 tutorials, 3 panel discussions, 5 special sessions and 100 paper sessions

The plenaries are scheduled from 08:30 to 10:00 every morning, Monday, August 6 through Thursday, August 9, and also from 14:00 to 15:30 on Tuesday, August 7, in the Pavilion Room on the Plaza level. They are described in the “Plenaries” section of this Bulletin.

The Tutorials are offered by experts in specific areas of technology management. They are scheduled among the regular paper sessions.

THE PAPERS

Research papers and applications-oriented papers are explicitly identified in this conference. Separate evaluation criteria were used, and different referees were selected for each category to make sure that appropriate papers were included in the conference for the “Research” and “Application” categories. We emphasized research methodology, the use of the research literature, the theory behind the paper, the sample size, and the impact on the research community of the “Research Papers.” The important evaluation criteria for “Industry Applications” were the usefulness of the application, the importance of the case being discussed, the generalizability of the concepts presented, and the impact of the paper on the users of technology management. The “Research Papers” included in PICMET ’07 are listed with an [R] in front of their titles on the following pages; and the “Industry Applications” papers are shown with an [A] in front of their titles. Roughly 66 percent are in the [R] category, and the rest are in the [A] category.

The Research Papers and Industry Applications are mixed in the sessions. This was done intentionally to assure effective exchange of ideas among those presenting research papers and those presenting applications-oriented papers.

THE SCHEDULE

The plenary is the only session in the 08:30-10:00 time slot. After that, there are up to 13 break-out sessions throughout the day, Monday through Thursday, with the exception of a second plenary session on Tuesday, August 7, from 14:00—15:30.

In order to make the sessions easy to see, we have prepared the schedule listings in two different formats for you.

First, you will find a pictorial display of the sessions for each day. The four pages (one for each day) should help you visualize what session is scheduled in what time slot and in which room each day.

In the second set of schedules, the sessions are listed in chronological in order to give you a breakdown of the sessions by time of day.

Finally, you will find a “Personal Schedule” following the schedule listings. It is a chart for you to make your own schedule. Only the common events are marked up on the personal schedule. You can fill it out as a daily calendar for the sessions you would like to follow, events to attend, and people to meet with.

We hope these will help you to take full advantage of the richness of the technical program at PICMET ’07.

MONDAY, AUGUST 6, 2007

	01 Pavilion East	02 Pavilion West	03 Broadway-1	04 Broadway-2	05 Broadway-3	06 Broadway-4	07 Forum Suite	08 Council Suite	09 Directors Suite	10 Studio Suite	11 Galleria-1	12 Galleria-2	13 Galleria-3
MA 08:30-10:00	Plenary 1												
MB 10:30-12:00	Technology Management in the Service Sector-1	Convergence of Technologies-1	Technology Adoption-1	Innovation Management-1	Doctoral Colloquium		Technology Management Education-1: Curriculum	Project/ Program Management-1	Technical Workforce-1	Technology Assessment and Evaluation-1	Productivity Management	Technology Marketing-1	Supply Chain Management-1
MC 12:00-14:00	Lunch												
MD 14:00-15:30	Technology Management in Nano-technology-1	TUTORIAL Why Well-Managed Projects Still Fail?	Accelerated Radical Innovation in the Industrial Technology Life Cycle-I	Innovation Management-2	Technology Management Framework-1	Technology Roadmapping -1	Technology Management Education-2: Pedagogy	Project/ Program Management-2	R&D Management-1	Emerging Technologies -1	Convergence of Technologies-2		Supply Chain Management-2
ME 16:00-17:30	Technology Management in the Health Sector-1	TUTORIAL Measuring the Strategic Value of Technologies	TUTORIAL /PANEL Accelerated Radical Innovation in the Industrial Technology Life Cycle	Innovation Management-3	Decision Making-1	Technology Diffusion-1	PANEL How Educational Programs can Respond to the Changing IT Workforce	Project/ Program Management-3	R&D Management-2	Emerging Technologies -2	Knowledge Management-1	Technology Management in Bio-technology	Manufacturing Management
	01 Pavilion East	02 Pavilion West	03 Broadway-1	04 Broadway-2	05 Broadway-3	06 Broadway-4	07 Forum Suite	08 Council Suite	09 Directors Suite	10 Studio Suite	11 Galleria-1	12 Galleria-2	13 Galleria-3

TUESDAY, AUGUST 7, 2007

	01 Pavilion East	02 Pavilion West	03 Broadway-1	04 Broadway-2	05 Broadway-3	06 Broadway-4	07 Forum Suite	08 Council Suite	09 Directors Suite	10 Studio Suite	11 Galleria-1	12 Galleria-2	13 Galleria-3
TA 08:30-10:00	Plenary 2												
TB 10:30-12:00	Technology Management in the Service Sector-2	TUTORIAL Making Offshoring a Success	Accelerated Radical Innovation in the Industrial Technology Life Cycle-2	Innovation Management-4	Entrepreneurship & Intrapreneurship-1	Software Process Management-1	PANEL How Much Technology in Technology Management Education?	Project/ Program Management-4	R&D Management-3	Science and Technology Policy-1	Knowledge Management-2	New Product Development-1	Supply Chain Management-3
TC 12:00-14:00	Lunch						Technology Management Education Best Practices						
TD 14:00-15:30	Plenary 3												
TE 16:00-17:30	Technology Forecasting and Planning-1	Product Development Process Evolution at Intel Corporation	Accelerated Radical Innovation in the Industrial Technology Life Cycle-3	Innovation Management-5	Strategic Management of Technology-1	Software Process Management-2	PANEL A Debate on the Future of the Technology Management Discipline	Project/ Program Management-5	Global Issues in Technology Management-1	Science and Technology Policy-2	Intergenerational Impact in the Future Workforce	New Product Development-2	Decision Making-2
	01 Pavilion East	02 Pavilion West	03 Broadway-1	04 Broadway-2	05 Broadway-3	06 Broadway-4	07 Forum Suite	08 Council Suite	09 Directors Suite	10 Studio Suite	11 Galleria-1	12 Galleria-2	13 Galleria-3

WEDNESDAY, AUGUST 8, 2007

	01 Pavilion East	02 Pavilion West	03 Broadway-1	04 Broadway-2	05 Broadway-3	06 Broadway-4	07 Forum Suite	08 Council Suite	09 Directors Suite	10 Studio Suite	11 Galleria-1	12 Galleria-2	13 Galleria-3
WA 08:30-10:00	Plenary 4												
WB 10:30-12:00	Technology Management in the Service Sector—Symposium Report	Nano-Biotechnology Policy	Competitiveness-1	Innovation Management-6	Strategic Management of Technology-2	Software Process Management-3	Technology Management Education-4	TUTORIAL Lightweight Project Management Framework	Global Issues in Technology Management-2	Technology Assessment and Evaluation-2	Knowledge Management-3	New Product Development-3	Decision Making-3
WC 12:00-14:00	Lunch												
WD 14:00-15:30	Technology Management in Electronics-1	Convergence of Technologies-3	E-Business-1	Innovation Management-7	Technology Management Framework-2	Technology Transfer-1	Knowledge Management-4	Project/ Program Management-6	Global Issues in Technology Management-3	Technology Assessment and Evaluation-3	Technology Management in Telecommun-ications-1		Supply Chain Management-4
WE 16:00-17:30	Technology Management in the Service Sector-3		E-Business-2	Innovation Management-8	Strategic Management of Technology-3	Technology Management in the Public Sector-1	Information Management-1	Project/ Program Management-7	Technology Management in Telecommun-ications-2	Technical Workforce-2	Technology Management for Sustainability-2	New Product Development-4	
	01 Pavilion East	02 Pavilion West	03 Broadway-1	04 Broadway-2	05 Broadway-3	06 Broadway-4	07 Forum Suite	08 Council Suite	09 Directors Suite	10 Studio Suite	11 Galleria-1	12 Galleria-2	13 Galleria-3

THURSDAY, AUGUST 9, 2007

	01 Pavilion East	02 Pavilion West	03 Broadway-1	04 Broadway-2	05 Broadway-3	06 Broadway-4	07 Forum Suite	08 Council Suite	09 Directors Suite	10 Studio Suite
HA 08:30-10:00	Plenary 5									
HB 10:30-12:00	Technology Management in the Service Sector-4	PANEL Engineering & Technology Management Journal Editors	Outsourcing-1	Innovation Management-9	Strategic Management of Technology-4	Technology Management in the Public Sector-2		Technical Workforce-3	Technology Management in Telecommun-ications-3	
HC 12:00-14:00	Lunch									
HD 14:00-15:30	Technology Management in the Service Sector-5	TUTORIAL New Product Development Training for Technical Entrepreneurs	Science and Technology Policy-3	Innovation Management-10	Strategic Management of Technology-5	Technology Management for Sustainability-1	Information Management-2	Technology Forecasting through Intelligence Mining		
HE 16:00-17:30	PICMET 08 and 09 Planning Session									
	01 Pavilion East	02 Pavilion West	03 Broadway-1	04 Broadway-2	05 Broadway-3	06 Broadway-4	07 Forum Suite	08 Council Suite	09 Directors Suite	10 Studio Suite

SCHEDULE OF SESSIONS

SCHEDULE OF SESSIONS BY DATE
MONDAY, AUGUST 6, 2007

Session	Number	Date	Time	Room	Session Title
MA	01	Monday	08:30 - 10:00	Pavilion East	PLENARY: "Plenary 1"
MB	01	Monday	10:30 - 12:00	Pavilion East	"Technology Management in the Service Sector-1"
MB	02	Monday	10:30 - 12:00	Pavilion West	"Convergence of Technologies-1"
MB	03	Monday	10:30 - 12:00	Broadway-1	"Technology Adoption-1"
MB	04	Monday	10:30 - 12:00	Broadway-2	"Innovation Management-1"
MB	05	Monday	10:30 - 14:00	Broadway-3	SPECIAL SESSION: "Doctoral Colloquium"
MB	07	Monday	10:30 - 12:00	Forum Suite	"Technology Management Education-1: Curriculum"
MB	08	Monday	10:30 - 12:00	Council Suite	"Project/Program Management-1"
MB	09	Monday	10:30 - 12:00	Directors Suite	"Technical Workforce-1"
MB	10	Monday	10:30 - 12:00	Studio Suite	"Technology Assessment and Evaluation-1"
MB	11	Monday	10:30 - 12:00	Galleria-1	"Productivity Management"
MB	12	Monday	10:30 - 12:00	Galleria-2	"Technology Marketing-1"
MB	13	Monday	10:30 - 12:00	Galleria-3	"Supply Chain Management-1"
MD	01	Monday	14:00 - 15:30	Pavilion East	"Technology Management in Nanotechnology-1"
MD	02	Monday	14:00 - 15:30	Pavilion West	TUTORIAL: "Why Well-Managed Projects Still Fail? "
MD	03	Monday	14:00 - 15:30	Broadway-1	"Accelerated Radical Innovation in the Industrial Technology Life Cycle-1"
MD	04	Monday	14:00 - 15:30	Broadway-2	"Innovation Management-2"
MD	05	Monday	14:00 - 15:30	Broadway-3	"Technology Management Framework-1"
MD	06	Monday	14:00 - 15:30	Broadway-4	"Technology Roadmapping-1"
MD	07	Monday	14:00 - 15:30	Forum Suite	"Technology Management Education-2: Pedagogy"
MD	08	Monday	14:00 - 15:30	Council Suite	"Project/Program Management-2"
MD	09	Monday	14:00 - 15:30	Directors Suite	"R&D Management-1"
MD	10	Monday	14:00 - 15:30	Studio Suite	"Emerging Technologies-1"
MD	11	Monday	14:00 - 15:30	Galleria-1	"Convergence of Technologies-2"
MD	13	Monday	14:00 - 15:30	Galleria-3	"Supply Chain Management-2"
ME	01	Monday	16:00 - 17:30	Pavilion East	"Technology Management in the Health Sector-1"
ME	02	Monday	16:00 - 17:30	Pavilion West	TUTORIAL: "Measuring the Strategic Value of Technologies"
ME	03	Monday	16:00 - 17:30	Broadway-1	TUTORIAL: "Accelerated Radical Innovation in the Industrial Technology Life Cycle"
ME	04	Monday	16:00 - 17:30	Broadway-2	"Innovation Management-3"
ME	05	Monday	16:00 - 17:30	Broadway-3	"Decision Making-1"
ME	06	Monday	16:00 - 17:30	Broadway-4	"Technology Diffusion-1"
ME	07	Monday	16:00 - 17:30	Forum Suite	PANEL: "How Educational Programs can Respond to the Changing IT Workforce"
ME	08	Monday	16:00 - 17:30	Council Suite	"Project/Program Management-3"

SCHEDULE OF SESSIONS

ME	09	Monday	16:00 - 17:30	Directors Suite	"R&D Management-2"
ME	10	Monday	16:00 - 17:30	Studio Suite	"Emerging Technologies-2"
ME	11	Monday	16:00 - 17:30	Galleria-1	"Knowledge Management-1"
ME	12	Monday	16:00 - 17:30	Galleria-2	"Technology Management in Biotechnology"
ME	13	Monday	16:00 - 17:30	Galleria-3	"Manufacturing Management"

TUESDAY, AUGUST 7, 2007

TB	01	Tuesday	10:30 - 12:00	Pavilion East	"Technology Management in the Service Sector-2"
TB	02	Tuesday	10:30 - 12:00	Pavilion West	TUTORIAL: "Making Offshoring a Success"
TB	03	Tuesday	10:30 - 12:00	Broadway-1	"Accelerated Radical Innovation in the Industrial Technology Life Cycle-2"
TB	04	Tuesday	10:30 - 12:00	Broadway-2	"Innovation Management-4"
TB	05	Tuesday	10:30 - 12:00	Broadway-3	"Entrepreneurship & Intrapreneurship-1"
TB	06	Tuesday	10:30 - 12:00	Broadway-4	"Software Process Management-1"
TB	07	Tuesday	10:30 - 12:00	Forum Suite	PANEL: "How Much Technology in Technology Management Education?"
TB	08	Tuesday	10:30 - 12:00	Council Suite	"Project/Program Management-4"
TB	09	Tuesday	10:30 - 12:00	Directors Suite	"R&D Management-3"
TB	10	Tuesday	10:30 - 12:00	Studio Suite	"Science and Technology Policy-1"
TB	11	Tuesday	10:30 - 12:00	Galleria-1	"Knowledge Management-2"
TB	12	Tuesday	10:30 - 12:00	Galleria-2	"New Product Development-1"
TB	13	Tuesday	10:30 - 12:00	Galleria-3	"Supply Chain Management-3"
TC	07	Tuesday	12:00 - 14:00	Forum Suite	"Technology Management Education Best Practices"
TD	01	Tuesday	14:00 - 15:30	Pavilion East	PLENARY: "Plenary 3"
TD	07	Tuesday	14:00 - 15:30	Forum Suite	PANEL: "A Debate on the Future of the Technology Management Discipline"
TE	01	Tuesday	16:00 - 17:30	Pavilion East	"Technology Forecasting and Planning-1"
TE	02	Tuesday	16:00 - 17:30	Pavilion West	"Product Development Process Evolution at Intel Corporation"
TE	03	Tuesday	16:00 - 17:30	Broadway-1	"Accelerated Radical Innovation in the Industrial Technology Life Cycle-3"
TE	04	Tuesday	16:00 - 17:30	Broadway-2	"Innovation Management-5"
TE	05	Tuesday	16:00 - 17:30	Broadway-3	"Strategic Management of Technology-1"
TE	06	Tuesday	16:00 - 17:30	Broadway-4	"Software Process Management-2"
TE	08	Tuesday	16:00 - 17:30	Council Suite	"Project/Program Management-5"
TE	09	Tuesday	16:00 - 17:30	Directors Suite	"Global Issues in Technology Management-1"
TE	10	Tuesday	16:00 - 17:30	Studio Suite	"Science and Technology Policy-2"
TE	11	Tuesday	16:00 - 17:30	Galleria-1	"Intergenerational Impact in the Future Workforce"
TE	12	Tuesday	16:00 - 17:30	Galleria-2	"New Product Development-2"

SCHEDULE OF SESSIONS

TE	13	Tuesday	16:00 - 17:30	Galleria-3	"Decision Making-2"

WEDNESDAY, AUGUST 8, 2007

WA	01	Wednesday	08:30 - 10:00	Pavilion East	PLENARY: "Plenary 4"
WB	01	Wednesday	10:30 - 12:00	Pavilion East	SPECIAL SESSION: "Service Engineering Symposium - Report"
WB	02	Wednesday	10:30 - 12:00	Pavilion West	"Nano-Biotechnology Policy"
WB	03	Wednesday	10:30 - 12:00	Broadway-1	"Competitiveness-1"
WB	04	Wednesday	10:30 - 12:00	Broadway-2	"Innovation Management-6"
WB	05	Wednesday	10:30 - 12:00	Broadway-3	"Strategic Management of Technology-2"
WB	06	Wednesday	10:30 - 12:00	Broadway-4	"Software Process Management-3"
WB	07	Wednesday	10:30 - 12:00	Forum Suite	"Technology Management Education-4"
WB	08	Wednesday	10:30 - 12:00	Council Suite	TUTORIAL: "Lightweight Project Management Framework"
WB	09	Wednesday	10:30 - 12:00	Directors Suite	"Global Issues in Technology Management-2"
WB	10	Wednesday	10:30 - 12:00	Studio Suite	"Technology Assessment and Evaluation-2"
WB	11	Wednesday	10:30 - 12:00	Galleria-1	"Knowledge Management-3"
WB	12	Wednesday	10:30 - 12:00	Galleria-2	"New Product Development-3"
WB	13	Wednesday	10:30 - 12:00	Galleria-3	"Decision Making-3"
WD	01	Wednesday	14:00 - 15:30	Pavilion East	"Technology Management in Electronics-1"
WD	02	Wednesday	14:00 - 15:30	Pavilion West	"Convergence of Technologies-3"
WD	03	Wednesday	14:00 - 15:30	Broadway-1	"E-Business-1"
WD	04	Wednesday	14:00 - 15:30	Broadway-2	"Innovation Management-7"
WD	05	Wednesday	14:00 - 15:30	Broadway-3	"Technology Management Framework-2"
WD	06	Wednesday	14:00 - 15:30	Broadway-4	"Technology Transfer-1"
WD	07	Wednesday	14:00 - 15:30	Forum Suite	"Knowledge Management-4"
WD	08	Wednesday	14:00 - 15:30	Council Suite	"Project/Program Management-6"
WD	09	Wednesday	14:00 - 15:30	Directors Suite	"Global Issues in Technology Management-3"
WD	10	Wednesday	14:00 - 15:30	Studio Suite	"Technology Assessment and Evaluation-3"
WD	11	Wednesday	14:00 - 15:30	Galleria-1	"Technology Management in Telecommunications-1"
WD	13	Wednesday	14:00 - 15:30	Galleria-3	"Supply Chain Management-4"
WE	01	Wednesday	16:00 - 17:30	Pavilion East	"Technology Management in the Service Sector-3"
WE	03	Wednesday	16:00 - 17:30	Broadway-1	"E-Business-2"
WE	04	Wednesday	16:00 - 17:30	Broadway-2	"Innovation Management-8"
WE	05	Wednesday	16:00 - 17:30	Broadway-3	"Strategic Management of Technology-3"
WE	06	Wednesday	16:00 - 17:30	Broadway-4	"Technology Management in the Public Sector-1"
WE	07	Wednesday	16:00 - 17:30	Forum Suite	"Information Management-1"
WE	08	Wednesday	16:00 - 17:30	Council Suite	"Project/Program Management-7"
WE	09	Wednesday	16:00 - 17:30	Directors Suite	"Technology Management in Telecommunications-2"

SCHEDULE OF SESSIONS

WE	10	Wednesday	16:00 - 17:30	Studio Suite	"Technical Workforce-2"
WE	11	Wednesday	16:00 - 17:30	Galleria-1	"Technology Management for Sustainability-2"
WE	12	Wednesday	16:00 - 17:30	Galleria-2	"New Product Development-4"

THURSDAY, AUGUST 9, 2007

HA	01	Thursday	08:30 - 10:00	Pavilion East	PLENARY: "Plenary 5"
HB	01	Thursday	10:30 - 12:00	Pavilion East	"Technology Management in the Service Sector-4"
HB	02	Thursday	10:30 - 12:00	Pavilion West	PANEL: "Engineering & Technology Management Journal Editors"
HB	03	Thursday	10:30 - 12:00	Broadway-1	"Outsourcing-1"
HB	04	Thursday	10:30 - 12:00	Broadway-2	"Innovation Management-9"
HB	05	Thursday	10:30 - 12:00	Broadway-3	"Strategic Management of Technology-4"
HB	06	Thursday	10:30 - 12:00	Broadway-4	"Technology Management in the Public Sector-2"
HB	08	Thursday	10:30 - 12:00	Council Suite	"Technical Workforce-3"
HB	09	Thursday	10:30 - 12:00	Directors Suite	"Technology Management in Telecommunications-3"
HD	01	Thursday	14:00 - 15:30	Pavilion East	"Technology Management in the Service Sector-5"
HD	02	Thursday	14:00 - 15:30	Pavilion West	TUTORIAL: "New Product Development Training for Technical Entrepreneurs "
HD	03	Thursday	14:00 - 15:30	Broadway-1	"Science and Technology Policy-3"
HD	04	Thursday	14:00 - 15:30	Broadway-2	"Innovation Management-10"
HD	05	Thursday	14:00 - 15:30	Broadway-3	"Strategic Management of Technology-4"
HD	06	Thursday	14:00 - 15:30	Broadway-4	"Technology Management for Sustainability-1"
HD	07	Thursday	14:00 - 15:30	Forum Suite	"Information Management-3"
HD	08	Thursday	14:00 - 15:30	Council Suite	"Technology Forecasting through Intelligence Mining"
HD	09	Thursday	14:00 - 15:30	Directors Suite	"Technology Management in Telecommunications-4"
HE	01	Thursday	16:00 - 17:30	Pavilion East	SPECIAL SESSION: "PICMET 08 and 09 Planning Session"

PERSONAL SCHEDULE

	Sunday	Monday	Tuesday	Wednesday	Thursday
08:00 – 08:30 Bright Start					
8:30 – 10:00 (A)	Symposium (Optional)	Plenary (Hilton Pavilion)	Plenary (Hilton Pavilion)	Plenary (Hilton Pavilion)	Plenary (Hilton Pavilion)
10:00 – 10:30 Coffee Break					
10:30 – 12:00 (B)	Symposium (Optional)				
12:00 – 14:00 Lunch Break					
14:00 – 15:30 (D)	Symposium (Optional)		Plenary (Hilton Pavilion)		
15:30 – 16:00 Coffee Break					
16:00 – 17:30 (E)					PICMET '08 and PICMET '09 Planning Session (Hilton Pavilion East)
19:00 – 22:00	Welcome Reception (Hilton Pavilion)	Dinner in the Park Blocks (1 block west of the Hilton)	Awards Banquet (Hilton Pavilion)	Native American Dinner (optional)	

Notes:

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PLENARY SESSION — 1

DATE: MONDAY, AUGUST 6, 2007

TIME: 08:30-10:00

ROOM: PAVILION ROOM, PLAZA LEVEL

Session Chair: Rick Warren, Senior Site Executive, IBM Systems & Technology Group, USA

KEYNOTE-1

Dr. Matthew J. Realff, Program Director for Service Enterprise Engineering, National Science Foundation, USA

"Service Enterprise Engineering: An Overview"

The U.S. economy, along with the rest of the developed world, has increased its economic activity through the dramatic growth of the service sector. Over 80 percent of the U.S. labor force now works in the service sector, which accounts for 4.2 trillion dollars out of a total of 7.4 trillion dollars of personal expenditures. Research in manufacturing technologies has enabled gains in manufacturing efficiency and productivity, keeping the U.S. manufacturing sector of the economy competitive in a global marketplace. The Service Enterprise Engineering program is engaging the engineering community in basic research to understand the needs, and synthesize new designs, of service enterprises so that the U.S. can continue to be competitive in the sector of the economy and deliver high quality services both for domestic consumption and export.

Dr. Realff will highlight some of the recent research areas that have been the focus of activity in service engineering research and give his perspective on the challenges that are to be faced. He will give his perspective on the challenges of systematizing services and fostering innovation in the service industry.

Note: Any opinion, findings, and conclusions or recommendations expressed in this talk are those of the author and do not necessarily reflect the views of the National Science Foundation.

Dr. Matthew J. Realff is an Associate Professor of Chemical and Biomolecular Engineering at Georgia Tech, and the David I. L. Wang Faculty Fellow. He has been at Georgia Tech since 1993, after completing his Ph.D. in chemical engineering at MIT and a visiting scientist position at Imperial College London. As of September 2005, he is on leave from Georgia Tech at the National Science Foundation as Program Officer within the Division of Manufacturing Innovation responsible for the Service Enterprise Engineering program and cross-cutting activities in Environmental Benign Design and Manufacturing.

KEYNOTE-2

Dr. Jay Lee, Ohio Eminent Scholar and L.W. Scott Alter Chair Professor, University of Cincinnati; and Director, NSF Multi-Campus Industry/University Cooperative Research Center on Intelligent Maintenance Systems (IMS), University of Cincinnati, USA

"Design of Innovative Product Service Systems"

Innovation is not an option for today's industry. For the past decade, globalization and transformation of the flat-world economy has produced vast new challenges for industry. Innovation is not just about new product development; it also refers to the creation of new value-added services to transform better productivity and business performance. As the practice of product design has expanded both in economic and social impact and in technological complexity, so has the demands upon innovative service systems. For example, GE Medical changed its name to GE Healthcare Technologies to expand its business opportunities. Companies such as IBM and Xerox are also transforming to be smart service business leaders. Industry needs to learn how to develop niche expertise with value-added innovation to compete globally.

This presentation introduces the strategies and emerging technologies for product service business innovation. Examples (including iPod, GE Healthcare, John Deere, Otis Elevator, GM OnStar, etc.) will be given to illustrate how to formulate "gaps" between product and customer needs using innovation matrix and the right thinking mechanisms. In addition, an Industry/University Cooperative Research Center Model as well as its operations in an academic environment will be discussed.

Dr. Jay Lee is Ohio Eminent Scholar and L.W. Scott Alter Chair Professor at the University of Cincinnati and is founding director of the National Science Foundation (NSF) Industry/University Cooperative Research Center (I/UCRC) on Intelligent Maintenance Systems (IMS) (www.imscenter.net), which is a multi-campus NSF Center of Excellence between the University of Cincinnati (lead institution), the University of Michigan, and the University of Missouri-Rolla in partnerships with over 35 global companies including P&G, Toyota, GE Aviation, Boeing, AMD, Caterpillar, Siemens, DaimlerChrysler, Festo, Harley-Davidson, Honeywell, ITRI (Taiwan), Komatsu, Omron, Samsung,

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Toshiba, Bosch, Parker Hannifin, BorgWarner, Spirit Aerosystems, and McKinsey & Company. His current research focuses on smart prognostics technologies for predictive maintenance, self-maintenance systems and innovative service business model studies.

He also serves as honorary professor and visiting professor for a number of institutions, including Cranfield University in the UK, Lulea University of Technology in Sweden, Shanghai Jiao Tong University, University of Manchester, City University of Hong Kong, and Hong Kong PolyU.

Previously, he held a position as Wisconsin Distinguished Professor and Rockwell Automation Professor at the University of Wisconsin-Milwaukee. Prior to joining UWM, he served as Director for Product Development and Manufacturing Department at United Technologies Research Center (UTRC), East Hartford, Connecticut, as well as Program Directors for a number of programs at NSF during 1991-1998, including the Engineering Research Centers (ERCs) Program, the Industry/University Cooperative Research Centers (I/UCRCs) Program, and the Division of Design, Manufacture, and Industrial Innovation.

Currently, he serves as advisor and board member to many global organizations, including Industrial Technology Research Institute (ITRI) in Taiwan, Japan Productivity Center (JPC), Academy of Machinery Science & Technology in China, and InnoLab of Shanghai, China. In addition, he serves as editor and associate editor for a number of journals including IEEE Transaction on Industrial Informatics, International Journal on Asset Engineering and Management, International Journal on Service Operations and Informatics, and Tsinghua Science & Technology Journal. He has delivered numerous invited lectures and speeches, including over 120 invited keynote and plenary speeches at major international conferences.

Dr. Lee received the Milwaukee Mayor Technology Award in 2003 and was a recipient of the SME Outstanding Young Manufacturing Engineering Award in 1992. He is also a Fellow of ASME and SME.

PLENARY SESSION — 2

DATE: TUESDAY, AUGUST 7, 2007

TIME: 08:30—10:00

ROOM: PAVILION ROOM, PLAZA LEVEL

Session Chair: Dr. Roy Koch, Provost, Portland State University, USA

KEYNOTE-1

Dr. Yoshio Nishi, Director of Research of the Stanford Center for Integrated Systems, Director of the Stanford Nanofabrication Facility, and a Research Professor in the Department of Electrical Engineering at Stanford University, USA

"Industry-Academia Collaboration for Nanotechnology Research"

A possible model and mechanisms for better industry-academia collaboration will be discussed, in which strong interactions between researchers/engineers from industry and from academia will stimulate each other as well as build complimentary relationships, which are critically important. The nature of nanoscale science and engineering in the nanotechnology era, which is defined as "multi-disciplinary cross fertilization and incubation of new ideas and applications," will force us to invent a new model of collaborations.

Dr. Yoshio Nishi is Director of Research of the Stanford Center for Integrated Systems, Director of the Stanford Nanofabrication Facility, and a Research Professor in the Department of Electrical Engineering at Stanford University.

He received his B.S. degree in metallurgy from Waseda University in 1962 and his Ph.D. degree in electronics engineering from the University of Tokyo in 1973. In 1962 he joined Toshiba Corporation, where he worked on silicon process research and development. From 1968 to 1969 he was a visiting

Research Associate at the Stanford Electronics Laboratories, working on high-field transport in semiconductors and materials characterization of GaAs. In 1969 he returned to Toshiba and supervised the nonvolatile memory R&D activity, working on the development of the world's first MNOS nonvolatile static memories. In 1976 he was responsible for theoretical and experimental studies of short-channel MOSFETs in the MITI VLSI project, as well as management of the SOS technology group at Toshiba, developing the 16bitSOS processor for medical information processing. In 1979 he directed work on VLSI process technology R&D for both memory and logic VLSI, where his team developed the world's first 1Mbit CMOS DRAM, 256kbit CMOS SRAM and 1M/4Mbit EEPROM, predecessor of Flash memory, which led Toshiba to become the leading manufacturer of DRAM and EEPROM in that era.

In 1986 Dr. Nishi joined HP Labs as Director of the Silicon Process Laboratory, where he led the team to build HP's first converged CMOS technology at 0.8 micron geometry used in HP RISC Processor, PA-RISC chip sets. In 1994 he established and became Director of the ULSI Research Laboratory. Dr. Nishi joined Texas Instruments in 1995 as Vice President and Director of Research and Development for the Semiconductor Group. In

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1996, he was appointed Senior VP, responsible for R&D activities for digital signal processing solutions, semiconductor processes and devices, memory, as well as components and materials. His contributions throughout his tenure in industry cover not only leading-edge technology development, but also an R&D model and strategy for consecutive developments of technologies of multiple nodes with co-located R&D and manufacturing with two staggering teams and broad deployment of "precompetitive collaboration and benchmarking," which is now commonly accepted world-wide.

In 2002 Dr. Nishi joined Stanford University as a faculty member in Electrical Engineering, and, by courtesy, in Material Science and Engineering. His research and teaching interest at Stanford covers nanoelectronic materials and devices such as metal gate/high k/high mobility channel MISFETs, resistance change nonvolatile memory, nanowires and nanotube-based devices with his Ph.D. students. He serves several companies as either board member or technical advisory board member, and he is also guest professor of several universities such as Tsinghua University and Peking University.

Professor Nishi has published over 200 papers in international technical journals and conferences and has co-authored 12 books. He has been awarded more than 50 patents in the U.S. and Japan. He is a Fellow of the IEEE, and he is a member of the Japan Society of Applied Physics; Institute of Electronics, Communication Engineers of Japan; and the Electrochemical Society. He received the IECE Japan Award in 1972, and IR100 awards in 1982 and 1986 for nonvolatile memory productization. In 1995, he received the IEEE Jack A. Morton Award. He is also the 2002 Robert Noyce Medal recipient.

KEYNOTE-2

Dr. Harold A. Linstone, Editor-in-chief, *Technological Forecasting and Social Change*; Professor Emeritus, Portland State University, USA

"Three Eras of Technology Foresight"

The talk examines the evolution of Technology Foresight (TF) from its roots in World War II to 1970, then the impact of the information technology era on TF, and finally some possible effects of the follow-on molecular (nano/bio) technology era. Of particular interest are the insights gained from complexity science, technology mining, computer modeling of complex adaptive systems as well as the generation of scenarios, and the use of multiple perspectives to bridge the gap between modeling and the real world.

Dr. Harold A. Linstone earned his M.A. and Ph.D. degrees in Mathematics from Columbia University and the University of Southern California, respectively. He now holds the rank of University Professor Emeritus of Systems Science at Portland State University, Portland, Oregon, USA. From 1970 to 1977 he served as director of its Systems Science Ph.D. Program. His 22 years of industrial experience include positions at Hughes Aircraft Company and Lockheed Corporation, where he was Associate Director of Corporate Planning—Systems Analysis. He has been a visiting professor at the University of Rome, the University of Washington, and Kiel University. In 1993-94 he served as president of the International Society for the Systems Sciences, and in 2003 he won the World Future Society's Distinguished Service Award.

Dr. Linstone is editor-in-chief of the professional journal Technological Forecasting and Social Change, which he founded in 1969, and which is now in its 38th year. He is author or co-author of the books The Delphi Method (1975), Futures Research: New Directions (1976), Technological Substitution (1977), Multiple Perspectives for Decision Making (1984), The Unbounded Mind (1993), The Challenge of the 21st Century (1994), and Decision Making for Technology Executives (1999).

PLENARY SESSION — 3

DATE: TUESDAY, AUGUST 7, 2007

TIME: 14:00—15:30

ROOM: PAVILION ROOM, PLAZA LEVEL

Session Chair: Skip Rung, President, ONAMI, USA

KEYNOTE

Dr. Mihail C. Roco, National Science Foundation (NSF), National Nanotechnology Initiative (NNI), and International Risk Governance Council (IRGC), USA

"Governance of Converging New Technologies Integrated from the Nanoscale"

The convergence of nanotechnology, modern biology, the digital revolution and cognitive sciences will bring about tremendous improvements in transformative tools, generate new products and services, enable opportunities to meet and enhance human potential and social achievements, and in time reshape societal relationships. After an outline of the technological opportunities, the presentation will discuss the progress made in governance of such converging, emerging technologies and suggests possibilities for a

global approach. It is suggested creating a multidisciplinary forum or a consultative coordinating group with members from various countries in order to start establishing a plan for governance of converging, emerging technologies.

The proposed framework for governance of converging technologies calls for four key functions: supporting the transformative impact of the new technologies; advancing responsible development that includes health, safety and ethical concerns; encouraging national and global partnerships; and establishing commitments to long-term planning and investments centered on human development. Several possibilities for improving the governance of converging technologies in the global self-regulating ecosystem are recommended: using open-source and incentive-based models, establishing corresponding science and engineering platforms, empowering the stakeholders and promoting partnerships among them, implementing long-term planning that includes international perspectives, and instituting voluntary and science-based measures for risk management.

Dr. Mihail C. Roco is the Senior Advisor for Nanotechnology at the National Science Foundation (NSF) and a key architect of the National Nanotechnology Initiative. Dr. Roco is the founding chair of the U.S. National Science and Technology Council's subcommittee on Nanoscale Science, Engineering and Technology (NSET), and leads the Nanotechnology Group of the International Risk Governance Council. He also coordinated the programs on academic liaison with industry (GOALI). Prior to joining the NSF, he was Professor of Mechanical Engineering at the University of Kentucky (1981-1995) and held visiting professorships at the California Institute of Technology (1988-89), Johns Hopkins University (1993-1995), Tohoku University (1989), and Delft University of Technology (1997-98).

Dr. Roco is credited with 13 patents and has contributed over 200 articles and 15 books, including Nanotechnology: Societal Implications - Maximizing Benefits to Humanity (Springer Science, November 2006), significantly advancing the body of literature in the field. Dr. Roco coordinated the preparation of the U.S. National Science and Technology Council (NSTC) reports on "Nanotechnology Research Directions" (NSTC, 1999) and the "National Nanotechnology Initiative" (NSTC, 2000). Under his stewardship, the nanotechnology federal investment has increased from about $3 million in 1991 at NSF to $1.3 billion in 2005/2006. His research included experimental and simulation methods to investigate nanosystems. Dr. Roco was a researcher in multiphase systems, visualization techniques, computer simulations, and nanoparticles in the 1980s as a professor at the University of Kentucky. In 1991 he initiated the first federal government program with a focus on nanoscale science and engineering (on Synthesis and Processing of Nanoparticles at NSF in 1991). He formally proposed NNI in a presentation at the White House/OSTP, Committee on Technology, on March 11, 1999. Since 2002 he prepared a series of four volumes related to development and management of new technologies, beginning with Converging Technologies for Improving Human Performance in collaboration with W.S. Bainbridge.

Dr. Roco is a Correspondent Member of the Swiss Academy of Engineering Sciences, and a Fellow of ASME, of AIChE, and of the Institute of Physics. Forbes magazine recognized him in 2003 as first among "Nanotechnology's Power Brokers," and Scientific American named him one of 2004's top 50 Technology Leaders. In 2005, he received the AIChE Forum award "for leadership and service to the national science and engineering community through initiating and bringing to fruition the National Nanotechnology Initiative." He is the editor of several journals, including the Journal of Nanoparticle Research. He was honored as recipient of the Carl Duisberg Award in Germany, "Burgers Professorship Award" in the Netherlands and the "University Research Professorship" award in the U.S. Dr. Roco is a member of several honorary boards and was elected Engineer of the Year by the U.S. Society of Professional Engineers and NSF in 1999 and again in 2004.

PLENARY SESSION — 4

DATE: WEDNESDAY, AUGUST 8, 2007

TIME: 8:30-10:00

ROOM: PAVILION ROOM, PLAZA LEVEL

Session Chair: Craig Wessel, Publisher, *Portland Business Journal*, Portland, Oregon, USA

KEYNOTE-1

Dr. Jim Spohrer, Director, IBM Almaden Services Research, USA

"Service Science, Management and Engineering (SSME): A Next Frontier in Education, Innovation and Economic Growth"

Service Science, Management, and Engineering (SSME) is a frontier field, defined as the application of scientific, management, and engineering competencies that one organization ("service provider") beneficially performs for and with another ("service client or customer") to coproduce value. Value creating service

systems now span the globe. New business and information services are both output from and input to the growth of the knowledge economy. Business services unbundle and rebundle knowledge on-demand into offerings ranging from tell me (help desk and call centers), to enable me (e-commerce and application hosting in data centers), to do it for me (outsourcing business processes, information integration, and IT operations), not to mention field service, front stage customer service centers, and back stage service operations centers.

SSME, also known as "service science," is the study of the design and evolution of service systems or "value creating systems." Service systems are value coproduction configurations of people, technology, value propositions connecting internal and external service systems, and shared information (languages, laws, measures, etc.). To better understand the design and evolution of service systems – especially measures of service productivity, quality, compliance, innovation, and learning curves - IBM has been collaborating with academic, industry, government, and foundation partners around the world since 2002.

The focus on service systems and interdisciplinary approaches to understanding their design and evolution is of great economic relevance and scientific interest. First, the economies of most developed countries are dominated by services (70% of the labor, GDP, etc.). China, in its 2006-2011 Five-Year Plan, has made the "transition to a modern service economy" a national priority, and India is well along on this path as well. Second, even traditional manufacturing companies such as GE (70 percent services revenue) and IBM (50% services revenue) need to add high values services to grow their businesses. Third, information services and business services are two of the fastest growing segments of the service economy. The growth of B2B and B2C web services, service oriented architectures, and self-service systems suggests a strong relationship between SSME and the more established discipline of computer science.

The goal of SSME is to encourage research aimed at solving unique problems of service businesses and society, and to encourage development of courses and programs aimed at producing graduates who are ready to innovate in the service sector, particularly in areas of high skill, high value, IT-enabled, knowledge-intensive business services.

Dr. Jim Spohrer is the Director of Almaden Services Research, with the mission of creating and deploying service innovations that matter and scale well both internally to transform IBM and externally to transform IBM client capabilities ("double win" service innovations). Service system innovation is a multidisciplinary endeavor, integrating technology, business model, social-organizational and demand innovations (just think about the ubiquity of credit cards, and what it took to make that service system innovation global; also, too often, people focus on the invention of the light bulb, and forget about the service system innovations required to make that point technology innovation beneficial to so many).

Prior to joining IBM, Dr. Spohrer was at Apple Computer, attaining the role of Distinguished Scientist, Engineer, and Technologist (DEST) for his pioneering work on intelligent multimedia learning systems, next generation authoring tools, on-line learning communities, and augmented reality learning systems. He has published in the areas of speech recognition, artificial intelligence, empirical studies of programmers, next generation learning systems, and service science. He graduated with a Ph.D. in Computer Science from Yale University (specializing in Artificial Intelligence and Cognitive Science) in 1989 and a B.S. in Physics from MIT in 1978.

KEYNOTE-2

Dr. Daniel Berg, Professor, Rensselaer Polytechnic Institute, USA

"2007 A Service Odyssey!"

Using his own experiences in collaborating to develop a research and educational program in the service sector over the last two decades, Dr. Berg will discuss some of the key issues in the Service Sector. Hopefully, this will highlight some fundamentals of what we have learned and where the field is now poised, especially from the standpoint of the role of technology and its management. The global economy and the implications of the burgeoning service sector component will also be emphasized along with the growing focus on "Service Innovation" by the academic and industrial community

Dr. Daniel Berg received his B.S. in Chemistry and Physics from the City College of New York (C.C.N.Y.) and his M.S. and Ph.D. in Physical Chemistry from Yale. He was employed by Westinghouse Electric in a variety of technical/managerial positions, including Technical Director. He was dean and provost at Carnegie Mellon University (C.M.U.) as well as provost and president at Rensselaer Polytechnic Institute

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(RPI), where he is Institute Professor of Science and Technology. He is director of RPI's Center for Services Research and Education. He is a Life Fellow of the Institute of Electrical and Electronic Engineers, a Fellow of INFORMS, and a Fellow of the American Association for the Advancement of Science. He is a member of the National Academy of Engineering. He serves as the American Editor of the International Journal of Services Technology and Management.

PLENARY SESSION — 5

DATE: THURSDAY, AUGUST 9, 2007

TIME: 8:30—10:00

ROOM: PAVILION ROOM, PLAZA LEVEL

Session Chair: Dr. Chik Erzurumlu, Dean Emeritus, College of Engineering, Portland State University, USA

KEYNOTE-1

Dr. Rosalie Zobel, European Commission, Belgium

"Joint Technology Initiatives in ICT: A New Approach to Foster Research Efforts in Europe"

The European Commission is prepared to spend over 9 billion in research on information and communications technologies (ICT) in the next seven years. ICT is the largest single research area within Europe's 7th Framework Programme for research and development, accounting for 18% of the total Community budget. The ICT research work programme for 2007-2008 aims to raise European research performance and help keep Europe's ICT sector at the forefront of technology developments and advanced ICT use. The work programme focuses on key areas where Europe has competitive advantages and established strengths: communications, electronics and photonics, and software systems and architecture. It also aims to ensure that ICT research will benefit not only the European economy but also society by improving everyday life in areas such as transport, energy efficiency and healthcare.

The European Technology Platforms active in ICT, through their industry-led Strategic Research Agendas, have contributed significantly to the focus of the new work programme. These platforms aim to speed up innovation, in particular by building consensus around technology development strategies. They are poles for attracting more research investment and help transfer new technologies to the market. Nine ICT European Technology Platforms have already been launched. Two of them will provide the basis of Joint Technology Initiatives, in which, for the first time ever, EU, Member State and industry funds will be pooled in public-private research partnerships to boost European cutting-edge research in areas such as nanoelectronics and embedded systems – both vital areas for competitiveness in many end user industries.

The paper will present recent activities to set up Joint Technology Initiatives in Europe with the aim to structure R&D efforts around focused technology objectives to achieve competitiveness goals.

Dr. Rosalie A. Zobel was born in England. She received a bachelor's degree in physics from Nottingham University, UK, in 1964, and a PhD in radiation physics from London University in 1967.

She started her career in the Information Technology industry in ICL in 1967, and later held positions as a systems engineer in CERN (Centre Européen pour la Recherche Nucléaire), Geneva, Switzerland, the Atomic Energy Research Establishment, Harwell, UK, and the Max-Planck Institut für Plasmaphysik, Garching, Germany. At the latter she became operations manager of the first CRAY Supercomputer centre in continental Europe.

In 1981 she moved to the USA and took up a position in the AT&T Headquarters, Basking Ridge, USA. She held positions as senior marketing manager for open systems software both for the USA and international markets, and was responsible from 1983-1986 for the international UNIX business. In 1986 she became senior marketing manager for information technology products in AT&T Japan.

She returned to Europe in 1988 as Deputy Head of Unit of the European Community's ESPRIT Business Systems unit. In 1991 she launched the initiative in Open Microprocessor systems (OMI). From 1995 she was the Head of unit "Business systems, multimedia and microprocessor applications", and EU-coordinator of the G7 Pilot Project "Global Marketplace for SMEs". From 1999-2002 she was Director of "New Methods of Work and Electronic Commerce". From 2003 she is Director of "Components and Systems" in the Information Society and Media Directorate-General of the European Commission.

KEYNOTE-2

Dr. Yong-In S. Shin, Executive Vice President, Samsung Electronics, Korea

"IT/BT/NT Convergence Technology and its Business Managerial Considerations"

PLENARIES

In recent years, a technical level of IT has been heading toward its maturity, and many convergences have taken place among different IT technologies such as computation, communication, consumer & entertainment electronics, and content of digital information & broadcasting. These convergences have formed many new functions for the cell phone, TV, PC, etc. As the technical advancement of BT and NT has recently been making a good inroad, a convergence of IT, BT and NT is on its course to create many unprecedented applications. The well-advanced IT provides a function of input and output interfaces, algorithms and networks, the NT provides new capabilities in a quantum level of material manipulations (bottom up) and nano-electronics (top down), and the BT provides many new understandings of genes and diseases for plants, animals and humans. A combination of IT and NT will provide tools and materials for a much better understanding of BT, and a convergence of these three technologies will definitely provide many possibilities to enrich human lives (e.g., understanding how the human brain works to prevent brain related neural diseases).

Dr. Shin will review the status and progress of these three technologies and their future markets with two examples for the convergence technology: the biochip and the ubiquitous health. Both are examples of convergence technologies that presently are in a process of being incubated by many venture companies and some MNC's. Dr. Shin will provide some details of the new technology and the associated business possibilities of these two new industries. Assuming that the needed technical and market breakthroughs will be accomplished in time, a market for a combination of both the biochips of micro array genechip and the proteinchip will likely grow to a vicinity of a one hundred billion dollar market in its maturity (from the present half billion dollar market). When a social ecosystem will be in place for ubiquitous connections in the health industry, it will extensively revolutionize the present four trillion dollar health industry, and change human lifestyles extensively. Just as the hardware, software, semiconductors, computers and internet technology of IT have created new wealth and many billionaires, these convergence technologies will undoubtedly produce many new industries and new billionaires as well.

Dr. Shin will address some of the major managerial concerns for the convergence business in terms of disparities between these three technologies, and business executives' social responsibilities; IT business is applicable to a technology business model, while BT is applicable to a science business model. Since these technical and business progresses will affect all the aspects of human life for a healthier and longer life span, the leaders of the society need to provide proactive measures for the benefit of the society, and to minimize possibilities of wrongful and unethical usage of these new technologies and businesses.

In conclusion, Dr. Shin will provide some recommendations that he sees pertinent for educators, business executives and government officers at this point. However, managerial responsibilities need to be continually updated as this convergence technology and business progress.

Dr. Yong-In S. Shin is an Executive Vice President of Samsung Electronics in Korea. He has been in charge of new business development focusing mostly on disruptive technologies and innovations, and has incubated a few new businesses including an IT/BT/NT convergence business and an energy-related business. Prior to joining Samsung Electronics, he was a Senior Manager for Intel Corporation in the USA, where he was in charge of a research project for the PC usage model development, a CRM program for the IT division, and a new circuit technology development of the P4 microprocessor. He was a technical marketing manager for Philips Corporation in the Netherlands, where he managed a technical support program, and developed support processes and methods for European and Asian sales organizations. He also worked for Signetics Company in the USA as an engineering manager.

Dr. Shin has been an invited professor at Seoul National University, an adjunct professor for Portland State University, and Oregon Health & Science University for techno MBA and Ph.D. students. He is an ITPP fellow for Seoul National University, a recipient of the Presidential Award from Hanbat University, an inductee to Omega Rho by Portland State University, a recipient of the Intel Division Award, and a Patent of the Year Award winner from Signetics and Philips. He holds a number of patents and has published many articles for both fields of management and integrated circuit design engineering.

He has a doctorate degree in Economics and Business Administration from Erasmus University Rotterdam, The Netherlands; and master's and bachelor's degrees in Electrical Engineering from Brigham Young University, USA.

SPECIAL SESSIONS

ETMERC MEETING

DATE: MONDAY, AUGUST 6, 2007

TIME: 12:00 – 14:00

LOCATION: ALEXANDER'S RESTAURANT, 23RD FLOOR

ETMERC (Engineering and Technology Management Education and Research Council) is the organization of the heads or their designees of the educational programs and departments in Engineering and Technology Management throughout the world. These include all programs with a variety of titles, including but not limited to Engineering Management, Technology Management, MOT, Innovation Management, etc. Membership is open to all universities offering educational and/or research programs in these fields.

ETMERC operates under the auspices of PICMET as an all-inclusive organization, not limiting its affiliation to any professional society. Its objective is to provide leadership in developing educational guidelines, curriculum strategies, evaluation criteria, and research agenda for the field.

ETMERC Executive Committee invites the member organizations as well as the deans, department chairs, program directors and their representatives in non-member universities, who are interested in joining ETMERC, to a meeting

- to participate in the discussions involving strategic issues in engineering and technology management research and education,
- to share ideas and experiences with colleagues from around the world,
- to learn about ETMERC's leadership role in the field, and
- to participate in ETMERC's strategy development for future activities.

Lunch will be provided.

TMEDA

PICMET is pleased to welcome TMEDA (Technology Management Education Association), which will hold its annual meeting as part of PICMET '07. TMEDA represents technology management programs in several U.S. East Coast universities, and its headquarters is currently located at Stevens Institute of Technology.

TMEDA has organized the sessions MB-07, MD-07, ME-07, TB-07, TC-07, TE-07 and WB-07 on technology management education. They are all scheduled in the Forum Suite on the 3rd floor.

TECHNOLOGY MANAGEMENT IN THE SERVICE SECTOR—SYMPOSIUM REPORT

DATE: WEDNESDAY, AUGUST 8

TIME: 10:30-12:00

ROOM: PAVILION EAST

Speakers: Tugrul Daim, Portland State University, USA; Haluk Demirkan, Arizona State University, USA; Antonie Jetter, Portland State University, USA; Paul Maglio, IBM Almaden Research Center, USA

This special session will provide a presentation of the conclusions from the NSF-sponsored Symposium, "Technology Management in the Service Sector," held on Sunday, August 5th, immediately preceding the PICMET Conference.

COUNTRY REPRESENTATIVES MEETING

DATE: WEDNESDAY, AUGUST 8

TIME: 12:00 – 14:00

LOCATION: ALEXANDER'S RESTAURANT, 23RD FLOOR

PICMET has 92 Country Representatives in 53 countries. They provide the linkage between PICMET headquarters and the different parts of the world by sending information to PICMET's quarterly electronic newsletter, TM News, disseminating PICMET information in their regions, proposing locations for future PICMET conferences, and starting PICMET chapters in their countries. Two such chapters, PICMET –Japan, and PICMET-Turkey, are already in operation.

PICMET's Director and co-Director of International Activities, Dr. Kiyoshi Niwa of the University of Tokyo and Dr. Dilek Cetindamar of Sabanci University, respectively, invite the Country Representatives and those who are interested in becoming Country Representatives to a meeting to discuss

- the roles of the Country Representatives,
- the procedure to start and organize PICMET Chapters, and
- the requirements for holding future PICMET conferences in their countries.

Lunch will be provided.

PICMET '08 AND '09 PLANNING SESSION

DATE: THURSDAY, AUGUST 9

TIME: 16:00-17:30

ROOM: PAVILION EAST

Please join us in providing feedback on PICMET '07 and developing plans for future conferences, including PICMET '08 in Cape Town, South Africa; and PICMET '09 in Portland, Oregon, USA. All PICMET attendees are invited to participate in helping make future PICMET meetings as productive as possible.

TUTORIALS

WHY WELL-MANAGED PROJECTS STILL FAIL?

MONDAY, AUGUST 6, 14:00-15:30, PAVILION WEST

Speaker: Aaron J. Shenhar, Stevens Institute of Technology, USA

Project management research shows that most projects today fail. You may think that projects fail because of poor planning, lack of communication, or inadequate resources; but as the evidence suggests, failure is often found even in well-managed projects, run by experienced managers, and supported by highly regarded organizations. This research-based tutorial will show that the current practices of project management are insufficient to guarantee project success. The tutorial will present the current myth and the reality of project management and will offer a new paradigm and a new language to deal with today's projects.

According to this paradigm, projects are business-related processes that must deliver business results. They are not predictable or certain. Rather, they involve a great deal of uncertainty and complexity, and they must be managed in a flexible and adaptive way. Planning is adjustable and changing, and as the project moves forward, re-planning is often necessary. And project management styles must adapt to the specific project and its requirements. While this approach represents a shift in thinking, it is inevitable to meet today's organizational challenges. We believe that every organization can significantly improve its business results and achieve more homeruns from its projects if it will consciously apply the frameworks of this workshop.

Dr. Aaron J. Shenhar is the Institute Professor of Management at Stevens Institute of Technology. He holds five academic degrees in engineering and management from Stanford University and the Technion, Israel Institute of Technology. Dr. Shenhar has accumulated over 20 years of technical and management experience as an executive in the defense industry in Israel. In his present academic career, Dr. Shenhar is focused on teaching and research in the areas of technology and innovation management, project management, product development, and the management of professional people. He is a recognized speaker and consultant to leading high-technology organizations. For his cumulative contribution to engineering and technology management he was selected "Engineering Manager of the Year" by the Engineering Management society of IEEE in 1999.

ACCELERATED RADICAL INNOVATION IN THE INDUSTRIAL TECHNOLOGY LIFE CYCLE

MONDAY, AUGUST 6, 16:00-17:30, BROADWAY-1

Speaker: **John Dismukes, University of Toledo, USA**

Panel Chair: **John Bers, Vanderbilt University, USA**

Panelists: **Michael C. Carroll, Bowling Green State University; Cherie Courseault Trumbach, University of New Orleans; Aleksey Dubrovensky, Vanderbilt University; Michael Gallis, Michael Gallis and Associates; Lawrence K. Miller, The University of Toledo; Ruth H. Miller, University of Detroit Mercy; Alan Porter, Search Technology, Inc.; Neil Reid, The University of Toledo; Jainagesh A. Sekhar, University of Cincinnati; Andrew T. Walters, University of Wales Institute; Richard A. Williams, The University of Leeds**

The academic work of Schumpeter has popularized the importance of innovation, particularly since about 1970 when an exponential increase in published papers dealing with the technological innovation began. NSF has concluded that over 50 percent of the economic growth in the economy derives from technological innovation. Notwithstanding, recent assessments of global competitiveness have concluded that innovation methodologies for cost reduction and incremental improvement of existing technologies that proved so effective in the 20th Century will be increasingly ineffective in the information intense, globally competitive economy of the 21st Century.

Despite the continued increase in science and innovation publications, unfortunately, there is a Balkanization of innovation hindering the optimization of breakthrough innovation in the 21st Century. As perceptively described by John Age in his 1995 paper, there is a lack of a holistic model needed for successful integration of radical innovation principles into rapid and affordable radical innovation. In response to this strategic crisis, a team of researchers since 2004 has recognized the need for an effective methodology grounded in theory and principles, to guide acceleration of innovation from the discovery phase through to standard design, diffusion, and finally innovation maturity. The result, summarized in this paper, is a new paradigm of Accelerated Radical Innovation (ARI).

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This tutorial session will feature a presentation by Dr. John Dismukes on the above topic, which will be followed by and a panel of experts responding with commentary and answering audience questions related to the topic.

Dr. John Dismukes upon completion of his university education, immediately undertook materials science research in the semiconductor industry (RCA Laboratories, Princeton, NJ), where he received the David Sarnoff Gold Medal for successful transfer of Ge-Si thermoelectric alloy processing to factory production for the Voyager and other space missions. After two years of semiconductor business and marketing experience, he launched and ran the first new business venture for the manufacture of amorphous metal alloy ribbon at Allied Corporation. He then spent 17 years at Exxon's Corporate Research Laboratory in Annandale, New Jersey. There he conducted materials science research in structural materials, nanotechnology, polymer composites, and synthetic diamond, and served as program coordinator in major external joint R&D ventures including low-cost solar cells and high-strength steel.

In 1996 Dr. Dismukes moved to The University of Toledo, where he served as Associate Dean for Research in the College of Engineering from June 1996 to June 1999, and as Interim Vice Provost for Research for seven months during 2000. He is currently Professor in the Department of Chemical and Environmental Engineering, with research and teaching interests in materials science, alternative energy technologies, and methodologies for acceleration of radical innovation. Since 2004, John has taken the lead in organizing conferences and workshops in the new field of Accelerated Radical Innovation, and has initiated a graduate course in this area available worldwide via Distance Learning.

Dr. Dismukes received a Ph.D. in Inorganic Chemistry from the University of Illinois and a B.S. in Chemistry from Auburn University. Dr. Dismukes has published over 80 technical papers and has been awarded 12 U.S. patents. He is a Fellow of The Electrochemical Society.

MEASURING THE STRATEGIC VALUE OF TECHNOLOGIES

MONDAY, AUGUST 6, 16:00-17:30, PAVILION WEST

Speakers: Nathasit Gerdsri, Mahidol University, Thailand; Dundar F. Kocaoglu, Portland State University, USA

This tutorial presents a quantitative model used for evaluating the impact value of technologies on a company's objective. The hierarchical decision making approach is applied to construct the model. Both quantitative and qualitative aspects of technology evaluation are also integrated into the model development process. The impact of technologies on a company's objective is calculated as a composite index called Technology Value. Two case studies will be presented in the session to demonstrate how the concept can be applied.

Dr. Nathasit Gerdsri is Program Chair of Management and Strategy in the College of Management, Mahidol University (CMMU), Thailand. He received his Ph.D. in Systems Science/Engineering and Technology Management from Portland State University, USA, in 2004. His Ph.D. dissertation was on the development of a technology development envelope (TDE) for roadmapping of emerging technologies. A part of his dissertation received the PICMET '05 Outstanding Student Paper Award. Dr. Gerdsri received a B. Eng in Mechanical Engineering from Chulalongkorn University (Thailand) and dual M.S. degrees in Mechanical Engineering and Engineering Management from Portland State University. Dr. Gerdsri's research areas include strategic technology management, technology roadmapping, strategic decision making, project management, and international technology management.

Prior to joining CMMU, Dr. Gerdsri held a faculty position as Visiting Assistant Professor at Portland State University, where he taught courses such as Technology Roadmapping and Decision Making. Before that, Dr. Gerdsri worked with Intel Corporation's R&D Lab located in Oregon (USA) as a technology developer and research program coordinator during 2001-2002. In addition to academic works, Dr. Gerdsri has served the community by providing tutorial presentations, consulting and training services on issues related to technology roadmapping, technology management, and R&D project selection to companies, government agencies and conferences.

Dr. Dundar F. Kocaoglu, is Professor and Chairman of the Department of Engineering and Technology Management at Portland State University, and President and CEO of PICMET (Portland International Conference on Management of Engineering and Technology). His research areas include technology management, project management, R&D management, decision theory, hierarchical decision modeling, evaluation and selection of emerging technologies, and resource optimization.

Dr. Kocaoglu received his B.S. in Civil Engineering from Robert College (in Turkey) in 1960, M.S. in Structural Engineering from Lehigh University in 1962, M.S. in Industrial Engineering from the University of Pittsburgh in 1972, and Ph.D. in Operations Research and Systems Management, also from the University of Pittsburgh in 1976. He joined Portland State University to start the Engineering Management Program in 1987. The program has since become the

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Department of Engineering and Technology Management. Prior to 1987, Dr. Kocaoglu was the director of a similar program for 11 years at the University of Pittsburgh.

Dr. Kocaoglu has worked in industry as an engineer and project manager from 1962 to 1971. He has been a consultant on engineering and technology management since 1973. His clients include Westinghouse, Brown Boveri, IBM, Intel Corporation, Tektronix, II-Morrow, Cascade Microtech, several other small-to-medium sized technology-based companies, more than 10 universities, R&D Centers and the United Nations. He has served in National Research Council committees for the evaluation of the NIST (National Institute of Science and Technology) manufacturing centers, and for the improvement of U.S. Department of Energy decision making processes for nuclear waste disposal and decommissioning. He has also been an NSF (National Science Foundation) reviewer for research proposals, and served on NSF panels for the evaluation of research centers.

Dr. Kocaoglu is the author, editor or co-editor of seven books titled, *Engineering Management* (Mc-Graw-Hill, 1981), *Technology Management: The New International Language* (IEEE, 1991), *Management of R&D and Engineering* (Elsevier, 1992), *Innovation in Technology Management* (PICMET, 1997), *Technology and Innovation Management* (PICMET, 1999), *Technology Management in the Knowledge Era* (PICMET, 2001) *Technology Management for Reshaping the World* (PICMET, 2003), *Technology Management: A Unifying Discipline for Melting the Boundaries* (PICMET, 2005). He was the Editor-in-chief of *IEEE Transactions on Engineering Management* (1986 – 2002), and the Series Editor of *John Wiley Book Series in Engineering & Technology Management* (1985 – 1998). Dr. Kocaoglu is the recipient of the Distinguished Research Mentor Award of the National Science Council of Taiwan, the IEEE Fellow Award, IEEE Centennial Medal, and IEEE Millennium Medal, all of which were awarded for "leadership in the development of the Engineering Management discipline".

MAKING OFFSHORING A SUCCESS

TUESDAY, AUGUST 7, 10:30-12:00, PAVILION WEST

Speaker: Arezou Zarafshan, Hewlett-Packard, USA

Offshoring has been a controversial practice in the industry. Many books and articles have been written about why offshoring is a business necessity in the 21st Century. There is also probably an equal number of books and studies about the dangers, pitfalls and macro-level adverse effects of offshoring as a business strategy. In this tutorial session, we will not be discussing if offshoring is right or wrong for the business; rather, how to make it a success.

We define offshoring as work taking place in a remote (from the organization epicenter-) geographic location with reduced labor costs. Organizations which offshore ought to pay attention to three foundational vectors as critical success factors for the endeavor: Cultural Awareness, Operational Tactics and Strategic Alignment. A set of methodologies (tools and processes) must be established and carried out in the practicing organization in order to ensure the three critical vectors of Culture, Operations & Strategic remain healthy and intact. In this tutorial we will examine each vector, and based on our experience at Hewlett-Packard, Vancouver, we will offer a set of practices that have proven essential to successful offshoring.

Arezou Zarafshan, received her BS and MS degrees in Electrical Engineering from Washington State University, USA. She has spent over 13 years in industry working at Hewlett Packard and with a diverse set of companies such as Motorola, Texas Instruments and Flextronics. She has managed research and development teams and has led technology development for components and systems for HP's Inkjet products. Ms. Zarafshan is currently a Research & Development Section manager at Hewlett-Packard. In her role, she creates and utilizes successful development strategies that capitalize on globalization trends for delivering superior products with utmost efficiency.

LIGHTWEIGHT PROJECT MANAGEMENT FRAMEWORK

WEDNESDAY, AUGUST 8, 10:30-12:00, COUNCIL

Speakers: Michael Burton, Intel, USA

The Lightweight Project Management Framework (LPMF) is a suite of six project management tools (Project Life Cycle, Scope of Work, Work Breakdown Structure, Responsibility Interface Matrix, Critical Path Mapping, and Risk Management Model) that interlock to provide a lightweight and flexible structure for "micro IT projects" with timelines less than one year and non-capital budgets. This tutorial will provide a fast-paced interactive experience with all six tools in a simulated project environment from project inception to postmortem. Teams will be created and individual members will own application of a single tool while providing input into other team member's tools. At the end of this session, attendees will be able to describe the six tools, identify if LPMF is appropriate for a specific project, and implement LPMF structure in their environment.

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Michael Burton is a global technical project manager in Intel's IT Business Unit owning both IT Network Operations learning/development efforts and "BIG IP," Intel's internal network load balancers. Completing a BA in Theatre and Drama from Indiana University (IU) in 1997, Michael was heavily involved with computers from childhood. He took on an apprentice role supporting IU's computer network infrastructure before moving to Portland, Oregon, USA in 1998. After two years on Portland State University's network operations team, he moved on to work for Intel, where he has been for the last seven years.

Michael's involvement in project management started at IU in the Theatre Department where he was a stage manager, and each job he has held since has had a growing component of project management. To formalize is skill set, he took on the Master's of Engineering in Project Management track from Portland State University, where he completed his degree late in 2006.

While at Intel Michael has coordinated several cross-cultural project teams. Coping with differences in culture, language, and time zones, a structured and formalized method was required. He developed the Lightweight Project Management Framework (LPMF) to drive multiple concurrent international projects to success. The LPMF course is taught internationally to Intel's IT Project Managers and service owners.

NEW PRODUCT DEVELOPMENT TRAINING FOR TECHNICAL ENTREPRENEURS

THURSDAY, AUGUST 9, 14:00-15:30, PAVILION WEST

Speakers: Terry Schumacher, Rose-Hulman Institute of Technology, USA

Published literature reports that NPD processes in general, and technological entrepreneurs (TEs) in particular, under-emphasize marketing in NPD. An interactive computer simulation was created to introduce participants to published NPD best practices, primarily greater marketing early in NPD. Simulation participants are placed in the role of an entrepreneur with a product vision and limited money. Participants move from the initial product vision, through customer interviews, focus groups, trade shows, break-even analysis, product feature selection, pricing and customer segmentation. The simulation concludes with product launch and feedback.

The speaker will run the simulation with participants viewing projected screen images. They will be asked to discuss and make the necessary decisions (Should we attend a trade show now? Talk with more potential customers? Select additional product features? etc.). A full simulation requires two to three hours depending on the amount of discussion. It has been used in our graduate marketing class and our entrepreneurship class where initial results indicate students learned to integrate the various choices into a coherent NPD strategy. They enjoyed the exercise. The workshop also presents a summary of the NPD best practices found in the literature.

Dr. Terry Schumacher is an Associate Professor of Engineering Management at the Rose-Hulman Institute of Technology, USA. He has taught Project Management, Marketing for New Product Development, Technology Management & Forecasting, Globalization & Strategy, Intercultural Communication, and Organizational Behavior since joining the RHIT Masters of Science in Engineering Management (MSEM) program in 1999.

Professor Schumacher worked for two years at the Open University Business School as a member of the team developing the MBA course "Knowledge Management." He taught Business Policy and Strategic Management courses at Oregon State University. His industrial experience includes three years in a software research center in Munich, Germany, and seven years as a policy analyst in the electric utility industry in the U.S.

Dr. Schumacher studied the culture of a high-tech start-up in his Ph.D. research at Portland State University, USA. He measured significant attitude change in employees who experienced the training simulation developed for that project. His research interests include training simulations, organizational culture, and scenario planning. His current projects include a simulation addressing virtual teams and one on strategic project management.

PH.D. COLLOQUIUM

"CRITICAL STAGES AND CAREER PATHS FOR THE PH.D. STUDENT"

DATE: MONDAY, AUGUST 6, 2007

TIME: 10:30—14:00

LOCATION: BROADWAY

COSTS: $15 PER STUDENT (INCLUDES LUNCH)

Through guest lectures and a workshop, the colloquium gives Ph.D. students an excellent opportunity to meet colleagues, network and learn about the following topics:

- The Ph.D. process and career paths in different countries
- Critical stages in the Ph.D. process and how to successfully master them
- Coping with possible personal problems while pursuing a Ph.D., such as the fear that you will never finish it or the lack of time for family and friends
- Entering the academic job market as future junior faculty
- Landing your first industry job

Guest lectures will provide a starting point for workshop discussions. Workshops will tackle topics the participants are most interested in. They provide a unique opportunity to share experiences and ideas with students from different countries and university systems.

We encourage students in all stages of the Ph.D. process, as well as recent graduates, to join us.

NSF SYMPOSIUM

TECHNOLOGY MANAGEMENT IN THE SERVICE SECTOR

Sponsored by the National Science Foundation (NSF)

DATE: SUNDAY, AUGUST 5, 2007

TIME: 08:00 – 17:00

LOCATION: GALLERIA III & IV

A one-day Symposium, "Technology Management in the Service Sector," will be held at the Hilton Portland Hotel and Executive Tower immediately preceding the technical program of the PICMET '07 (Portland International Center for Management of Engineering and Technology) Conference (August 6—9, 2007).

Key leaders in the field will present their ideas in the morning, leading to open discussions in the afternoon focused on identifying the critical research needs in Technology Management in the Service Sector. The results will be presented to the PICMET '07 Conference participants toward the end of the conference and will be published as a report to be submitted to the National Science Foundation (NSF).

Symposium registration fee is $450. PICMET Conference attendees who also attend the Symposium will receive a $200 Symposium registration discount.

Symposium Chairs

- Tugrul Daim, Associate Professor, Portland State University, USA
- Paul Maglio, Service Systems Research, IBM Almaden Research Center, USA

Symposium Co-Chairs

- Antonie Jetter, Assistant Professor, Portland State University, USA
- Haluk Demirkan, Assistant Professor, Arizona State University, USA

Panelists

- Daniel Berg, Professor, Rensselaer Polytechnic Institute
- Bob Chlebowski, Executive Vice President of Distribution Strategies and Services at Wells Fargo & Company
- Connie Chang, Research Director and Chief of Staff to the Under Secretary of Technology, U.S. Department of Commerce's Technology Administration (TA)
- Eliezer (Elie) Geisler, Distinguished Professor, Stuart School of Business, Illinois Institute of Technology
- Anatole Gershman, Distinguished Career Professor, Carnegie Mellon
- Bridget Haggerty, Interim Chief Information Officer, Oregon Health & Science University
- Bill Hefley, Associate Teaching Professor, Carnegie Mellon University, Pittsburgh, Pennsylvania, USA; and Associate Director, Carnegie Mellon's IT Services Qualification Center (ITSqc)
- Henry Kelly, President, Federation of American Scientists (FAS)
- Douglas Morse, Vice President of Strategic Planning and Delivery Operations for Oracle Global Customer Services
- Terry Oliver, Chief Technology/Innovation Officer, Bonneville Power Administration (BPA)
- Jim Spohrer, Director, Almaden Services Research, IBM
- Chris Tofts, Visiting Professor, University of Bath.

Dr. Daniel Berg

Dr. Daniel Berg received his B.S. in Chemistry and Physics from the City College of New York (C.C.N.Y.) and his M.S. and Ph.D. in Physical Chemistry from Yale. He was employed by Westinghouse Electric in a variety of technical/managerial positions, including Technical Director. He was dean and provost at Carnegie Mellon University (C.M.U.) as well as provost and president at Rensselaer Polytechnic Institute (RPI), where he is Institute Professor of Science and Technology. He is director of RPI's Center for Services Research and Education. He is a Life Fellow of the Institute of Electrical and Electronic Engineers, a Fellow of INFORMS, and a Fellow of the American Association for the Advancement of Science. He is a member of the National Academy of Engineering. He serves as the American Editor of the *International Journal of Services Technology and Management.*

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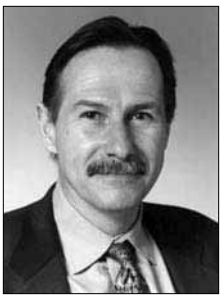
Robert Chlebowski

Robert Chlebowski is Executive Vice President of Distribution Strategies and Services at Wells Fargo & Company. He is responsible for improving the efficiency and effectiveness of Wells Fargo's physical distribution network, including 3,200 retail stores and the third largest ATM network in the U.S.

Mr. Chlebowski began his career with Wells Fargo in 1984, working as a consultant in strategic planning with the company until 1990, when he moved to the Savings and Investment Group and managed a wide range of products, including traditional savings products and investment products such as brokerage, mutual funds, wrap accounts and annuities. He was named Senior Vice President of the Savings and Investment Group in 1993. He oversaw strategy, marketing and finance for several bank divisions, including asset management, private banking, business retirement plans, and retail savings and investment products. In 1995, he moved to Electronic Commerce business development, where he was responsible for the initiation of joint projects with technology companies in the areas of consumer and business internet payments.



Chlebowski was named Senior Vice President of the Savings and Investment Group in 1993. He oversaw strategy, marketing and finance for several bank divisions, including asset management, private banking, business retirement plans, and retail savings and investment products. In 1995, he moved to Electronic Commerce business development, where he was responsible for the initiation of joint projects with technology companies in the areas of consumer and business internet payments.

Chlebowski spent a year as a special assistant to the office of the chairman before being named to his current position in 1998. Before joining Wells Fargo, Chlebowski worked for the U.S. Treasury Department as an international economist and for Strategic Planning Associates in Washington, D.C.

Chlebowski holds a bachelor's degree in English from Fairfield University, a master's degree in international economics from the Fletcher School of Law and Diplomacy at Tufts University, and an M.B.A in finance and strategy from Stanford University.

Connie Chang

Connie Chang currently serves as Research Director and Chief of Staff to the Under Secretary of Technology in the U.S. Department of Commerce's Technology Administration (TA), where she is responsible for overseeing staff, budget, and workflow, leading the development of TA's overall policy agenda, and managing the execution of its various projects and activities with a staff of policy analysts, consultants, and external researchers. Current policy research work includes i) understanding the role of standards and standards setting in advancing technological innovation; ii) examining corporate strategies, innovation challenges, and public policies in the 21st globally integrated economy across 12 industries (in partnership with the National Academies of Science's Board on Science, Technology, and Economic Policy); iii) building a new "resilient enterprise paradigm" that challenges companies to integrate all forms of risk management into their business operations as a competitiveness-enhancing measure akin to the quality movement of the 1980s (in partnership with the Council on Competitiveness); iv) identifying the state of, and barriers to, the commercialization of nanotechnology in the U.S. (in partnership with the University of Illinois, Springfield, College of Business and Management); and v) developing a framework that will lead to the design of "innovation vital signs" or a set of key indicators that will serve as a proxy for the innovation pulse of our nation (in partnership with the Alliance for Science and Technology Research in America and the Center for Accelerating Innovation).

Immediately prior to her current position, Ms. Chang served as the Acting Director for the Office of Technology Policy at TA. She is currently an adjunct assistant professor at Georgetown University, where she co-teaches a course on the economics of technology, innovation, and growth. Connie's interest in the processes, corporate strategies, and funding sources for innovation and policies related to science, technology, innovation was shaped and honed during the 10 years she spent at the Advanced Technology Program (ATP), a public-private partnership program focused on developing high-risk, enabling technologies with the potential for broad-based economic impact. ATP is part of the National Institute of Standards and Technology, an agency TA oversees. She was involved in all aspects of the program, ranging from serving as a voting member

on several Source Evaluation Boards, which assess and recommend qualified R&D projects for ATP funding, to managing the business and economic aspects of dozens of multi-million dollar projects in advanced chemistry and materials processing, to evaluating the impact of funded projects. Most recently, she served as supervisory economist to a staff of six professionals assigned to the Policy Research & Analysis group of the Economic Assessment Office.

Drawing in outside experts and research consultants, she led major program evaluation studies and policy research reports for ATP to advance the understanding of technology-based innovation, including studies that examined methodologies and established new frameworks for evaluating the impact of R&D projects, and reports that focused on the funding sources and private-sector decision making for investing in early-stage technology development as well as publications to assist entrepreneurs in how to present their story to venture capitalists. All reports can be found on ATP's website (http://www.atp.nist.gov/eao/eao_pubs.htm). She has also funded research on using cited and citing patents as a forward indicator of emerging technologies, applying GIS (geographic information system) mapping techniques to visualize these effects, and developing an entrepreneur-centered understanding of regional innovative capacity—work that she is advancing in her capacity as Research Director at TA.

Prior to her government career, Ms. Chang worked at Credit Suisse First Boston (CSFB), formerly known as The First Boston Corporation, a premier Wall Street investment banking firm. As a financial analyst for the Federal Finance and Mortgage Finance Groups for CSFB, she structured, valued, and analyzed a variety of financing options for federal agencies, foreign governments, commercial banks, and thrift savings banks, and in 1988 was responsible for valuing the offering of Farmer Mac, the Federal Agricultural Mortgage Company, which is still in operation today.

Ms. Chang earned a master's degree in International Management and Comparative Politics from the School of International Relations and Pacific Studies at the University of California, San Diego, and a bachelor's degree in Economics, with honors, from Wellesley College. She completed doctoral studies and passed her qualifying exams in Political Economy and Science, Technology, and Public Policy at the Massachusetts Institute of Technology's (MIT) Department of Political Science.

Dr. Eliezer (Elie) Geisler

Dr. Eliezer (Elie) Geisler is IIT Distinguished Professor at the Stuart School of Business at the Illinois Institute of Technology in Chicago, Illinois, USA. He holds a doctorate in Organization Behavior from the Kellogg Graduate School of Management at Northwestern University. Dr. Geisler is the author of over 90 papers in the areas of technology and innovation management; the evaluation of R&D, science and technology; and the management of medical technology. He is the author of nine books, including: Managing the Aftermath of Radical Corporate Change, (1997); Management of Medical Technology: Theory, Practice and Cases (Co-authored with Heller) (1998), Kluwer Academic Publishers; The Metrics of Science and Technology (2000), and Creating Value with Science and Technology (2001). His most recent books are: Installing and Managing Workable Knowledge Management Systems (Praeger, 2003, co-authored with Rubenstein) and Technology, Health Care and Management in the Hospital of the Future (Praeger, 2003, with Krabbendam and Schuring). His forthcoming books are Knowledge Management: Concepts and Cases (M.E. Sharpe, with Wickramasinghe, 2007) and Knowledge and Knowledge Systems: Learning From the Marvels of the Mind, Idea-Group Publishers, 2007).

Dr. Geisler was the founder and editor of the Department of Information Technology for the IEEE Transactions on Engineering Management (1991-1999), and is founder and associate editor of the International Journal of Healthcare Technology and Management. He has consulted for major corporations and for many U.S. federal departments, including the U. S. Department of Defense, U.S. Department of Commerce, EPA, U.S. Department of Energy, U.S. Department of the Air Force, U.S. Department of the Navy; U.S. Department of Agriculture and the Agricultural Research Service, NIOSH, and NASA. He also consulted for state agencies such as the State of Illinois. Dr. Geisler is currently Director of IIT's Center for the Management of Medical Technology (CMMT). He co-chairs the annual Conference on the Hospital of the Future, in conjunction with universities in the Netherlands, Australia, the United Kingdom, Japan, Brazil, Mexico, Denmark, and Italy.

Dr. Geisler's areas of research, teaching and consulting are the management and evaluation of research, development, knowledge, and technological innovation.

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He developed the stage approach to the evaluation of technology and technological organizations. He is a leading scholar in the area of measurement of complex phenomena and the metrics of science, technology, and knowledge. His book on metrics was translated into Chinese, in the People's Republic of China. Dr. Geisler also pioneered the systematic study of management of medical technology and co-authored a textbook on this growing topic. More recently his area of research and publication has been the nature and progress of human and organizational knowledge and the management of knowledge systems.

Dr. Geisler was chair of the College of Innovation Management and Entrepreneurship of the Institute of Management Sciences and is the elected chair of the Special Interest Group on healthcare technologies for the Association for Information Systems. He is a reviewer for leading journals in management and technology management. Dr. Geisler serves on the Board of Directors of Sinai Medical Center and Schwab Rehabilitation Hospital in Chicago, Illinois, and he chairs the Quality Committee of the Board of Directors. His research was funded by private and public organizations, such as the National Science Foundation and NASA.

Dr. Anatole Gershman

Dr. Anatole Gershman is a Distinguished Career Professor of Computer Science at Carnegie Mellon University. Prior to his current position, Dr. Gershman joined Accenture Technology Labs in 1989, and in 1997 he became its Global Director of Research. Under his leadership, research at the laboratories focused on early identification of potential business opportunities and the design of innovative applications for the home, commerce and work place of the future. These included electronic commerce, high-performance virtual enterprise, knowledge management, and human performance support. To achieve these goals, the laboratories conducted research in the areas of ubiquitous computing, human-computer interaction, interactive multimedia, information access and visualization, intelligent agents, and simulation and modeling.

Prior to joining Accenture, Dr. Gershman spent over 15 years conducting research and building commercial systems based on artificial intelligence and natural language processing technology. He held R&D positions at Coopers & Lybrand, Cognitive Systems, Inc., Schlumberger, and Bell Laboratories. In 1997, he was named among the top 100 technologists in the Chicago area by Crain's Chicago Business. In 2000, Industry Week named Dr. Gershman one of the "R&D stars to watch."

Dr. Gershman studied Mathematics and Computer Science at Moscow State Pedagogical University and received his Ph.D. in Computer Science from Yale University in 1979.

Bridget Haggerty

Bridget Haggerty is Interim Chief Information Officer at Oregon Health & Science University (OHSU) in Portland, Oregon. She has worked in OHSU's Information Technology Department since 1999 and has had a key role in implementing and managing its Oracle ERP applications, student information systems, and research information systems during that time. Her team of technical professionals is responsible for supporting all missions of OHSU (academic, clinical, research and outreach functions), as well as the multiple business entities that support OHSU (university, hospitals and clinics, university medical group, OHSU Foundation). She has published and presented to professional organizations on application implementation and selection strategies. Ms. Haggerty is currently on the Board of the Oracle Higher Education User Group, the Northwest Oracle User Group, and the Northwest Academic Computing Consortium.

Ms. Haggerty began her career as research administrator for the California Public Health Foundation and moved to Oregon in 1997 to become OHSU's Contracts Manager in Logistics. In 1999 Bridget moved to the Information Technology Group (ITG) to support research and academic information systems and since that time has taken on increasing responsibility and a leadership role within ITG. She has completed two graduate degrees, Engineering Management and an MBA, while working at OHSU; and she is currently working on obtaining her Ph.D.

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Dr. Bill Hefley

Dr. Bill Hefley is an Associate Teaching Professor at Carnegie Mellon University (Pittsburgh, Pennsylvania, USA). He concurrently serves as an associate director of Carnegie Mellon's IT Services Qualification Center (ITSqc), where he is involved in model and evaluation method development, as well as design and development of curriculum for strategic service management. Within ITSqc, he led the development of the eSCM for Client Organizations (eSCM-CL) and is a founding member of the faculty in the Service Management concentration in Carnegie Mellon's Masters of Information Systems Management.

Dr. Hefley has over 30 years' experience with industry roles in academic, government, and commercial settings. He directed software engineering improvement and training initiatives for Carnegie Mellon in the Asia-Pacific region, and served as project director for a long-term project with the Korea IT Industry Promotion Agency (KIPA). Dr. Hefley was an executive consultant with IBM Global Services, focusing on helping global organizations to improve their capabilities. As a senior executive at Q-Labs, an international software engineering firm, he consulted with key client organizations and helped Q-Labs address strategic business issues. He was also a resident affiliate and visiting scientist at the Software Engineering Institute (SEI) in its Capability Maturity Modeling project.

Prior to joining IBM, Dr. Hefley was on the faculty of the undergraduate Information Systems Program at Carnegie Mellon University. In his prior activities at the SEI, he led the team that developed the People Capability Maturity Model® (P-CMM®) (first published by AddisonWesley, 2002, now in five imprints: US, India (2), China and Japan) to guide organizational efforts in maximizing their human capital potential. He is co-author of the People CMM® appraisal method and its handbook for assessment leaders. He has led systems development and user interface design projects for critical space and C3I applications, and for financial and manufacturing systems for firms in the heavy manufacturing and semiconductor industries. He was project manager for a crew trainer for the Space Shuttle.

Dr. Hefley has consulted in the U.S., India, Australia, Korea, Denmark, Japan, France, and the Netherlands, and has taught in the U.S., India, Korea, Australia, Denmark, U.K., and Germany. He also taught at IBM's Executive Consulting Institute. Dr. Hefley has taught the Introduction to the eSourcing Capability Model for Service Providers and Introduction to the eSourcing Capability Model for Client Organizations, and is well known as an SEI-authorized instructor for the SEI's Introduction to the Capability Maturity Model for Software and Introduction to the People CMM courses. A lead evaluator for eSCM Capability Determinations and member of Carnegie Mellon's eSCM Certification Board, he was authorized by the SEI as a lead assessor for the CBA IPI, People CMM and SCAMPI appraisal methods. Dr. Hefley is also a managing principal consultant with Pinnacle Global Management, L.L.C., and a vice president at Hefley Associates, Inc.

Dr. Hefley has a Ph.D. in Organization Science and Information Technology from Carnegie Mellon University. He received an M.S. in Engineering and Public Policy from Carnegie Mellon University and an M.S. in Systems Management from the University of Southern California. His undergraduate degrees are in psychology, computer science and political science.

Dr. Henry Kelly

Dr. Henry Kelly is the President of the Federation of American Scientists (FAS). Before he joined FAS, he was Assistant Director for Technology in the White House Office of Science and Technology for eight years helping negotiate and implement major administration research partnerships in energy and the environment, information technology, and learning technology. These included partnerships for new automobile and truck technology, housing technology, bio-processing technology, and information technology. He convened the President's Information Technology Advisory Committee and helped translate the committee's advice into a large expansion and refocusing of federal information technology research. He also was instrumental in creating major federal programs in learning technology for children and adults, including an executive order accelerating the use of instructional technology for training federal civilian and military employees. Prior to his work in the White House he was a senior associate at the Congressional Office of Technology Assessment, assistant director for the Solar Energy Research Institute, and worked on the staff of the Arms Control and Disarmament Agency. Kelly is an elected fellow of the American Physical Society, 2002 winner of the APS' Leo Szilard Lectureship Award for

NSF Symposium

"promoting the use of physics for the benefit of society," and was named the biannual "Champion of Energy Efficiency" in 2000 by the American Council for an Energy Efficient Economy. He received a Ph.D. in Physics from Harvard University and is the author of numerous books and articles on issues in science and technology policy.

Douglas Morse

Douglas Morse, Vice President of Strategic Planning and Delivery Operations for Oracle Global Customer Services, has spent over 29 years developing service strategies and solutions for companies in high tech and medical equipment services. He started his career and spent over 18 years with IBM Global Services, specializing in service strategies for distributed computing environments, professional services, and outsourcing. He has been a consultant to Fortune 500 companies, guiding efforts to build highly profitable services organizations. Through extensive market research and comprehensive delivery modeling, he has helped a variety of services companies focus on the customer value chain to improve overall profitability and to drive operational excellence.

Mr. Morse is an executive advisor and member of Services and Support Professional Assoc. (SSPA). He is a member of the executive advisory board for the Center for Services Leadership at the W.P. Carey School of Business at Arizona State University and KISMT, the Center for Knowledge, Information Systems, and Management of Technology at the University of California at Santa Cruz. Most recently, he joined the advisory board for the Services Research and Innovation network, or SRInet, to promote national and international initiatives that drive investments into services education and innovation that will prepare us for the new services economy. He also teaches and does guest lectures at a number of leading universities on services strategy, marking and global operations.

Terry Oliver

Terry Oliver has worked globally to advance energy conservation and renewable energy. He has worked for Bonneville Power Administration (BPA) since 1981. In the Pacific Northwest, USA, he managed one of the world's largest residential energy conservation programs, the PNW Residential Weatherization Program, led ground-breaking research on community-based energy conservation applications in the Hood River Conservation Project, and established two enduring icons of energy efficiency innovation, the Lighting Design Lab and the Energy Ideas Clearinghouse. In 1992 he moved to Bangkok, Thailand, to lead the Asia Regional Office of the International Institute for Energy Conservation (IIEC). In 2000, Terry returned to BPA where he worked on BPA's EnergyWeb concept and its application to the PNW. As part of this effort he helped create BPA's Non-Wires Solutions initiative, participated in EPRI's Intelligrid grid architecture initiative, and led the GridWise Alliance Demonstrations Working Group. In June 2005 Terry was appointed Bonneville Power Administration's first Chief Technology Innovation Officer, responsible for re-energizing, focusing, and managing BPA's research and development activities.

Dr. Jim Spohrer

Dr. Jim Spohrer is the Director of Almaden Services Research, with the mission of creating and deploying service innovations that matter and scale well both internally to transform IBM and externally to transform IBM client capabilities ("double win" service innovations). Service system innovation is a multidisciplinary endeavor, integrating technology, business model, social-organizational and demand innovations (just think about the ubiquity of credit cards, and what it took to make that service system innovation global; also, too often, people focus on the invention of the light bulb, and forget about the service system innovations required to make that point technology innovation beneficial to so many).

Prior to joining IBM, Dr. Spohrer was at Apple Computer, attaining the role of Distinguished Scientist, Engineer, and Technologist (DEST) for his pioneering work on intelligent multimedia learning systems, next generation authoring tools, on-line learning communities, and augmented reality learning systems. He has published in the areas of speech recognition, artificial intelligence, empirical studies of programmers, next generation learning systems, and service science. He graduated

with a Ph.D. in Computer Science from Yale University (specializing in Artificial Intelligence and Cognitive Science) in 1989 and a B.S. in Physics from MIT in 1978.

Dr. Chris Tofts

Dr. Chris Tofts has worked on the analysis of complex systems for the last 20 years. Having trained as a mathematician, he developed theories of correctness for concurrent systems. In particular, he was an early student of the impact of adding probability and timing phenomena to process algebras. After developing several models of biological behavior, in particular task allocation in ants and vertical parasite migration, using these techniques, he applied similar methods to the theory of simulation modeling languages. This work culminated in the formally specified DEMOS2k (www.demos2k.org) modeling language.

During his time at Hewlett-Packard, he was interested in the rapid analysis of complex business problems, in particular the effectiveness of the contract terms for large outsourcing deals. Along with his colleague Richard Taylor, he is responsible for developing a quantitative analysis based approach to the lifetime properties of IT service deals.

Dr. Tofts is a visiting professor in computer science at Bath University. He has published over 75 papers, applied for over 50 patents, and refereed extensively. He has degrees in Mathematics from Cambridge University; Computer Science from Cambridge University; a PhD in Theoretical Computer Science from LFCS, Edinburgh; an MBA from Bath University; and Fellowships from the BCS and the IMA.

SESSIONS

MA-01 PLENARY-1

DATE: MONDAY, AUGUST 6
TIME: 08:30 – 9:30
ROOM: PAVILION
CHAIR: RICK WARREN; IBM SYSTEMS & TECHNOLOGY GROUP

KEYNOTE

Matthew J Realff; National Science Foundation, United States

"Service Enterprise Engineering: An Overview"

The U.S. economy, along with the rest of the developed world, has increased its economic activity through the dramatic growth of the service sector. Over 80% of the U.S. labor force now works in the service sector, which accounts for 4.2 trillion dollars out of a total of 7.4 trillion dollars of personal expenditures. Research in manufacturing technologies has enabled gains in manufacturing efficiency and productivity, keeping the U.S. manufacturing sector of the economy competitive in a global marketplace. The Service Enterprise Engineering program is engaging the engineering community in basic research to understand the needs, and synthesize new designs, of service enterprises so that the U.S. can continue to be competitive in the sector of the economy and deliver high quality services both for domestic consumption and export.br /> Dr. Realff will highlight some of the recent research areas that have been the focus of activity in service engineering research and give his perspective on the challenges that are to be faced. He will give his perspective on the challenges of systematizing services and fostering innovation in the service industry. Note: Any opinion, findings, and conclusions or recommendations expressed in this talk are those of the author and do not necessarily reflect the views of the National Science Foundation.

KEYNOTE

Jay Lee; University of Cincinnati, United States

"Design of Innovative Product Service System"

Innovation is not an option for today's industry. For the past decade, globalization and transformation of the flat-world economy has produced vast new challenges for industry. Innovation is not just about new product development; it also refers to the creation of new value-added services to transform better productivity and business performance. As the practice of product design has expanded both in economic and social impact and in technological complexity, so has the demands upon innovative service systems. For example, GE Medical changed its name to GE Healthcare Technologies to expand its business opportunities. Companies such as IBM and Xerox are also transforming to be smart service business leaders. Industry needs to learn how to develop niche expertise with value-added innovation to compete globally. This presentation introduces the strategies and emerging technologies for product service business innovation. Examples (including iPod, GE Healthcare, John Deere, Otis Elevator, GM OnStar, etc.) will be given to illustrate how to formulate "gaps" between product and customer needs using innovation matrix and the right thinking mechanisms. In addition, an Industry/University Cooperative Research Center Model as well as its operations in an academic environment will be discussed.

MB-01 Technology Management in the Service Sector-1

Monday, 8/6/2007, 10:30 - 12:00 **Room: Pavilion East**
Chair(s): Bharat Rao; Polytechnic University

The Effects of Technology Readiness Index and IT-based Services on the Service Quality in the Hotel Industry

Chi-Shiun Lai; National Yunlin Univ. of Science & Tech., Taiwan

In the past the hotel primarily focused on the personnel services. Nowadays, they gradually use information technology to provide the services, for example, on-line room reservation, free internet services and so on. However, does the customer accept these IT-based services or not? How do IT-based services influence service quality, customer's satisfaction, and loyalty? Theses issues need further discussion. This study explores the effects of customer's technology readiness index and IT-based services on the total service quality in the hotel industry. We investigate the customer of a five-star international hotel and use LISREL software to test our hypotheses. The results indicate that when the customer has a higher technology readiness index, he (she) will perceive better IT-based services and total service quality. That is, the more the customer accepts technology, the more he (she) has a positive attitude about IT-based services and total service quality. Next, when the customer has a better perception about IT-based services, he (she) will feel better about total service quality. Finally, when the customer has a better perception about IT-based services and total service quality, he (she) will be more satisfied and more loyal to the hotel.

MB-01.2 [R] The Effects of Service Quality on Customer Relational Benefits in Travel Website

Chi-Shiun Lai; National Yunlin University of Science & Technology, Taiwan
Chun-Shou Chen; Hsiuping Institute of Technology , Taiwan
Pei-June Lin; Da-Yeh University, Taiwan

Relational benefits are important factors to build relationships with customers. As for our knowledge, no research has focused on the relationships between service qualities of travel website with each customer's relational benefits. However, the on-line travel market has been growing faster than before. It is important to discuss this issue. This study explores the effects of travel website service quality on the customers' relational benefits, and the relationships among customers' relational benefits, e-satisfaction, and e-loyalty. We investigate on-line customers who had have transactions with a travel website within one year, and we use LISREL software to test our hypotheses. The results reveal that: 1) When the service quality of a travel website is better in responsiveness, quality of information, and empathy, the customer will perceive more confidence benefits; 2) when the travel website has more empathy, the customer will perceive more social and special treatment benefits; 3) when the customers perceive higher confidence, social, and special treatment benefits, they will have more e-satisfaction; 4) when the customers feel e-satisfaction when using a travel website, they will be more e-loyal; and 5) when the travel website is responsive, it will influence directly the customers' e-loyalty.

MB-01.3 [A] Managerial Decisions in Service Industry: Case of Information Technology

Rosine H Salman; Portland State University, United States
Tugrul Daim; Portland State University, United States

The service sector has become increasingly important for economic growth and wealth in the United States. It is the fastest growing sector among the three traditional sectors: goods, manufacturing and services. This paper investigates differences in the patterns of decision-making processes between private organizations in the service sector. It specifically looks at IT-purchasing decisions of three private corporations. The paper is based on a literature review that provides a theoretical basis for the analysis, expert interviews and a set of (informal) questionnaires that were sent out to mid- and high-level decision makers of the three organizations.

MB-01.4 [A] Process Integration Using SOA: An Implementation Case in a Municipality

Norberto A Torres; Fundacao Getulio Vargas, Brazil

There is a new world in which we are living, with a complete reconfiguration of the concept of enterprise and organization in course, in which whole business chains shall be the basis for any management action, and for which are of crucial importance the new information and process technologies architectures (Business Process Management (BPM) and Service Oriented Architecture (SOA)). As the central focus of the paper, an interesting case is presented in which the best solution, for a municipality, was to jump into this new world of possibilities.

MB-02 Convergence of Technologies-1

Monday, 8/6/2007, 10:30 - 12:00 **Room: Pavilion West**

Chair(s): Narendra K Jain; University of Rajasthan

MB-02.1 [A] University-Industry Relations and Technological Convergence

Fernando Romero; Universidade do Minho, Portugal

University-industry relationships and the associated diversity of multi-institutional networks of researchers are phenomena that have important implications in terms of the management of technological integration. The nature of these peculiar relationships has inherent knowledge generation characteristics that may be particularly suitable to the task of integrating different approaches and different technologies in novel ways. This paper attempts to systematize and synthesize recent literature on the subject. It focuses on the relationships between forms or modes of academia and industry cooperative channels and their implications for knowledge production and exploitation. It explores their contribution in terms of their potential as tools that can be used in the management of technological convergence. It presents relevant or illustrative examples, describing the main empirical findings and their important contributions, and it proposes a model that conceptualises the problem.

MB-02.2 [A] Generation of Manpower for Teaching, Research and Industry at the Centre for Converging Technology

Narendra K Jain; University of Rajasthan, India

In the beginning of the 21st century we have seen tremendous human progress, which became possible because of merging of all disciplines of sciences at the nano scale, through converging technologies, resulting in the advancements in four core fields: nanotechnology, biotechnology, information technology, and new technologies based in cognitive science (NBIC). The present paper discusses the creation of the Centre for Converging Technology (CCT) at the University of Rajasthan, Jaipur, India, which is the first of its kind in the country to educate a vast population of students in these fields, who can undertake research and development for the betterment of human life. Various aspects of these technologies along with their applications have been discussed. Undergraduate prerequisites of master's program, program curriculum, needs of the laboratory facilities and infrastructure for CCT have been incorporated. It has been proposed to initiate national and international collaboration with various institutes, universities, laboratories and scientific agencies for the development of CCT, leading to a revolution in the human life enrichment. A brief description of the University, State of Rajasthan and Jaipur has been given for national and international students.

MB-02.3 [R] Managing Converging Technologies Requires System Health

Dietmar H Winzker; Innomed Africa / U. of Johannesburg , South Africa
Leon Pretorius; University of Johannesburg, South Africa

High technology companies often struggle with the effective integration of systems and processes and effective convergence of diverse technologies. By utilizing a management model which is analogous to the functioning of an organism at cellular and tissue levels, diverse organizational processes, technologies and system functions can be integrated successfully. For a human body the following holds: All cells, processes and functions in the diverse and highly specialized tissues of the organism have to function harmoniously, be adaptable to diverse environmental conditions and have to be ailment-free if top performance is to be expected. The organism is fully capable of achieving this, if a few critical characteristics are optimized and when supplied with the correct nutrients and sufficient supply of oxygen by means of the blood and the body's circulatory system. In the case of an organization, this translates into business units or sections and to every individual in the organization, each with its own mix of multi-disciplinary functions, its applicable technologies, subsystems and processes that have to be sustained with the overall strategic intent, the correct and appropriate business information and effective competencies. Collectively, these have to function harmoniously, concurrently and with high efficacy for the organization to consistently outperform the competition. The paper describes the management model referred to as System Health Management Model in which the emphasis is placed on a living organism's key characteristics, causing it to reach consistent top-performance. A top-performing, correctly nourished, living organism is characterized by being networked, self-organised, self-regulated, highly optimized and self-healing. By judiciously choosing and correctly managing analogous characteristics for the organization, technology convergence and system performance are greatly enhanced.

MB-03 Technology Adoption-1

Monday, 8/6/2007, 10:30 - 12:00 **Room: Broadway-1**

Chair(s): Frederick W Betz; Venture2Reality

MB-03.1 [A] ICT Adoption and Use by SMEs in the UK: A Survey of South East

Romano Dyerson; University of London, United Kingdom
G. Harindranath; University of London, United Kingdom

The authors present the results of a survey of 400 small- and medium-sized enterprises (SMEs) drawn from four economically significant sectors in the UK's most productive region, the southeast of England, on their adoption and use of information and communications technology (ICT). Our objectives were to explore ICT adoption and use patterns by SMEs; identify factors enabling or inhibiting the successful adoption and use of ICT; and explore the effectiveness of government policy mechanisms at national and regional levels. The main result indicates a generally favorable attitude to ICT amongst the SMEs surveyed, but also suggests a failure to recognize ICT's strategic potential: the majority of ICT applications implemented are at a strictly operational level. SMEs are also generally distrustful of ICT consultants and fear being "trapped" by spiraling costs associated with "wasteful" ICT expenditure. The most surprising result was the overwhelming ignorance of regional, national and European Union wide policy initiatives to support SMEs. This strikes at the very heart of EU and UK policy that have identified SMEs as requiring support mechanisms. Our findings from the UK's most productive region, therefore, have important implications for policy aimed at ICT adoption and use by SMEs.

MB-03.2 [A] A Study of Applying the Structuration Model of Technology to the Implement of Enterprise Resource Planning

Chia-Hsien Wu; Diwan University/Yunlin University of Sci. & Tech., Taiwan
Fang Kwoting; Yunlin University of Science and Technolog, Taiwan

The velocity and dynamic nature of the global marketplace, in terms of the progress of the information technology, have driven a competitive incentive among companies in Taiwan to consolidate and reconcile their service, as a means of creating value that is sustainable over time. The enterprise resource planning (ERP) system, during the past decade, is paid much attention in the business setting in Taiwan. A lot of efforts have been spent on its related studies, especially on critical success or failure factors; however, the depth and practical standpoints for the interaction among people when implementing the ERP system are spare. The main purpose of this study is that it adopted the Structuration Model of information technology, originally from Orlikowski, to explore the interactions among the ERP system, organization and people when the ERP system was implemented. The results reveal that there existed interactions among technology, ERP participants and organization. It is hoped that the results of this study will provide valuable information to managers when launching an ERP system.

MB-03.3 [A] Closing Digital Gap on RFID Usage for Better Farm Management

Urachada Ketprom; NECTEC, Thailand
Chaichana Mitrpant; NECTEC, Thailand
Putchapun Lowjun; NECTEC, Thailand

In a developed country, farmers have access to advance technology for Radio Frequency Identification (RFID) farm management. Recently, RFID has become a globally recognized technology for animal identification to simplify farm activities such as automatic feeding. In a developing country, Thailand, RFID is a cutting-edge technology unknown to most farmers. Uneducated farm laborers are often afraid of being replaced with technology while farm owners lack interest in technology because of cheap labor cost (5 US dollars per day for the minimum wage). RFID plays an important role in widening the digital gap in farm management because RFID investing pioneers will get the highest return and widen the gap much greater from an access to technology and information. The integration of greater information availability reduces feed waste and labor cost, and improves animal health and ease of animal management. A research survey by NECTEC in 2005 indicates that low RFID usage in Thailand is based primarily on four factors: RFID cost, standard, technology suitability, and

lack of knowledge. Comparing RFID investment with benefits and returns on broiler farms, this paper aims to analyze ways to close the digital gap and provide levels of RFID usage for better farm management.

MB-03.4 [R] Firm that Transform Scrap of Glass into Gold: The Evolution of Technology of UNIQUE

Fang-Chen Kao; National Yunlin University of Science & Technology, Taiwan
Yun Ken; National Yunlin University of Science & Technology, Taiwan
Justine Chang; Chinese Culture University , Taiwan

The research focuses on a case study of the Unique Optical Corporation located in Taiwan. Research includes longitudinal data of events in chronological order from the main axis and sorting the events according to the timing of their occurrence and magnitude in order to explore the origin and development of this company's technology. The historical phases of this company's technological development is segmented according to summarized data, with cross-sectional data as supplementary support, revealing the evolution of innovation to track this case company's technology transfers. Unique Optical is the sole blank optical glass manufacturer in Taiwan and has its technology development experiences from OEM, first imitating technology to eventually reaching technological autonomy. The study attempts to discover the evolutionary relationship among issues such as important factors that connect the evolution process in a case company, methods of capability development, operating technology strategies and types of innovation, etc., that form the important factors of business innovation process structures. Thus, how a business utilizes its existing capability organizational development to identify and select innovation types and technology strategies to continue influencing the opportunity of business growth in the next phase can be explained.

MB-04 Innovation Management-1
Monday, 8/6/2007, 10:30 - 12:00 **Room: Broadway-2**
Chair(s): Jeong-Dong Lee; Seoul National University

MB-04.1 [R] Becoming a 'Global Top Niche Company' through Two-Step Innovation

Masanori Namba; Ritsumeikan Asia Pacific University, Japan

Nowadays, many Japanese companies are becoming "global niche top companies" with unique products or technologies originating, in many cases, in traditional or commonly used technologies. These companies contribute, as parts or materials, to high-tech or high quality final products in the global market. A "global niche top company" is defined as a company holding the leading position in a specific niche market at the global level. Analyzing these companies from the viewpoint of innovation creation, and extracting common factors, is very meaningful for companies aiming for the global niche top position. In this paper, three companies are analyzed from the innovation viewpoint through the case study method, including interviews with top management, and then the common factors are extracted. The "two-step innovation process" is observed as the common factor among these three companies. The two-step innovation process is composed of, first, a small innovation and then, second, a major innovation. The first small innovation is created through combining the accumulated skills of traditional technologies or commonly used technologies with modern technologies. Following that, the major innovation occurs as a result of the further skills which have been accumulated through the usage of the first innovation.

MB-04.2 [A] The Possibility of Competitive Edge Improvement in the Satellite Equipment Industry of Japan

Manabu Ohhashi; The University of Tokyo, Japan
Shuichi Rokugawa; The University of Tokyo, Japan

In this research, the possibility of industrial competitive edge improvement necessary to activate the satellite equipment industry of Japan in the future was analyzed. Because the satellite development policy of Japan aims at up-to-date technological development and proof, it doesn't lead to the development that reflects industrial users' needs and the establishment of the satellite bus; on the other hand, the development of high technology is advanced. In the development of the satellite equipment, integration technology that integrates each part and subsystem is necessary. The satellite equipment industry of Japan does not fill steady achievement of function, acquisition of reliability, using the bus with abundant accumulation of integration technology, and advance designing and manufacturing efficiently, using the bus as a product platform. The approach on the technology necessary for industry (cost, development period) is insufficient, and the influence of no established bus is also large. These originate in the difference of development budgets and operation results. As a result, the possibility that the satellite equipment industry of Japan improves competitive edge by continued innovation along present architecture is low. A new strategic scenario like revolution to new architecture is considered to be necessary.

MB-04.3 [R] Distribution and Evolution of Industrial Innovation Efficiency

Jiancheng Guan; Beijing University of Aeronautics & Astronautics, China
Xiangju Qu; Beijing University of Aeronautics & Astronautics, China
Sumin Zhong; Beijing University of Aeronautics & Astronautics, China

We propose a two–stage model of Data Envelopment Analysis (DEA) to assess the innovation efficiency of the innovative effort for Chinese industries. The first stage is to measure the technology efficiency and the second is to measure the economy efficiency. The integral stage is the combination of the two stages and to evaluate integral efficiency for the whole innovative process. For different evaluating purposes, two kinds of DEA models, namely CCR and BCC, are used to measure the innovation efficiency and analyze evolution of innovation efficiency of Chinese industries during the recent years, respectively. The results indicate that most of Chinese industries have a relative high efficiency in the first stage, however, and a low efficiency in the second stage. Mediocre efficiency occurs for most of Chinese industries in the integral stage. This reveals there are some serious inconsistencies between technology capability and economic performance in most Chinese industries, and their capability of transforming technology efficiency to economy is relatively poor. Research results further show that there is still much room for Chinese industries to improve their innovation efficiency. The findings reveal that the heavy investment in R&D alone can neither bring high S&T output, nor competitive advantages.

MB-04.4 [R] Enterprise Technology Management Maturity Model and Application

Junwen Feng; Nanjing University of Science and Technology, China
Xiaoyan Li; Nanjing University of Science and Technology, China

Retrospectively, in human history economic development has been concerned with technology. Technology is the huge force that pushes forward economic development. In the current knowledge-economic period, technology has become an important asset in an organization, especially in an enterprise. Consequently, technology management has emerged as an issue that managers have to deal with. Therefore, this paper aims to construct a technology management maturity model to evaluate the differences among enterprises' technology management practices. An enterprise will be used as an example to illustrate the application of this model and discuss how to support the practices at each maturity level in a certain enterprise by using this model.

MB-05 SPECIAL SESSION: Doctoral Colloquium
Monday, 8/6/2007, 10:30 - 12:00 **Room: Broadway-3**
Speaker(s) Nathasit Gerdsri; Mahidol University
Antonie Jetter; Portland State University
Peerasit Patanakul; Stevens Institute of Technology

Through guest lectures and a workshop, the colloquium gives Ph.D. students an excellent opportunity to meet colleagues, network and learn about the following topics: • The Ph.D. process and career paths in different countries • Critical stages in the Ph.D. process and how to successfully master them • Coping with possible personal problems while pursuing a Ph.D., such as the fear that you will never finish it or the lack of time for family and friends • Entering the academic job market as future junior faculty • Landing your first industry job Guest speakers will provide a starting point for workshop discussions. Workshops will tackle topics the participants are most interested in. They provide a unique opportunity to share experiences and ideas with students from different countries and university systems. We encourage students in all stages of the Ph.D. process, as well as recent graduates, to join

us. Lunch will be provided. Registration for the workshop is $15, and that is to partially cover the cost of lunch.

MB-07 Technology Management Education-1: Curriculum
Monday, 8/6/2007, 10:30 - 12:00 **Room: Forum Suite**
Chair(s): Edward A Stohr; Stevens Institute of Technology

MB-07.1 [R] Teaching the Global Dimensions of Technology Management: A Framework for Course Development

Beate Klingenberg; Marist College, United States
Eitel Lauria; Marist College, United States

Technology Management education emerged through the last two decades in order to enable technology-driven firms to link strategic management goals to their technological capabilities and requirements. Technology in the broadest sense has become a driver for individual firms and entire industries, as well as being the key component for the increasingly complex global economy. It is therefore a given that technology management programs need to provide a thorough understanding of how technology impacts the global economy, and vice versa, how to manage globalized technology. This paper provides a framework for the development of courses that address this requirement. In particular, the framework focuses on study-abroad courses, which allow integrative, cross-cultural learning while being exposed on-site to the effects of globalization. Two methodologies are combined to build the framework. As part of a vision-driven approach to program development, program and basic course learning objectives are defined. Second, a systems perspective is used to identify the relationships between business, society, and governments, for which technology management education is playing the role as mediator. Course learning objectives are mapped to the identified relationships. Based on these refined learning objectives, the detailed visits and activities for a study-abroad trip are developed. This process is exemplified with the case of a study-abroad trip to China, which is a mandatory course in an existing technology management program. The paper concludes with recommendations to educators on how the framework can be applied in order to customize such courses for visits to different countries or regions.

MB-07.2 [R] A Comparative Analysis of Undergraduate Engineering and Technology Management Education Programs in the United States

Pamela R Becker; Eastern Michigan University, United States

Exponential growth in undergraduate engineering and technology management programs has occurred since 1987; yet there is no agreed upon body of knowledge in this field nor are there established benchmarks. Unifying models, theories and curricula are needed for the codification of knowledge to occur. Benchmarks must be established so that technology management programs can be assessed and so that the development of the knowledge base and the structure of programs will be relevant in the future. The purpose of the study will be to explore the progression of undergraduate technology management education since the 1987 National Research Council report "Management of Technology: The Hidden Competitive Advantage". A cross-sectional document review and content analysis of identified undergraduate engineering and technology management programs will occur to determine the current status of the field. The identified programs will be examined to ascertain if there is a common body of knowledge, and what that common body of knowledge entails. The report delineated issues and responsibilities specific to the management of technology, and a comparative analysis of the programs to these issues and responsibilities will also be undertaken.

MB-08 Project/Program Management-1
Monday, 8/6/2007, 10:30 - 12:00 **Room: Council Suite**
Chair(s): Ayala M Pines; Ben-Gurion University

MB-08.1 [R] Program Value: What Can We Learn From Major Defense Programs?

Peerasit Patanakul; Stevens Institute of Technology, United States
Aaron J Shenhar; Stevens Institute of Technology, United States

In program management, several best practices have been developed from major aerospace and defense programs. In this study, we examined seven major defense programs. Our intention was to learn from these successful programs, especially about the concepts of program value. As a result, we are able to suggest the definition of program value, the forms of program value, and some propositions for future research. Our research also suggests a better way to manage a program for the better business results, organized as a conceptual hierarchy of program value.

MB-08.2 [R] Development of an Effort Estimation Model: A Case Study on Delivery Projects at a Leading IT Provider within the Electric Utility Industry

Teodor Sommestad; KTH Royal Institute of Technology, Sweden
Joakim Lillieskold; KTH Royal Institute of Technology, Sweden

When projects are sold with fixed prices, it is utterly important to quickly and accurately estimate the effort required to enable an optimal bidding. This paper describes a case study performed at a leading IT provider within the electric utility industry, with the purpose of improving the ability to early produce effort estimates of projects where standard functionality is delivered. The absence of reliable historic data made expert judgment the only appropriate foundation for estimates, with difficulties of quickly developed estimates and reuse or modified estimates already made. To overcome these troubling issues, the expert estimates were incorporated into a model where they and the factors influencing them are traceable and readily expressed. The model is based on decomposition of projects and bottom-up estimation of them, where impact of relevant variables is estimated by assessing discrete scenarios. It provides a quick and straightforward means of developing estimates of the decomposed elements and whole projects in various circumstances, where not only expected effort is considered, but the uncertainty of the individual estimates is visualized as well, which together with the traceability enables the estimates produced by the model to be assessed, analyzed and refined as more details of the project are known.

MB-08.3 [R] Measuring the Value of Project Management

Leandro A Patah; University of Sao Paulo, Brazil
Marly M Carvalho; University of Sao Paulo, Brazil

In the last few years many companies around the world are spending lots of money on project management. They realize that it is important to work with a structured project management methodology. But, how do we get top management committed to project management? How can we prove that spending money in project management is worthwhile? Regardless of how much literature exists in the area of effective project management, executives will not become committed until they see the system operating effectively and producing the expected dollar value of profit on the bottom line of the projects. This conducts us to the controversial discussion about the results of PM methodologies' application considering the return over the investments. In order to contribute to the evaluation of PM value in organizations, this paper discusses one possible systematic to measure the value of project management, trying to establish a connection between the investments in project management and the financial return obtained by the companies.

MB-09 Technical Workforce-1
Monday, 8/6/2007, 10:30 - 12:00 **Room: Directors Suite**
Chair(s): Norman G Einspruch; University of Miami

MB-09.1 [R] Study on Sales Engineers of IT Companies by Means of a Dual Scaling Method

Shinya Imai; Waseda University, Japan

Junzo Watada; Waseda University, Japan

Quality is an attribute which is not limited only to products, but also related to management and a company itself. The development and promotion of personnel resources are indispensable to increase the quality of management and a company. Therefore, companies place stress on the personnel development and the personnel training for employees. It should be a key issue today. The management quality relates deeply to a corporate culture and a social sense of responsibility. In the main discussion of this paper, engineers of a regional IT company were questioned and analyzed what talent is imaged, what kind of a value should be

promoted, whether the company tries to enhance its own value, and clarified the relation between QWL (Quality of Working Life) and the personnel training. The paper illustrates that the management quality and the social existence value of regional companies relate deeply with the improvement of their personal growth and self-quality.

MB-09.2 [R] Personality Composition, Affective Tie and Knowledge Sharing: A Team Level Analysis

Bi-Fen Hsu; National Yunlin University of Science & Technology, Taiwan
Wei-Li Wu; National Chi Nan University, Taiwan
Ryh-Song Yeh; National Chi Nan University, Taiwan

Since knowledge has become the most valuable asset for organizations in the knowledge-economy age, related issues of knowledge management have been getting more and more attention, especially the concept of knowledge sharing, because it is a necessary condition for organizations to perform fruitful knowledge transfer and creation, which will then help them gain and sustain competitive advantage. Previous research has for the most part only studied how to induce employees to perform knowledge sharing at the individual level. However, it might not be enough as nowadays most organizational goals must be met by teamwork; therefore, recognizing what kind of team attributes can effectively promote knowledge sharing is important. In this study, we investigate the issue of knowledge sharing based on the IPO (input-process-output model) model at the team level. Fifty three R&D teams composed of 205 employees participated in this study to examine the relationships among team personality composition (the five-factor personality), team process (affective tie), and team outcome (knowledge sharing). The findings are then discussed in terms of their implications for management practices and future research.

MB-09.3 [R] Social Capital in Academic Engineers

Claudia N Gonzalez-Brambila; Instituto Tecnologico Autonomo de Mexico, Mexico
Francisco M Veloso; Carnegie Mellon University, United States

This paper explores recent trends in the scientific collaboration of the most productive academic engineers in Mexico. First, an analysis of team size, institutional and international collaboration is explored. Then, the relationship between social capital and knowledge creation is examined. For this purpose, knowledge creation is measured by research papers in internationally peer-reviewed publications and social capital is measured through the pattern of connection between actors, where a connection between two researchers is established through co-authorship. The results suggest that the number of direct ties is the most important aspect of social capital. This characteristic enhances the quantity and quality of the productivity of academic engineers. The results also suggest that the strength of those ties affects negatively the productivity. Finally, evidence is found that actors embedded in sparsely connected networks (rich in structural holes) take advantage of the brokerage opportunities to enhance their productivity.

MB-09.4 [R] Conceptual Model on the Impact of Organizational Memory on Organizational Performance

Li Zhang; Harbin Institute of Technology, China
Yezhuang Tian; Harbin Institute of Technology, China
Zhongying Qi; Harbin Institute of Technology, China

Organizational memory and knowledge management are the two topics that have grown in importance for businesses and academics over the past few years. Organizational memory, which records the organization's history, is the important asset in organizations that can impact present activities. Organizational memory integrates all kinds of organizational knowledge. Organizational memory is also considered as the means by which previous knowledge is brought to bear on present activities, thus resulting in higher levels of organizational performance. According to the review of organizational memory contents, this paper provides four organizational memory constructive factors. According to the review of the organizational memory process, this study provides three organizational memory dynamic factors. On the basis of organizational memory factors, this study proposes a conceptual model on the impact of organizational memory on organizational performance. The model shows that organizational memory can impact on organizational performance by supporting the coordination of organizational memory constructive factors and organizational memory dynamic factors.

MB-10 Technology Assessment and Evaluation-1

Monday, 8/6/2007, 10:30 - 12:00 **Room: Studio Suite**
Chair(s): Charles Romito; University of Cambridge

MB-10.1 [A] FAST: Value Creation through Technology Investment Management

Alex Coman; Tel Aviv University, Israel

Firms such as General Motors facing difficult competitive conditions must choose a number of technological investments from a broad range of opportunities. The FAST methodology rationalizes the technology selection and implementation process. FAST applies Root-Cause-Analysis for the identification of Root-Problems and Core-Competencies. Potential technological investments are developed into scenarios and their Key-Success-Factors are identified. Gap analysis assesses the risk related to the investment in each technology. The risk is defined as the Gap between the organizations available technological assets and the factors required for success. Technological challenges can be overcome through business alliances. Alternative technologies are mapped on the Ease/Value continuum and the optimal portfolio is selected.

MB-10.2 [A] Technology Level Assessment by Publication Analysis: Application in Agriculture Research

Moonjung Choi; KISTEP, Korea, South
Sangho Ji; KAIST, Korea, South
Min Ho So; KAIST, Korea, South

It is very important to assess technology level to establish an S&T strategic plan. Technology level can be assessed by publication statistics which present objective data. In this study, the technology level of the agriculture field was compared by assessing research performance with SCI publications for 10 years (1996 - 2005). The agriculture field includes six categories such as agricultural engineering, agriculture-dairy and animal science, agriculture-multidisciplinary, agriculture-soil science, agronomy and horticulture, which are selected from the subject categories of SCI Web DB. Quantitative and qualitative comparisons were performed by using several indicators, such as the number of publications, the internationally standardized number of citations, scientific strength, etc. The USA was ranked the world's top position in all categories of the agriculture field. The excellence of the USA was outstanding in agricultural engineering. Korea was ranked 28th in 1996 – 2000, and was in 20th place in 2001 – 2005. The number of publications of the top five countries was occupied 49 percent and 44 percent in 1996 – 2000 and 2001 – 2005, respectively. The portion of the publication number in northeastern Asia, including Korea, was increased from 7.1 percent in 1996 - 2000 to 10.1 percent in 2001 - 2005. The extent of increase in publication numbers was highest in soil science, which was 4.0 percent point.

MB-10.3 [R] How to Select and Weight the Indicators Used for Evaluating the Potential of New Technology Industrialization

Yafei Luo; Beijing University of Technology, China
Lucheng Huang; Beijing University of Technology, China
Qian-long Cai; Beijing University of Technology, China

The selection of the indicators and how to weight the indicators are the key point for questionnaire design of the potential evaluation for new technology industrialization. In this paper, we will discuss how to select indicators by using soft system methodology (SSM) to decide how many numbers of indicators can be used in questionnaire of the potential evaluation for new technology industrialization, and how to weight the indicators by using fuzzy analysis decision making theory and the three standard degree method. We calculate two kinds of weights, and text the difference of them.

MB-10.4 [R] A Conceptual Framework of Identifying the Commercialization Potential of Emerging Technology Based on Subjective Judgment and Objective Fact

Lucheng Huang; Beijing University of technology, China
Yafei Luo; Beijing University of Technology, China
FeiFei Wu; Beijing University of Technology, China

How to identify the commercialization potential of an emerging technology is important, no matter if it is in the theory studying or the activity practicing. But there is a separateness of subjective judgment and objective fact in the conventional methodologies. This paper argues that we should propose a conceptual framework of combining the subjective perspectives and the objective perspectives. The subjective perspectives of the conceptual framework resolve the problems of judging the marketing potential, the industrialization process and the profits obtained from the emerging technology. On the other hand, the emerging technology is from the number of related technology achievements that it is the focus of attention in internet, patents, and policies and planning, etc. so, the evaluation on the commercialization potential of an emerging technology should reflect all of the attention to the objective fact. Therefore, this paper proposes the conceptual framework of meeting the requirement of combining the subjective and objective together, and the main steps of this methodology are illustrated at last.

MB-11 Productivity Management
Monday, 8/6/2007, 10:30 - 12:00 **Room: Galleria-1**
Chair(s): Thomas G. Lechler, Stevens Institute of Technology

MB-11.1 [A] Quality Management Programs: Designed to Increase Competitive Advantage

Jane E Humble; Arizona State University Polytechnic, United States
William R Peterson; Arizona State University Polytechnic, United States
Jeffery Sornberger; Arizona State University Polytechnic, United States

Successful competition in the global marketplace requires service and manufacturing organizations to develop effective programs to increase quality and productivity. This research reports the current competitive strategy of a large sample of Arizona organizations.

MB-11.2 [R] Managing Factors Limiting National Competitiveness to Improve Productivity in Developing Countries

Vuyani Lingela; University of Pretoria, South Africa
Andre J Buys; University of Pretoria, South Africa
Tateo Shimozawa; Hokkaido University, Japan

This paper examines socioeconomic factors influencing regional economic competitiveness among South African provinces and Japanese prefectures. The choice of the two countries is motivated by the fact that South Africa as the largest economy in Africa is an example of a successful developing country. As the second largest world economy, Japan represents the perspective of developed economies. For comparative analysis, South Africa and Japan together represent two different stages of national economic development: developing and developed economies. With this background, this paper introduces a new Innovation Management (IM) Framework for a regional system of innovation. The IM Framework calls for coordination across a wide range of policies including labor policies, education policies, industrial policies, and science and technology policies in the NSI. This paper applies the IM Framework to the region of Hokkaido in Japan to assess the activities of innovation actors in managing factors limiting regional competitiveness. Hokkaido is selected among other regions in Japan because it is experiencing similar socioeconomic challenges that are facing many developing countries. For this reason, the experiences of innovation actors in Hokkaido can be applied in developing countries to identify and manage factors limiting competitiveness to improve national productivity.

MB-12 Technology Marketing-1
Monday, 8/6/2007, 10:30 - 12:00 **Room: Galleria-2**
Chair(s): Robert Harmon; Portland State University

MB-12.1 [R] The Effects of Technology Readiness on the Formation of E-Service Value

Chien-Hsin Lin; Yu Da College of Business, Taiwan

Customer perceived value is a strategic imperative for many service firms, and many human-to-human services are shifting to Internet-based services to enhance firm competitive advantages. Under such circumstances, knowing what customers want is a challenge as the concept of boundary is no more definite in virtual worlds. We posit that consumer's technology readiness (TR) plays an important role in forming their perceived e-service value. From a field survey, we find that monetary cost has negative effect on consumer's perceived overall e-service value; service-enhancing and risk-reducing value drivers both have positive effects on overall e-service value. As to the effects of technology readiness, the results indicate the effects of service-enhancing attributes are stronger in high-TR group than in low-TR group; the effects of risk-reducing attributes are greater in low-TR group than in high-TR group. Monetary cost is equally important in both TR groups. Research implications and suggestions for future research are discussed.

MB-12.2 [R] How Technology Is Made Visible When Exploring Its Application Fields

Yoko Takeda; Yokohama National University, Japan
Dai Senoo; Tokyo Institute of Technology, Japan

Industrial maturation and technological accumulation have fostered the need for the exploration of new applications of existing technology. This paper identifies how R&D workers from companies or research institutions visualize and describe their technology to other entities inside and outside the organization when they are exploring a technology's potential applications. This research uses a web-based questionnaire survey of R&D personnel working in Japan. The first finding of the survey shows that when the presentation team includes non-technical people (e.g. product development, marketing, or sales) in addition to the technical staff in-charge, technology visualization tends to be more effective. At the same time, the audience of such technology visualization should also be cross-functional. The second finding illustrates that, even though the audience is most often made up of acquaintances working within the same organization, technology visualization is also effective with non-acquaintances working in different organizations in order to lead to the successful exploration of such technology's potential applications.

MB-12.3 [A] Marketing Opportunity Analysis for Daimler Chrysler's Sprinter Van Plug-in Hybrid Electric Vehicle

Matt Fildes; Portland State University, United States
Sarah Nelson; Portland State University, United States
Neslihan Sener; Portland State University, United States
Frank Steiner; Portland State University, United States
Patt Suntharasaj; Portland State University, United States
Refik Tarcan Tarman; Portland State University, United States
Robert R Harmon; Portland State University, United States

Concerns about the high costs of petroleum based fuels and the long-term impact of fossil fuels on the environment have automotive manufacturers and their customers exploring options for more fuel-efficient commercial vehicles. This paper presents a marketing opportunity analysis to support the business case for the development of a plug-in hybrid vehicle version of Daimler Chrysler's Sprinter Van.

MB-13 Supply Chain Management-1
Monday, 8/6/2007, 10:30 - 12:00 **Room: Galleria-3**
Chair(s): Dragoslav P Nikolic; Faculty of Management Novi Sad

MB-13.1 [A] RFID Application System for Postal Logistics

Jeong-Hyun Park; ETRI, Korea, South
Jong-Heung Park; ETRI, Korea, South
Boo-Hyung Lee; Kongju National University, Korea, South

This paper suggests a postal RFID system and RFID tag data structure for the postal process, especially parcel process and pallet management, to define and find in advance the problems, difficulties, and solutions when the RFID technology is adapted to postal environments. This paper also suggests the real time monitoring and the statistics management of parcel

processing and pallet usage based on RFID technology. The contribution of this paper is to stimulate deployment of RFID technology for postal logistics service and SCM (supply chain management).

MB-13.2 [R] Using Information Technology to Facilitate Pooling of Retail Inventories

Nagihan Comez; The University of Texas at Dallas, United States
Kathryn E Stecke; The University of Texas at Dallas, United States
Metin Cakanyildirim; The University of Texas at Dallas, United States

The availability of an intranet system among retailers of a distributor facilitates retailer-to-retailer trade, which is called virtual inventory pooling. We study a centralized virtual pooling system of retailers, which is replenished periodically by the distributor. Between two replenishments, an item can be transshipped to a stocked-out retailer from another retailer, but it arrives a transshipment time later. During this time, the stocked-out retailer incurs a backorder cost. If the transshipment is not possible, a backorder cost is incurred until the next replenishment. Since the transshipment time is shorter than the time between two replenishments, transshipments can reduce the backorder cost at the stocked-out retailer, while decreasing the holding costs at the other retailer. The transshipment policy is characterized by hold-back inventory levels, which are non-decreasing in time. Retailers entirely base their transshipment decisions on optimal hold-back levels and real-time inventory data, which are easily communicated among retailers through an intranet system. In addition, the initial model is altered by charging the holding costs only at the end of a replenishment cycle, which induces more dynamic hold-back levels. Our transshipment policy differs from those in the literature because we allow multiple in-cycle transshipments with positive transshipment times and backorder costs.

MB-13.3 [R] Wireless Technology: A Challenge toward Supply Chain Management

Sheng-Fei Hsu; National Yunlin University of Science & Technology, Taiwan
Chi-Hui Chiang; Chia Nan University of Pharmacy & Science, Taiwan

While the intensive global competition, faster product development, increasingly flexible manufacturing system, an unprecedented number and variety of products are the characteristics of today's global market, wireless technology is becoming a crucial strategy to promote the performance of supply efficiently. Wireless technology has been developing fast in decade and gaining recognition as a major source of cost reduction. This article attempts to explore the challenges of supply chain management combined with wireless technology. The implications of wireless technology for an effective supply chain management (SCM) are examined with reference to three critical areas of SCM: competitive advantage, relationship management, coordination and integration. This article will identify the implications of SCM combined with wireless technology and develops propositions that have important influence on the performance of an efficient SCM.

MD-01 Technology Management in Nanotechnology-1
Monday, 8/6/2007, 14:00 - 15:30 **Pavilion East**
Chair(s): Anthony K Wensley; University of Toronto Mississauga

MD-01.1 [A] Multi-Stage Collaborative System for Microelectromechanical Systems Manufacturing

Tetsu Nakashima; University of Alberta, Canada
Ted Heidrick; University of Alberta, Canada
Walied Moussa; University of Alberta, Canada

In order to reap the economic rewards from a new technology, it is necessary for it to be commercialized by private enterprise. A lot of research work and product development is being done in universities in the microelectromechanical systems (MEMS) field. Unfortunately, much of these early stage MEMS developments can not be easily prototyped or produced due to the lack of required manufacturing facilities able to address the complex set of related manufacturing processes within a single institution. This paper describes a proposed methodology for a system capable of coordinating the interaction among different organizations and different facilities in order to optimize the commercialization of diverse MEMS ideas. A systematic commercialization model will be discussed. The model will ultimately be extended to nanotechnology, which is at an even earlier stage of development than MEMS. This system will allow the researcher to take advantage of all the strengths and unique capabilities of various institutes and companies that may not be necessarily located geographically close to each other.

MD-01.2 [A] Bibliometrics and Social Network Analysis of the Nanotechnology Field

Guillermo R Rueda ; Portland State University, United States
Pisek Gerdsri; Portland State University, United States
Dundar F Kocaoglu; Portland State University, United States

This paper presents bibliometrics analysis as a way to determine the key authors contributing to the nanotechnology field. The Web of Science database from the 1992-2006 time frame is used for that purpose. Statistics such as the authors with highest number of publications, their countries, and authors making the highest level of contribution to the field are obtained from the bibliometrics analysis. Concepts from social network analysis are used to determine the interrelationships among lead authors and co-authors. The key players in the nanotechnology field are identified, and the nature and intensity of collaborations among them are described.

MD-01.3 [R] A Study of Strengthening Nano-technology New Product Value by Using Internet-Marketing Technology

Yi-Hsien Tu; Minghsin University of Science & Technology, Taiwan
Ting-Ho Huang ; Minghsin University of Science & Technology, Taiwan

Currently, the fast development of nanotechnology takes all the attention of the world. Following the development of the nanotechnology all over the world, governments, companies, and academic communities all want to gain profit by using this new technology. For nanotechnology firms, it is important to be able identify, select, assimilate, exploit, and protect their nano-related technologies they developed, but an successful marketing strategy could give them enough competitive advantages in existing and often saturated markets to become market leaders in their respective markets. The marketing strategy is often critical to the firm's survival. As a result, to succeed in promoting a nanotechnology product, it will be most important to understand the market.

MD-02 TUTORIAL: Why Well-Managed Projects Still Fail?
Monday, 8/6/2007, 14:00 - 15:30 **Pavilion West**
Speaker(s): Aaron J Shenhar; Stevens Institute of Technology

Project management research shows that most projects today fail. You may think that projects fail because of poor planning, lack of communication, or inadequate resources; but as the evidence suggests, failure is often found even in well-managed projects, run by experienced managers, and supported by highly regarded organizations. This research-based tutorial will show that the current practices of project management are insufficient to guarantee project success. The tutorial will present the current myth and the reality of project management and will offer a new paradigm and a new language to deal with today's projects. According to this paradigm, projects are business-related processes that must deliver business results. They are not predictable or certain. Rather, they involve a great deal of uncertainty and complexity, and they must be managed in a flexible and adaptive way. Planning is adjustable and changing, and as the project moves forward, re-planning is often necessary. And project management styles must adapt to the specific project and its requirements. While this approach represents a shift in thinking, it is inevitable to meet today's organizational challenges. We believe that every organization can significantly improve its business results and achieve more homeruns from its projects if it will consciously apply the frameworks of this workshop.

MD-03 Accelerated Radical Innovation in the Industrial Technology Life Cycle I
Monday, 8/6/2007, 14:00 - 15:30 **Room: Broadway-1**
Chair(s): Neil Reid; The University of Toledo

MD-03.1 [R] Principles and Practice of Accelerated Radical Innovation

John A Bers; Vanderbilt University, United States
John P Dismukes; University of Toledo, United States

Two opposing trends characterize the dilemma for radical innovation in the 21st century: the continued explosion of the science and technology base, and the necessarily short-term, profit-driven outlook of the technology sector. Responding to this dilemma, a team of researchers, since 2004, has been developing a methodology for accelerating radical innovation through the industrial technology life cycle. This paper asks what factors drag radical innovation out to the point where momentum and initiative are lost. It then describes the Accelerated Radical Innovation Methodology, which addresses the three grand challenge areas responsible for delaying radical innovation: technological/scientific, market/societal, and business/organizational. The methodology is supported by three sets of tools. The first is a systemic approach linking the innovation to underlying market and technological drivers, reframes the problem at higher levels, and develops explicit linkages to interdependent external systems. The second, an interacting triad of information technology tools to support information retrieval, pattern recognition, and knowledge management, helps the innovator manage the overwhelming amount of relevant information. The third consists of a systematic process for developing the communities of practice, clusters, and supply chains necessary to support the radical innovation process. The second and third tool sets are described in companion papers.

MD-03.2 [R] Platform Equation Modeling of Innovation Activity Across the Industrial Technology Life Cycle

Jainagesh A Sekhar; University of Cincinnati, United States
John P Dismukes; University of Toledo, United States

An attempt is made to provide a collapsed framework for inventions and innovations through a single platform equation and model. We find that this model is able to correctly describe the production activity for several materials and energy conversion technologies. Activity patterns are shown for several oxides, metals, oil and wind energy and its derivatives which have shown significant similarities. The metals Cu, Al, W, Mo and Pb are particularly studied for the amount produced over time. The total activity for the metals encompasses both the invention and innovation stage for a particular metal. Four major stages and two sub stages are identified for the discovery (invention stages) and subsequent growth regimes (innovation stages). Although the metals studied existed over differing periods (e.g. copper greater than 200 years whereas aluminum, just over 100 years), one single pattern equation appears to capture all the major trends. The use of the pattern model is also attempted for productivity analysis, especially for the condition of radical innovation (i.e. the condition for very rapid growth). For sustained radical innovation, there are various factors which influence growth. These factors have been isolated for the case study of thermal processing of materials. We find that for the common industrial plants where thermal processing and plant size are the dominant variables, their impact on the growth may be examined in the context of the pattern equation. A preliminary analysis of oxide production activity also appears to follow the same innovation model as do energy production trends. The results point to the possible existence of a fertile field for future research in innovation theory.

MD-03.3 [R] Accelerating Integration and Synthesis in the Global Network

Michael Gallis; Michael Gallis and Associates, United States

Since the beginning of recorded history, radical innovations have always reshaped the world. At the opening of the 21st century, radical technologies, once rare and unusual occurrences, are taking place at ever increasing rates. At the same time, the combination of incremental innovation based on older technologies and radical technologies are forming ever increasing complex networks that are more rapidly reshaping the world. Understanding the current direction and trends in technology requires an understanding of their effects on, and relationship to, global development trends. The pioneers Kondratieff and Shumpeter, and later Anderson and Tushman, have described a theory of technological cycles related to industrial and economic cycles. However, in the current context of globalization, industrial and economic cycles can be placed in a new and more comprehensive global context that demonstrates that technological development cycles are more related to the larger macro stages in the history of globalization than to economic cycles. This paper proposes that a new framework for understanding the development of technology can emerge from a deeper understanding of the stages of development of the global network that has linked the economies of the world for the past 22 centuries.

MD-03.4 [R] Developing Radical Innovation Practices in UK Healthcare and Medical Technologies

Gillian Holt; The University of Leeds, United Kingdom
Julian White; White Rose University Consortium, United Kingdom
Richard A Williams; The University of Leeds, United Kingdom

The UK operates in a burgeoning global health market, currently worth over $200 billion. Increasing emphasis is being placed on technologies, devices and combined systems that improve healthcare by targeting prevention diagnosis, treatment and rehabilitation rather than the traditional late treatment of disease. Therefore, cost effective healthcare and improved health management will be delivered in the future through the integration of multidisciplinary technological solutions combined with expertise in health-science decision analysis. Under a $9M grant from the UK government's Higher Education Funding Council, a consortium activity has been formed, "The White Rose Health Innovation Partnership" (WRHIP). This project, developed by the authors and partners, seeks to create a dynamic environment for accelerating innovation by using a unique combination of methods to stimulate more effective innovation in healthcare, with the objective to break down the "silos" of Clinical Research and Practice, University Research and Teaching, and Industrial Manufacturing and Supply Chain Activity. Distinctively, the project brings together a range of stakeholders to develop open innovation platforms with a wider range of stakeholders in the Yorkshire region of the UK and the New Jersey region in the U.S. The paper reports on the ethos and the current progress of this unique transnational experiment providing a reference point for others interested in developing region-region innovation partnerships from the health industry and academia.

MD-04 Innovation Management-2
Monday, 8/6/2007, 14:00 - 15:30 **Room: Broadway-2**
Chair(s): Dov Dvir; Ben-Gurion University

MD-04.1 [R] An Approach of How to Establish a Technological Innovation Nucleus in Brazilian General Command of Aerospace Technology

Cesar Augusto O'Donnell Alvan; Instituto de Fomento e Coordenacao Industrial, Brazil
Marck Silva; Instituto Tecnológico de Aeronáutica, Brazil
José Henrique de Sousa Damiani; Instituto Tecnológico de Aeronáutica, Brazil

This paper investigates the activities of strategical management of innovation involving the Brazilian General Command of Aerospace Technology. It proposes an approach of how to establish a Technological Innovation Nucleus in a scientific institution, showing the need to know the current legislation as well as to survey and follow up the evident progress and the most important technological advances in a productive environment. It also shows the current difficulties faced by managers during the definition, implementation and recognition processes of the Nucleus by the community of scientific institution. This work intends to set the basis for investigation and development in order to enhance the managers with a reference guide to grow the domain of technological knowledge, to reduce the execution efforts and to improve the management of technological innovation.

MD-04.2 [R] The Research of the Relationship between Cluster's Development Stage and Entrepreneurship Based on an Ecology-Model: An Empirical Study from Zhongguancun Science Park

Yafei Luo; Beijing University of Technology, China
De'an Song; Beijing University of Technology, China

This paper, borrowing the 1-dimension and 2-dimension models from the ecological science, discusses the tracks of cluster development when upgrading is existent and inexistent and goes on to analyze the relationship between its various phases and entrepreneurship and production. When upgrading is inexistent in the cluster, we would use the 1-dimension logistic equation to describe it; when innovation is existent in the cluster, we would use the 2-dimension Lotka-Volterra Model to describe the process of cluster development. When the

cluster can be upgraded in the global value chains, the ratio of occurrence in entrepreneurship will appear itself a u-type relationship. Through the verification of actual data of Zhongguancun Science and Technology Park, we discovered that our theoretically deduced result could be well proof-tested. And in terms of testing variables used, the GDP of previous years was more effective than the number of enterprises of previous years.

MD-04.3 [A] Application of Complex Adaptive Systems Theory to Ica Wine and Grape Cluster

Jose C Alvarez; PUC-Peru, Peru

The enterprise agglomerations are becoming an interesting study topic, so several authors are sure that the interactions and geographic proximity have a strong impact on the competition and innovation of the enterprises of the clusters [1,8,12]. So it is also possible to talk about "learning clusters", knowledge accumulated, and knowledge constructed in a collective form. For the study of these shapes of post-fordists production organizations and for the many variables that they present, new frameworks are necessary, and one of them is the complex adaptive systems theory. The model of the complex adaptive systems permits one to evaluate multiple interactions between different agents and the impact of the agent's action on the system. This focus permits one to find news and unexpected models from the interactions between the parts of the open systems. This paper has the aim of studying the dynamic interaction, the knowledge transfer, the learning, and the evolution of the Ica wine cluster in Peru with that model. In this context, the research questions are: What is the dynamic of the interactions between enterprises of the cluster? How is the knowledge transferred? How does the cluster learn? How is the technological evolution of this cluster? The methodology is the elaboration of a theoretical model that integrates the concepts of characteristics of the clusters and complex adaptive systems, then accordingly this theoretical model is elaborated in a questionnaire; after that the questionnaire is applied to a wine and grape cluster, and finally the main conclusions and recommendations are obtained. The results of the research will be an important document for the actions, strategic decisions and improvement of the interactions between cluster agents.

MD-05 Technology Management Framework-1
Monday, 8/6/2007, 14:00 - 15:30 **Room: Broadway-3**
Chair(s): Sujan Samanta; KaufmanHall & Associates

MD-05.1 [R] The Study of Taxonomy and Evolutional Trends of Relevant Literatures on Patent Analysis

Kuei-Kuei Lai; National Yunlin Univ. of Science & Tech., Taiwan
Mei-Lan Lin; Far East University, Taiwan
Shann-Bin Chang; Ling Tung University, Taiwan
Chin-Fu Hsu; National Sun Yet-Sen University, Taiwan

Analysis of patent data is an important tool for industrial research. Patent analysis has been used in many research fields and applied for rich topics in technology management. This study explored the classification and research development of patent analysis literature for 24 years (1980-2003) and applied by evolutional perspectives and bibliometrics techniques. The research scope is focused on the business and management level. There was some significant literature retrieved from online electronic databases, and a citation database was built by their references. After that, the study was analyzed by multivariate methods to classify research taxonomy and literature's relative positions. The study was expected to help in understanding the current situation of patent analysis research. Additionally, the main purposes of this study were to synthesize core knowledge and research trends in research fields, to point out the major contributors and influential journals, to understand their positions, and to explore the evolution life cycle. The research results are classified into five research fields, namely the sources of technology knowledge, patent applications and patent value, patent research and technology position, the indicators of technological and innovative activities, and interdisciplinary applications.

MD-05.2 [A] ARENA: Structured Visual Mapping of the Technological Ecology

Alex Coman; Tel Aviv University, Israel

A study of 500 senior executive presentations to the analyst community reveals multiple references to the business arena: technologies, competitors, distribution chain, supply chain, regulators, media, markets, etc. The study exposes the fact that senior executives in large US and international firms strive to map their business environment. Many of these efforts take a visual form. The study shows that these visual representations are inconsistent in terms of symbols, syntax, flow, etc. Academic approaches to visual arena mapping are just as unstructured. We appropriate the Unified-Modeling-Language, a discipline developed for systems analysis and design by computer scientists, to map the business arena. Next, we present the ARENA formalism. Finally, we illustrate how the ARENA formalism facilitates a synthesis of concepts and models from the technology management realm.

MD-05.3 [R] Organizations, Institutions, and Activities: The Case of Taiwan's Optical Components

Fang-Chen Kao; National Yunlin University of Science & Technology, Taiwan
Kuei-Kuei Lai; National Yunlin University of Science & Technology, Taiwan

In this paper, we analyze the rise of the Taiwanese optical components industry, examine the ways in which institutions emerge and develop over time, and the resulting effects on innovative capability and performance. Following broadly Taiwan's system of innovate approach, we develop a historical viewpoint in the context of process, centered on the interaction between organizational action and social institutions over time. In particular, we rely on ten activities that were recently proposed by Edquist and Hommen, among other NSI scholars, as points of entry into the phenomenon explored. These activities include: 1) provision of R&D, 2) competence building, 3) generation of new markets, 4) articulation of quality requirement demands, 5) provision of organizations, 6) networking, interactive learning and knowledge integration, 7) provision of institutions, 8) incubation activities, 9) financing, and 10) provision of consultancy services.

MD-05.4 [R] Intangible Assets and Cost of Capital: An Application for a Technology Utilizing Firm

Kaya Tokmakcioglu; Istanbul Technical University, Turkey
Oktay Tas; Istanbul Technical University, Turkey
Sitki Gozlu; Istanbul Technical University, Turkey

Intangible assets, which are not physical in nature, play a very important role in today's firms. However, current financial statements provide very little information about these assets. Thus, managers are constrained to recognize and report them, leading to flawed information about a firm's cost of capital. This is the opportunity cost of an investment; that is the rate of return, which a company would otherwise be able to earn at the same risk level as the investment that has been selected. This paper examines the linkage between intangible assets and the cost of capital of a technology-utilizing firm. First, the basic concepts about intangible assets are presented. Then, the relationship between intangible assets and cost of capital are explained. Finally, an application in a technology-utilizing firm is carried out, the results are evaluated, and future recommendations are proposed.

MD-06 Technology Roadmapping-1
Monday, 8/6/2007, 14:00 - 15:30 **Room: Broadway-4**
Chair(s): Tugrul Daim; Portland State University

MD-06.1 [R] Towards Visual Strategy: An Architectural Framework for Roadmapping

Robert Phaal; University of Cambridge, United Kingdom
Gerrit J Muller; Technical University of Eindhoven, Netherlands

Roadmapping concepts and techniques have been widely adopted (and adapted) at product, technology, company, sector and policy levels since its first application in the late 1970s to support integrated product-technology planning. The roadmapping approach is flexible and scalable, and it can be customized to suit many different strategic and innovation contexts. However, this demands careful planning and design, including consideration of roadmap structure, process and participation. This paper explores the issues of how to design and architect roadmaps and roadmapping processes, which is crucial if the approach is to pro-

vide a framework for supporting effective dialogue and communication within and between organizations. The structure of the roadmap, and the process for developing and maintaining the roadmap, should be designed to serve the purpose for which the activity is intended to satisfy, providing a 'common language and structure' for both development and deployment of strategy.

MD-06.2 [A] Dynamics of Technology Roadmapping (TRM) Implementation

Nathasit Gerdsri; Mahidol University, Thailand
Ronald S Vatananan; Mahidol University, Thailand

To achieve a sustainable competitive advantage, organizations apply Technology Roadmapping (TRM) as an effective tool to link technology into business strategies. The overall objective for today's businesses is to strengthen their core competencies and their adaptability to business dynamics. Critical factors to the successful initiation and implementation of a roadmap development are People, Processes and Data. This paper focuses on the People factor by emphasizing the need to understand how the roles and responsibilities of key players involved in the TRM process evolve over time in order to match with the dynamics of TRM implementation.

MD-06.3 [A] Outline of the Strategic Technology Roadmap of METI (Ministry of Trade and Industry of JAPAN) and Trial Approach for Technology Convergence with the Methodology of Technology Roadmapping

Yuko Yasunaga; Ministry of Trade and Industry, Japan
Masayoshi Watanabe; Ministry of Trade and Industry, Japan
Motoki Korenaga; Ministry of Trade and Industry, Japan

The Ministry of Trade and Industry of JAPAN (hereinafter referred to as "METI") formulated the Strategic Technology Roadmap (hereinafter referred to as "the STRM") as a navigating tool for strategic planning and implementation of R&D investment in cooperation with industry, academia, and public institutions. Formulating the STRM is the first attempt ever, not only by METI but also by the Japanese government as a whole. A total of approximately 400 members were involved to study and discuss the STRM under task forces, such as front-line junior researchers and those who actually use products and receive services, i.e., users, manufacturers, and medical/care workers, in order to reflect comments and advice of users' side. In addition, METI carried out a trial approach for technology convergence with the methodology of the technology roadmapping process. The result of the trial was submitted as a "Discussion Manual for Technology Convergence (Ver.1.0) C-Plan (Convergence-Plan)" and was opened to the public. It stressed that there is a strong possibility that the technology roadmapping process might be a good tool for technology convergence. METI is going to keep road mapping activities every year.

MD-06.4 [A] Technology Roadmapping through Intelligence Analysis: Nanotechnology

Hillary Martin; Intel, United States
Tugrul U Daim; Portland State University, United States

Nanotechnology is predicted to create the Sixth Kondratieff period following the "Age of Information". It represents a new revolutionary approach in fundamental research moving from a macrocentric to nanocentric system. Nanotechnology is expected to stimulate 1 trillion dollars of production involving about 2 million workers in the next 10 to 15 years. More than 40 countries now have specific nanotechnology research funding programs with the common goal of finding greater uses for the emerging technologies and enacting measures to encourage commercialization. This study uses text mining to uncover trends in nanotechnology and changes in nanotechnology programs and applications since the first distribution of the National Nanotechnology Initiative (NNI) funds in 2001. Top keywords in current nanotechnology research will be analyzed to provide insight into the translation of government funding invested in applied research programs to resulting publications and patents. Future work will extend this text mining model to develop an emerging technology roadmap to uncover commercialization opportunities by using R&D project funding at this lowest level to roll up to the technology and product dimensions.

MD-07 Technology Management Education-2: Pedagogy
Monday, 8/6/2007, 14:00 - 15:30 **Room: Forum Suite**
Chair(s): Mel Horwitch; Polytechnic University

MD-07.1 [A] Building a Global Brand: The Case of Wipro

Bharat Rao; Polytechnic University, United States
Bala Mulloth; Polytechnic University, United States

In this business case study, we describe the transformation of Wipro, a Bangalore-based information technology company. Founded in 1945 as Western India Vegetable Products Limited, Wipro is today the world's largest independent R&D services provider and among the top three offshore business process outsourcing (BPO) service providers with over 490 clients, 53,000 employees and 40 plus development centers across the globe. Wipro's aim was to continue its transformation from a low-cost provider of outsourced services to become a global information technology leader, delivering world-class solutions to its global customers through a process of fostering ongoing internal and external innovation while maintaining the cost advantage associated with being located in India. The case also describes the steps senior management at the firm took to enhance brand awareness, brand differentiation, and brand positioning, which were all playing important roles in the growth of the company. Teaching objectives of the case include a) understanding the evolution on the Wipro brand, b) developing strategic initiatives to move up the value chain, c) enabling intellectual leadership and building a global outlook within a large services firm, and d) managing the challenges and opportunities of a technology-based global delivery model, combined with a multi-location strategy.

MD-07.2 [A] Innovation by Imitation: Using an 'Adopt-Transform-Apply' Methodology Coupled with Pattern Recognition to Enhance Firm Innovation

Vincent Cozzolino; IBM Corporation, United States
Andres Fortino; Polytechnic University, United States

Executives from across all industries have sought the holy grail of innovation productivity improvements at their organizations. We are advocating a process of innovation by imitation where managers and staff in organizations are taught to look at advances in other industries and see how those processes or innovations may be emulated in their own industry. We term the emulation process "adopt-transform-apply" to represent the actual adopting of the innovative idea from another industry, transforming and adapting it to the current circumstances and applying and execution of the transformed idea. There are numerous instances in history that shows that this is a very profitable activity, and that a great deal of innovation occurs this way, and thus is a natural process in problem solving. We are proposing to use this process to improve the innovation capacity and performance of firms by educating their managers and staff on the technique. This process has become the basis for the activity of an Institute for Business Innovation where industry groups meet regularly to share innovations and practice the adopt-transform-apply technique to the benefit of the Institute's constituents.

MD-07.3 [R] Business Games as Pedagogical Tools

Tal Ben-Zvi; Stevens Institute of Technology, United States
Thomas C Carton; Stevens Institute of Technology, United States

This paper discusses business games as teaching tools in Technology Management (TM). The discipline's traditional teaching methods, while appropriate for the dissemination of foundational knowledge, may not be the optimal means to provide students with a platform to link abstract concepts and real world problems. We suggest that business simulation games are an effective way to engage students in TM topics; that they prepare students to understand and cope with the ambiguities associated with real-world organizations. Specifically, we discuss our experience with the International Operations Simulation Mark/2000 (INTOPIA), a game designed to channel students into a stream of entrepreneurial decision-making. We employed the game over 12 semesters with approximately 1000 advanced MBA candidates. Our findings indicate that business games represent a sufficiently novel approach to teaching and learning.

SESSIONS

MD-08 Project/Program Management-2
Monday, 8/6/2007, 14:00 - 15:30 **Room: Council Suite**
Chair(s): Jang W Ra; University of Alaska Anchorage

MD-08.1 [A] Lesson Learned in Managing IT Departments

Jiyang Xu; Qwest Information Technologies, United States
David Lippert; Qwest Information Technologies, United States

Managing a large IT department with many legacy systems can be very challenging. Though replacing legacy systems that use outdated technologies is recognized by most as an urgent necessity, the efforts quite often fail and can be the cause of management turnover, leaving the subject a formidable task for each new generation of IT leadership. With this presentation we share our observation on the issues surrounding managing IT departments, with a focus on why efforts are often unsuccessful and lead to policy flip-flops. We have seen flip-flopping on policies such as outsourcing vs. self-building, buying vs. building, agile vs. rigid software development methodologies, preferences over tactical vs. strategic approaches, centralized vs. distributed architecture groups, technical vs. managerial middle management, funding controlled by IT vs. business unit, etc. Although our experience is primarily based on the IT department of a telecommunication company, we believe the lessons learned are valuable for companies in many other industries.

MD-08.2 [R] Information Systems and Technology Service Introduction Success Criteria

Udechukwu Ojiako; University of Northumbria, United Kingdom
David Greenwood; University of Northumbria, United Kingdom

Good project management practice has been a major research theme over the last few decades with its practical impact on successful implementation of organizational strategy, becoming more paramount as business objectives become more closely linked to the lowering of prices and improvement in quality of service. It is expected that such a strategy is delivered by information systems and technology. Unfortunately, the need to develop and deliver innovative information systems and technology projects is constrained by the belief that such projects are always going on for longer than expected. In addition, they fail to meet user requirements or a return on investment. Against this background, there have been repeated reports of very high failure rates of such projects, which indicate that businesses need to be concerned. The approach taken to examine IS&T failure at this stage of the development of this theme is non empirical. It also avoids the traditional approach of examining the entire project life cycle. Instead, it concentrates on examining success criteria of the project from the service introduction stage.

MD-08.3 [R] The Effect of Client – Consultant Coordination on IS Project Performance: An Agency Theory Perspective

Matthew J Liberatore; Villanova University, United States
Wenhong Luo; Villanova University, United States

Increasingly, consulting firms are employed by client organizations to participate in the implementation of enterprise systems projects. Such consultant-assisted IS projects differ from internal and outsourced IS projects in two important respects. First, the joint project team consists of members from client and consulting organizations that may have conflicting goals and incompatible work practices. Second, close collaboration between the client and consulting organizations is required throughout the course of the project. Consequently, coordination is more complex for consultant-assisted projects and is critical for project success. Drawing from coordination and agency theories, we developed a research model to investigate how client-consultant coordination can help build relationships based on trust and goal congruence and achieve higher project performance. Hypotheses derived from the model were tested using data collected from 324 projects. The results provide strong support for the model. Client-consultant coordination was found to have the largest overall significant effect on performance. However, its effect was achieved indirectly by building trust and goal congruence and reducing requirements uncertainty. The positive effects of trust and goal congruence on project performance demonstrate the importance of managing the client-consultant relationship in such projects. Project uncertainty, including both technical and requirements uncertainty, was found to negatively affect project performance, as expected. This study represents a step towards the development of a new theory on the role of interorganizational coordination.

MD-08.4 [R] The Effect of Organization Process Focus and Organizational Learning on Project Performance: An Examination of Taiwan's Companies

Chun-Hui Wu; National Yunlin University of Science & Technology, Taiwan
Shiow-Luan Wang; National Formosa University, Taiwan
Kwoting Fang; National Yunlin University of Science & Technology, Taiwan

The impact of organizational learning on project performance has received a great deal of attention in recent years. Process focus is recognized as one of five factors which helps to promote organizational learning throughout the process. A theoretical model is derived based upon prior research in the literature to examine the effects of organizational learning and process focus on project performance. The structural equation modeling was adopted to test the proposed hypotheses, and Taiwanese corporate IS companies served as examples. The results revealed that organization process focus has a positive impact on organizational learning, which in turn has a positive influence on project performance. Both organization process focus and organizational learning play the influence on project performance. These findings should give valuable information for managers to revisit their priorities in terms of the relative efforts in organization process focus and organizational learning.

MD-09 R&D Management-1
Monday, 8/6/2007, 14:00 - 15:30 **Room: Directors Suite**
Chair(s): Mario M Coccia; National Research Council of Italy

MD-09.1 [R] Highly Autonomous Small-team-type R&D Management Model and Its Trial Management Experiment

Kazuhiko Itaya; University of Tokyo, Japan
Kiyoshi Niwa; University of Tokyo, Japan

This paper presents a model aimed at actual application to R&D sites where technological uncertainty is high. The key points are to make the team small on the premise that the leader and the members share the goal, to transfer the power and authority for research activities to the team almost completely, and to minimize interference with the researchers as much as possible to enhance the autonomy of their activities. Results of the management experiment conducted at an R&D center of a Japanese company engaged in the electronic industry are reported. We compared teams to which this model was applied, and therefore had higher autonomy, with other teams under conventional management. Several months afterwards, we conducted a questionnaire survey, according to the structured interview method, of researchers engaged in trial-and-error approaches in their research activities asking how their actions and feeling changed. We found that the activities of researchers on teams to which this model was applied tended to be more autonomous. In addition, it became clear through the application of this model that they had a higher tendency to achieve deep insight and a higher tendency to work without worrying about failure or deadlines.

MD-09.2 [R] Analysis on the Structure and Key Factors of the Project Results Management System in Korea

Byung Mok Kim; KISTEP, Korea, South
Soon Cheon Byeon; KISTEP, Korea, South
Sang Yup Lee; KISTEP, Korea, South

There has been increased investment in national R&D in Korea, but it is still short compared with the advanced countries. Therefore, efficiency of the R&D programs became an issue and caused a demand for a paradigm shift in R&D from the investment-oriented management to performance-based management. Several R&D management systems of a few R&D institutes in Korea have been developed for their specific purposes, but those systems are not closely connected to each other and do not meet the various demands, and therefore caused some problems in the efficient performance management. In this study, a comprehensive management system of the national R&D outputs was modeled to enhance the efficiency of national R&D programs, and a unique system was developed to reflect the current

situation of Korea. Modeling of the comprehensive management system focused on three points, such as construction of information system, promotion of utilization of the outputs, and expansion of infrastructure. These include methodologies on the systematic classification of outputs, distribution system, cooperative application and commercialization of outputs, feedback, and development of human resources for the R&D management.

MD-09.3 [R] Risk Management in R&D Projects

Deniz Kasap; TUSSIDE, Turkey
Istemi Sidre Asyalı; Bogazici University, Turkey
Kemal Elçi; Bogazici University, Turkey

Since the failure risk probability of R&D projects is considerably high compared with other projects, risk factors in R&D projects should be analyzed. Stating and analyzing these risks clearly will lead to more effective decision making in various steps of the R&D project. Therefore, risk management in R&D projects affects the project considerably. Through our preliminary studies, risks can be categorized as follows: market-related risks, technology related risks, environment related risks, and organization related risks.

MD-10 Emerging Technologies-1
Monday, 8/6/2007, 14:00 - 15:30 **Room: Studio Suite**
Chair(s): Paul R Newman; Portland State University

MD-10.1 [R] Defining Key Inventors: A Comparison of Fuel Cell and Nanotechnology Industries

Alan Pilkington; University of London, United Kingdom
Linda L Lee; National University of Singapore, Singapore
Casey K Chan; National University of Singapore, Singapore

This paper defines the notion of key inventors – those whose patenting is simultaneously highly productive and also widely cited. By implication, key inventors should be the leaders in any developing new field and we investigate the validity of the notion through an exploration of two emerging technological fields: fuel cell and nanotechnology. The nature of the two groups is compared to discuss the differences between the technological groups.

MD-10.2 [R] The New Technology Evaluation Based on Rough-Set Theory

Lu Wen-Guang; Beijing University of Technology, China
Huang Lu-Cheng; Beijing University of Technology, China
Wang Ji-Wu; Harbin Engineering University, China

This paper proposes the index system of new technology evaluation on the basis of commercial potential by an expert panel. Rough Set theory was used to reduce the proposed index and determine the weight of each index, which can minimize the workload and increase the efficiency without damage to new technology evaluation. This methodology can avoid the subjectivity and randomness, and guarantee the objectivity of evaluation.

MD-11 Convergence of Technologies-2
Monday, 8/6/2007, 14:00 - 15:30 **Room: Galleria-1**
Chair(s): Dietmar H Winzker; University of Johannesburg, South Africa

MD-11.1 [R] Analysis of Competing Technologies and Firms in a Convergence Industry by Using Patent Information: The Case of Telematics

Yoo-Jin Han; KIIP, Korea, South

In this research, the author aims to explore the competing technologies and firms in a convergence industry. The author makes use of patents as a proxy for technology since they are not only the representative measure for technology but are also effective when formulating strategies with regard to firms. In addition, the telematics industry is adopted as an exemplary convergence industry. In the analysis using US patents from January 2005 until November 2006, 36 major technological fields and 40 major firms are identified.

MD-11.2 [R] 'Application-specific Research': A New Concept Representing 'Mode-Conversion' from 'Research Mode' to 'Development Mode'

Fujio Saito; Tama University Graduate School, Japan

Business realization of a new basic technology requires a set of technologies consisting of every necessary complimentary technology in addition to the original basic technology. This leads us to a concept of "application-specific research", which is the research activity including further elaboration of the basic technology but also development of every necessary complimentary technology in order to realize a specified application. Application-specific research can be regarded the mode-conversion stage from "Research" mode to "Development" mode in an R&D process. Application-specific research is also assigned to the stage 2 (Business case) in the stage-gate process. By assigning so, the roles of the stage 2 and the gate 3 (Decision on business case) will be much more clearly understood. "The Valley of Death" should be understood not as the gap between basic research and business, but as the mode-conversion stage connecting them.

MD-11.3 [R] Coevolutionary cycles of convergence: will NBT become the next ICT?

Fredrik Hacklin; ETH Zurich, Switzerland
Christian Marxt; ETH Zurich, Switzerland
Fritz Fahrni; ETH Zurich, Switzerland

Convergence between technologies can be regarded as an increasingly emerging trend and has received particular attention in the coming together of previously distinct products and solutions within the information and communication technologies (ICT) industry. In previous research, the overall impact of the convergence phenomenon remains ambiguous. Whereas some scholars suggest convergence to be associated with disintegration, entry and growth, others relate the phenomenon to opposite effects, such as consolidation and shakeouts. This inconsistency in managerial conceptions of convergence formulates a need for an integrated understanding. Within an embedded multi-case study approach, the convergence within information and communication technologies (ICT) has been observed through studying the co-evolution of actors in a converging environment, and patterns in innovation dynamics and managerial responses have been identified. In reflection with existing models of innovation cycles, a model for convergence innovation processes is elaborated and discussed. In particular, the reasoning within the ICT case set is transferred onto the currently emerging entrepreneurial activities in the intersection between nano- and bio-technologies (NBT), resulting in a comparison between ICT and NBT convergences, and deriving recommendations from a retrospective to a predictive context.

MD-13 Supply Chain Management-2
Monday, 8/6/2007, 14:00 - 15:30 **Room: Galleria-3**
Chair(s): Muammer Zerenler; University of Selcuk

MD-13.1 [A] Finding the Needle in a Haystack: Using Treemaps to Analyze Supplier Performance

Larry Mallak; Western Michigan University, United States
David M Lyth; Western Michigan University, United States
Betsy Aller; Western Michigan University, United States
Juhani Engelberg; Kohler, United States

Supplier evaluation is critical to managing an organization's supply base. Key to that evaluation is portraying the information graphically. Organizations with large supply bases find traditional methods are overwhelmed with large datasets. A Tier I automotive supplier's quality system tracked eight performance measures for its many divisions and plants within the divisions. Each plant had a multitude of suppliers. Even when pivot tables and pivot charts were used, the effective representation of that information was not accomplished through spreadsheets. Treemapping is a data visualization technology that makes efficient use of space and allows very large hierarchies to be displayed in their entirety. It sorts data using a user-defined hierarchy and displays data to meet the user's needs and decision making style. This paper provides a case study on the use of Treemaps as a Supplier Performance Rating System. The system was presented to users of the Excel-based system, and their perceptions and evaluations of the Treemap system were analyzed. They found the Treemap system provided them with better information, made their job easier, and allowed for a full representation of supplier performance. Users were also appreciative of the ability to "drill

down" on details of specific suppliers.

MD-13.2 [R] The Elaboration of a Model to Explain the Adoption of Information Technologies for Supply Chain

Pilar E Arroyo; ITESM Campus Toluca, Mexico
Jorge A Ramírez; ITESM Campus Toluca, Mexico
Victoria E Erosa; Universidad Autonoma de Tamaulipas, Mexico

Information technologies (ITs) are recognized as critical for supply chain integration because ITs facilitate information interchanges, decision and process synchronization. But the integration of small and medium enterprises (SMEs) to supply chains is difficult due to their limited technological capabilities. The objective of this work is to determine those factors affecting IT implementation among SMEs. To determine which factors of the internal context of the company (its characteristics and structure) and which of their external atmosphere (businesses environment and partners' influence) affect the adoption and/or the assimilation of technology, a survey among SMEs located in the central part of Mexico was conducted. Multivariate statistical analysis allowed determining that the external factor "influence of clients" only affects IT adoption, whereas all the internal factors related with the perceptions of the CEO-owner, plus a technology supporting culture and human resources, affect both adoption and assimilation. Contrary to expectations, a high CEO-owner innovation perception decreases the adoption and commitment to ITs implementation; whereas a high perception of insecurity/discomfort about electronic relations increases both adoption and assimilation of ITs. The study results allow the establishment of recommendations for the design of technology supporting plans for SMEs integration to their supply chains.

MD-13.3 [R] A Procurement Planning Improvement by Using Linear Programming and Forecasting Models

Athakorn Kengpol; King Mongkut's Institute of Tech. North Bangkok, Thailand
Peerapol Kaoien; King Mongkut's Institute of Tech. North Bangkok, Thailand
Markku Tuominen; Lappeenranta University of Technology, Finland

As known that an appropriate procurement policy is one of industrial competitive advantages, an over or under inventory in a procurement system can significantly affect management in budget spending on stock of raw material. The objective of this research, therefore, is to improve a procurement planning in order to achieve an optimal inventory level and to optimize the purchasing policies by applying linear programming and forecasting models, which correspond with each of the purchasing conditions. At the first phase, the trend in a material's price is analyzed, then Microsoft Excel CB Predictor programme Add-Ins is applied to forecast the results; after that the model is optimized by using models in program Microsoft Excel Add-Ins. Finally, the models have been tested by improving raw materials purchasing since January 2004 to June 2005 (for 18 months), and then the results are compared on purchasing efficiency with the actual purchasing. The research results show that the mathematical models can improve the raw materials procurement planning. Moreover, performance index in inventory policies are increased 83.33 percent, performance index order quantity in ratio from Japans' suppliers are increased 44.45 percent, performance index supplier partnership are increased by 44.45 percent, and total costs are decreased 0.68 percent. The other results, limitations and recommendations are also presented.

ME-01 Technology Management in the Health Sector-1
Monday, 8/6/2007, 16:00 - 17:30 Room: Pavilion East
Chair(s): Eliezer Geisler; Illinois Institute of Technology

ME-01.1 [A] U-Health in Korea: Opportunities and Challenges

Misook Sohn; ETRI, Korea, South
Jeunwoo Lee; ETRI, Korea, South

Ubiquitous technology is expected to be the next hero who will rapidly change the world. This wave is also flowing to the healthcare field, and various Korean healthcare organizations are eager to adopt these technologies, calling them ubiquitous healthcare. However, it is difficult to utilize these new technologies because there are so many relevant stakeholders with different views and interests. In order to analyze such a complicated situation, this study uses actor-network theory (ANT), which is considered a good tool to understand social complexity. Because it stresses the heterogeneity of network, the construction and maintenance of networks is made up of both human and non-human actors. This paper offers current healthcare issues in Korea, a brief introduction of actor-network theory, and suggests that they might be usefully incorporated to describe ubiquitous healthcare innovation.

ME-01.2 [R] Enhancing Medication Safety and Healthcare for Inpatients Using RFID

Chun-Liang Lai; National Yunlin University of Science & Technology, Taiwan
Show-Wei Chien; Taichung Hospital, Taiwan
Li-Hui Chang; Taichung Hospital, Taiwan
Shiu-Ching Chen; Taichung Hospital, Taiwan
Kwoting Fang; National Yunlin University of Science & Technology, Taiwan

At least 44,000 people, and perhaps as many as 98,000 people, die in hospitals each year as a result of medical errors. Medical errors could be prevented by building a safer healthcare system. Recently, radio frequency identification (RFID) has been applied in hospital management. RFID is valuable for quickly retrieving patient information and monitoring patient locations in the hospital. The purpose of this paper is to improve the accuracy of patient identification, and any medications the patient is taking. We propose a framework using RFID, integrating with the Hospital Information Systems (HIS), and reengineering the inpatient medication processes to improve patient safety and reduce serious medical errors. Our framework initially focuses on improving the workflow of patient's medication medical care and enhancing the patient safety. The framework was implemented in Taichung Hospital in January 2007. We intend to construct a system integrating RFID into the existing HIS to improve the efficiency of hospital management and patient safety. The purpose of this is to decrease the risk of serious medical errors and therapeutic mistakes and thereby increase higher quality of patient care.

ME-01.3 [R] The Perfect Clinical Information System Implementation: Does It Exist? A Literature Review Of Critical Success Factors in Systems Implementations in the Healthcare Industry

Bridget J Haggerty; Oregon Health and Science University, United States

This paper is the result of a comprehensive literature review of new information system implementations within the health care environment. An introduction to the healthcare industry, including current opportunities and challenges, is offered and common critical success factors and pitfalls of system implementations are identified and discussed. In addition, organizational roles and behavior during major system changes are analyzed within the context of healthcare organizations. Finally, recommendations for further study are provided and evaluated for their potential value toward improving outcomes in system implementations at healthcare institutions.

ME-02 TUTORIAL: Measuring the Strategic Value of Technologies
Monday, 8/6/2007, 16:00 - 17:30 Room: Pavilion West
Speaker(s): Nathasit Gerdsri; Mahidol University
Dundar F Kocaoglu; Portland State University

This tutorial presents a quantitative model used for evaluating the impact value of technologies on a company's objective. The hierarchical decision making approach is applied to construct the model. Both quantitative and qualitative aspects of technology evaluation are also integrated into the model development process. The impact of technologies on a company's objective is calculated as a composite index called Technology Value. Two case studies will be presented in the session to demonstrate how the concept can be applied.

ME-03 TUTORIAL: Accelerated Radical Innovation in the Industrial Technology Life Cycle
Monday, 8/6/2007, 16:00 - 17:30 Room: Broadway-1
Panelist(s): John P Dismukes; University of Toledo
John Bers; Vanderbilt University
Michael C Carroll; Bowling Green State University

Cherie Courseault Trumbach; University of New Orleans
Aleksey Dubrovensky; Vanderbilt University
Michael Gallis; Michael Gallis and Associates
Lawrence K Miller; The University of Toledo
Ruth H Miller; University of Detroit Mercy
Alan Porter; Search Technology, Inc.
Neil Reid; The University of Toledo
Jainagesh A Sekhar; University of Cincinnati
Andrew T Walters; University of Wales Institute
Richard A Williams; The University of Leeds

The academic work of Schumpeter has popularized the importance of innovation, particularly since about 1970 when an exponential increase in published papers dealing with the technological innovation began. NSF has concluded that over 50 percent of the economic growth in the economy derives from technological innovation. Notwithstanding, recent assessments of global competitiveness have concluded that innovation methodologies for cost reduction and incremental improvement of existing technologies that proved so effective in the 20th Century will be increasingly ineffective in the information intense, globally competitive economy of the 21st Century. Despite the continued increase in science and innovation publications, unfortunately, there is a Balkanization of innovation hindering the optimization of breakthrough innovation in the 21st Century. As perceptively described by John Age in his 1995 paper, there is a lack of a holistic model needed for successful integration of radical innovation principles into rapid and affordable radical innovation. In response to this strategic crisis, a team of researchers since 2004 has recognized the need for an effective methodology grounded in theory and principles, to guide acceleration of innovation from the discovery phase through to standard design, diffusion, and finally innovation maturity. The result, summarized in this paper, is a new paradigm of Accelerated Radical Innovation (ARI). This tutorial session will feature the Tutorial Paper 07T008 given before the audience and a panel that will respond with commentary and answers to audience questions related to the topic, after the presentation.

ME-04 Innovation Management-3

Monday, 8/6/2007, 16:00 - 17:30 **Room: Broadway-2**
Chair(s): Akiya Nagata; Kyushu University

ME-04.1 [A] Designing the Value Curve for Your Next Innovation

Desai A Narasimhalu; Singapore Management University, Singapore

This paper introduces an additional feature to the Strategy Canvas and Value Curve that will make innovation designers more effective. The new feature is to let the innovators carry out the designs of their new innovations taking into account both the cost of improving the quality of a parameter that the users value highly and the savings accrued from the drop in provisioning for parameters that users place less emphasis in an innovation.

ME-04.2 [R] Evaluating the Patent Performance of the Computer Communication Equipment Industry in United States

Yu-Shan Chen; National Yunlin University of Science & Technology, Taiwan
Bi-Yu Chen; Yuanpei University, Tanzania

This study uses data envelopment analysis (DEA) to explore the efficiency of the computer communication equipment industry in the United States. The financial data of this study are obtained from the COMPUSTAT database, and the patent data are collected from the United States Patent and Trademark Office (USPTO) database from 2002 to 2004. Moreover, the input variables of this study are total assets, R&D expenditures, and employee productivity, and the output variables are patent counts and patent citations. The average efficiency score of the CCR model and that of the BCC model are 17.21 percent and 24.56 percent, and there are three efficient firms in the CCR model, while there are five efficient firms in the BCC model. Besides, this study finds out that there is the advantage of firm size for patent performance, and demonstrates that R&D expenditures and employee productivity have positive effects for patent performance in this industry. Results of this study not only provide a valuable reference for managers of computer communication equipment companies in reviewing their patent performance and efficiency, but also find that there is the advantage of firm size and suggest them to enhance their employee productivity and R&D expenditures.

ME-04.3 [R] Analysis on Inhibiting Factors for Innovation in the Petrochemical Industry

Kaori Shinozaki; Tokyo Fuji University, Japan
Akiya Nagata; Kyushu University, Japan

Research and development in the Japanese petrochemical industry has been yielding high results scientifically; however, this is a typical case where such results do not easily lead to the commercialization of products or practical implementations. This research will provide an understanding of the current status, with regards to the management of research and development using data obtained from a survey conducted of managers of research centers and corporate organizations for R&D that belong to business enterprises of the industry in question, as well as clarify the inhibiting factors for innovation. It has been pointed out that a factor behind the inferior international competitiveness of the chemical industry in Japan has to do with the relatively small scale of relevant business enterprises. With this in mind, we conducted an examination on issues relating to the size of firms, as well as that of research centers and corporate organizations for R&D that impact innovation. As a result, on levels of both overall firms and business establishment, those with a relatively smaller size were found to be more advantageous with regards to efficiency of research and development.

ME-04.4 [R] Determinants Factors of Innovation in Japan's Chemical Industry: Analysis of Its Technological Opportunities

Akiya Nagata; Kyushu University, Japan
Kaori Shinozaki; Tokyo Fuji University, Japan

The purpose of this research is to clarify the determinant factors of technological innovation in the chemical industry of Japan. This paper examines the results of analysis on "technological opportunity" from among factors that determine technological innovations. Technological opportunity links research and development conducted by firms to the creation of a new technical knowledge. Technological opportunity is provided by a variety of information sources that surround research and development. Furthermore, technological opportunity is considered to be something captured by the affluent, since opportunities to come into contact with various information sources increase as the firm size becomes larger. Consequently, we analyzed the capturing status of technological opportunity in terms of size and information sources, based on data obtained from a questionnaire survey conducted on firms that belong to the petrochemical industry. As a result, we observed a clear advantage for firms of a larger size, in regards to the capturing of technological opportunity from scientific information sources, such as universities. We then analyzed the implementation status of joint research and development, which is one of the methods used to capture technological opportunity from universities. From this we clarified that the main inhibiting factor of implementation was the mismatch of firms and universities in the domain of research and development.

ME-05 Decision Making-1

Monday, 8/6/2007, 16:00 - 17:30 **Room: Broadway-3**
Chair(s): Charles Weber; Portland State University

ME-05.1 [A] Application of Hierarchical Decision Modeling for Selection of Laptop

Rimal Abu Taha; Portland State University, United States
Byung Chul Choi; Portland State University, United States
Phakphoom Chuengparsitporn; Portland State University, United States
Adriana Cutar; Portland State University, United States
Qian Gu; Portland State University, United States
Kenny Phan; Portland State University, United States

In this paper we will focus on a decision-making process for selecting the best laptop to buy for a college student. We used the hierarchal decision modeling in order to construct the decision model. First, we have to select the criteria that are important to our student. The paper discusses four different criteria as a base in structuring the decision model. When these dif-

ferent criteria are selected, a set of sub-criteria for every major criterion is chosen based on our team's judgment as experts in this project. Each of these sub-criteria contributes as a part of each major criterion's weight or relative importance. After selecting the criteria, the model is validated on 10 of the most popular laptops in the year 2006. Once these steps are established, the model can be calculated; comparisons between the alternatives will be made and the best laptop to buy will be recommended based upon the criteria.

ME-05.2 [R] A Fuzzy Negotiation Model Based on Bayesian Learning

Yuying Wu; Beijing University of Technology, China
Jinxuan Lu; Beijing University of Technology, China
Feng Yan; Beijing University of Technology, China

We usually decide to accept or reject the offer based on the utility function in the traditional automatic negotiation of E-commerce so that we reject the offers whose utility is lower than a specified value. Here we evaluate the acceptability based on the fuzzy set theory and the membership function. Since different issues have different effects on the negotiators, we state the combined concession in the multi-issue negotiation for the negotiators and negotiator agent adopts Bayesian learning mechanism to update its beliefs about incomplete information. We put forward a more practical negotiation model than the traditional negotiation model.

ME-05.3 [R] Analogizing and Maneuvering as New Product Development Decision Making Approaches at Technology-Based Organizations in Malaysia

Shahrul Yazid Yahaya; Universiti Teknologi Malaysia, Malaysia
Nooh Abu Bakar; Universiti Teknologi Malaysia, Malaysia

The purpose of this paper is to report findings related to new product development (NPD) decision-making approaches from an ongoing study on the NPD management process. The research adopts the grounded theory method using interviews as the primary data source on 16 senior managers from six technology-based organizations in Malaysia. Our in-depth discovery study revealed that senior managers apply two astute schemes in making NPD-related decisions which signify their decision- making competency: "analogizing" and "maneuvering". Analogizing is defined as an approach taken to skillfully make use of some information from one situation in an attempt to understand another situation which is ambiguous but to some degree resembling the former. "Maneuvering" is defined as an approach taken to skillfully shift or override previously decided choices or directions in response to certain influence. We propose a framework of NPD decision-making approaches which facilitates theory generation in the area of NPD management. Although the insights from this study are not statistically generalizable, the concepts and proposed framework can analytically reflect similar cases and can also be used for future research to build on and refine. More importantly, this study brings awareness to NPD management practitioners on the requisites to increase their competency in NPD decision making.

ME-05.4 [R] Evaluation on the Industrialization Potential of Emerging Technologies Using the Analytic Network Process

Jiwu Wang; Harbin Engineering University, China
Lucheng Huang; Beijing University of Technology, China
Wenguang Lu; Beijing University of Technology, China
Jian Li; Beijing University of Technology, China

Because uncertainties and complexities give birth to the future of emerging technologies, conventional methods for technology evaluation are subjected to many drawbacks and limitations. Even though we can divide a complex system into subsystems, the relative weights of the subsystems are also a crucial problem because there usually exists in these subsystems interdependence and feedback. This paper discusses the industrialization potential evaluation system, based on a Delphi survey, and evaluates the industrialization potential of emerging technologies using the analytic network process (ANP). A complete ANP model and pairwise comparisons are generated in this paper though the Super Decision software, and supermatrix calculation and sensitivity analysis are discussed at last. Benefits of the approach are detailed through an illustrative example.

ME-06 Technology Diffusion-1
Monday, 8/6/2007, 16:00 - 17:30 **Room: Broadway-4**
Chair(s): Harold A Linstone; Portland State University

ME-06.1 [R] Exploring the Technology Diffusion Trajectories and Groups of Basic Patents of Business Methods: Using the Patent Citation Network

Shann-Bin Chang; Ling Tung University, Taiwan
Shu-Min Chang; Nan Kai Institute of Technology, Taiwan
Wei-Yuan Guh; Nan Kai Institute of Technology, Taiwan

In the face of rapid change in technological development, the capabilities of enterprises for keeping ahead of new technologies, monitoring technological development, and acquiring the most advanced and appropriate technologies are critical to competing successfully. Among the many technology forecast indicators, patents are a mature and objective indicator. In a patent document, an inventor must describe the prior art of the invention, which is usually presented by citing former patents or previous literature. The more frequently a certain patent is cited by subsequent patents, the more the related technology can be said to be diffused, implying that technology is more widely applied and valuable. Therefore, patent citation is often regarded as one of tracing the spread of technology. Since 1996, the number of patents for business methods, computer software, and electronic commerce has increased drastically. This paper is in the field of business methods technology and draws upon the largest patent database in the world - USPTO - as its resource of information. This paper used the patent citation network to obtain three objectives: to establish an indicator and process for finding basic patents, to find basic patents on business method technologies, and to illustrate the technology diffusion trajectories and groups of these basic patents.

ME-06.2 [R] Using Patent Citation to Explore Knowledge Flow between Different Industries

Kuei-Kuei Lai; National Yunlin University of Science & Technology, Taiwan
Shu-Min Chang; Nan Kai Institute of Technology, Taiwan
Shann-Bin Chang; Ling Tung University, Taiwan

R&D and innovation are important activities in firms. During these activities, spillover and diffusion of knowledge are generated. Especially in this era of information and the Internet, the speed of knowledge flow is faster, the costs are lower and the paths are more diverse. In the past year, most of the studies about spillover or knowledge flow were focused on one industry or one industrial park because the cross-industries' knowledge flow was limited. That is, researchers discussed knowledge flow between firms within one specific industry. Since Internet technology began sweeping the world, the conception and boundaries of industry blurred. The phenomenon was called digital convergence. This means that some technologies and knowledge can be applied to different industries, or the firms of different industries can enter the same markets and become competitors. Therefore, this paper will discuss the knowledge flow of different industries. Among many indicators of measuring spillover and knowledge flow, patent citation is a mature and objective indicator. This paper is positioned in the field of business methods technology and draws upon the largest patent database in the world - USPTO - as its source of information. The purposes of this paper are: 1) to examine the knowledge flow of business methods that have any significant difference between and within different industries; 2) to detect the direction of knowledge flow between the different industries; and 3) to propose some suggestions for knowledge flow in the field of business methods technology.

ME-06.3 [R] Study of Basic Logic of Diffusion with Specific Models

Satoshi Yoshida; The University of Tokyo, Japan
Tomonari Yashiro; The University of Tokyo, Japan

In recent years, the importance of diffusion has been remarked with many researches, especially in the field of user need, user satisfaction and user innovation. But there are not so many researches to explain the fundamental logic with some specific examples. This paper proposes the fundamental analysis of diffusion with user demand with the study of specific product models. At first, it is necessary to understand the user structures of each product. Because every product's structural design is based on functional design basically, and func-

tional design is based on user's demand. So we would like to pick several industries up to describe the users structure, and try to make some typology of these structures of each product. Then, several models would be selected to analyse the diffusion of products to society from the viewpoint of customer participation. We tried to understand the relationship between structure and function of each product with Architecture logic, and tried to analyse the fundamental rules to design each product. Then, we tried to analyse how to create the demand of customers for functional design. Especially, construction projects have many stakeholders in every case, and this paper tried to make clear the elements of user demand to create functional design. Finally, we tried to find the user participation with construction projects, and make clear the role and position of users in the projects.In recent years, the importance of diffusion has been remarked upon with much research, especially in the field of user needs, user satisfaction and user innovation. But there is not much research to explain the fundamental logic with some specific examples. This paper proposes the fundamental analysis of diffusion with user demand with the study of specific product models. At first, it is necessary to understand the user structures of each product because every product's structural design is based on functional design basically, and functional design is based on user's demand. So we would like to pick several industries up to describe the user's structure and try to make some typology of these structures of each product. Then, several models are selected to analyze the diffusion of products to society from the viewpoint of customer participation. We tried to understand the relationship between structure and function of each product with Architecture logic, and tried to analyze the fundamental rules to design each product. Then, we tried to analyze how to create the demand of customers for functional design. Especially, construction projects have many stakeholders in every case, and this paper tried to make clear the elements of user demand to create functional design. Finally, we tried to find the user participation with construction projects, and make clear the role and position of users in the projects.

ME-07 PANEL: How Educational Programs can Respond to the Changing IT Workforce
Monday, 8/6/2007, 16:00 - 17:30 **Room: Forum Suite**
Panelist(s): Christine V Bullen; Stevens Institute of Technology
Joy Howland; Seattle Chapter, SIM

The increasingly global sourcing of IT work, pending baby-boomer retirements, and low IT enrollments in U.S. and European universities are prompting fundamental changes in the availability of IT capabilities needed in both client and IT providers. The panel will report on the latest results of the provider survey and compare this with the results from an earlier study focused on client organizations. The following will be addressed: • Understand the current and future needs for IT capabilities; • Determine how IT providers recruit and develop in-house IT capabilities to meet current and future needs; • Determine what skills and capabilities universities should be providing in their graduates; • Identify how capabilities will change over the next three years. This research project is sponsored by the Society for Information Management (SIM) and is being carried out by a team of nine researchers. We are interviewing executives who can describe the capabilities they seek to own (now and in the near future) and the capabilities they seek in entry-level and mid-level hires. The research is using a survey available on the Web to make it easily accessible

ME-08 Project/Program Management-3
Monday, 8/6/2007, 16:00 - 17:30 **Room: Council Suite**
Chair(s): Justin M Reginato; University of California, Berkeley

ME-08.1 [R] Strategic Focus: Why We Do Projects

Michael Poli; Stevens Institute of Technology, United States
Aaron J Shenhar; Stevens Institute of Technology, United States

Projects offer an enormous opportunity for achieving competitive advantage and/or value for the corporation. A Project Strategy is necessary to take advantage of these opportunities. One of the key elements of a Project Strategy is to have an appropriate Strategic Focus. Individual researchers used a standardized case study format to analyze the Project Strategy of real-life projects from within their company. Project Strategy helps the project achieve the intent of the strategic stakeholders. The researchers focused on the what, why, how, who, when and where of the project as well as the project's desired strategic results. Four strategic focuses were examined: Customer, Cost, Product, and Time. Distinct patterns of behavior were observed; some were successful and others were not. We must manage projects more than just tactically or operationally. We must manage projects strategically to take advantage of the enormous opportunities that projects represent. Following the right patterns as part of an explicit Project Strategy will help corporations to achieve better competitive advantage/value in their projects and achieve the strategic intent that stakeholders expect.

ME-08.2 [R] A Framework and Findings for Learning Based Project Reviews

Tim Kotnour; University of Central Florida, United States
Catherine Vergopia; University of Central Florida, United States

This paper contributes a framework for project reviews. The emphasis of this paper is on how to increase the learning that occurs within project reviews. Typical projects view learning as a "lesson learned" session at the end of the project. We explore the organizational learning and project review literature to develop an integrated framework. Findings from working NASA and the Launch Services Program are used to demonstrate the framework. A project manager can use this paper to better understand project reviews.

ME-08.3 [R] Using Strategic Fit for Portfolio Management

Supachart Iamratanakul; Portland State University, United States

Dragan Z Milosevic; Portland State University, United States

We focus in this paper on a tool to improve portfolio management. More precisely, of the three major goals that Cooper et al. specify for project portfolio management – selecting the MVP projects, balancing portfolio, and aligning project portfolio with strategy - goal three attracted our attention. Even more precisely, we look to use strategic fit for goal three. For this reason, we need to use concepts of diverse disciplines of project management, business strategy, portfolio management and alignment of business strategy with project management. The theory-building literature stream is also reviewed to gain better understanding of how to build a theoretical model of using the strategic fit approach for portfolio management. Finally, we conclude this paper laying down the concept of our ideas to use the strategic fit.

ME-09 R&D Management-2
Monday, 8/6/2007, 16:00 - 17:30 **Room: Directors Suite**
Chair(s): Kazuhiko Itaya; University of Tokyo

ME-09.1 [R] Research & Development Project Selection Model and Process Approach In Defense Industry Related Programs: First Phase – Concept Approval Decision

Arda M Cakmak; TUBITAK-SAGE, Turkey
Serdar E Gokpinar; TUBITAK-SAGE, Turkey

The defense research and development (R&D) projects are chancier and more costly than the civil R&D projects because of their complexity and interdisciplinary nature. Not only are the risks and finances excessive when compared with the civil ones, but also the project selection process is also more complicated in the defense area. To complete an R&D project in an effective manner, a system approach has to be set to consider the life cycle as a whole. Only a well-defined R&D project has a chance for success. Because of this reason, defining the process of an R&D project is the most critical period in the integrated life cycle. It is very important to form a "Concepts of Operations" (CONOPS) document according to the requirements, which are focused on the achievement, performance and basic technological necessities of the system. In this paper, for an influent selection of a defense related R&D project, a systematic process for an effective approach model beginning from CONOPS will be exhibited. A system approach will be discussed where the CONOPS document is in the life cycle and how the outputs of CONOPS can be used in the project definition process.

ME-09.2 [R] Governance and Organizational Behaviour of Public Research Labs

Mario M Coccia; National Research Council of Italy, Italy

Secondo Rolfo; Ceris-Cnr, Italy

The organization of public research labs plays a fundamental role to increase their efficiency, and the production of scientific research is more and more necessary for economic growth of countries. The paper presents the main organizational studies carried out on public research bodies in the U.S. and Europe. After that, this research analyzes the organization of the biggest public research body in Italy, showing the points of strength and weakness in comparison with other scientific structures. Some public management implications and the relationship with bureaucracy complete the research.

ME-09.3 [R] Behavioural Additionality of R&D Evaluation: Empirical Evidence from Korea Public R&D Program

Eui-seong Kim; Korea Institute of Science and Technology, Korea, South
Yong-Il Song; Korea Institute of Science and Technology, Korea, South

Additionality means what types of outputs are generated by research policy or investment. Some policy generated output additionalities include enhanced productivity, stronger competitiveness, and larger amounts of paper. Another policy generated input additionality is leveraging private R&D investment by public R&D investment. There is a more extended concept of additionality - behavioral additionality. It means that some policy or investment changes the behavior of an R&D player – R&D pattern or action. In this research, we want to talk about the impact of government investment evaluation to R&D activity and outputs. Especially, we discuss the impact of a specific R&D evaluation policy – in Korea, the government emphasized a number of American patents – to R&D activity and output change.

ME-10 Emerging Technologies-2
Monday, 8/6/2007, 15:30 - 17:00 Room: Studio Suite
Chair(s): Alan Pilkington; University of London

ME-10.1 [R] Estimation of Willingness to Pay Using Dichotomous Choice Data under Proportional Hazard Approach

Choonmo Ahn; ETRI, Korea, South

Estimation techniques and empirical studies for the dichotomous choice contingent valuation model are receiving considerable interest. These methodologies originally have been developed to find the willingness-to-pay or implicit valuation of non-market goods. The form of willingness-to-pay distribution can be applied to find several characteristics of new services or goods. Furthermore, it can be used for risk-minimizing marketing strategy if we know the relations between WTP and covariates – salary, expenditure for telecommunication services, age, etc. The methodologies to estimate willingness-to-pay distribution can be classified into three categories. The most popular approach is the parametric approach. The second approach is a fully nonparametric one. The most popular models are Turnbull's estimator and kernel method. The final approach is semi-nonparametric approaches, which are the most preferable in some sense that take both advantage of parametric and nonparametric approaches. In this paper, we have applied a well-known semi-parametric estimation procedure called proportional hazard regression model into binary discrete response data. We performed a series of simulation under various model assumptions and considered the efficiency of a proportional hazard model and other models. We also give empirical studies of real situations for finding consumer's valuation of prescribed services.

ME-10.2 [A] Evolution of RFID Applications and Its Implications: Standardization Perspective

Byoung Nam Lee; ETRI, Korea, South
Yong-Woon Kim; ETRI, Korea, South
Hyoung Jun Kim; ETRI, Korea, South

This paper is concerned with the global standardization issues currently viewed in terms of network aspects of RFID (Radio Frequency Identification). It intends to provide relevant information about the review of RFID systems and the standards relevant to network aspects of RFID. It classifies the RFID systems from the viewpoint of telecommunications network operators. It also provides the concept of networked RFID with a view to facilitating discussions about network aspects of standardization requirements for RFID. It shows the evolution of RFID applications in the business context such as B2B, B2C, B2B2C models.

ME-10.3 [R] Technology Readiness Characteristics of 3G Subscribers in Indonesia: A Preliminary Study

Reza A Nasution; Institut Teknologi Bandung (ITB), Indonesia
Priyantono Rudito; PT. Telekomunikasi Indonesia, Indonesia
Zulfikar Syaharuddin; Institut Teknologi Bandung (ITB), Indonesia

The technology of 3G (Third Generation) mobile communication was launched in the Indonesian market in September 2006. Studies have been conducted to discover contents frequently accessed by subscribers and their satisfaction level with operators' services. However, little is known about the subscribers' technology readiness characteristic. Knowing this characteristic is important since it will help 3G operators designing a proper marketing program in widening the customer base. A preliminary survey was conducted to obtain this information, and it was discovered that a significant number of users possessed technology readiness characteristics different than those originally presented in the literature.

ME-11 Knowledge Management-1
Monday, 8/6/2007, 16:00 - 17:30 Room: Galleria-1
Chair(s): Jamie Rogers; University of Texas at Arlington

ME-11.1 [R] Fostering Knowledge Sharing to Encourage R&D Team Learning

Wei-Li Wu; National Chi Nan University, Taiwan
Ryh-Song Yeh; National Chi Nan University, Taiwan
Chin-Chung Huang; National Central University, Taiwan

Nowadays, firms operating in highly competitive environments must adapt quickly to their customers' changing tastes as well as to new challenges in the marketplace. They need to recognize and respond to external opportunities and threats in order to survive and succeed. Therefore, it would be beneficial for a company if its R&D teams could continue to learn new skills in order to respond to future challenges. Managers need to create an environment for their teams to succeed, and they should try their utmost to increase their teams' motivation to learn. This article, in extending the concept of knowledge management, proves that nurturing an environment of knowledge sharing can motivate a team to learn. In addition, two methods are also provided to enable managers to efficiently foster knowledge sharing within a team. In this regard, knowledge sharing could be regarded as a function of how an atmosphere of trust is created and interdependence among tasks is managed.

ME-11.2 [R] Organizational Learning Strategies and Managerial Culture in Software Firm Networks in Mexico

Ricardo Arechavala-Vargas; University of Guadalajara, Mexico
Claudia Diaz-Perez; University of Guadalajara, Mexico
Berta E Madrigal Torres; University of Guadalajara, Mexico
Selene Ferrer-Ramirez; University of Guadalajara, Mexico

This paper analyses changes in organizational learning patterns in software enterprises in Western Mexico. It is part of an ongoing research program that deals with organizational learning and entrepreneurial culture development, as firms begin to create networks in order to compete internationally. The research reported here was based in case studies and a survey. Case studies are aimed at understanding in detail entrepreneurial culture traits that guided the search for collaborative work, as well as the learning processes that ensue. The survey was used to assess the degree in which specific behaviors and practices were generalized among software firms, and the number and nature of the links developing amongst them. Results point toward a substantial departure from baseline entrepreneurial culture values toward social capital building processes and toward joint learning processes. The change seems to be driven mainly by the firms' orientation toward international markets, and the need to devise and implement competitive strategies accordingly. Implications for the understanding of social capital building and joint learning processes as they occur, and for comparison with what the literature reports in a posteriori studies in advanced economies, are discussed.

ME-11.3 [R] Managing and Processing Knowledge Sharing between

Software Organizations: A Case Study

Jari Soini; Tampere University of technology, Finland
Timo Mäkinen; Tampere University of Technology, Finland
Vesa Tenhunen; University of Joensuu, Finland

Knowledge sharing increases the knowledge capital of every organization, and thereby its competitiveness. The goal of collaboration and knowledge sharing is to generate additional value for the organization. The prerequisites in this issue such as collecting, absorbing and applying new information and new knowledge are paramount, especially in knowledge-intensive organizations where intellectual capital is the most important asset. In this empirical case study, we describe a method for managing and implementing this knowledge-sharing process between software organizations. We also analyze and discuss the factors observed, which seem to affect success when trying to collect and share information between individuals or organizations. The results give empirical information for management when they try to find ways to manage and solve knowledge management issues. In addition, we briefly present a knowledge-sharing management tool under development for delivering the knowledge; collected and shared, back to the software organizations for utilization in their software development processes in order to make their business more effective.

ME-11.4 [A] Knowledge Management for High Technology Industries

Isabel C Santos; University of Taubate (UNITAU), Brazil
Joao Amato Neto; University of Sao Paulo, Brazil

This article aims to contribute to Knowledge Management (KM) theory, centering its analysis towards a social organization perspective. The Knowledge Management Model developed by Fraunhofer Institute was partially used as a reference for this work. The focus is specifically oriented to human resources, leadership and organizational culture issues. For the research, a main problem was defined, which asked the question: How can an industry, that manufactures from customers orders, in a long-term commitment and lead time, generate state-of-the-art knowledge, considering accelerated moves of technological boundaries? This question required both a qualitative and quantitative approach, addressed to a single case study, supported by bibliographical research, questionnaires and interviews. Finally, some conclusions were made: the innovative aspect of high technology is limited by the available knowledge in related sciences and also in its applications; high technology enterprises themselves generate innovation through R&D, aiming to fulfill the lack of governmental investment programs. To implement adaptations required by a new technological and competitive order, a cluster of human competencies is demanded. These are developed through educational processes which include personnel and leadership development. Organizational culture can also contribute to the KM process based on continuous improvement, customer and shareholder satisfaction.

ME-12 Technology Management in Biotechnology
Monday, 8/6/2007, 16:00 - 17:30 Room: Galleria-2
Chair(s): Charles Thompson; Northwestern University

ME-12.1 [A] The San Jose BioCenter: BioConvergence Entrepreneurship in Silicon Valley

Burton V Dean; San Jose State University, United States
Asbjorn Osland; San Jose State University, United States
Melinda Richter; San Jose BioCenter, United States
William Y Jiang; San Jose State University, United States

We describe the role of an incubator to accelerate entrepreneurship in the BioConvergence industry in Silicon Valley. Soft systems methodology (SSM) is used to explain the concept of an entrepreneurial system and apply it to the evolution of the San Jose BioCenter (SJBC), an incubator for BioConvergence startup companies (i.e., a service provider in the BioConvergence entrepreneurial system). The San Jose Redevelopment Agency (SJRDA) fostered and continues to nurture incubators in partnership with San Jose State University Foundation (SJSUF), which operates the fairly autonomous, loosely coupled SJBC. These entities are all part of the entrepreneurial system that characterizes Silicon Valley. Specifically, using the language of SSM, in the present study we analyze the second order or complementary relationships connected to the "incubation" service provider (i.e., SJBC) component of the BioConvergence entrepreneurial system.

ME-12.2 [R] Analysis and Examination of Protection of Genetic Resources and Profit Sharing

Hiroshi Kato; National Graduate Institute for Policy Studies, Japan

Convention of Biological Diversity is aimed at "the fair and equitable sharing of the benefits arising out of the utilization of genetic resources" with countries providing genetic resources. Based on Convention of Biological Diversity, the protection of genetic resources is discussed at international conferences. This issue should be discussed in terms of economic analysis because this issue includes aspects of economics - the sharing of a benefit arising from the use of genetic resources. The author shows some economic analysis in the biodiversity field after focusing on some legal and international issues and finally discusses some cases for the benefit sharing. These cases are 1) Direct Contracts, 2) Revision of IP System, and 3) Sui Generis. Each pharmaceutical company who uses genetic resources should plan several intellectual property strategies according to those 3 cases, and choose the suitable strategy from them.

ME-13 Manufacturing Management
Monday, 8/6/2007, 16:00 - 17:30 Room: Galleria-3
Chair(s): Kathryn E Stecke; The University of Texas at Dallas

ME-13.1 [R] Some Effects of a Human Resources Strategy on Total Productive Manufacturing (TPM) Improvement

Pule A Kholopane; University of Johannesburg, South Africa
Leon Pretorius; University of Johannesburg, South Africa
Alwyn Strauss; University of Johannesburg, South Africa

Total Productive Manufacturing (TPM) addresses planned maintenance as well as autonomous maintenance that determine the maintenance requirement of machines in their operating context. This paper focuses on the effect of an integrated human resource strategy on TPM and assesses how the combination of the two can increase a firm's productivity. Some results of a South African manufacturing case study company in a unique environment are presented. The main conclusion reached in this paper is that when innovative human resources practices are applied properly, they will promote total machine system efficiency and hence increase the productivity of the company. As a result, TPM that does not normally focus on HR is taken to a higher level, whereby the additional human factor is taken into consideration. It suggests that operators should be nurtured and be well trained as part of the TPM focus because they are the ones who are operating those machines with intimate knowledge. The limited research presented here as part of a doctoral thesis highlights some element of human resources practice that can be applied to enable operators to be efficient and productive as part of the TPM machine system.

ME-13.2 [A] Strategy of Production Management Subsidiary Units in the Frames of Cable Industry Technological System Novkabel in Serbia

Dragoslav P Nikolic; Faculty of Management Novi Sad, Yugoslavia (Srbija)

The aim of this work is to distinguish strengths, weaknesses, opportunities and threats at the level of overall production management and business of subsidiary 'Javor' in the system of cable industry 'Novkabel' in Serbia. The conveyed research, in the frames of SWOT and ABC analyses and BCG portfolio matrix, provide hypothetical forecasts of candidates aimed at accepting hypothesis about future prosperity of subsidiary Javor. This opens new horizons of possible growth and development at the production level. Moreover, it is also considered whether the production management of subsidiary represents a base for management improvement by using outsourcing forces from Novkabel. Thus, the clear prediction of the business future is created after having carried out the research. Firstly, there should be the improvement of the current business and production performances. Secondly, there should be the new investments in the expansion of the product range and the growth of the product capacities. Thirdly, Novkabe should invest equally in all subsidiaries. Running of a company without the system of management (preparation, production and services) is the same as conducting a ship without navigational equipment. It is just a matter of the time when we

will be blown off the market.

ME-13.3 [R] Modular Manufacturing and Supplier Relations: A Survey of Practices in the Turkish Automotive Supplier Industry

Muammer Zerenler; University of Selcuk, Turkey
Ferhat Gungor; Marmara University, Turkey

During the last 15 years, the structural changes of the automotive industry have modified the technology and the business organization of the large automakers and their suppliers in many ways. This paper analyzes the main results of a survey to 63 automotive suppliers in the Turkish automotive supplier industry. It has been found in a regression analysis that the rotation of tasks and teamworking are positively correlated with the training and the use of modular components. Nearly half of the companies cooperate with customers, suppliers, and technological centers to improve their production processes, but only four companies cooperate with their customers in component development and design, which indicates an under-involvement of the surveyed companies with the automotive manufacturers. The companies are much more integrated with the automakers in the delivery process, since more than half of the companies have daily deliveries and directly to the assembly line of the automaker.

TA-01 PLENARY - 2

DATE: TUESDAY, AUGUST 7
TIME: 08:30 – 10:00
ROOM: PAVILION
CHAIR: ROY KOCH, PORTLAND STATE UNIVERSITY, UNITED STATES

KEYNOTE

Yoshio Nishi ; Stanford University, United States

"Industry-Academia Collaboration for Nanotechnology Research"

A possible model and mechanisms for better industry-academia collaboration will be discussed, in which strong interactions between researchers/engineers from industry and from academia will stimulate each other as well as build complimentary relationships, which are critically important. The nature of nanoscale science and engineering in the nanotechnology era, which is defined as "multi-disciplinary cross fertilization and incubation of new ideas and applications," will force us to invent a new model of collaborations.

KEYNOTE

Harold A Linstone; Technological Forecasting and Social Change Journa, United States

"Three Eras of Technology Foresight"

The talk examines the evolution of Technology Foresight (TF) from its roots in World War II to 1970, then the impact of the information technology era on TF, and finally some possible effects of the follow-on molecular (nano/bio) technology era. Of particular interest are the insights gained from complexity science, technology mining, computer modeling of complex adaptive systems as well as the generation of scenarios, and the use of multiple perspectives to bridge the gap between modeling and the real world.

TB-01 Technology Management in the Service Sector-2

Tuesday, 8/7/2007, 10:30 - 12:00 **Room: Pavilion East**
Chair(s): Haluk Demirkan; Arizona State University

TB-01.1 [R] An Integrated Framework for Managing Service Innovation

Yiche G Chen; Yuan Ze University, Taiwan
Pi-Feng Hsieh; Takming College, Taiwan
Chung-Shing Lee; Pacific Lutheran University, United States

To create and deliver value for customers in the age of technology convergence, developing services is a major part of the high-technology product strategy. In addition, the realization of the economic value from technology depends on the firm's choice of business model. This paper develops a new framework of managing service innovation. The framework takes into account service innovation in both industry and firm-levels. The main emphases in the industry level are value proposition – identifying potential industry demand and earnings, value deployment – positioning the firms in the value networks or systems, and value appropriation – exploiting resources and capturing the benefits of service innovation (i.e., the 3V Innovation Model). At the firm level, the key processes are new service design – identifying customer value and proposing a scope of offerings, service development – acquiring resources and managing service innovation projects, and service delivery – enhancing service value and sustaining revenues and growth (i.e., the 3D Innovation Model). The 3V Innovation Model provides guidance to assist firms in identifying and securing their product-market positions, defining the supply chain and network relationships, and appropriating the gains from service innovation. The 3D Innovation Model presents firms specific processes for implementing service innovation. Finally, business model innovation serves as a linkage between the industrial-level 3V and business-level 3D models for implementing service innovation.

TB-01.2 [R] Pervasive Information Systems Value Chain: A Services Perspective

Bharat Rao; Polytechnic University, United States
Bojan Angelov; Polytechnic University, United States
Michael McGetrick; L.F. O'Connell Agency, United States

Current research in the field of pervasive information systems is predominantly focused on technical and engineering issues. In this paper, we look at the value chain boundaries of pervasive information systems as constituted by components from multiple industrial sectors. We identify a new value chain comprised of (1) infostructures, (2) devices, (3) interfaces, and (4) smart spaces that form the core elements of a pervasive information environment. We further investigate how businesses can achieve competitive advantage in this value-chain through the design and delivery of innovative products and services. Different stakeholders at each level of the value chain are identified with a goal of creating a virtually omnipresent range of services and delivery mechanisms. We survey current research in the area as well as specific firm-level strategies and business models to determine key success factors. Based on our survey, we develop a managerial framework for conceptualizing pervasive information systems in today's service-oriented organizations.

TB-01.3 [R] Development of Methodology for Service Concept Creation

Atsuko Koizumi; Hitachi, Ltd., Japan
Chiaki Hirai; Hitachi, Ltd., Japan
Takahiko Nomura; Fuji Xerox Co., Ltd., Japan
Yayoi Kubota; Fuji Xerox Co., Ltd., Japan

We are developing a methodology for service concept creation. Taking an approach consisting of four steps - observation (involvement in pilot projects), conceptualization, modeling, and deployment - we have clarified the basic concept of our methodology and designed a process for service concept creation. The process includes 1) sharing a vision of new services, 2) exploring customer values, and 3) creating a service concept consisting of target users (WHO), customer values (WHAT), and key technologies (HOW). In this paper we illustrate this process and propose methods designed to be used in the process by focusing on effective use of observation, story telling, and analogies for abductive reasoning in the step of searching for customer values.

TB-01.4 [R] A Service Concept Framework Based on the Maslow's Needs Hierarchy and Its Application to Typical Types of Service

Kotaro Nakamura; Japan Advanced Institute of Science and Technology, Japan
Akio Kameoka; Japan Advanced Institute of Science and Technology, Japan
Tetsuro Fujiwara; Japan Advanced Institute of Science and Technology, Japan
Nobuhisa Kamada; Japan Advanced Institute of Science and Technology, Japan

In order to further expand the service industry, including the service sector of manufacturing industries, a new service concept framework for the launch and design of new services

is required. Especially in the case of large-scale services using wide service infrastructure such as IT and public facilities, the framework needs to involve not only technological elements and legal restrictions, but also the needs of individual customers, the goals of organizations served, and the social acceptability of the service. This paper applies a service conceptual framework proposed by the author before to several typical services. The framework core is a two-dimensional service classification (SCHM model) based on Maslow's needs theory's 5 types of needs and 3 customer segments resulting in 15 service types. This SCHM model is further extended to a three-dimensional diagram by introducing on the third axis the "customer value creation phase" such as delivery, adaptation, and co-creation with the customer. The dynamic service change due to interaction of user segments and/or shift of needs is examined using methodology from the sociology of knowledge. Such a service conceptual framework makes it possible for multiple otherwise competing service business players to find common ground for collaborative activities and service road-mapping aimed at enhancing their individual target services.

TB-02 TUTORIAL: Making Offshoring a Success
Tuesday, 8/7/2007, 10:30 - 12:00 Room: Pavilion West
Speaker(s): Arezou Zarafshan; Hewlett-Packard

Offshoring has been a controversial practice in the industry. Many books and articles have been written about why offshoring is a business necessity in the 21st Century. There is also probably an equal number of books and studies about the dangers, pitfalls and macro-level adverse effects of offshoring as a business strategy. In this tutorial session, we will not be discussing if offshoring is right or wrong for the business; rather, how to make it a success. We define offshoring as work taking place in a remote (from the organization epicenter_) geographic location with reduced labor costs. Organizations which offshore ought to pay attention to three foundational vectors as critical success factors for the endeavor: Cultural Awareness, Operational Tactics and Strategic Alignment. A set of methodologies (tools and processes) must be established and carried out in the practicing organization in order to ensure the three critical vectors of Culture, Operations & Strategic remain healthy and intact. In this tutorial we will examine each vector, and based on our experience at Hewlett-Packard, Vancouver, we will offer a set of practices that have proven essential to successful offshoring.

TB-03 Accelerated Radical Innovation in the Industrial Technology Life Cycle-2
Tuesday, 8/7/2007, 10:30 - 12:00 Room: Broadway-1
Chair(s): Michael C Carroll; Bowling Green State University

TB-03.1 [R] Software Tools to Enable Information Accelerated Radical Innovation

Ruth H Miller; University of Detroit Mercy, United States
Lawrence K Miller; The University of Toledo, United States
C. Eick; University of Houston, United States

While information technology is a basic and necessary component to any research and development project leading to innovation, knowledge derived from information is crucial to accelerating radical innovation. Information has become more readily available to researchers in the past decade, with much of this information residing in digital libraries, patent databases, and even on the World Wide Web. However, much of this information is not easily retrievable. As the amount of information has grown throughout the past decade, finding specific information has become nearly impossible. Search engines are not adequate for finding critical knowledge for innovation in this vast sea of information. On the other hand, information must be rapidly retrieved and processed into knowledge in order to accelerate radical innovation. This paper describes a novel accelerated radical innovation methodology for accelerating breakthrough innovation from inception through commercialization, and then describes the required capabilities of a triad of necessary IT technologies that must be integrated with the new methodology if radical innovation is to be accelerated by the envisioned 2-10 times beyond current innovation time horizons. This IT triad includes integrated tools for information retrieval, pattern recognition, and knowledge management which must interact and cooperate.

TB-03.2 [R] A Framework for Effective Environmental Scanning and Analysis

Cherie Courseault Trumbach; University of New Orleans, United States
Greg Elofson; University of Hawaii, United States

Areas such as competitive intelligence and environmental scanning are becoming increasingly more important business practices, particularly under the intense competition of the technology industry. However, organizations are reluctant to search for information which they cannot act on immediately and are also reluctant to experiment in the absence of reliable information, conditions leading to organizational inattention. On the other hand, many organizations are spending valuable resources either on projects assessed with insufficient information or on information that they are unable to internalize. This paper provides a framework, based on environmental turbulence and organizational flexibility, to aid organizations in developing the appropriate strategy for effective environmental scanning and analysis.

TB-03.3 [A] Tech Mining to Accelerate Radical Innovation

Alan I Porter; Search Technology, Inc., United States

Timely provision of effective technical intelligence can revamp technology innovation management. To date, this has not been widespread. A user-focused framework is offered that starts with managerial issues; leads to questions; and then devises "innovation indicators" to help answer those questions. This framing lends itself to standardization of sets of empirical analyses. That contributes to user familiarization with the form and content of technical intelligence products. It also enables one to set up templates to expedite those analyses via scripting. Our target is to provide quick technical intelligence products (QTIPs) within one day. Experience using VantagePoint text mining software in conjunction with topical searches in R&D publication and patent abstract databases supports the QTIP approach. Case illustrations are offered to illustrate the speed-up of such technical intelligence processes over the past decade. How this approach lends itself to facilitating the information retrieval and pattern recognition phases of the Accelerated Radical Innovation (ARI) approach is explored. Experiences at Air Products and Chemicals, Inc. further show how these results can be integrated into knowledge management (business decision processes).

TB-04 Innovation Management-4
Tuesday, 8/7/2007, 10:30 - 12:00 Broadway-2
Chair(s): Jiang He; Stevens Institute of Technology

TB-04.1 [A] Innovation Stack - Choosing Innovations for Commercialization

Desai A Narasimhalu; Singapore Management University, Singapore

This paper describes a method for enterprises to order the innovations of interest according to a number of parameters, including their own business strategy and core competencies. The method takes into account aspects such as ability to create entry barriers and complementary assets. Enterprises can now use this method to both filter out innovations that may not be of interest to them and then order the short listed or selected innovations according to their attractiveness.

TB-04.2 [A] Engaging the Creative Minds: The ENGAGE Models

C. M Chang; State University of New York at Buffalo, United States

Companies need creativity and innovation on a continuous basis to achieve and sustain long-term profitability. Research literature indicates that it usually takes about 10 years for individuals to amass diversified experience, acquire deep insights and apply their knowledge effectively in order to become productive in the pursuit of invention and innovation. It would be of great value to our society if individuals' creative and inventive minds could be actively engaged to significantly shorten this development period. This paper advocates the possibility of systematically expediting the development of this creative process by applying the ENGAGE model. The model consists of 1) Excite the inquisitive and curious minds with external stimuli, 2) Nurture different thinking strategies to produce new ideas beyond the conventional, 3) Gain new information and perspectives by evaluating data with new ideas, 4) Apply insights and interpretations to glean new knowledge from information, 5) Grow new wisdom from processing and distilling new knowledge, and 6) Empower new wisdom to procreate creative and innovative outcomes. In order to frequently generate new ideas, creative people need to pursue new thinking strategies, which are outlined by a second ENGAGE mod-

el: 1) Explore metaphors and analogies, 2) Notice lessons from failures and mistakes, 3) Garner divergent perspectives, 4) Adopt idea combinations, 5) Go after intellectual prompts, and 6) Envision relationship graphically. Having a preponderance of creativity and innovation is no longer opulence, but a necessity for many enterprises to survive in today's marketplace. It is believed that by consistently emphasizing both the creative process and the thinking strategies indicated in these two ENGAGE models, individuals and companies could become inventive and innovative much sooner than otherwise, when pursuing either the traditionally closed or the newly promoted open innovation paradigm, or both, and contribute more effectively to the wellbeing of their enterprises and to the society at large.

TB-04.3 [A] The Lost Link: Why Successful Innovation Needs Sound Project Management

Aaron J Shenhar; Stevens Institute of Technology, United States
Dov Dvir; Ben-Gurion University, Israel

To function in an effective way, organizations must learn the principles of successful innovation that will fit their environment and mission. However, having the best and most innovative ideas is not enough. Successful innovation requires setting up well-organized and well-run projects that will put things in place in the most effective and efficient way. While the research literature on innovation management is rich and developed, there are very few studies on the linkage between innovation management and project management. The goal of this paper is to provide new and practical insights on the problems of innovation and how these problems can be resolved with proper project management that will fit the situation, problem, and the specific organization. Our premise is that managers must learn how to adopt the right project and its management style to the specific type of innovation, environment, and organization. We will address a wide spectrum of different innovation types, including the traditional distinctions of incremental or radical, and up to more modern concepts such as Roger's product adaptation model and Christensen's innovator's dilemma. In each case we will create an integrated approach to the problems of how to put the right project in place for the specific type of innovation or initiative.

TB-04.4 [R] A Study on the Relationship between Organizational Slack and Technology Innovation

Weifeng Yao; Tsinghua University, China
Wu Yang; Tsinghua University, China

Since the 1980s, most research regarding firm competitive advantage strategy focuses on the relationship between organizational factors and firm performance, either using a resource-based view or capability-based view. The findings with a resource-based view and capability-based view cannot illustrate the essential characteristics of forming and maintaining firm competitive advantages when the environment is changing greatly. The present dissertation proposes an integrated resource- and capability-based view, which expounds the basic principles and forming paths to achieve firm competitive advantage under super-competitive environment. In order to expound the rationality and effectiveness of the integrated resource and capability-based view, this dissertation proposes a structural equation model, which consists of organizational slack, absorptive capabilities and technology innovation factors, and empirically tests the model with data from a questionnaire. Eight hundred firms in Gangdong, Sandong, Sichuan, Liaoning, Shaanxi, Shanxi, Henan and Shanghai participated in this questionnaire. The study leads to such a conclusion: the exploitation of the slack assimilated into a firm's productive system not only produces certain product innovation which enhances differential competitive advantage, but also produces process innovation to enhance cost advantage for firms.

TB-05 Entrepreneurship & Intrapreneurship-1
Tuesday, 8/7/2007, 10:30 - 12:00 **Broadway-3**
Chair(s): William Y Jiang; San Jose State University

TB-05.1 [R] The Impact of Academics in Start-Ups Emerging from Universities

David W Birchall; Henley Management College, United Kingdom

The U.S. has a long tradition of university research being spun out to form new high tech business. Many have grown to become leading firms not only within the U.S. but internationally. In Europe there has been much less of a tradition of universities encouraging faculty to develop their research competency and outputs as new businesses. It is only in relatively recent times that attention has focused on this as a way of enhancing the position of the university, generating more income and prestige and enabling mutually beneficial partnerships with the corporate world. In addition, as global competition accelerates in more traditional industries, these knowledge-intensive businesses are seen by governments at all levels as offering the potential for competitive advantage to regions and countries and new high quality jobs. Driven by budgetary cuts from central governments, European universities have increasingly been forced to look for new sources of revenue. A focus on commercialisation has led to many new start-ups based on leading edge research and some examples of new enterprises achieving rapid growth. But many seem to fail either to find a sustainable market or, despite public funding being channeled into such firms, at the stages where venture capital is required. One long established success factor for starts ups is the network of the entrepreneur and how it is used. In this paper we present new thinking about the importance of the network of the entrepreneur as a support for growing such businesses. We examine the literature on social network theory and its application to entrepreneurship. We then present a model of the role of the social network. Following this we look at the particular circumstances of the university spin-out with particular reference to two key domains of leadership – technical leadership and commercial leadership. This enables us to examine university spin-outs to see how thy have structured themselves, the capabilities within the enterprise, the extent to which the entrepreneurial leadership is networked, the form of networks and their impact on the success or otherwise of the business. An exploratory study is presented in which the model is tested using the case method. Conclusions drawn will be of particular relevance to researchers seeking to undertake quantitative research in this field. They will also be of interest to practitioners setting up such businesses, particularly those coming from an academic background, the many venture capitalists seeking investment opportunities and consultants offering support to such ventures.

TB-05.2 [R] Entrepreneurship Awards as a Source of National Innovation Capability: A Case from Switzerland

Christian Marxt; Swiss Federal Institute of Technology Zurich, Switzerland
Aino Piekkola; Swiss Federal Institute of Technology Zurich, Switzerland

The foundation of new companies has attracted world-wide attention for the past decades, as the emergence of small firms has been increasingly regarded as the spine of a healthy economy. In order to support entrepreneurship, most Western countries have included several supporting features into their national (and regional) systems of innovations (NSI). In addition to most conventional support instruments, there exist a variety of more concentrated initiatives or instruments to support entrepreneurship. An example of such can be observed in the initiative of "Venture – companies for tomorrow", a Swiss-wide business plan contest. This research is aiming to investigate whether such a support initiative does have a positive perceived impact on the creation of new companies. As a first step a qualitative study (n=115) was conducted to analyze the impact of the initiative on participating companies in 2006. Initial results show that the importance of networking, feedback and coaching was perceived to be the most useful features of the initiative. Also, the presence of a sparring partner was seen to be helpful in writing a business plan. Additionally, it can be concluded that one third of the respondents had founded their own company after the competition, which indicates a positive overall impact of the competition in its aim of fostering entrepreneurship.

TB-05.3 [A] A Success Factor of a Digital Material Startup Company

Hideki Hayashida; Osaka University , Japan

The Japanese parts/materials industry has high technology and competitive power globally and offers parts/materials having high reliability and performance to an end product such as digital home electronics. In a field of the digital material, which is used for an information digital home electronics and a semiconductor in that, there is a Japanese maker holding more than 50 percent of world share. It is expected that strengthening of the chemistry and the new material industry that became basic was indispensable for a further competitive edge

strengthening of such industry, and the role of research and development type start-up companies that especially bore the innovation of the new material and the new functional feature was large, but enough study has not been done yet. By this lecture, the author reports the thing that is different from a conventional research and development model aiming at industrialization of core technology from analysis of a case study of a startup material company, which supplies for an information digital home electronics or a semiconductor, and argue for the success factor.

TB-06 Software Process Management-1
Tuesday, 8/7/2007, 10:30 - 12:00 **Broadway-4**
Chair(s): Adrian Moore; University of Texas at San Antonio

TB-06.1 [R] Improving Global Software Development Project Performance Using Simulation

Siri-on Setamanit; Portland State University, United States
Wayne Wakeland; Portland State University, United States
David Raffo; Portland State University, United States

Global software development (GSD) has become a dominant paradigm in the software industry. Conducting development projects in multiple countries offers many potential benefits including reduction in development cost and reduction in time-to-market, especially through the use of follow-the-sun strategy. However, GSD also poses challenges and difficulties due to geographic dispersion, time-zone differences as well as cultural and language differences. Thus, few GSD projects have been able to realize the full benefits of follow-the-sun development. This raises the question whether follow-the-sun strategy is the best method to pursue in order to reduce development time. What needs to be done to ensure that the full benefits of follow-the-sun are achieved? In this paper, we describe a hybrid simulation model of the software development process that is specifically architected to examine GSD projects. Then, we illustrate how project managers can use such a model to support project planning and process improvement. We found that, in general, one should avoid using a follow-the-sun strategy since it requires too much communication and coordination between sites, which resulted in higher effort and longer duration. If one is determined to use a follow-the-sun strategy, three development sites working in a 24-hour cycle are needed in order to reduce cycle time.

TB-06.2 [R] Integration of Software Process Assessment and Modeling

Timo K Mäkinen; Tampere University of Technology, Finland
Timo K Varkoi; Tampere University of Technology, Finland
Jari O Soini; Tampere University of Technology, Finland

Several approaches, such as modeling, assessment, measurement, and technology adoption, are available to improve a software process. The approaches supplement each other, but one usually dominates in process improvement. Process assessment is a norm-based approach, which is often used for evolutionary process improvement. The starting point for process improvement actions is the gap between the current state of an organization and the desired future state. These two states can be characterized using a norm for good software practices like CMMI or SPICE. Process modeling comprises analysis of activities, artifacts, roles and tools. Process assessment studies the capability of the process based on process attributes defined in the assessment model. In this paper we illustrate how a method for descriptive process modeling can be integrated with an approach of assessment-based software process improvement. The outcome is based on the observations of existing solutions and proposals for their improvement. The final result of our on-going study is a unified method for process improvement. The application of the method results in detailed process profiles with process improvement opportunities, and a descriptive process model of the assessed software unit. The main benefit of the approach is that the improvements are clearly expressed in the actual process model to make the process changes more manageable.

TB-06.3 [R] The Cp and Cpk Indexes in Software Development Resource Relocation

Mauro M Spinola; Universidade de Sao Paulo, Brazil
Marcelo S Pessôa; Universidade de São Paulo, Brazil
Antonio C Tonini; Universidade de São Paulo, Brazil

In software development, the effort is the measure of process capacity, while resource relocation is one of the potential causes of its variability. Without appropriate capacity, the developer cannot meet the demand; with capacity excess, it creates an idleness that reduces its profitability. Six Sigma proposes the use of Cp capacity index just with process data and Cpk capacity index when a certain goal is considered. The article analyzes the use of those indexes for effort calculation in some projects of an ERP software developer organization in which resource relocation is a condition for the businesses. The use of those indexes makes possible to calculate the opportunity cost, that translates the resource relocation cost-benefit relationship and, for this reason, they are used as exchange currency in business negotiations.

TB-07 PANEL: How Much Technology in Technology Management Education?
Tuesday, 8/7/2007, 10:30 - 12:00 **Forum Suite**
Panelist(s): John O Aje; University of Maryland
Bharat Rao, Polytechnic University
Marthinus Pretorius, University of Pretoria
William Flannery, University of Texas at San Antonio

Technology management programs emphasize topics such as strategy, innovation, entrepreneurship, project management, and leadership in technology-based organizations. With the possible exception of some courses in information systems and telecommunications management, technology, per se, is not taught. But new technologies such as biotech, genomics and nanotech will fundamentally change our world. Should our students be exposed to the possibilities and management concerns that are specific to these new technologies?

TB-08 Project/Program Management-4
Tuesday, 8/7/2007, 10:30 - 12:00 **Council Suite**
Chair(s): Hans J Thamhain; Bentley College

TB-08.1 [R] A Framework for Increasing Project Maturity and Capability in Southern Africa

Andre Malan; University of Johannesburg, South Africa
Leon Pretorius; University of Johannesburg, South Africa
Jan-Harm Pretorius; University of Johannesburg, South Africa

In Southern Africa, it has been shown that information technology projects are currently generally performed in a basic, but rapidly maturing, project management environment. Now, in order for the organization (or project environment) to mature, certain processes must first be institutionalized. These processes are identifiable by inspection of the standards that relate to PM in general (and to IT PM in particular) and by excluding the activities that relate to specific technologies and products. Those identified processes should therefore be applied to most (if not all) IT projects in SA most (if not all) of the time. These processes were identified and used to iteratively create a Project Management Framework which forms a basis of growth in terms of organizational capability or maturity. In this product, the PMBOK Guide is used in combination with the CMMI and tailored for a sector, time and place, resulting in a unique approach to project management. This approach also provides a path for attaining and measuring project management maturity/capability.

TB-08.2 [R] Configuration of Project Steering Committees and Their Role in Project Implementation Insights from Case Study Data

Thomas G Lechler; Stevens Institute of Technology, United States
Marty Cohen; Stevens Institute of Technology, United States

In this paper we analyze the role and the structure of steering committees for the management of projects. The impact of steering committees on the single project is not well understood. To date only few studies analyze steering committees and their focus is on understanding the organizational effectiveness rather than their effect on the single project level. In two in depth cases studies we analyze the configuration and the specific functions of steering committees. In both organizations steering committees play an important role in the selection and initiation, definition and control of projects. In many interviews, project

managers perceived the existence of a project steering committee only when the context was defined and clarified in terms of what it meant to be a committee. This may answer the question why project steering committees were not directly analyzed.

TB-08.3 [A] The Virtual Team Challenge: Is It Time for Training?

Terry R Schumacher; Rose-Hulman Institute of Technology, United States
Lance Poehler; Rose-Hulman Institute of Technology, United States

There has been considerable growth in the use of Virtual Teams in the past decade, and further growth is broadly assumed as this practice is driven by globalization. Researchers investigating Virtual Teams describe problems these teams encounter, assert that training for virtual team assignments is necessary, and offer suggestions on the issues that such training should address. Further evidence of the need for such training is that a fortune 100 company employed one of the authors to interview their employees and develop the initial version of a Virtual Team training simulation for their use. The 'Virtual Team Challenge' simulation, an updated version of that simulation, is being used in the Rose-Hulman Project Management course. Participants face problems similar to those reported as they manage a simulated project with virtual team members. Participants receive advice and are guided to adopt best practices as defined by our literature review and those offered by the client. Playing time is two to three hours. This presentation includes a literature review, an overview of the simulation (including screen shots), and reports on initial use results.

TB-09 R&D Management-3
Tuesday, 8/7/2007, 10:30 - 12:00 **Directors Suite**
Chair(s): Arda M Cakmak; TUBITAK-SAGE

TB-09.1 [R] R&D Integration: How to Build a Diverse and Integrated Knowledge Community

Jerald Hage; University of Maryland, United States
Gretchen Jordan; Sandia National Laboratories, United States
Jonathon E Mote; University of Maryland, United States

Stokes advocated the benefits of uniting basic and applied research as a way to facilitate research breakthroughs. Recently, the U.S. Department of Energy launched an initiative designed to foster better integration in research and technology development (R&D), such as the concurrent application of scientific and engineering knowledge. This paper suggests that in basic and applied research - two arenas in the production of knowledge - there are difficulties in integrating them because of two somewhat disparate barriers: 1) cognitive distance among the researchers and 2) structural differentiation in the idea innovation network. This paper discusses these two barriers in greater depth and explains why these barriers are increasing. The larger issue is to build a diverse and integrated knowledge community via the following kinds of mechanisms: complex charters, visionary team leadership, recruitment from diverse sources, multiple team and network integration mechanisms, and diverse sources of funding. These ideas emerge from not only the recent literature but more critically from a case study of a transformational research organization that built an international knowledge community in biomedicine, the Institut Pasteur.

TB-09.2 [R] A Comprehensive Model of Conflict at the R&D/Marketing Interface: Linking Organizational Factors and Conflict to New Product Performance

Abram Hernandez; Portland State University, United States
Jin Su Lee; Portland State University, Korea, South

The extant literature on R&D and Marketing integration has shown that conflict has a negative impact on new product performance, but despite these findings no suitable model of conflict has been presented and conflict persists. Past research in the new product development field has studied only a small subset of factors at a time with limited findings and has ignored the various forms of conflict (i.e. task, relationship, and process conflict). These models have also not allowed for an examination of the possible benefits of conflict. Organizational theory provides a strong body of literature on conflict, but the models that are presented there are general and not specific to R&D and Marketing. This paper presents a comprehensive model of conflict at the R&D and Marketing interface. It is comprehensive from the standpoint of covering the various types of conflict, the factors involved, and being capable of measuring conflict through out the entire new product development (NPD) cycle. The model hypothesizes links between organizational factors, personal and interpersonal responses to conflict, and NPD success. Traditional NPD performance measures are used as well as psycho-socio measures to examine the effects of conflict on performance and to identify constructive and destructive conflict. Hypotheses are formed based on this model and suggestions for future research given.

TB-10 Science and Technology Policy-1
Tuesday, 8/7/2007, 10:30 - 12:00 **Studio Suite**
Chair(s): Charles W Thompson; Northwestern University

TB-10.1 [R] Developing Technological Capability in Science Parks: A Networking Model Approach

Alice Chan; University of Pretoria, South Africa
Marthinus W Pretorius; University of Pretoria, South Africa

The purpose of this paper is to discuss the development of a model that will help South African science parks to develop long-term technological capabilities and competencies to compete successfully in today's highly competitive world. The paper covers the conceptual part of a research project being conducted to improve the performance of science parks. Science parks have been researched for almost 20 years (e.g. MacDonald 1987). The most essential research areas related to science parks are new technology based firms (Löfsten & Lindelöf 2001; Lindelöf & Löfsten 2002), academic entrepreneurship (Mitra 2002), university-industry links (Westhead & Storey 1995; Vedovello 1997), technology transfer (Grayson 1993; Buratti & Penco 2001; Sigel, Westhead & Wright, 2003). Science parks are "seedbeds" for innovation (Felsenstein 1994); innovation and networking are the two key issues which provide the new generation industrial clusters' competitive capacity in the globalization process (Eraydin & Armatli-Köro_lu 2005). Therefore, for science parks to be competitive, innovation and networking serve as important factors. From the definitions and characteristics of science parks in various studies, networking is regarded as one of the most important benefits science parks can offer to its tenants (Castella et al 2000; Wang & Zhu 2003; Mäki 2002; Chan & Lau 2005). However, only a few studies were done on the networks in the contexts of science parks (Castella et al. 2000; Mäki 2002). In seven South African science parks, only two are considered to be successful (Saeys, 2003). However, compared to other successful science parks in the first world countries, South African science parks have insufficient competitive advantages due to poor innovation levels and the lack of resources (including human resources, research infrastructures, financial support, etc.). Through networks, one can build and develop the necessary technological capability (Arnold, E. & Thuriaux 1997; Marcelle 2003). Since technology builds on knowledge of different resources and activities, the development of technology is dependent on access to knowledge (Andersson et al., 2006). The very essence of a science park is to manage the flow of knowledge between universities, research and development institutions, industry and government. Therefore, knowledge network plays an important role in the science park's context. In order for networks to bring out the most beneficial outcomes, i.e., access to new knowledge, it is necessary to understand the environment that the network operates in and the network structures.

TB-10.2 [R] Analysis on Each Country's Patent-Standardization Position and Standardization Strategy Using Patent DB of the ITU-T

Wung Park; ETRI, Korea, South
H. H. Lee; ETRI, Korea, South
B. N. Lee; ETRI, Korea, South

This paper briefly surveys an overview of IPR Policies of ITU-T, which is a representative international standards development organization. And then we analyze Patent DB of ITU-T in detail, which contains information relating to patents incorporated into its standards. After that, this paper examines the Patent-Standardization Position by countries, which indicates the degree of each country's standardization activities linked to patents based on the analysis of ITU-T Patent DB. Finally, this paper gropes for the national standardization policy cop-

ing with the rapidly changing ICT environment.

TB-10.3 [R] The Science and Technology Parks as Instruments of Public Policies for Promote the Collaboration of Technology Based Companies

Devanildo Damiao; Technology Park of Sao Paulo, Brazil
Desirée Zouain; Technology Park of Sao Paulo, Brazil
Mauro Catharino; Technology Park of Sao Paulo, Brazil

The Science and Technology Parks have the objective to organize an appropriate environment for the creation and development of technology based companies, by putting together and articulating research institutions, government and private companies. The interaction between these institutions is capable of boosting the development of the innovating and intense activities involving technology. This paper aims to propose Technological Parks planning like instruments concerning the insertion of these innovation habitats in the urban environment and their contribution to the public policies for the local economic development. The reference methodology of the work is modeling for the decision making. The results of this study are presented based on the Sao Paulo Technology Park Project having involved the determinative factors for the specification of the priority areas that include basic conditions and the applied methodology for specification for the companies' clusters considered in the project model. About the economic activities, the references used for the specification of the priority economical activities were technology intensive and low environment impact, the profiles of the companies' projects developed in the Incubator Center for Technological Companies and the results obtained by a developed study of the technological activities in the area of influence of the Technology Park.

TB-11 Knowledge Management-2
Tuesday, 8/7/2007, 10:30 - 12:00 **Room: Galleria-1**
Chair(s): Charles M Weber; Portland State University

TB-11.1 [R] Improved Metrics of the Impacts of Knowledge Management: Linking Proximal Outcomes to Critical Success Factors

Albert H Rubenstein; IASTA Inc., United States
Eliezer Geisler; Illinois Institute of Technology, United States

In order to gain and maintain support for the KM system we need to employ several categories of metrics that have been in existence for some time. These include operational and behavioral indicators of use, such as number of users, level of utilization of the system, number of knowledge "nuggets" found or transferred, and the satisfaction of users of knowledge management systems. However, these metrics are of little interest or use to managers who are mostly concerned with the contributions of the system to the "bottom line" and other measures of organizational performance and success. Over the past several decades we have developed methodologies that track and relate immediate or proximal outputs and outcomes to the "downstream" or "up the tree" measures of most interest to managers. We have used two approaches: (1) Flow or stage models to display indicators and measures at several stages in an organizational process. We have applied this successfully in measuring the contributions of Research and Development (R&D) in various organizational settings. This approach can also be applied to measure the contributions of knowledge management systems to organizational success. (2) Criterion trees which display similar information in a vertical format, showing the relationships of criteria of success at adjacent levels. The Critical Success Factors (CSFs) for the organization and the functional or operating units are linked at various levels to the direct or proximal outcomes and impacts from knowledge management systems. This paper describes our methodology and pilot studies designed for several federal technology organizations. The paper discusses benefits and limitations of the methodology.

TB-11.2 [A] A Case in Effective Knowledge Management

Adnan Sahin; EMC Corporation, United States

Even in today's electronic world, knowledge management (KM) remains a big challenge for many companies. Before the proliferation of electronic networks, physical access to data was the main problem. Currently, even though the information is available somewhere in the network, or there is a knowledgeable employee in remote offices of the company, managing and accessing this knowledge still poses a hurdle. Although there are tools to simplify knowledge management, in practice it is quite difficult to make KM work in real life. In this talk, we will present a KM system established in a Fortune 500 company in the information technology industry. The KM system is based on a homegrown tool that provides information sharing and email exchange. The system (tool + process) has been a big success for the company in that it leveraged the knowledge and expertise in a small group of engineers (about 30) and supported large pre-sales and post-sales organizations. Furthermore, the system provided self-sustaining information sharing among the members of these large organizations. Due to its success, the system recently has been extended to support other product lines in the company.

TB-11.3 [A] Is Our Focus on Knowledge Making Us Dumb?

Andrea Fox; Mentor Graphics, United States

Capturing customer voice and successful knowledge management are critical for business success. At Mentor Graphics we focus heavily on both areas, yet the question remains: "Could we do more?" Is there something we could do to improve efficiency while maintaining our current level of customer satisfaction; or are we missing something which would further improve customer satisfaction? In this paper the author outlines the company's current systems and processes at a high enough level to capture a basic understanding of what we are doing and what we might consider improving upon. The information is based on the author's personal experience and the perceptions of 19 other Mentor Graphics employees representing various functional roles and several different products and product divisions. It was found that the processes in each division vary drastically, but the perceptions of effectiveness align very closely. This presentation is a subset of the paper. Current systems are outlined as well as how knowledge is being generated for customer consumption. The author will also discuss areas where the company is currently failing to capture knowledge and how it is working to improve those situations.

TB-12 New Product Development-1
Tuesday, 8/7/2007, 10:30 - 12:00 **Room: Galleria-2**
Chair(s): Jacobus P Venter; University of Pretoria

TB-12.1 [A] Open Approach for the Fuzzy Front-End of PDP in Corporate Venturing Samuli Kortelainen; Lappeenranta University of Technology, Finland

Marko Torkkeli; Lappeenranta University of Technology, Finland
Olli-Pekka Hilmola; Lappeenranta University of Technology, Finland
Markku Tuominen; Lappeenranta University of Technology, Finland

As innovations have become increasingly important, the research on innovation management has intensified. Many researchers have identified the fuzzy front-end (FFE), also know as e.g. front end of innovation (FEI) or stage 0, as one of the main factors for innovation process success. Fuzzy front-end covers the first stages of innovation process. It precedes the development phase, where the actual product development takes place. The main responsibilities of FFE are to process signals to identify product possibilities and to define ideas for further development. The execution of these actions is often done improperly that leads to problems concerning the whole innovation process. FFE has been identified as one of the most lucrative points for development when considering the efficiency of the innovation process. One method for tackling the problems occurring in FFE execution is to open innovation process boarders. To maximize the efficiency of the signal processing, organizations must create working routines to scope their business environment. In such case opening the boarders of the innovation process is natural and opens lucrative options for managers. In addition, the open approach can be used as a leverage to help organizations cope with problems that cannot be solved internally as it offers an opportunity to access a bigger resource pool. Approaching the innovation process as an open model offers managers different methods for FFE execution that range from internal process to fully outsourced process. Corporate venturing can be seen as one plausible method for execution. Opening process boarders increases the challenges in process management. In an open environment managers need to be able to manage both internal and external parts of FFE. The existence of this boarder adds another object that needs to be managed. Managers are forced to create routines for

controlling work done in this interface. Management of open innovation process is crucial due to the confidential knowledge that is utilized in the innovation process. If the process is not managed properly, the risks of opening FFE boarders increase radically. Using open approach in FFE can be seen to have strategic implications. It opens an opportunity to execute the innovation process more efficiently than before, enabling better product development. Additionally, good ideas that do not fit the organization's strategy can be transferred outside the organization, enabling economical profits from projects that before were only discarded. However, the risks involved are also significant and need to be acknowledged in the higher levels of the organization.

TB-12.2 [R] Managing the New Product Development Project Portfolio: A Review of the Literature and Empirical Evidence

Catherine Killen; University of Technology Sydney, Australia
Robert Hunt; Macquarie Graduate School of Management, Australia
Elko Kleinschmidt; McMaster University, Canada

Literature on Project Portfolio Management (PPM) has been escalating as interest has intensified. The surge of interest has been attributed to the increased importance of technological innovation and the recognition that successful innovation depends upon effective selection and management of the New Product Development (NPD) project portfolio. PPM processes are responsible for the alignment of projects with the innovation strategy, maintaining a balance of project types, and ensuring that the project portfolio fits with resource capability so that the organization can gain the maximum value from the investment in NPD. This is the first comprehensive review of the literature on NPD PPM to be published, and it reveals a wide range of considerations from a variety of sources across several disciplines. The growing importance of NPD PPM is highlighted, and interest in PPM is shown to have stimulated a field of research that is beginning to offer empirical findings to help clarify the relationships between PPM methods and NPD outcomes. Findings reported in the empirical literature are compared with the common beliefs and assertions presented in other published sources. The empirical findings show support for some assertions, and challenge others, while some proposed relationships remain untested.

TB-12.3 [A] New Product Attack Roadmapping

Alex Coman; Tel Aviv University, Israel

Models applying to the disciplined development of new products range from Porter's generic strategies and product portfolio maturity models on the strategic level, to Value-Engineering and Quality-Function-Deployment on the tactical level. We present a consistent view translating strategic concepts into product platform design. We merge the spiral model with the product portfolio strategy to introduce the WAVE model of platforms, releases and versions. We use the concept of Attack-angle to introduce four alternative new-product launching roadmaps. These attack angles are: Skimming, Storming, Flooding and Piercing. The classical Skimming attack angle is appropriate for innovative breakthroughs such as the Segway. The Storming attack angle is appropriate for innovative pharmaceutical products aiming to maximize profits before patent protection expiry and the emergence of generic products. The Flooding attack angle is appropriate in cases where network effect benefits a single dominant product architecture, as in the case of game platforms. Finally, the Piercing attack angle is appropriate for new inexpensive technologies such as Linux. The criteria and benefits of each attack angle are illustrated with real world examples.

TB-13 Supply Chain Management-3
Tuesday, 8/7/2007, 10:30 - 12:00 **Room: Galleria-3**
Chair(s): Jasper Steyn; University of Pretoria

TB-13.1 [R] Development of Methodology for Measuring and Reducing Value Recovery Time of Returns

Santhanam Rajagopalan; University of Texas at Arlington, United States
Srikanth Yellepeddi; University of Texas at Arlington, United States
Jamie Rogers; University of Texas at Arlington, United States

Returns are becoming inevitable across all industries. Consequentially, the importance of reverse logistics (RL) as a potential profit making center in an organization has grown drastically in the past few years. A typical reverse supply chain (RSC) starts from the "gate keeping" process where the products are checked if they are eligible to enter the RSC. It is ensued by a series of operations like the "collection and transportation", "sorting", "storing" and "asset recovery". The last operation is usually "transportation and distribution" to the concerned destination. We define the time taken by the retuned product to traverse from the first operation in the RSC to the last one as the "cycle time of value recovery" of the product. A large value of this parameter has significant implications for the company. Firstly, it directly impacts the bottom line viz., money that is locked in the form of returned assets. The assets could be obsolete products, defective products, non-defective products, capital equipments like machinery, tools etc. Secondly, it has an adverse indirect effect on the corporate image of the enterprise. Today, more and more companies are utilizing their RL operations as a key differentiator for market sustenance. They realize that performing consistently to meet the customer expectations will bolster their customer retention process. This paper develops a methodology to measure and reduce the time taken by a returned product to traverse through the reverse supply chain. We focus specifically on key lean techniques that have a direct impact on the cycle time of value recovery of returns. For each operation in the RSC, we analyze its process flow chart to identify the possible delays, storage and transportation. We suggest solutions that reduce the time taken in delays and storages for all the operations in the RSC. This will account for the reduction in the cycle time of value recovery.

TB-13.2 [R] Modeling the Metrics for Measuring the Performance on Logistics Centers by BSC and ANP in Korean Context

Byunghak Leem; Pusan University of Foreign Studies, Korea, South
Myungho Hong; University of Incheon, Korea, South
Jeongsick Kang; Korea Maritime University, Korea, South
Byung-Jin Yim; Open Cyper University, Korea, South

This paper develops a framework for modeling the metrics of measuring logistics center performance in interdependency between logistics center organization types and strategy types using the balanced scorecard (BSC) and analytic network process (ANP). The framework designs a BSC for measuring logistics center performance with a relationship among logistics center organization types, strategy types, dimensions, and set weights of key performance metrics according to strategy types using ANP. The ability of ANP to consider interdependencies between levels of decision attributes makes it an attractive multicriteria decision making tool. A combination of the BSC and ANP-based approach proposed in this paper provides a more realistic and accurate representation of the problem for measuring logistics center performance.

TB-13.3 [R] A Business Model Analysis for the Convergence Services of Supply

Myung-Hwan Rim; ETRI, Korea, South
Kwang-Sun Lim; ETRI, Korea, South
Yeong Wha Sawng; ETRI, Korea, South

In this paper, we explore the merging of supply chains between media and telecommunications as an example of business application of industry convergence. The goal of this study is to provide managerial insight into the various facets of convergence of supply chains so that companies can effectively exploit business opportunities presented by the accelerating process of digital convergence and related technological innovations. In this study, the focus is set on business models, rather than business strategies as such, since digital convergence is an emerging sector that deserves independent attention as a new business concept. We formulated a series of propositions, related to customer value, value network, and supply chain efficiency, using frameworks borrowed from the existing business model literature and value creation theories for internet business. Managerial implications are discussed and applied to DMB (Digital Multimedia Broadcasting), a new telecom-broadcasting convergence business model, recently introduced in South Korea.

TB-13.4 [R] The Impact of ISO Implementation on Output Parameters in SME's in India

Lakhwinder Pal Singh; National Institute of Technology, India
Arvind Bhardwaj; National Institute of Technology, India

Anish Sachdeva; National Institute of Technology, India

In the globalized world there has been a tough competition among the manufacturing as well as the service sector. The manufacturing firms are striving to survive in the competitive world. However, the firms have to struggle with growing trade deficits and outsourced operations, while strong market competitors have emerged using superior manufacturing practices and continuous process improvement. The small and medium enterprises are also being stressed by their (large) customers to adopt quality management systems. The present work is an exploratory study of the impact of ISO certification on output parameters. The output parameters incorporated for the study are manpower and assets utilization, inventory management, quality aspects, cost aspects, time performance and purchasing procedure. A comprehensive questionnaire was developed and circulated to the different firms in and around Jalandhar (Punjab), and responses were collected for analyzing the data. On the basis of a literature review and the survey of the industry, a hypothesis was formulated, which was validated using correlation analysis.

TC-07 Technology Management Education Best Practices
Tuesday, 8/7/2007, 12:00 - 14:00 **Room: Forum Suite**
Chair(s): Andres Fortino; Polytechnic University
Speaker(s): Siebert Benade; University of Pretoria

This special lunch-time session organized by TMEDA will provide short presentations by representatives of several Technology Management Programs. Take advantage of this opportunity to hear about how your academic colleagues operate.

TD-01 PLENARY - 3

DATE: TUESDAY, AUGUST 7
TIME: 14:00 – 15:30
ROOM: PAVILION
CHAIR: SKIP RUNG; ONAMI, UNITED STATES

KEYNOTE

Mihail C Roco; National Science Foundation, United States

"Governance of Converging New Technologies Integrated from the Nanoscale"

The convergence of nanotechnology, modern biology, the digital revolution and cognitive sciences will bring about tremendous improvements in transformative tools, generate new products and services, enable opportunities to meet and enhance human potential and social achievements, and in time reshape societal relationships. After an outline of the technological opportunities, the presentation will discuss the progress made in governance of such converging, emerging technologies and suggests possibilities for a global approach. It is suggested creating a multidisciplinary forum or a consultative coordinating group with members from various countries in order to start establishing a plan for governance of converging, emerging technologies. The proposed framework for governance of converging technologies calls for four key functions: supporting the transformative impact of the new technologies; advancing responsible development that includes health, safety and ethical concerns; encouraging national and global partnerships; and establishing commitments to long-term planning and investments centered on human development. Several possibilities for improving the governance of converging technologies in the global self-regulating ecosystem are recommended: using open-source and incentive-based models, establishing corresponding science and engineering platforms, empowering the stakeholders and promoting partnerships among them, implementing long-term planning that includes international perspectives, and instituting voluntary and science-based measures for risk management.

TE-01 Technology Forecasting and Planning-1
Tuesday, 8/7/2007, 16:00 - 17:30 **Room: Pavilion East**
Chair(s): Harold A Linstone; Portland State University

TE-01.1 [A] A Study of Information System Integration - with the Structuration Model of Technology as the Foundation

Fang Kwoting; Yunlin University of Science and Technolog, Taiwan
Chia-Hsien Wu; Diwan University/Yunlin University of Sci. & Tech., Taiwan
Chiang Tung-Yang; National Yunlin University of Science & Technology, Taiwan

In recent years, mergers and acquisitions (M&A) activities have highly growth and turns into global trend. Enterprise merger and acquisition is a rather complex business structure and complex reengineering process. M&A really can bring some benefits, such as cost reduction, lower taxes, the increases of revenues and so on. An organization can quickly make significant strides by improving its global presence, marketing share, financial strength, product lines, shareholder values and profitability.Less attention has been dedicated to the role of the Information Systems (IS) in companies engaging in these activities. However, in the M&A situations that integration of the information systems is an extremely difficult subject. Our research has been conducted mainly through a Manufacture company which had started preceding the management of technology in mergers and acquisitions for one year. The goal of this paper is to build upon the Structuration Model of technology (SMOT) as a foundation. This research uses the literature methodology and the case methodology.

TE-01.2 [R] Technology Policy Instrument (TPI): A Decision Model for Evaluating Emerging Technologies for National Technology Policy – Research Framework

Pisek Gerdsri; Portland State University, United States
Dundar Kocaoglu; Portland State University, United States

In this paper, a model and process for strategic evaluation of emerging technologies for a national technology policy is proposed. A decision model is built to assess the contributions of emerging technologies and evaluate their impacts on the country's objective. The "impact value" of the technology is called "technology effectiveness". A hierarchical decision model comprised of six hierarchies - national objective, industry's goals, industry's strategies, technological benefits, technological factors, and technologies - will be developed.

TE-01.3 [R] The Overall Foresight Model that Focuses on Consensus Forming

Benjamin J. C. Yuan; National Chiao Tung University, Taiwan
Tsai-Hua Kang; National Chiao Tung University, Taiwan
Chien Ching Chang; National Chiao Tung University, Taiwan
Kuang-Pin Li; National Chiao Tung University, Taiwan
Chun-Yi Liu; National Chiao Tung University, Taiwan

Due to global competition and rapid technological advancement, foresight has become an important method of formulating technological policies. Consensus forming is one of the benefits of the foresight procedure as it allows the society to effectively understand a technology's characteristics during its initial developmental stage. Also, foresight effectively guides the development of a technology, eliminating the dilemma of being unable to manage the technology's future influences. Focusing on consensus forming, this study analyzes foresight through different stages: a macro model that focuses on consensus forming has been proposed in this study in order for us to understand the influence of different factors on foresight planning. The content of consensus forming may include areas such as the possible future, the beneficial future, the preferable future, the current action plan, and its development and promotion.

TE-01.4 [A] The Future Development of Global LCD TV Industry

Lee-Yun Pan; Feng Chia University, Taiwan
Shih-Chi Chang; National Changhua University of Education, Taiwan
Ming-Yu Liao; Shu Zen College of Medicine and Management, Taiwan
Ya-Ti Lin; National Chiao Tung University, Taiwan

The popularity of notebook PC creates the first high peak of the TFT-LCD industry, and the replacement of the CRT monitor by the LCD monitor makes this industry reach the second high peak. Now, the LCD TV shipment is the key driver to the third high peak in the global TFT-LCD industry. It is out of the question that the potential market for the LCD TV is large and appealing, but not realized now. The LCD TV market is growing but not fast enough. All

panel makers care about is when most customers will buy LCD TV. However, there are still some hurdles to impede the sales growth of LCD TV. Only when the barriers are removed or disappear will the market accelerate its growth. In view of the potential profits of the LCD TV industry, more players than expected build their brands to compete in the market share, not only original TV vendors, but panel makers, IT giants, and distributors. In this paper, the authors also make market forecasts under different scenarios to take uncertainty into consideration. The potential market size will be realized in the future without doubt. But if supply and demand don't have a good match, some players will definitely be hurt.

TE-02 Product Development Process Evolution at Intel Corporation
Tuesday, 8/7/2007, 16:00 - 17:30 Room: Pavilion West
Chair(s): Tugrul Daim; Portland State University

TE-02.1 [A] Intel's Desktop Platform Group: The Transition from Developing and Launching Components to Developing and Launching Platforms

Sarah Nesland; Intel, United States

In 2000, Intel's Desktop Platform Group (DPG) changed their strategy from selling components to platforms. DPG defines Platform as "a set of inter-dependent (stack) of ingredients associated with a unique processor, chipset, or a processor chipset combination, all qualified to launch at the same time". A Platform Ingredient is a "component of the platform required to be available at launch, that may or may not be manufactured by Intel". Intel's customers need all of the ingredients qualified and available in quantity at the same time to start the final validation process and prepare for their own product launches. DPG established a Platform Management group consisting of two highly experienced program managers with technical backgrounds. In 2000 the group began to build the system for managing the platform starting with organization. They formed Joint Platform Teams (JPTs), which consist of ingredient owners and functional groups from across DPG and other businesses at Intel. In 2001 the workload increased, platforms continued to increase in complexity, new program managers were hired and required training. Developing a system to organize and drive the development teams toward a single, coordinated mission became a matter of survival. The two original Platform Program Managers recognized they needed additional infrastructure; however, they had little to no time to develop it. They decided to partner with two organizations to work with them to define, manage the development of, develop and implement the system they needed: Platform Quality Methods and the Project Controls Group. This paper will outline the partnership that evolved, the strategy developed and executed, the business results achieved by the pilot program, and how the system has evolved and expanded over the course of time, in addition to the lessons learned along the way.

TE-02.2 [A] The Implementation of the Product Life Cycle at Intel

Chris Galluzzo; Intel, United States

The implementation of the Product Life Cycle at Intel required the evolution of a competency in change agency by the team that led the effort. In developing this competence, the team had to learn to see when the necessary elements of change were in place and what action was required. They had to learn how to put these necessary elements in place. It has been said that to create organizational change is to make war on middle management. While this may sound confrontational, the analogy is not too far removed from other analogies regarding change. Such analogies include overcoming the energy barrier or the laws of thermodynamics. The thinking is that middle managers are the ones who define how things get done. They are the ones whose job it is to maintain the status quo on how things get done. To create change, to be a change agent, requires moving middle management into an unsettled state so that a new (and presumably improved) status quo can be defined and diffused through the organization. This paper is about change agency. It is about knowing when change is possible and about knowing how to put enablers in place so change is possible.

TE-02.3 [A] Managing Risk at Intel

Russ Martinelli; Intel, United States

Developing high technology products is risky business by nature, especially if a company wants to achieve or maintain competitive leadership. Technology risk alone is a constant, and risk-taking can provide a means to gaining competitive advantage. However, risk-taking does not mean taking chances. It involves understanding the risk/reward ratio, then managing the risks that are involved in each product development effort. Failure to do so can lead to substantial loss for the enterprise, including the possibility that the product will fail to achieve the business results intended (such as increased revenue, increased market share, or technological superiority). This paper demonstrates why risk management is a vital element of Intel's new product development process, explains how risk is managed throughout the development cycle, and provides a case study showing how effective risk management was used to terminate a new product development program when it became evident that the business objectives would not be fully achieved.

TE-03 Accelerated Radical Innovation in the Industrial Technology Life Cycle -3
Tuesday, 8/7/2007, 16:00 - 17:30 Room: Broadway-1
Chair(s): Alan Porter; Search Technology, Inc.

TE-03.1 [A] The Dynamics of Cluster Formation in Accelerated Radical Innovation: Bridging the Inception to Implementation Gap

Neil Reid; The University of Toledo, United States
Michael C Carroll; Bowling Green State University, United States

Innovation is a social process. Successful accelerated radical innovation requires high levels of social capital (trust, mutual understanding, and shared values and behaviors) between those engaged in the innovation process. Developing and maintaining sufficient levels of social capital is a major impediment to innovation. Cluster-based innovation programs can facilitate the trust-building process and, as a result, speed up the pace of innovation. A cluster is a geographic concentration of an industry and affiliated support infrastructure (e.g. university researchers, vocational training providers, financial institutions, etc). A cluster-based innovation program recognizes the value of bringing together, at a very early stage, all the various stakeholders who are critical to the innovation process. Through this early engagement, social capital is more quickly developed and the innovation process speeded up. This paper will present ideas for speeding up the innovation process through a cluster-based initiative. These ideas will be drawn both from the literature on cluster-based innovation initiatives and our own experience in cluster-based economic development in Northwest Ohio.

TE-03.2 [A] Challenges in Managing the Convergence of Information and Product Design Technology in a Small Company

Andrew T Walters; University of Wales Institute, United Kingdom

In a manufacturing environment, product development technologies have the potential to be a central tool in the organization of administrative and manufacturing tasks. Such integration of technology and information presents a strategic avenue for creating efficiencies in the development of highly complex products. This paper examines the implementation of a sophisticated CAD package in a small company that produces luxury motor yachts. The strategic aim was to bring the 1000+ components into the CAD environment, supporting each component with procurement information. The intention was that this would lead to: reduced design cycle times through the development of parts libraries; improved efficiencies in planning boat-building; and, reduced manufacturing cycle times through improved drawings with relevant supporting information. In a small commercial environment such strategic development presents a challenging task. In implementing the system, the researcher was presented with resistance to change; difficulties in managing the expectations of non-technologically driven management; and difficulties with balancing the development of the strategic goals with pressures for commercial output. The research is based on a two-year structured partnership between the university department and the company. The department has run over 20 such partnerships with different companies and found them to be effective mechanisms for gaining insight into technology management issues. This case study highlights the difficulties that can arise when ambitious technology implementation plans, that impact on various business functions, are developed in an active commercial environment with limited labor resources.

TE-03.3 [R] Wind Energy Electrical Power Generation: Industrial Life Cycle of a Radical Innovation

John P Dismukes; University of Toledo, United States
Lawrence K Miller; The University of Toledo, United States
Andrew Solocha; The University of Toledo, United States
Sandeep Jagani; The University of Toledo, United States
John A Bers; Vanderbilt University, United States

This study addresses past, current and future development of the wind electrical power industry that began prior to 1890 in Cleveland, Ohio, and Askov, Denmark. Overcoming technological, business, societal and political hurdles required approximately 120 years of exploration to establish wind electricity generation as a radical innovation entering the acceleration stage of the industrial technology life cycle. Further growth and maturation is expected to continue to 2100, corresponding to a life cycle of 210 years. This finding has profound implications for radical innovation theory and practice, since historical analysis attributes a 50-60 year life cycle for 5 industrial revolutions, and emerging theory anticipates acceleration of radical innovation, as discussed in companion papers in this conference. Rapid growth in installed capacity of large-scale wind turbines (>1MW) now positions wind electrical power generation in the Acceleration Stage, characterized by market competition between dominant wind turbine designs and societal acceptance by wind energy communities of practice in Europe, North America and Asia. Technical cost model based learning curve projections of Cost of Electricity (COE) suggest that by 2020, COE from wind will be competitive, without tax incentives, with electricity from conventional fossil and nuclear fuel sources. Capture by wind energy of up to 20 percent of the world electricity market appears likely by the end of the 21st Century.

TE-03.4 [R] A Case Study for Accelerated Radical Innovation: Monochromatic X-rays

Aleksey Dubrovensky; Vanderbilt University, United States
John A Bers; Vanderbilt University, United States
Frank E Carroll; Vanderbilt University, United States

TTo illustrate the application of accelerated radical innovation (ARI), this paper examines a promising new cancer therapy technique now at the juncture between Phase I (Inception) and Phase (II Implementation) of the ARI industrial technology life cycle (ITLC). The new technology which uses tunable, monochromatic X-rays shows significant promise in the delivery of curative radiation therapy targeted specifically at the DNA of cancerous cells, sparing normal tissues. Factors that have inhibited its commercialization include the high capital cost of the equipment, the lack of an established supply chain for the key component of the system, and the reluctance of investors to gamble on what they perceive as a long-term high-risk investment. The path of this innovation is studied in depth, both retrospectively and prospectively, through the perspective of ARI to determine how this promising radical innovation can be accelerated into widespread clinical use. The paper demonstrates that the ARI methodology offers a flexible set of tools and procedures that can be adapted to innovations at this critical juncture of the ITLC, provides a structured approach to uncovering the challenges that all such risky endeavors face, and offers a template for dealing with them as they arise.

TE-04 Innovation Management-5

Tuesday, 8/7/2007, 16:00 - 17:30 **Room: Broadway-2**
Chair(s): Masanori Namba; Ritsumeikan Asia Pacific University

TE-04.1 [R] Social Innovation Management with Resonant Individuals' Insights

Takahiko Nomura; Fuji Xerox Co., Ltd., Japan
Yayoi Kubota; Fuji Xerox Co., Ltd., Japan

So far, various innovation processes have been studied in the past, but the work style of organizational members will be more important to continuously drive innovation, rather than the process itself. During the Knowledge Benchmarking Program conducted in 2006, the theme of which was continuous innovation and organic growth, we compared best practice companies' and participating companies' research and discovered that their largest gap was communication among extraneous employees and the culture to challenge and allow failure. In other words, creating an organization in which every member contributes to innovation will lead to the greatest difference in the result that is beyond technological strategies. Through three years of the benchmarking program of innovation companies, we have created the social innovation model that aims for an organization in which every member contributes to innovation. This paper will discuss the case of the pilot project based on this model that aims at innovation, which was conducted through collaboration with Japanese companies and a practical social innovation model which we obtained from this project.

TE-04.2 [A] The Effect of Partnership for Innovation Using Lead User Theory: Case Study of Korean Industry

Yunyoung Kim; Seoul National University, Korea, South
Jeong-Dong Lee; Seoul National University, Korea, South

As users' needs are getting more complex and subsequent developments of technology are getting faster, mutual partnerships between clients and suppliers have been considered more important. This research analyzes the role of clients and suppliers for the accomplishment of successful innovation. To analyze such partnerships, we adopted "Lead user method" using data extracted from the "Korean Innovation Survey 2005, manufacturing sector."

TE-04.3 [A] Re-engineering XID Technologies – From Enterprise to Consumer Markets

Desai A Narasimhalu; Singapore Management University, Singapore

Several studies have addressed the process of taking ideas to markets, but few have shared the experiences of start-up companies that have re-examined their product strategies and repositioned their products and services for better revenues and profits. This paper reports the efforts related to repositioning of XID Technologies, a start-up company, into new markets while continuing to exploit its core technical competencies.

TE-04.4 [R] Analysis of the Brazilian Digital TV System (BDTVS) and Signal-Converting Devices

Bruno P Costanzo; University of São Paulo, Brazil
Joao Amato Neto; University of Sao Paulo, Brazil

This paper aims to analyze the different aspects related to the process of defining the Brazilian Digital TV System and its main impact on the productive value chain of the electronics industry. Specifically, this work seeks to identify the possible functionalities and characteristics to be implemented in the Brazilian Digital TV System (BSDTV) and to make a sales projection of the signal-converting devices (set-top boxes). To achieve the set of characteristics the Brazilian Digital Television System should have, a wide research was conducted to discover and understand the opinion of the four most important players: the government, television broadcasters, the electronics industry and the Brazilian population. Research was also done on the evolution of set-top boxes and digital television prices and costs in other foreign markets. To make the demand forecast of the set-top boxes, a method called the Bass model was applied.

TE-05 Strategic Management of Technology-1

Tuesday, 8/7/2007, 16:00 - 17:30 **Room: Broadway-3**
Chair(s): Jorg Lalk; Pebble Bed Modular Reactor (Pty) Ltd

TE-05.1 [R] Enterprise Customer's Needs for SLA on Telecom Services in Korea

Jee Hyung Lee; ETRI, Korea, South

With concerns about the quality of telecom services rising, greater importance is being placed on the Service Level Agreement (SLA). Although telecom service providers are expanding the provision of SLA to satisfy enterprise customers' demands for service quality, they still tend to design SLA details from their standpoint. If the provision of SLA aims to improve telecom services for enterprise customers, and thus, enhance their loyalty, this approach and attempt should be revamped. At this juncture, it is considered a good attempt in the process of SLA provision to survey enterprise customers regarding the provision of SLA with the aim of overcoming the problems and to identify their demand and direction for improvement. Thus, this research seeks to review the major components of SLA including service level objectives

(SLO), measurement and penalty, as well as additional factors following the projected structuring of the next-generation network. This review is expected to maximize achievements in the utilization of SLA provision as the most useful tool aimed at guaranteeing service quality.

TE-05.2 [R] An Examination of Computer-Aided Design (CAD) Usage Patterns, Product Architecture and Organizational Capabilities: Case Illustrations from Three Electronic Manufacturers

Youngwon Park; University of Tokyo, Japan
Takahiro Fujimoto; University of Tokyo, Japan
Ryozo Yoshikawa; University of Tokyo, Japan
Paul Hong; University of Toledo, United States
Takeshi Abe; PTCJ, Japan

Increasingly, firms recognize the strategic implications of front-end product design for improving total cost effectiveness. Computer-Aided-Design (CAD) is becoming firms' competitive weapon beyond its traditional function as a product design tool. Yet, it is unclear how the full potential of an IT system, particularly the usage patterns of a 3D CAD system, may be realized through organizational capabilities. This paper presents a model of IT system configurations and CAD usage patterns. Next, a typology of IT system configurations is presented based on 1) the degree of CAD Integration between assembly makers and suppliers and 2) the structure of product design information, or product architecture. The product architectures of four electronic firms illustrate that organizational capabilities to utilize IT's potential is more important than IT investment itself.

TE-05.3 [R] Innovation and Technological Convergence: An Assessment of Critical Resources of Telecommunications Service Providers Using Resource Based View and Dynamic Capabilities

Americo B Cunha; Centro Federal de Educacao Tecnologica - CEFET-RJ, Brazil

Many telecommunications service providers already dispose of the structure to provide convergent services, although they did not reach an increase on sales in accord with market, investors, and customer's expectations. Most of the incumbents are running their businesses based on a few "cash cow" services. The introduction of new telecommunications services seems not to follow the same rate of technological innovations in networks' platforms and end user's devices. This article has focused its analysis in the capabilities and competencies required in a fast changing business and technological environment. An alternative strategic analysis was developed using Resource Based View (RBV), Dynamic Capabilities, and Complementary Assets to analyze the innovation strategy of telecommunications service providers – TSP in Brazil since deregulation and privatization in the 90s. New technological standards and customers' needs require new organizational capabilities and competencies. Under the RBV and Dynamic Capabilities conceptual framework, we examined traditional TSP's business models and organizational boundaries against the new virtual telecommunications service providers - VSP (ex. Skype, MSM, Vanco). The article concludes with a brief discussion of what directions the TSP should take in terms of organization, outsourcing, integrative and collaborative strategies to carry out the benefits of technological advancements to the consumer market.

TE-06 Software Process Management-2
Tuesday, 8/7/2007, 16:00 - 17:30 **Room: Broadway-4**
Chair(s): Jari O Soini; Tampere University of Technology

TE-06.1 [A] Use of Extreme Programming Methodologies in IT Application Design Processes: An Empirical Analysis

Adrian Moore; University of Texas at San Antonio, United States
William T Flannery; University of Texas at San Antonio, United States

An attempt to control and standardize new application software development has led a large telecommunications firm in the Southwest United States to create a centralized Information Technology department. Centralization, however, resulted in an increase in development and implementation cycles and a concomitant increase in software development costs, especially for small- and medium-sized IT projects. Functional units within the firm, faced with uncertain and fast-changing business environments, responded to the increased development and implementation times by creating their own development teams, thus competing with the centralized department and thwarting the synergies realized from having a centralized IT department. Alternative development processes to the waterfall process currently in use by the firm were studied. Of the alternative processes, Extreme Programming was selected to be deployed in a phased approach. This paper examines the issues facing the company, the alternative software development processes considered, and the selection criteria. The paper will also examine the progress made to date in the deployment process.

TE-06.2 [R] Using Simulation to Evaluate the Impact of New Requirements Analysis Tools

David Raffo; Portland State University, United States
Robert Ferguson; Carnegie Mellon University, United States
Siri-on Setamanit; Portland State University, United States
Bhuricha Sethanandha; Portland State University, United States

Adopting new tools and technologies on a development process can be a risky endeavor. Will the project accept the new technology? What will be the impact? Far too often the project is asked to adopt the new technology without planning how it will be applied on the project or evaluating the technology's potential impact. In this paper we provide a case study evaluating one new technology. Specifically, we assess the merits of an automated defect detection tool. Using process simulation, we find situations where the use of this new technology is useful and situations where the use of this new technology is useless for large-scale NASA projects that utilize a process similar to the IEEE 12207 systems development lifecycle. We also calculate the value of the tool when implementing at different point in the process. This can help project managers to decide whether it would be worthwhile to invest in this new tool. The method can be applied to assessing the impact (including return on investment), break-even point and the overall value of applying any tool on a project.

TE-06.3 [R] Practical Experience in Customization of a Software Development Process for Small Companies Based on RUP Processes and MSF

Valerio F Del Maschi; UNIP - Universidade Paulista, Brazil
Mauro M Spinola; UNIP - Universidade Paulista, Brazil
Alexandre L Esteves; UNIP - Universidade Paulista, Brazil
Ivanir Costa; UNIP - Universidade Paulista, Brazil
Wilson Vendramel; UNIP - Universidade Paulista, Brazil
Luciano S Souza; UNIP - Universidade Paulista, Brazil

Most Brazilian software development companies focus on the customer's needs, thus creating cells dedicated to these customers both for products that have been built or that are being built. Furthermore, they normally lack the financial resources necessary for investments in specialized technologies and professionals, leading them to use processes that do not adhere to the market's best practices, such as object-oriented technology, standard development methods and procedures such as RUP (Rational Unified Process), UML (Unified Modeling Language), MSF (Microsoft Solutions Framework) and quality models proposed by SEI/CMMI (Software Engineering Institute/Capability Maturity Model Integration). This paper describes the general concepts of the low and high complexity software development processes and models, the steps that a small Brazilian software development company followed to achieve maturity, parting from a research and development initiative in the aforementioned processes, and finally creating and instituting the Customized Software Engineering Process – CSEP and the Process Support Tool – PST. An economic/financial overview of the Brazilian market for software development is also presented, besides historical data concerning the projects before and after the implementation of the processes and tool, as well as the success obtained, and lastly the emerging trends in Brazil's software development market. .

TE-07 PANEL: A Debate on the Future of the Technology Management Discipline
Tuesday, 8/7/2007, 16:00 - 17:30 **Room: Forum Suite**
Panelist(s): Mel Horwitch; Polytechnic University

Edward A Stohr; Stevens Institute of Technology

Opposing viewpoints of the future of technology management education will be presented and debated by academic and industry experts. At the conclusion of this session, there will be an informal wrap up in the same room.

TE-08 Project/Program Management-5
Tuesday, 8/7/2007, 16:00 - 17:30 **Room: Council Suite**
Chair(s): Andre Malan; University of Johannesburg

TE-08.1 [A] Adopting Project Management Methodologies at Horizon Air Flight Operations

Jang W Ra; University of Alaska Anchorage, United States
Dennis Schoenberg; Horizon Air, United States

This paper researches the current project management knowledge level, toolset and methodologies at Horizon Air and researches the value of adopting structure project management. Horizon Air, specifically the Flight Operations Division, has the opportunity to leverage project management standards and practices as set forth in the "Project Management Body of Knowledge" Guide, a document created by the Project Management Institute (www.pmi.org) and considered the de facto standard for project management, as a method towards enhancing project success and achieving corporate strategic goals. This paper will discuss the value and benefits of adopting standards and practices using the Guide's principles when initiating and planning projects and show how the academic side of project management is being applied throughout the Horizon Air and its sister company, Alaska Airlines.

TE-08.2 [R] Leadership Lessons from Managing Technology-Intensive Teams

Hans J Thamhain; Bentley College, United States

The results of an ongoing field study of over 50 complex technology-based product developments in 10 companies identify specific barriers and drivers to effective team performance. The paper provides insight into the organizational environment and managerial leadership conducive to high project performance in technology-oriented team environments. The results suggest that many of the performance criteria have their locus outside of the project organization. Managerial leadership has significant impact on both the project team and its broader organizational environment ultimately affecting team and project performance. Project leaders must manage the work and people relations across diverse organizational and cultural boundaries, including support functions, suppliers, sponsors and partners. The study examines the leadership skills necessary for successful implementation of complex projects, and the work process and organizational environment most conducive to effective product integration.

TE-08.3 [A] Innovation in a Large Public School System in Brazil: the Knowledge Network (Rede do Saber)

Guilherme A Plonski; Universidade de Sao Paulo, Brazil
Beatriz L Scavazza; Fundacao Vanzolini, Brazil
Angela Sprenger; Fundacao Vanzolini, Brazil

This paper documents the experience of creating and implementing Rede do Saber [Portuguese for Knowledge Network]. Its aim is developing educational agents in service, with the support of an array of converging ICTs, education management and program/project management. This approach has been successfully implemented in the State of Sao Paulo public education system, which has six million students and 300,000 teachers and managers. Over 1.2 million professionals were served by the Network since its implementation, in 2003. The project has been awarded several prizes for its innovative character and excellent performance.

TE-09 Global Issues in Technology Management-1
Tuesday, 8/7/2007, 16:00 - 17:30 **Room: Directors Suite**
Chair(s): Paul R Newman; Portland State University

TE-09.1 [R] Cross-National and Cross-Industrial Comparison of Two Strategy Approaches for Global Industrial Evolution

Chia-Han Yang; Institute of Management of Technology/NCTU, Taiwan
Z. Shyu Joseph; Institute of Management of Technology/NCTU, Taiwan

This research focuses on analyzing the two prime science and technology (S&T) strategy approaches for industrial evolution based on the concept of S&T gap, namely, the optimist and pragmatist approaches. Particularly, the cases of global IC, pharmaceutical, and computer industries are used to make cross-national and cross-industrial comparison of these two approaches. The optimist approach is developed based on the product life cycle theory, which envisions technology transcending everyday limitations. With this perspective, market demand is the most critical factor in selecting the S&T strategy approaches. The pragmatist approach is formed based on the new trade theory, which recognizes the power of science and technology but seeks to fit it into structures that already exist, and the government must manage resources pouring into science and technology. Case studies of global IC, pharmaceutical, and computer industries during the second half of the 20th century are used as research targets to reflect policy impacts on the technological evolution. The results of this study reveal that strategy approaches have to be adapted and turned to the specific stage, technology level, and market segment that have been selected for intervention. This result of comparison also offers the criteria of strategy approach selection for developing different industry based on distinct national base.

TE-09.2 [R] The Emergence of China into Global Level

Byung Chul Choi; Portland State University, United States
Kenny Phan; Portland State University, United States

This paper focuses on the various effects of the emergence of China. Moreover, it explains if China can succeed in maintaining its development based on several factors. The rising of China will also change the global economic map. Therefore, this paper focuses on the anticipation of the major effects and changes after the emergence of the great China based on various literature, when that the time will be, and what will be the major changes in the world. Finally, this paper attempts to explain the mission of Africa, bipolarization of wealth and knowledge, and US unipolarity to support the effect of the emergence of China.

TE-10 Science and Technology Policy-2
Tuesday, 8/7/2007, 16:00 - 17:30 **Room: Studio Suite**
Chair(s): Alice Chan; University of Pretoria

TE-10.1 [R] Industry and Government Measures to Promote Forward Integration of Automotive Supplier R&D from Developing Countries to Multinational OEMs

Oliver Moos; University of Pretoria, South Africa
Marthinus W Pretorius; University of Pretoria, South Africa
Jasper L Steyn; University of Pretoria, South Africa

Options are explored by which a developing country can promote its local automotive component industry's R&D and resulting technologies' forward integration into the multinational automotive life cycle. This is becoming increasingly difficult because vehicle design decisions are made at the global head office level. Technological innovation is a means of taking competitiveness beyond low cost labor in developing countries towards more sustainable bases of competition. An example of advanced casting technology developed by a South African research agency is considered. South Africa offers the opportunity of learning from eight subsidiaries of multinational OEMs (Ford, GM, BMW, DaimlerChrysler, VW, Nissan, Toyota, Fiat). First, local OEM procurement managers were interviewed on what technology innovators in developing countries could do to gain access to the global supply chain. Then a case study of successful global forward integration was considered. Government measures were explored based on literature as well as industry response. It was found to include increased support for tertiary education and research, research publications and patenting, but also for business development towards representation near multinational OEM parent design offices.

TE-10.2 [R] Strategies of Developing Deep Ocean Water Industry: Cluster

and Value Network Views

Yiche Chen; Yuan Ze University, Taiwan
Yan-Ru Li; Aletheia University, Taiwan
PiFeng Hsieh; Takming College, Taiwan
Chung-Shing Lee; Pacific Lutheran University, United States

Deep ocean water is a special resource which has been emphasized by the government in recent years. This resource is clean, low temperature, nutritious, and is stable, which makes it useful in a wide range of applications such as tourism, agriculture, fishery, energy and culture. This paper focuses on the case studies of Japan and U.S. and experts' opinions to offer some conclusions. This paper proposes four suggestions for policies, based on the cluster and value network views: 1) respect international connections of a value network; 2) foster human resources and research teams; 3) integrate the local economy and sustainable development; 4) create job opportunities across industries.

TE-10.3 [R] A Study on the Architecture of Performance Evaluation System of National R&D Programs in Korea

Dong Hoon Oh; KISTEP, Korea, South
Soon Cheon Byeon; KISTEP, Korea, South
Sang Yup Lee; KISTEP, Korea, South

There have been increased requirements for accountability and efficiency of national R&D programs according to the increased R&D investment within the limited national resources. To cope with these issues, each government is introducing a performance evaluation system, and Korea is also trying to upgrade its evaluation system under the guidance of NSTC (National Science and Technology Committee). There are several points to be considered in the Korean R&D evaluation system. Firstly, individual program evaluation is working very well, but these evaluation methods are not systematically organized in the national evaluation system (NES). Secondly, most of the current evaluation is focused on the monitoring of the R&D programs; therefore, there is little in-depth performance evaluation to improve the programs. To deliver these problems, the Korean government established laws regarding performance evaluation and management of national R&D programs and is trying to set up systematic performance evaluation methodology on a national scale. In this study, several evaluation methods were developed and systematically organized into the national R&D evaluation system from the viewpoint of performance evaluation and systemization of the methodologies.

TE-11 Intergenerational Impact in the Future Workforce

Tuesday, 8/7/2007, 16:00 - 17:30 **Room: Galleria-1**
Chair(s): Edward G Perkins; IEEE - USA

TE-11.1 [A] The Intergenerational Workforce

Edward G Perkins; IEEE - USA, United States
Gregory B Hutchins; IEEE - USA, United States
Elizabeth Lions; IEEE - USA , United States
Henry J Lindborg; IEEE - USA , United States

A rapidly aging global workforce – and the increasing numbers of older workers who want or need to work beyond normal retirement age – is creating an unexpected challenge and a major opportunity for employers and employees in the United States and other developed countries. In the US, private sector industries currently feeling the greatest pain in terms of imminent skills shortages include oil, gas, energy and healthcare as well as aerospace and defense. In the public sector, Federal, state and local government agencies are particularly hard-pressed. In this paper, we first introduce and define what is meant by the "aging and intergenerational workforce," then we describe the different generations, and scope out the anticipated impacts on companies, workers, and society. We list major issues resulting therefrom and conclude with some recommendations on actions that the profession, companies and policy-makers can take in response.

TE-11.2 [A] A Generational Divide: Challenge and Response

Henry J Lindborg; IEEE - USA , United States

Demographic and economic forces are converging in ways that are rapidly reshaping the United States workforce. After decades of downsizing and "right sizing" - combined with the effects of off-shoring - a tech "bubble," national security issues, and shifts in corporate-culture expectations for stable careers and long-term relationships with employers have diminished. At the same time, a "2010 meltdown" of the workforce, with massive numbers of baby boomers retiring, looms in the near future. This presentation explores a new workplace in which those with high-level skills will be encouraged to work beyond traditional retirement, and at the same time employers will be under significant pressure to recruit a new generation skeptical of old psychological work contracts. It suggests approaches to enhancing employee engagement, planning for succession, creating a multigenerational workplace, and recruiting "millennials."

TE-12 New Product Development-2

Tuesday, 8/7/2007, 16:00 - 17:30 **Room: Galleria-2**
Chair(s): Catherine Killen; University of Technology Sydney

TE-12.1 [R] New Product Development with Dynamic Decision Support

Jacobus P Venter; University of Pretoria, South Africa
Cornelis C van Waveren; University of Pretoria, South Africa

The development of new and improved management methods for new product development is important. Existing methods suffer from a number of shortcomings, especially the ability to deal with a mixture of quantitative and qualitative data. The objective of this study is to apply decision support techniques (especially Bayesian networks) to the area of new product development management in order to address some of the shortcomings. The research approach is one of decision structuring and modeling. A three-step decision structuring framework is used to develop a conceptual model, based on a Bayesian network, to support new product development management. The result is a Bayesian network that incorporates the knowledge of experts into a decision support model. It is shown that the model is requisite because it contains all the essential elements of the problem from which a decision maker can take action. The model can be used to perform what-if analysis in various ways, thereby supporting the management of risk in new product development. This research contributes not only a model to support new product development management but also provides insight into how decision support, and especially Bayesian networks, can enhance technology management methods.

TE-12.2 [R] Product Development for Successive Generations: Creating Decision Support Graphic Information by the Modeling Approach

Yasuo Kusaka; Dokkyo University, Japan
Yoshiki Nakamura; Nihon University, Japan
Jim Brogan; Dokkyo University, United Kingdom

This study adopts the modeling approach described by Kusaka and co-authors. It aims at specifying fundamental approaches for product development (PD) in order to gain long-range competitive advantages and to create decision support information. Two approaches are introduced: the long-range approach introduces product functions and technologies over successive generations of products as and when they become appropriate; the short-range approach enables the latest environmental changes to be flexibly and quickly introduced into PD decision-making. Thus, the study builds a PD model that optimally selects product functions and technologies for successive generations. The system builds on previous research by introducing a time factor. It considers the latest information based on present market needs and current technological advances. A graphic information tool, which we call a generalized cost performance curve (GCPC), enables decision-makers to see through changing PD patterns for successive generations. It also clarifies product evolution patterns and their characteristics under a planned roadmap.

TE-12.3 [R] Product Management Strategies for a Technology Product Market

Masaru Ishioka; Fukushima University, Japan
Kazuhiko Yasuda; Tohoku University, Japan

In the current major process of new product development, most of the products are devel-

oped to satisfy the customer's expectations of product performance and functions. Also, it is still the most effective basic concept to develop the new products. But, in the recent fast moving market trend, organizations are facing the difficulties of following the customer expectations. In this paper, from the view of strategic product development, the new concept with three product related strategic competitive factors - technology, feature, and product style - is introduced. This new competitive concept brings more selections to compete in the market. By managing the three factors, organizations are able to define more suitable competitive methods in the technology product market. In this research, first, conceptually define the several strategic new product management concepts which are suitable for the current technology product market by using the introduced three factors. Then, as the case study, the digital camera industry is selected. The developed strategy concept and three factor analysis is applied to this sample market. The major products in the market are characterized by the three factor analysis and defined the strategic competitive positioning.

TE-13 Decision Making-2
Tuesday, 8/7/2007, 16:00 - 17:30 **Galleria-3**
Chair(s): Nathasit Gerdsri; Mahidol University

TE-13.1 [A] Early Application of Full Spectrum Analysis as Business Process

John W Peterson; The Strategy Augmentation Group, United States
Kenneth O Wofford, Jr.; United States

In "Early Application of Full Spectrum Analysis as Business Process" the authors make two heroic assumptions. The first is that the planning methodologies in use by the American business community roughly parallel those in use by the US intelligence community (IC). Both face the problem sets of rapid context and process changes. The second, based on the first, is that planning is NOT a bad word in business - it is the business. Context drives market requirements; market requirements drive both technology and product (service) development; and resulting market-driven solutions drive both cash flows and profitability. In both, the need for internal control creates the underlying decision networks that define the pathways and alignment necessary to comprehend and communicate operational requirements and constraints. In the business community, the underlying marketing, product, and technology decision sets identify common needs across the corporation and create organization and strategy development and execution processes. Strategy decisions both generate and consume requirements, thereby creating (and destroying) value. Given the accelerating pace of change in the environment, the planning processes become both more critical and require more rigor. The potential value destruction of ill-considered propositions and investments may risk organizational survival. With these stated assumptions as a baseline, the authors begin to explore first applications of full-spectrum analysis in the global business environment where, like the IC, the participants can never have more than a passing advantage. Faced with rapidly changing global contexts; dissimilar standards of ethics and conduct; information overload, conflict, and obsolescence; fierce competition (including new and non-traditional competitors); multiuse and breakthrough technologies, etc., participants must pursue relentless improvement to create and address ever-present capability and operational mismatches. The macro environment has become chaotic and the only real sustainable strategic advantage is time-to-understanding-and-action.

TE-13.2 [A] A Study on Performance Measurement of a Plastic Packaging Organization's Manufacturing System by AHP Modeling

Gul Tekin Temur; Istanbul Technical University, Turkey
Bahar Emeksizoglu; Istanbul Technical University, Turkey
Sitki Gozlu; Istanbul Technical University, Turkey

By the effect of globalization, products, services, capital, technology, and people began to circulate more freely in the world. As a conclusion, in order to achieve and gain an advantage against competitors, manufacturing firms had to adapt themselves to changing conditions and evaluate their critical performance criteria. In this study, the aim is to determine general performance criteria and their characteristics and classifications from previous studies and evaluate performance criteria for a plastic packaging organization by utilizing Analytic Hierarchy Process (AHP) modeling. A specific manufacturing organization, operating in the Turkish plastic packaging sector, has been selected, and the manufacturing performance criteria have been determined for that specific organization. Finally, the selected criteria have been assessed according to their relative importance by utilizing the AHP approach and Expert Choice (EC) software program. As a result of this study, operating managers chose cost, quality, customer satisfaction and time factors as criteria for this organization. As the findings of the study indicate, the manufacturing organization, operating in the plastic packaging sector, overviews its operations and measures its manufacturing performance basically on those four criteria and their sub criteria. Finally, the relative importance of those main measures and their sub criteria are determined in consideration to the plastic packaging sector.

TE-13.3 [R] Manufacturing Performance Criteria: An AHP Application in a Textile Company

Ezgi Kaya; Istanbul Technical University, Turkey
Firuze Duygu Caliskan; Istanbul Technical University, Turkey
Sitki Gozlu; Istanbul Technical University, Turkey

Global competition and technological changes are forcing firms to redefine their strategies, operations, processes, and procedures to survive. Globalization has expanded the market and opportunities, but at the same time it has increased competition, its threats and risks. Manufacturing organizations must understand and measure the different dimensions of their performance to stay competitive in this global environment. In order to achieve their goals manufacturing firms need to identify and implement performance criteria that are appropriate, valid, reliable, and measurable. In this study, we firstly aim to determine manufacturing performance criteria for a Turkish textile company, and then we present the situation of Turkish textile industry in regard to these criteria and make suggestions for the sectors' improvement. In this context, a typical small and medium size enterprise is chosen and the identified criteria are evaluated in this organization by using Analytical Hierarchy Process (AHP). The performance criteria are cost, quality, flexibility and speed, which are critical factors for success. The findings seem to be consistent in general and provide insight for improvement in the Turkish textile companies.

WA-01 PLENARY - 4

DATE: WEDNESDAY, AUGUST 8
TIME: 08:30 – 10:00
ROOM: PAVILION
CHAIR: CRAIG WESSEL, PORTLAND BUSINESS JOURNAL, UNITED STATES

KEYNOTE

Jim Spohrer; IBM Almaden Services Research, United States

"Service Science, Management and Engineering (SSME): A Next Frontier in Education, Innovation and Economic Growth"

Service Science, Management, and Engineering (SSME) is a frontier field, defined as the application of scientific, management, and engineering competencies that one organization ("service provider") beneficially performs for and with another ("service client or customer") to coproduce value. Value creating service systems now span the globe. New business and information services are both output from and input to the growth of the knowledge economy. Business services unbundle and rebundle knowledge on-demand into offerings ranging from tell me (help desk and call centers), to enable me (e-commerce and application hosting in data centers), to do it for me (outsourcing business processes, information integration, and IT operations), not to mention field service, front-stage customer service centers, and back-stage service operations centers. SSME, also known as "service science," is the study of the design and evolution of service systems or "value creating systems." Service systems are value co-production configurations of people, technology, value propositions connecting internal and external service systems, and shared information (languages, laws, measures,

etc.). To better understand the design and evolution of service systems – especially measures of service productivity, quality, compliance, innovation, and learning curves - IBM has been collaborating with academic, industry, government, and foundation partners around the world since 2002. The focus on service systems and interdisciplinary approaches to understanding their design and evolution is of great economic relevance and scientific interest. First, the economies of most developed countries are dominated by services (70 percent of the labor, GDP, etc.). China, in its 2006-2011 Five-Year Plan, has made the "transition to a modern service economy" a national priority, and India is well along on this path as well. Second, even traditional manufacturing companies such as GE (70 percent services revenue) and IBM (50 percent services revenue) need to add high value services to grow their businesses. Third, information services and business services are two of the fastest growing segments of the service economy. The growth of B2B and B2C web services, service-oriented architectures, and self-service systems suggests a strong relationship between SSME and the more established discipline of computer science. The goal of SSME is to encourage research aimed at solving unique problems of service businesses and society, and to encourage development of courses and programs aimed at producing graduates who are ready to innovate in the service sector, particularly in areas of high skill, high value, IT-enabled, knowledge-intensive business services.

KEYNOTE

Daniel Berg; Rensselaer Polytechnic Institute, United States

"A Service Odyssey!"

Using my own experiences in collaborating to develop a research and educational program in the service sector over the last two decades, some of the key issues in the Service Sector will be discussed. Hopefully, this will highlight some fundamentals of what we have learned and where the field is now poised, especially from the standpoint of the role of technology and its management. The global economy and the implications of the burgeoning service sector component will also be emphasized along with the growing focus on "Service Innovation" by the academic and industrial community.

WB-01 SPECIAL SESSION: Service Engineering Symposium - Report
Wednesday, 8/8/2007, 10:30 - 12:00 **Pavilion East**
Speaker(s): Tugrul U Daim; Portland State University
Haluk Demirkan ; Arizona State University
Antonie J Jetter; Portland State University
Paul Maglio; IBM Almaden Research Center

This special session will provide a presentation of the conclusions from the NSF-sponsored Symposium, "Technology Management in the Service Sector," held on Sunday, August 5th, immediately prior to the beginning of the PICMET Conference.

WB-02 Nano-Biotechnology Policy
Wednesday, 8/8/2007, 10:30 - 12:00 **Room: Pavilion West**
Chair(s): Steven Walsh; University of New Mexico
Minna Allarakhia; University of Waterloo

WB-02.1 [A] Evolving R&D Paradigms and Intellectual Property Strategies: A Historical Analysis across the Chemical, Biological, and Information Paradigms

Minna Allarakhia; University of Waterloo, Canada
Anthony Wensley; University of Toronto, Canada

As research in biology transitions from the chemical, to the biological paradigm, and now to the information-based (systems biology) paradigm, researchers should be aware of how such a transition is likely to interact with the existing patent regime. Such interactions critically affect investments in research and decisions relating to when to patent and what to patent. Practicing researchers both in the biological sciences and other scientific disciplines are increasingly facing the need to develop research and exploitation strategies in domains that are dynamic and complex. The traditional research addressing patent thickets and patent pools offers insufficient guidance with respect to new biological knowledge structures and their accompanying challenges. In this presentation, we historically analyze the evolution of knowledge appropriation as paradigms change, providing case examples of models of appropriation across paradigms. Furthermore, we provide preliminary data on appropriation activities within biopharmaceutical alliances covering the period from 1980 to 2005. From our analysis, it appears that activities across the chemical and biological paradigms tend to focus on downstream, application oriented discoveries. However, the relative frequency of licenses on upstream oriented knowledge and discoveries when the focus of research is information-based warrants further study.

WB-02.2 [R] Game Models of the Defection Dilemma in Biopharmaceutical Discovery Research

Minna Allarakhia; University of Waterloo, Canada
Marc Kilgour; Wilfrid Laurier University, Canada

Recent trends in biopharmaceutical discovery research toward the systems biology paradigm have created a need for interdisciplinary teams with a wide range of skills. Success, especially economic success, will depend on the ability of team members to learn from each other. The mechanisms used for knowledge transfer and the motives of team members during knowledge production are crucial to this sharing of knowledge. Moreover, the timing of appropriation may determine whether downstream developments can be pursued. In this article we use game models to represent and analyze interactions between partners in collaborative alliances. Our contention is that a researcher's "freedom to operate" downstream is determined by cooperate-versus-defect decisions upstream, as discovery knowledge is being produced and subsequently disseminated. These decisions therefore determine whether researchers can equitably pursue downstream opportunities for medical application development.

WB-02.3 [R] Models of Cooperation and Knowledge Management: The Case of BioMedical Technology Management

Minna Allarakhia; University of Waterloo, Canada
Steven Walsh; University of New Mexico, United States
Anthony Wensley; University of Toronto, Canada

In the current biological paradigm, the biologist can no longer work in isolation. Networks of collaboration that are supported by information and communication technologies will enable researchers from a variety of disciplines and laboratories to generate and validate biological knowledge. Central to the development of medical tools and medical products is ensuring accessibility to knowledge for multiple researchers. Academia, government, and industry will all play a role in shaping policies that will enable cooperative knowledge production and the broad dissemination of biological knowledge. To better understand models of cooperation and knowledge management, we profile two case studies, the Agilent Microarrary Design program and the Accelrys Nanotechnology Consortium. Agilent has introduced the industry's first shared microarray design program. The program provides a new way of doing business with Agilent that allows scientists to share their custom microarray designs with designated groups while maintaining control of their intellectual property, or to share them with the scientific community at large. The Accelrys Nanotechnology Consortium provides a project framework that addresses the challenges of rational nanomaterials and nanodevice design. The Consortium gives members an edge in their R&D, increasing both its efficiency and effectiveness. It will further enhance the impact of software tools, contributing to R&D cost savings, supporting patent applications, facilitating interdisciplinary working, and supporting a smooth ongoing 'lab to fab' transition.

WB-03 Competitiveness-1
Wednesday, 8/8/2007, 15:30 - 17:00 **Room: Broadway-1**
Chair(s): Paul R Newman; Portland State University

WB-03.1 [R] Developing Digital Content Industry in Taiwan

Hsiao-Cheng Yu; National Chiao Tung University, Taiwan
Hsin-Hann Tsai; National Chiao Tung University, Taiwan

According to predictions by PriceWaterHouseCoopers in 2004, the average global annual

growth rate of digital video and audio products (VOD, MOD., etc) will reach 235 percent, wireless contents will reach 91 percent, and digital archives will reach 84 percent. This is due to the advancement, cost reduction and availability of the enabling technologies, e.g. digital processing, digital storage and digital telecommunications. The development of the Digital Content Industry (DCI) requires fine culture, initiative ideas, respect of intellectual property (IP) rights, and telecommunications infrastructure, which are all very dependent on government supportive policies. This study summarizes the government policies, progress, and obstacles in the development of Taiwan's DCI. Comparisons with those in other countries, including the U.S., EU, Japan, and Korea, will be provided. Taiwan's DCI opportunities and challenges will be discussed; strategies and recommendations will be provided based on Taiwan's unique resources and competitive advantages.

WB-03.2 [A] A Structural Complexity Perspective for Understanding Value Networks

Ying Ki Kwong; Oregon Department of Administrative Services, United States
Robert R Harmon; Portland State University, United States

Since the 1960's, complexity has been an important construct for understanding the dynamics of systems and how they exchange resources with the environment. The business literature contains many examples of the application of complexity theory to the analysis of value networks and business ecosystems, emphasizing the importance of the interdependence between participating firms. Frequently, the nature of this interdependence and the resultant market-wide complexity are explored in terms of evolutionary biology or bio-ecology metaphors. While biological metaphors represent a valid framework for characterizing complex business systems, this presentation will broaden the perspective by qualitatively applying an "ensemble" view; usually employed by physical scientists to infer macro-properties of complex systems from the interaction of their micro components. We will review different ways for characterizing complexity, emphasizing organizational complexity and its dynamical consequences near equilibrium and far away from equilibrium. These consequences may be attributable to system components interacting through effectively one-body (many-body) forces at small (large) time scales relative to market-wide disruptive forces. We conclude by summarizing the implications of this framework to strategy formation and strategic planning in corporate food chains for global technology or technology-enabled markets.

WB-03.3 [R] A Competitiveness Model for Mexican Software Development Companies

Alejandra Herrera Mendoza; Universidad Nacional Autonoma de Mexico, Mexico
Jose Luis Solleiro Rebolledo; Universidad Nacional Autonoma de Mexico, Mexico
Rosario Castanon Ibarra; Universidad Nacional Autonoma de Mexico, Mexico

In the last 30 years, the software development industry has become a very important source of employment for several countries, particularly in India, Ireland and Israel. For Mexico, the American market represents a very attractive opportunity to strengthen this industry. Although many of the Mexican software development firms (MSDF) fulfill isolated efforts oriented to the enterprise management, service and product quality that frequently outcome failed strategies and firms closing. A Delphi analysis, interviews of entrepreneurs and a focus group technique was applied to identify relevant management elements in order to define a model of a competitive firm in the Mexican context. The recommended strategies for developing a competitive company are based on a strategic plan with measurable objectives, clear market segment identification, capacity building and strategy to create management, technological, marketing and sales skills, and so on. Our study identifies the importance of public policies as well as the whole company strategy through the definition of rules according to today's global market reality. This paper presents the main results of this analysis and a proposed competitiveness model that applies to the MSDF. The appropriate response to market opportunities will depend on the adoption of the recommendations provided by the participating experts.

WB-04 Innovation Management-6
Wednesday, 8/8/2007, 10:30 - 12:00 **Room: Broadway-2**
Chair(s): Jiang He; Stevens Institute of Technology

WB-04.1 [R] The Life-Cycle Revisited: Stage Transitions and the Failure of the Iridium Project

Greg Daneke; University of Calgary, Canada
Kevin Dooley; Arizona State University, United States

In order to provide a clearer picture of the innovation life cycle, this study focuses upon the stage transitions themselves. Specifically, it seeks to go beyond existing uses of life-cycle (or developmental stage) models by exploring when and why ventures shift from one stage to another. Employing a novel narrative and textual analysis system, this study detects patterns that connect stages transitions with basic themes in the public narrative of high visibility ventures (in this case the Iridium Project). These connections not only re-confirm the existence of a life-cycle pattern, they provide a glimpse into the role that stage transitions play in the success or failure of new ventures. They also facilitate the construction of a true process model of organizational and entrepreneurial life cycles.

WB-04.2 [R] The Effect of SMEs' Partnership for Innovation: Case Study of the Japanese Manufacturing Industry

Yunyoung Kim; Seoul National University, Korea, South
Kiyoshi Niwa; The University of Tokyo, Japan

Firms compensate for their lack of internal resources with various partnerships. Therefore, the identification of effective partnerships is important. This paper analyzes the effects of financial cooperation and the sharing of knowledge of the successful innovation of Japanese manufacturing. The study examines the role of partnerships in the successful innovation of firms. The results of the study suggest that, in partnerships with government, both financial partnership and sharing of knowledge have had a positive effect, but, in partnership with clients, exclusively sharing knowledge but not financial cooperation has had a positive effect.

WB-04.3 [R] A Case Study on the Innovation Process from Mission-Oriented Basic Research Stage to Applied Research Stage

Hideki Yoshida; Japan Science and Technology Agency (JST), Japan
Joji Shinohara; Japan Science and Technology Agency (JST), Japan
Tadashi Sasa; Japan Science and Technology Agency (JST), Japan
Eiichi Maruyama; RIKEN, Japan/GRIPS, Japan

The role of the stage-gate II, the interface between mission-oriented basic research and applied research, has been investigated by means of the case studies on typical JST (Japan Science and Technology Agent) projects. The disincentive factors of the breakthrough at the stage-gate II, the patterns of the mission-oriented basic research processes based on this case study, and the success factors of the breakthrough at the stage-gate II are found. Moreover, the stage-gate II is found to be the important indicator of mission-oriented basic research for the innovation process.

WB-04.4 [A] A Case Study of the Application of 'Strategic Management of Technology and Innovation' Concepts at Atech – Tecnologias Críticas, a Firm of the Brazilian Aero-Spatial Cluster

Willian Limonge; Instituto de Fomento e Coordenação Industrial, Brazil
Aldo Bergamasco; Parmalat Indústria e Comércio Ltda. , Brazil
José H Damiani; Instituto Tecnológico de Aeronáutica, Brazil

This job focuses on identifying the practices of Atech – Tecnologias Críticas, a firm of the Brazilian aero-spatial cluster, related to "Strategic Management of Technology and Innovation" during the development and market introduction of "ARES" (an integrated solution for logistic management), and the fit of these practices to the literature largely accepted about the theme. Also, it evaluates the relation among the verified practices, the firm's knowledge management and the market results obtained by the product. Initially, an analysis is made on the firm's technology management practices, as well as on its Innovation Cycle. Then, a field research is performed, in which the firm's Chief Innovation Officer (CIO) expresses his feeling about in what degree some selected theoretical concepts are present on the firm's management of technology and innovation, mainly in the development of "ARES". Additionally, he expresses his perception about the impact of these concepts on the market results obtained by the product. The conclusion of this job suggests in what degree the results

obtained by "ARES" are associated with the firm's practices that fit the selected concepts and, finally, the relevance of the "Knowledge Management" in the firm's Innovation Cycle.

WB-05 Strategic Management of Technology-2
Wednesday, 8/8/2007, 10:30 - 12:00 Room: Broadway-3
Chair(s): J. Michael Munson; University of Santa Clara

WB-05.1 [R] Standardization Forming Process of Industrial Goods

Akira Nagashima; Tohoku University, Japan
Akio Nagahira; Tohoku University, Japan
Yong Cao; Huazhong Univ. of Science and Technology, Japan

Recently, increased attention has been paid to the standard and standardization. Although there are a lot of technical standards of industrial goods affect industries dramatically, many past researches were only with regard to the standard and standardization of consumer goods such as video recorders, DVD recorders. The aims of this study are to show the key strategies for decision management at each stage of the standardization process concerning industrial goods. In order to weigh the priority of strategies at each stage of the standardization process, we used AHP (Analytic Hierarchy Process) methodology and built a five stage process model. We revealed that companies needed to respond to the new market demands and begin new technology development at the Cradle Stage so that companies can take leadership of the whole standardization process. Consequently, it can be said that the Cradle Stage and the Convergence Stage are significant prior to the Introduction Stage. Through whole standardization process the strategy of creation and recognition of customers' value is important consistently. To conclude, the supplier who wants to win the standardization competitions should always try to catch the major customers' needs and create new value for major customers throughout the whole standardization process.

WB-05.2 [A] Effects of Technology Cycles on Strategic Alliances

Yi-Yu Chen; Rutgers, the State University of NJ, United States
George Farris; Rutgers, the State University of NJ, United States

This study examines various issues related to the formation of strategic alliances by using the cyclical model of technological change constructed by Tushman & Anderson (1986). Technology cycles offer a useful evolutionary perspective on shaping technology trajectories. The evolution of technology is a result of technological, social and political factors. The four stages in the model include technological variation (stage I), era of ferment (stage II), technology selection (stage III), and technology retention (stage IV). Within each of the four stages, issues related to the formation of strategic alliances – motivations, governance modes, and the selection of partners – are explored. The association between the cyclical model of technological change and the formation of alliances is empirically tested in response to the statement that a missing link exists for empirically validating the model of technology cycles. Specific research questions include: How will the context of cyclical stages of technological change affect the formation of strategic alliances? In other words, will different types of resources and capabilities be most valuable at different stages of technological change? How well does Tushman and Anderson's theory of technology cycles explain technology's impact on the formation of strategic alliances? Data were 594 alliances in the semiconductor industry from the Securities Data Corporation. Findings showed that the model of technological change is a useful framework in studying strategic alliances. More specifically, at the technology variation stage, innovation-driven alliances are the most important motives. Firms that lack promising technologies tend to select firms with promising technologies. Firms with promising technologies tend to select firms with complementary capabilities. At the era of ferment, both innovation- and efficiency-driven alliances for old technologies are the most important motives. Dominant industry players in either the semiconductor industry or other industries surprisingly are not the favorable alliance partners. At the stage of technology selection, manufacturing-type of alliances for new technologies are the most important motives. The more frequently adopted alliance modes are the ones with high control mechanisms and with equity involvement. Partners located either upstream or downstream of the focal firm are the most favorable choices. At the technology retention stage, market-driven alliances are the most important motives. However, firms in different industries or established firms in targeted markets are not favorable alliance partners. This study contributes to the literature in two ways: First, it empirically tested the cyclical model of technological change by Tushman and Anderson (1986) and linked the effects of technology cycles with studies on strategic alliances. Second, it empirically validates the argument that certain types of resources are most advantageous under particular technological conditions at various stages of technology cycles. The model provides rich settings to study how firms cope with their technical environment.

WB-05.3 [R] A Corporation Niche Analysis of Strategic Alliance

Yuying Wu; Beijing University of Technology, China
Tian Meng; Beijing University of Technology, China
Feng Yan; Beijing University of Technology, China

There are many ways to study the formation and stability of strategic alliance. We study the strategic alliance formation and symbiosis relation among the corporations in the alliance by the niche theory, and we conclude that there is a symbiosis among the corporations in strategic alliance of the corporation ecosystem. If the corporations are in the same niche£¨we can reduce the direct competition by separating the corporation niche, make full use of all members' resources and integrate their competency to reach win-win for the strategic alliance.

WB-06 Software Process Management-3
Wednesday, 8/8/2007, 10:30 - 12:00 Room: Broadway-4
Chair(s): Siri-on Setamanit; Portland State University

WB-06.1 [R] Converging Software Product Engineering with Process Management: A Pilot Study in Turkey

Nermin Sokmen; TUBITAK Marmara Research Center, Turkey
Mehmet Donmez; TUBITAK Marmara Research Center, Turkey

In developing countries such as Turkey, software organizations have struggled with market uncertainties and fragility of economies. By constructing and improving internal processes, organizations aim to handle the problems created by both internal and external actors. International software standards and models offer a framework that give companies an opportunity to understand their own weaknesses and strengths; and therefore to assimilate appropriate engineering, management, support, and organizational by tailoring defined standards and models. Improving product quality by improving process capability is needed to attain customer satisfaction. In this pilot study, the objective is to analyze data from companies operating in a technology zone in Turkey in order to observe the tendency of these companies about usage of quality standards and product and process convergence.

WB-06.2 [R] An Application of Six Sigma with Lean Production Practices for Identifying Common Causes of Software Process Variability

Antonio C Tonini; Universidade de São Paulo, Brazil
Fernando Jose B Laurindo; Universidade de Sao Paulo, Brazil
Mauro M Spinola; Universidade de Sao Paulo, Brazil

Six Sigma emphasizes the variability causes search. The special causes are more evident, which favors their identification, while the common causes are more difficult to be identified and solved and, for that, they request a specialist's participation. Many software development process variability causes are common, and it is not always possible to have Six Sigma specialists to identify them. An alternative might be the visibility criteria proposed by Lean Production. Instead of this criterion, software engineers are able to more easily notice the mistakes and their causes than Six Sigma specialists. This article verifies the advantages of using Lean Production practices based on a Multiple Case Study on some software organizations that uses this methodology. The study shows that the projects were finished more quickly and they presented more effective results.

WB-07 Technology Management Education-4
Wednesday, 8/8/2007, 10:30 - 12:00 Room: Forum Suite
Chair(s): John O Aje; University of Maryland

WB-07.1 [R] Designing a 'Knowledge Science' Based Graduate MOT Education Course and Its Review of Implementation and Practice

Akio Kameoka; Japan Advanced Institute of Science and Technology, Japan
Shuji Kondou; Japan Advanced Institute of Science and Technology, Japan
Yasuo Ikawa; Japan Advanced Institute of Science and Technology, Japan

JAIST (Japan Advanced Institute of Science and Technology) established a unique MOT course in 2003 in Tokyo, the framework of which was structured on the base of "Knowledge Science". The graduate school of knowledge science was established in 1996 by the first dean, Prof. Ikujiro Nonaka, a distinguished leader of knowledge creation management. The JAIST-MOT course focused its goal to innovation management and to educate technology based innovators to be called "Techno-producer" who has capabilities of concept generation, coordination, and project management. This MOT program introduced many new subjects such as strategic roadmapping, concept generation, services sciences that empower the competence of next-generation MOT or next-generation innovation management. This paper reviews the JAIST-MOT concept, characteristics of the programs, implementation process, resulting performance of about three-year practices and the future perspectives.

WB-07.2 [A] Developing Evaluation Tool for e-Learning

Ga-jin In; KISTEP, Korea, South

As human capital becomes more important for creating a firm's value, e-Learning is a core method to increase a firm's competitiveness in a rapidly changing environment. Many firms have converted the current employee education into digital way and increased the investments in e-Learning. This study develops the KAI (Key Activity Indicator) oriented "Evaluation Indicators of e-Learning" as a guideline for continuously checking a firm's e-Learning process. Focusing not on KPI (Key Performance Indicator) but on KAI (Key Activity Indicator) has many advantages in the sense that KAI is focused on the activities that cause the performance, while KPI is focused on ex-post performance. This study develops the framework of e-learning evaluation through 6 steps: 5 key activity dimensions and sub-activities (factors) of e-Learning were identified, and a conceptual and operational definition of the factors was presented. Measurement items for each factor were created and were verified by using the Delphi method. Finally "Evaluation tool for e-Learning" was suggested (concluding 5 key activity dimensions, 13 sub-activities (factors), and 38 measurement items). "Evaluation tool for e-Learning" shows managers present condition of operating e-learning and enables them to monitor every sub-activity of e-learning and immediately provide feedback.

WB-07.3 [A] Technology and Knowledge: Enhancing the Education Frontiers

Victoria E Erosa; Universidad Autonoma de Tamaulipas, Mexico
Pilar E Arroyo; ITESM Campus Toluca, Mexico

Universities are examples of knowledge oriented organizations where generating, sharing, storing and diffusing knowledge are highly valued. However, a great part of the knowledge in a university is tacit and partially communicated in the classroom via the interactions among professor and students. As part of an e-learning classroom project, a public university introduced a new technology, the Starboard. This technology facilitates the transmission of the course contents, provides access to the Internet during class and immediate notes for students, but furthermore, it also enables the university to capture and diffuse via e-mail the class' presentations, group discussions and interactions registered by the professor at the board. Starboard technology was introduced gradually but intensively. To administrate the technology change, the faculty participated in a workshop where Starboard benefits and technical aspects were discussed. Since this initial training, continuous technical assistance has been offered to the professors. The perceived benefits derived from the technology introduction in terms of the teaching-learning process and knowledge recovery is evaluated from the point of view of users, the faculty. The need for a strategic plan to guarantee information maintenance and diffusion, and the creation of cooperative involvement and trust as critical factors to promote knowledge sharing via Starboard is discussed from the perspective of different university authorities that could assume the technology and knowledge leadership role.

WB-07.4 [R] Survey and Modeling of Innovation System in Nanotechnology Programs in Iran

Hamidreza Darestani Farahani; Islamic Azad University, Iran

There are two important questions in this survey: First, how determined functions based on innovation system in Nanotechnology program have been proper and the other is what structures and organizations in the country must be established. The method of this survey is descriptive and monitoring. In this survey the objective population is experts in innovation and its system who know about nanotechnology. Due to limitations of the findings these people in scientific societies we used census instead of sampling and found 24 cases. It was found how accurate the confirmed programs by the Iranian Nanotechnology Initiative in different areas such as international interactions, leadership and encouraging programs to develop competitive industries, standardisation system and human resource development, etc have been chosen according to functions of innovation system. It was investigated if these findings have been chosen accurate. After evaluation of each function in every program, we returned to the programs and determined if they were strong, average or weak. It was seemed that there are 3 weak (5.6%), 17 strong (32.2%) and 33 average programs (62.2%). So it is included that majority of the programs are not as enough strong and would not cause the development of Nanotechnology in the country.

WB-08 TUTORIAL: Lightweight Project Management Framework

Wednesday, 8/8/2007, 10:30 - 12:00 **Room: Council Suite**
Speaker(s): Michael P Burton; Intel

The Lightweight Project Management Framework (LPMF) is a suite of six project management tools (Project Life Cycle, Scope of Work, Work Breakdown Structure, Responsibility Interface Matrix, Critical Path Mapping, and Risk Management Model) that interlock to provide a lightweight and flexible structure for "micro IT projects" with timelines less than one year and non-capital budgets. This tutorial will provide a fast-paced interactive experience with all six tools in a simulated project environment from project inception to postmortem. Teams will be created and individual members will own application of a single tool while providing input into other team member's tools. At the end of this session, attendees will be able to describe the six tools, identify if LPMF is appropriate for a specific project, and implement LPMF structure in their environment.

WB-09 Global Issues in Technology Management-2

Wednesday, 8/8/2007, 10:30 - 12:00 **Room: Directors Suite**
Chair(s): Seiko Arai; University of Oxford

WB-09.1 [A] Managing Global Design Teams

Vijay Bhusari; Portland State University, United States
Mitali Monalisa; Intel, United States
Rabah Khamis; Intel, United States
Fahim Mirani; Xerox, United States
Pranabesh Dash; Intel, United States

Global Design Teams (GDTs) are the reality of the 21st Century. These teams work across time, space and organizational boundaries toward common goals, providing the best possible results and in the shortest possible time. The results that can be achieved with respect to time, cost and performance of projects by such teams are hard to compete with. This paper analyzes eight different case studies of such teams, brings out the various issues involved in their functioning, and finally provides a set of recommendations that can be considered to ensure the success of virtual teams.

WB-09.2 [R] System Approach for Measuring Innovation Technology Capacity in Developing Countries

Florangel I Ortiz; University of Carabobo, Venezuela
Eugenio E Brito; University of Carabobo, Venezuela
María L Ovalles; University of Carabobo, Venezuela

This paper presents a measurement system which has as its objective to define a reference frame on the capacities of a company to face internally the process of technological innovation of products and of processes. The system mentioned before considers the variables suggested by experts as determinants of the process of such technological innovation of prod-

ucts and processes to which the most appropriate indicators are selected. In this sense, using the set of indicators selected in the treatment of each one of the variables of exposed analyses sets out a general indicator of the capacity of technological product and process innovations. The system contains all the instruments, procedures and methodology to measure and to analyze the capacity for innovation, and it may be possible to compare the behavior of different companies in an industrial sector. Thus, it contributes to acknowledging the process of technological innovation in any enterprise sector, from which it is possible suggest actions to impel this so necessary process in the competitive world of today.

WB-10 Technology Assessment and Evaluation-2
Wednesday, 8/8/2007, 10:30 - 12:00 **Room: Studio Suite**
Chair(s): Alex Coman; Tel Aviv University

WB-10.1 [R] Technology Evaluation under Information Inadequacy

Charles Romito; University of Cambridge, United Kingdom
David Probert; University of Cambridge, United Kingdom
Clare Farrukh; University of Cambridge, United Kingdom

Assessing the benefits of a new technology can be a foremost concern for managers in technologically intensive companies. Increasingly, technological complexity is combined with higher uncertainty (market and technology) and often decreasing budgets. This is particularly true in the case of converging technologies where markets have yet to fully emerge. The result is a need for ever more efficient resource allocation, particularly concerning the choice of R&D projects. In recent years progress has been made on techniques and methods to assess and value technological assets. Unfortunately, many of these require good estimations of future market conditions. However, the time required for technology development means that investment decisions typically have to be made when future market conditions are still uncertain. This paper is part of ongoing research that seeks to understand which technology valuation techniques perform best in the presence of ambiguity, complexity and imperfect or even absent information. Preliminary results are presented for the effectiveness of a technique for the structuring and manipulation of existing knowledge and thoughts (value roadmapping - an exploratory/divergent form of technology roadmapping).

WB-10.2 [A] Evaluation Methods in Preliminary Feasibility Analysis of R&D Programs

Jiyoung Park; KISTEP, Korea, South
Yong-Il Park; MOST, Korea, South

Evaluation is a key process in planning and implementing R&D programs. Evaluation is also performed for the purpose of allocating limited resources to R&D programs. At the national S&T planning stage, various evaluation methodologies are used to identify the best technology alternatives or develop S&T policy. For the newly proposed R&D programs, preliminary feasibility studies are performed to decide a budget using the multi-criteria decision making approach. The purpose of a preliminary feasibility study is to verify the feasibility of large public R&D programs through technical, economic and policy analysis. The system was introduced in 1999 for large-scale SOC projects by the Ministry of Planning and Budget (MPB), and the target boundary of the feasibility study has been broadened to the R&D programs beginning in 2006. The analysis has been performed for technical feasibility, economic merit, and policy implication. Preliminary feasibility studies employed AHP on the results of the three analyses. For the purpose of setting up a preliminary feasibility study system, we developed "General Guidelines for Preliminary Feasibility Studies." The guideline includes general procedures and methodologies for analysis. Standard guidelines for a preliminary feasibility study for each R&D program category are also developed and applied to various R&D programs.

WB-10.3 [R] Review of Methods and Tools Applied in Technology Assessment Literature

Thien A Tran; Portland State University, United States

Technology assessment is an emerging field of management study for the past four decades. An increasing amount of research has been carried out over the years that has contributed to the development of TA literature. There have been some journal articles summarizing the history and growth of the field during its evolution. However, there has been no effort made to present an overview of the methodologies and tools that have been used in the TA research literature. This paper is the first attempt to fill that need. A thorough review of the TA articles published in leading journals in the MOT field is conducted to identify the methodologies or research tools in the studies. The paper starts with a brief overview of the development of the TA field over its history. This section provides the readers with knowledge of the movements in the field. A classification of the approaches, methods and tools that are available for TA studies is then introduced. The main content of the paper presents the work done in TA literature that involves certain research methodologies. A separate section is devoted to the status of TA relating to developing countries, which highlights the interest of the author in his future research direction. It is hoped that the review will reveal opportunities for his research in devising a new TA model that is dedicated to the developing world. In general, the paper's main objective is to provide an overview of available TA methodologies that can be applied or further developed by other researchers.

WB-11 Knowledge Management-3
Wednesday, 8/8/2007, 10:30 - 12:00 **Room: Galleria-1**
Chair(s): David W Versailles; Research Center of the French Air Force

WB-11.1 [R] Epistemetrics: Conceptual Domain and Applications of Knowledge Management (KM) in Health Care

Nilmini Wickramasinghe; Illinois Institute of Technology, United States
Eliezer Geisler; Illinois Institute of Technology, United States

By and large, the emerging field of knowledge management (KM) has failed to deliver on its promises. The literature contains a variety of attempts to define the field, to explain its core components, and to discuss its relevance and utility to organizations. But, much of this literature is replete with narratives and descriptive statements, albeit with some cases of implementation. There is a lack of a cohesive set of research questions and an even more striking lack of an appropriate, generally accepted methodology for research in knowledge management. This void becomes particularly apparent when we begin to examine the role of KM in health care and how, by incorporating KM techniques, superior healthcare operations might ensue. Clearly, it is almost impossible to reach such consensus and convergence when there is a lack of metrics of what constitutes knowledge and how we process it. This paper describes the subfield of epistemetrics, the metrics of knowledge in relation to the application of KM to enabling effective, efficient, and quality healthcare delivery. It fills the need in the literature of having a coherent system to measure knowledge. Epistemetrics is the metrics of knowledge, and is composed of three inter-related parts: what we measure in knowledge; how we measure; and why we measure (what is the value generated by knowledge). This paper describes the conceptual domain of epistemetrics and suggests some applications of knowledge management in the healthcare context. We contend that by taking such an approach, the nascent field of knowledge management will be able to mature into a substantive and rigorous discipline, which in turn will be able to provide health care with needed solutions.

WB-11.2 [R] A Methodology for Design Ontology Modeling

MD B Sarder; University of Texas at Arlington, United States
Susan Ferreira; University of Texas at Arlington , United States
Jamie K Rogers; University of Texas at Arlington, United States
Don H Liles; University of Texas at Arlington, United States

Recent research has focused on the use of ontologies to promote the sharing of knowledge. Ontologies are becoming increasingly important because they provide the critical semantic foundation for the rapidly expanding field of knowledge. They are very useful for knowledge reuse, knowledge sharing, and enterprise modeling. A design ontology is a hierarchically structured set of terms for describing a design domain that can be used as a skeletal foundation for a knowledge base. It can help the collaborative design team by providing accurate design information and guidelines. This research develops a methodology called Domain Knowledge Acquisition Process (DKAP) for creating an ontology of product and process design using IDEF5 and generates a consistency matrix for checking the accuracy of cap-

tured information. DKAP is a step-by-step methodology, which captures the product and process design knowledge, stores this knowledge in a reusable format, and shares this knowledge across enterprises. DKAP addresses three critical aspects of a design ontology. It explores the availability of similar domain ontologies for reuse, checks the accuracy and consistency of captured knowledge, and allows the sharing of the captured knowledge.

WB-11.3 [A] The Design and Implementation of Information System for the MBO of National R&D Projects Cooperated by Industries, Universities and Government-Supported Research Institutes

Kwon-Joong Sohn; Tera-level Nanodevices, Korea, South
Wang-jin Yoo; Graduate School of Konkuk University, Korea, South
Cheol-gyu Lee; Graduate School of Konkuk University, Korea, South

With the result of finding the significance of effective objective management and communication by reviewing previous studies on the insufficient cooperation in projects undertaken by industries, universities and government-supported research institute collaborative system, we have set up an engineering process innovation model to be deemed most adequate for all practical purposes, relying on the theoretical studies of the information system based on Milestone Management, Work Breakdown Structures and Web, which are known to be effective for research project (schedule) management and the objective management, and we have implemented a real world web-based project (objective) management system. Actual managing progress may be cross-checked through both on line objective management on the web-based information system and design review meetings held on site, to improve the efficiency and validity of the information system. The questionnaire on the system effect revealed that the information system was useful to objective management and communication, and that the quality of the system was more than acceptable as well.

WB-12 New Product Development-3
Wednesday, 8/8/2007, 10:30 - 12:00 **Room: Galleria-2**
Chair(s): Cornelis C van Waveren; University of Pretoria

WB-12.1 [R] Industrializing Engineering Work: Challenges Associated with the Implementation of Product Models

Anders P Nielsen; Aalborg University Copenhagen, Denmark
Lars Hvam; Technical University of Denmark, Denmark

This paper will analyze organizational challenges in connection with the implementation of product models. Product models are implemented with the purpose of industrializing the engineering work associated with the product configuration process. The paper demonstrates that the introduction of a product model will create a number of organizational challenges. The paper identifies four key challenges. Firstly, a redesign of the product configuration process whereby this process is split in two – one process for standardized product variants which is supported by the product model and one process for highly customized product variants. Secondly, the introduction of the product model creates a need for the introduction of new organizational roles in the organization. Among the most important roles is the model manager. Thirdly, alongside the introduction of new organizational roles a new task structure also needs to be introduced. Fourthly, it is also a challenge is to ensure continual learning and development of the product model. Throughout the paper findings from cases will be used to illustrate how a number of companies have dealt with the identified challenges. The paper concludes by outlining a number of recommendations for a firm attempting to implement a product model successfully.

WB-12.2 [R] Design for Six Sigma: A Case Study

Richard M Franza; Kennesaw State University, United States
Satya S Chakravorty; Kennesaw State University, United States

This paper provides a demonstration of how Design for Six Sigma (DFSS) is utilized to design and engineer a new product. At the center of the DFSS approach is a five-step process, DMADV, which is an acronym - Define, Measure, Analyze, Design, and Verify. We find that when the product is clearly identified in the Define stage, the rest of the DMADV application proceeds in a sequential and rational manner. However, if we find that the product is not clearly defined in the Define stage, the rest of the DMADV application proceeds in recursive and reflective manner. Over time, as the DMADV approach is applied, the rate of progress dramatically decreases and the speed of product development becomes painfully slow, which was at times a very frustrating experience for the developer. We provide additional insights for implementing the DFSS approach to develop new products, which is important for both practicing managers and academicians. Most importantly, we conclude that DFSS appears to work well in new product development projects for evolutionary or derivative products, but not so well for revolutionary or breakthrough product projects.

WB-12.3 [R] The Relationships between Internal and External Environmental Factors of the Turkish Firms with Respect to New Product Development Strategies

Berna Tektas; Istanbul technical University, Turkey
Dilek Ozdemir; Istanbul Technical University, Turkey
Sitki Gozlu; Istanbul Technical University, Turkey

The development and introduction of new products to market has been a challenging activity for many firms for many years, especially in the last two decades, as competitiveness in the business environment has increased. The number of new product introductions has grown up drastically. Enhanced globalization, competition and customer expectations have not only decreased time-to-market and the life cycle of the products, but also increased product variety. The imposing factors of new product development from literature mostly have appeared in the external environment of firms. Changes in the competition conditions of the market, customer expectations, and legal constraints, bargaining power of suppliers and changing raw materials and other inputs are examples of these external factors. Considering these conditions as a whole and to understand how firms can survive and be successful, the dynamics, which influence NPD activities, must be analyzed. The aim of this study is to assist the firms in their new product development efforts.

WB-12.4 [R] Intangible Resource Flow as an Antecedent of New Product Development Success in Buyer-Seller Relationships

Roger A Baxter; AUT University, New Zealand

There is currently considerable interest in the co-creation of value by sellers and buyers. It is often noted in the literature that much, if not most, of the innovation in product development derives from the buyer rather than the seller. Sellers therefore need a means of judging which of the relationships that they have with buyers has the greatest potential for value creation through new product innovation. Because the flow of intangible resources through buyer-seller relationships is an important contributor to new product development, this paper investigates the literature on relationship marketing, new product development, innovation and intellectual capital, and proposes a conceptual model of the potential for intangible resource flow from buyer to seller and its relationship to the success of new product development. The potential for the intangible resource flow is conceptualized in terms of the availability of intangible resources in the buyer and the attributes of the buyer's boundary personnel.

WB-13 Decision Making-3
Wednesday, 8/8/2007, 10:30 - 12:00 **Room: Galleria-3**
Chair(s): Jang W Ra; University of Alaska Anchorage

WB-13.1 [R] Decision-Making for New Technology: A Multi-Actor, Multi-Objective Method

Scott W Cunningham; Delft University of Technology, Netherlands
Telli E Van Der Lei; Delft University of Technology, Netherlands

Technology managers increasingly face problems of group decision. The scale and complexity of research, development and alliance efforts in emerging fields of technology mandate a correspondingly sophisticated form of group coordination. Information technology, biotechnology and nanotechnology are good examples of sectors with complex coordination problems. Choices made include the selection of projects, the choice of investment alternatives, and the formation of technology licensing agreements. Multi-criteria decision analysis (MCDA) methods are often used to help decision makers in such situations. A shortcoming of these

methods is that the step from individual preferences to a collective preference is merely an aggregation. This aggregation of preferences requires the group of decision makers to agree on a collective preference. This paper presents a method that does not aggregate the individuals' preferences but instead considers strategic and economic factors in the assessment. We use an exchange coordination hypothesis, drawn from the theories of Coleman and other researchers, to support our model. The advantage of this method is that the results provide an improved prescription for strategy, given the constraints of preferences and existing alliance structures. The model is motivated based upon the needs of technology managers in new, converging fields of technology. The model is formally analyzed using operations research techniques. We then apply the model to a representative technology management problem in the converging fields of informatics, bio and nanotechnology.

WB-13.2 [A] The Use of Fuzzy Logic and Expert Judgment in the R&D Project Portfolio Selection Process

Sarah Riddell; Rensselaer Polytechnic Institute, United States
William A Wallace; Rensselaer Polytechnic Institute, United States

New technologies emerge every day in response to a variety of needs. In research and development (R&D) project portfolio selection, the agencies responsible for budget allocation must make the crucial decision of which projects to fund. A quantitative, objective decision-making process necessarily avoids internal strife amongst decision-makers, and contributes to a more unbiased process. This paper proposes a new decision aid that integrates fuzzy logic and expert judgment into non-crisp decision making criteria for the R&D project portfolio selection process thereby reducing the number of solutions under consideration. Managers' preferences and knowledge are incorporated into the process using a fuzzy rule based aggregation procedure. This technique provides an alternative to clustering in choosing amongst non-dominated solutions. The methodology is illustrated through a case study, determining funding levels for R&D projects for the particular example of the Nuclear Emergency Safety Team (NEST).

WB-13.3 [A] Analytic Hierarchy Process for Technology Policy: Case Study the Costa Rican Digital Divide

Audrey M Alvear Baez; Portland State University, United States
Dundar F Kocaoglu; Portland State University, United States

This paper presents an application of the Analytic Hierarchy Process (AHP) for technology policy. Developing countries face a great challenge to bridge their internal digital divide. However, most studies seeking to bridge this gap offer only recommendations at the policy level. With the use of AHP as a methodology, we can provide appropriate information about which technologies will have the greatest impact on bridging this gap.

WD-01 Technology Management in Electronics-1
Wednesday, 8/8/2007, 14:00 - 15:30 Room: Pavilion East
Chair(s): Cornelius van Waveren; University of Pretoria, South Africa

WD-01.1 [R] A Real-time Manufacturing Risk Management System: An Integrated RFID Approach

Kenneth T. C. Poon; Hong Kong Polytechnic University, Hong Kong
K. L. Choy; Hong Kong Polytechnic University, Hong Kong
Henry C. W. Lau; Hong Kong Polytechnic University, Hong Kong

It is inevitable to face production problems in various aspects such as human fallibility, defective processes and unreliable technologies in industrial manufacturing business. Thus, barcode-based shop floor control systems have been widely adopted in order to monitor the production processes. Striking issues can be identified easily by those systems. However, potential and critical risks cannot be identified by those systems such that both operational effectiveness and economical profit are significantly affected. This paper proposes a RFID-based Risk Management System (RRMS) that not only identifies the potential risks during production processes, it also suggests relative solutions to tackle those risks. The proposed system integrates the technologies of RFID and rule-based reasoning (RBR) with risk management concept to help monitor shop floor operations. Through pilot running of the RRMS in the ABC Limited, a significant improvement in terms of shop floor responsiveness was achieved.

WD-01.2 [R] Global Competition by Metanational Management in Liquid Crystal Display Industry

Yukihiko Nakata; Ritsumeikan Asia Pacific University, Japan

Japan created Liquid Crystal Display (LCD) industry and has grown up it. South Korea and Taiwan entered into it and are passing over Japan. Recently, the driving product of LCD industry has changed to LCD-TV. Although Sony had the first place in the world TV market, it did not have a flat display. Therefore, Sony established a joint venture with Samsung. Then, Sony could keep a high share in the TV market. On the other hand, Sharp Corporation makes LCD panels and assemble them into LCD-TVs by vertical integration in one factory. Sharp has a 40 percent share in Japan, but about 15 percent in the world market. Thus, Sharp has changed the global strategy. Sharp produces LCD panels in Japan. They are assembled into TVs in Japan for the Japanese market. Also, they are shipped and assembled in overseas factories for global market. Sony and Sharp have a top-class share of the world LCD-TV market. However, their global strategies are different. Yves L. Doz et al. proposed the "Metanational Management" concept, which combined and leveraged the globally dispersed knowledge. Sony took on the "Metanational Management." However, Sharp took the other strategy based on the "Core Knowledge" in Japan. Therefore, the author would like to propose "Core National Management."

WD-01.3 [A] Photomask Manufacturing: An Example of Synchronous Ecosystem Learning

C. Neil Berglund; Portland State University, United States
Charles M Weber; Portland State University, United States

To remain profitable, managers of photomasks synchronize their learning practices with those of their complementors - lithography tool makers, resist suppliers, chipmakers and desisgners. Is this a coordinated, learning effort of an ecosystem?

WD-01.4 [A] Evaluating Transmission Technologies: Case of Bonneville Power Administration

Fatima M Albar; Portland State University, United States
Rosy Hanna; Portland State University, United States
Tugrul Daim; Portland State University, United States
Terry Oliver ; Bonneville Power Administration, United States
Cesar Castilla; Portland State University, United States

The focus of this paper is on power transmission gridlocks; we studied Bonneville Power Administration (BPA) Transmission Technology Roadmap of September 2006 and focused on resolving transmission gridlock problems. The methodology used in the paper was literature research along with two experts in the field: one expert is from BPA company and the second expert has more than 20 years experience in the industry. We present three technologies for short term (0-5 years) and three more disruptive technologies for the long term (5-10 years). It is highly important to make decisions in the early stage of technology development since there are many uncertainties. This paper applies technology assessment/acquisition methodology for the Power Transmission technologies required to resolve the gridlock and congestion problem. In most of the articles found in the industry literature, each technology was evaluated and assessed individually against the current power grid capabilities. This paper compares more than three technologies' capabilities against each other and the current grid capabilities for both short-term period long-term technologies since challenges to the expanded use of power electronics is the high cost and lack of proven performance, reliability and durability. More collaboration of academic researchers and the power transmission companies along with technology vendors will ensure that the most valuable ideas and technologies are considered. Thus, this study could be a base for further research and study to compare technologies and assess the best available technologies and ensure that the most valuable technologies are simulated quickly to the market. The paper combines an empirical approach of looking at the real world with a literature review. It provides an interesting foundation for further research on the topic which might look at a higher number of organizations. The scope of further research should also extend the scope of the analysis beyond power transmission gridlock and congestion.

WD-02 Convergence of Technologies-3

SESSIONS

Wednesday, 8/8/2007, 14:00 - 15:30 **Room: Pavilion West**
Chair(s): Fujio Saito; Tama University Graduate School

WD-02.1 [A] Converging Technology in Society: Opportunity for Radio Frequency Identification (RFID) in Thailand's Transportation System

La-or Kovavisaruch; NECTEC, Thailand
Pattharaporn Suntharasaj; Portland State University, United States

Undoubtedly, in the world of urbanization, time and efficiency are a matter of priority. RFID (Radio Frequency Deification) emerges as one of the noteworthy converging technologies which improves the standard of living, particularly the two above mentioned ones. While transportation, being mass transit or logistic, plays an important role in the development of urbanization, RFID is now a key catalyst in signifying the merit of it. Thus, it is necessary to thoroughly study RFID technology for transportation advancement from initial deployment to each variety of its applications. There are many RFID applications available in the market such as RFID contactless smart card, commonly used by commuters or bus riders; Automatic Vehicle Identification (AVI), an applied RFID technology used in Electronic Toll Collection (ETC); Smart Parking; and Electronic Road Pricing (ERP). In Hong Kong, the Octopus Card is used not only in mass transit but also in convenience stores, fast food stalls and for paid parking. Driven by such a success story abroad, deployment of RFID technology in Thailand is thus encouraged. This paper researches existing technologies and examines the appropriate set of standards in integrating them for transportation applications. This paper has been carried out with a purpose to understand the benefits of the RFID technology in other countries and to identify the readiness of Thailand in exploiting it.

WD-02.2 [R] Coordinating Converging Technologies: A Survey of Models from the Field of Multi-Actor Systems

Telli E Van Der Lei; Delft University of Technology, Netherlands
Scott W Cunningham; Delft University of Technology, Netherlands

Converging technologies demand new forms of social, economic and technological coordination. The discovery of a new technology is increasingly diffused – no single inventor, institute or laboratory has the necessary knowledge to pioneer new discoveries in isolation from others. The development of new technology is increasingly a large-scale, high-risk enterprise, requiring the formation of partnerships and alliances. The commercialization of a new technology is subject to networked externalities, and the challenges of extracting the information rent for new knowledge. The field of multi-actor systems is a developing discipline of management of technology. One aspect of the field of multi-actor systems is the development of models of actor coordination. Such models are useful for explanatory, operational as well as strategic purposes. In this paper we investigate which formal modeling methods are most applied to emerging multi-actor problems. Our analysis shows that game theory is the most applied multi-actor method. We show that two types of papers with a multi-actor content can be distinguished: theoretical papers that advance understanding of multi-actor methods; and applied papers that provide tailored models for specific multi-actor problems. We create a classification of problems facing the technology manager, and examine the proposed models and coordination mechanisms in light of these emerging problems of converging technology.

WD-02.3 [R] Nanotechnology Systems of Innovation: Investigation of Scientific Disciplines' Fusion Trend into Nanotech

Nazrul Islam; Tokyo Institute of Technology, Japan
Kumiko Miyazaki; Tokyo Institute of Technology, Japan

Nanotechnology, manipulating atoms and molecules at the nanometer level, is an emerging technology, introducing new dimensions to science and technology by the convergence of traditional disciplines. In the early stage of nanotechnology development and diffusion, many expected benefits have not yet been fully accomplished. However, researchers of many countries in the scientific disciplines aggressively got involved in the relevant research as a parallel way to boost nanotech competitiveness through academic research, and corporations direct their R&D activities towards the exploration of nanotech opportunities. Through a combination of quantitative (bibliometric exploration) and qualitative method (primary data analysis), the paper attempts to establish the trend of science disciplines' knowledge fusion into nanotechnology field. In terms of fusing disciplines together, a number of approaches were considered: i) looking for nanoscientific output of journals of general disciplines categorized by ISI (find to what extent were nanotech papers coming from scientific disciplines over time and how it has changed over time?); ii) to look for a set of nanoscience papers in each disciplinary journals at present, 5 and 10 years ago and their reference citations (classify the citing references into disciplines using ISI journal based classification scheme and what proportions were coming out or linking with each disciplines). This study also identified the concerned factors driving multi-disciplines' fusion into nanotech, that would be a good evidence of fusing previously separate disciplinary activities into nanotech. The research offers useful insights for science & technology policy makers as well as for researchers of traditional science fields in the global community, revealing fusion trends of the emerging nanotechnological systems, existing domain-level competencies and differences between disciplines.

WD-02.4 [A] Are Converging Technologies Tools of Competitiveness?

Francois A Ravalison; University of Antananarivo, Madagascar
Patrick Rajaonary; PAPMAD-OI, Madagascar
Elise A Raveloson; University of Antananarivo, Madagascar
Etienne Rakotomaria; University of Antananarivo, Madagascar

Madagascar is the only country of the Indian Ocean Commission possessing a paper industry. Since three years ago, that paper industry has confronted major fiber waste due to major technological problems. The latter affects the competitiveness at the national and regional level. The objective is to prove that solving technological problems solves competitiveness problems. To approach this problem, the Skinner's competitiveness concept will be utilized, and the methodologies will be Value Engineering and the Benchmarking. The purpose of Value Engineering is to simplify products and processes. Its objective is to achieve equivalent or better performance at a lower cost while maintaining all functional requirements defined by the customer. The objective of Process Benchmarking is to understand and evaluate the current position of an industry in relation to "best practice" and to identify areas and means of performance. The survey analyzes fiber waste, and then it explores its effect on competitiveness. A focal result appears: the rehabilitation of the existing technology and its combination with information technology improves competitiveness. That permits one to conclude that the converging technologies are a competitive quality process.

WD-03 E-Business-1

Wednesday, 8/8/2007, 14:00 - 15:30 **Room: Broadway-1**
Chair(s): Zeynep Iltuzer; Istanbul Technical University

WD-03.1 [A] Ubiquitous-City Business Strategies: The Case of South Korea

Hyang-Sook Cho; ETRI, Kyrgyzstan
Byung-Sun Cho; ETRI, Korea, South
Woong-Hee Park; ETRI, Korea, South

Recently, the u-City market in Korea has increased dramatically due to the change of urban development paradigm. Not only the primary local governments but also the major cities are ready for the u-City project. In this research, u-City construction tendency and the schemata to realize the u-City in new towns like Company Cities and Innovative Cities are examined. The way to the u-City activation and the implementation based on the result are examined as well. First, specialized service, which is agreeable to the local governments' quality, should be developed to build U-cities in the Company City, Multi-functional Administrative City and Innovative City. Second, the risk and the investment expense is high at the beginning of the u-City building but it can be decreased if it is linked to the former Company Cities, Multi-functional Administrative City and Innovative City. Third, if the u-city business and the local activation plan should be linked, the expenses can be economical. U-Korea can be constructed if we are able to realize the u-Cities in the Company Cities, Multi-functional Administrative City and Innovative City designed to the local economic activation. This is the solution to the regional discrimination and competitive power as well.

WD-03.2 [A] An Analysis of the Economic Effects for Launching the Ubiquitous City

Woo Soo Jeong; ETRI, Korea, South
Byung Sun Cho; ETRI, Korea, South
Pang Ryong Kim; ETRI, Korea, South

This study is to research the economic effects of introducing the ubiquitous City (u-City) industry in Korea. For this purpose, we define the conception of the u-City industry. And to analyze it, we redistribute the Input-Output table from Korean bank. The methodological framework proposed in this paper addresses the strength of the economic effects that it reflects the endogenous model of the household. Also, this paper estimates and analyzes the forecast of final demand that does not exist in the marketplace. The results show that production derivative effect is about 2,940 trillion won, and value added creation 2,264 trillion won from 2007 to 2012.

WD-03.3 [A] A Study of the Evolution of the u-City Service

Woong Hee Park; ETRI, Korea, South
Woo Soo Jeong; ETRI, Korea, South
Hyang Sook Cho; ETRI, Korea, South

Recently, the government has more concerns elementarily high in the ubiquitous information technology (u-IT) introduction as a method to solve the problem of the city and to enhance its competition. This becomes the motivation to construct the next city called ubiquitous city (u-City). The advanced u-IT infra and ubiquitous computing technology exist as the environment, not just a tool in the city life. u-City is the future where the physical spaces and electronic spaces are converged. But there is not a clear definition and the standard service model for u-City. Therefore, the 'u' concept has to be understood around the realizable of services in consideration of the technique development. That is, it needs to look into how the ubiquitous computing relative technique and how the developed ubiquitous service evolves. To the ground the evolution of the technology and service required for the u-City build-up, this research categorized the conceptual range about the u-City service to the b-City, s-City, a-City, h-City. And the research will systematically increase understanding of the u-City service. Thereafter, in a research, the more concrete research has to proceed that the various service model can be developed according to the u-City service object.

WD-04 Innovation Management-7
Wednesday, 8/8/2007, 14:00 - 15:30 Room: Broadway-2
Chair(s): C. M Chang; State University of New York at Buffalo

WD-04.1 [R] Complex Innovation Networks, Patent Citations and Power Laws

Thomas Brantle; Stevens Institute of Technology, United States
M. Hosein Fallah; Stevens Institute of Technology, United States

We study knowledge and innovation flows as characterized by the network of patent citations and investigate its scale free power law properties. We discuss the importance of the application of complex networks to the understanding of the underlying processes of knowledge exchange and technological innovation. We suggest that this area of research, while traditionally investigated via econometric modeling and statistical data analysis, may be further examined and explained via a complex network analysis approach using the tools and techniques of statistical mechanics and advanced network analysis. We demonstrate that the citation network is a scale-free network. In particular, the network node degree probability distribution follows a power law. In other words, the probability that a patent is highly connected to other patents is statistically more likely than would be expected via random connections and associations. Hence, the network's properties are determined by a relatively small number of highly connected nodes or patents referred to as hubs. We also highlight several potential application areas for further investigation via a complex network analysis approach.

WD-04.2 [R] A Consortium for Enhanced Access to Patented Research Tools: Japanese Policy and Proposal of a Novel Scheme

Koichi Sumikura; National Graduate Institute for Policy Studies, Japan

Currently, in Japan and other developed countries, massive amounts of research funds, including government funds, are being poured into basic research conducted by universities and public research institutions in the area of life science. From such academic research, a number of innovations ultimately leading to the development of new medicines are attained. However, the existence of patents for research tools can result in impeding the promotion of academic research, making it necessary to form a proper measure. As such a measure, this paper considers the establishment of a patent distribution mechanism whereby patented inventions are gathered and managed by a single organization to facilitate the conclusion of license agreements for individual technologies. The results of our survey of life science researchers show that there is a substantial need among these researchers for such a mechanism. The same survey also found that many researchers hope for a mechanism based on the principle of reciprocity. Under this mechanism, a researcher offering his or her own patented invention for free would be entitled to use patented inventions of other researchers for free. Using the results of this survey as a reference, this paper considers specific aspects of a research tool consortium.

WD-04.3 [R] Integration Studies of Business Modeling and Roadmapping Methods for Innovation Support Technology (IST) and Its Practical Application to Real-World-Cases

Hitoshi Abe; Oki Electric Industry, Japan
Takashi Ashiki; Ikeno Tsuken, Japan
Akihiko Suzuki; Chubu Electric Power, Japan
Fumio Jinno; Oji Paper, Japan
Hiraku Sakuma; Japan Techno-Economics Society, Japan

The purpose of this paper is to report the integration studies of business modeling and roadmapping methods for "Innovation Support Technology (IST)" and IST's practical application to real-world cases. IST is conducted for the purpose of offering a convenient tool for engineers and researchers in order to enhance corporate value from R&D outputs. "Japan's lost decade" has forced companies to change R&D management and R&D operation style, especially regional industries. We propose the framework for revitalization of regional industries by using the Strategic Technology Roadmap made by the Ministry of Economy, Trade and Industry (METI-TRM) with business modeling. We applied this method IST to several real-world cases to show its effectiveness. This study represents the result of over four years (fall 2002) of work with the value creation framework of business modeling method for R&D outputs, done by a group of researchers from JATES(Japan Techno-Economics Society).

WD-05 Technology Management Framework-2
Wednesday, 8/8/2007, 14:00 - 15:30 Room: Broadway-3
Chair(s): Dilek Cetindamar; Sabanci University

WD-05.1 [A] Practical Framework of Manufacturing Technology Management for Efficient Cooperation between Design and Manufacturing Sections

Takehisa Seino; Toshiba Corporation, Japan

One of the most important issues in technology management at manufacturing companies is establishing practical methodologies for efficient integration of product design technologies for creating competitive functions and manufacturing technologies for producing high-quality, low-cost products with a short lead time. Many research studies concerning cooperation between product design and manufacturing technology sections have been reported, such as concurrent engineering and design for manufacturability. However, in these research studies, concrete management methods and practical frameworks from the viewpoint of manufacturing technology were not fully discussed. In this paper, a practical management framework of the manufacturing technology management required for promoting efficient cooperation between product design and manufacturing technology sections is discussed and proposed, with references to actual applications, as one of the methodologies of manufacturing technology management for strengthening the competitiveness of manufacturing industries.

WD-05.2 [R] Business-IT Alignment Strategies: A Conceptual Modeling

Sujan Samanta; KaufmanHall & Associates, United States

Three commonly used business-IT alignment strategies are parallelism, profile-matching

and leadership synergy. All these strategies provide alignment results for the moment but do not provide a sustainable framework over a period of time. As a result, business functions, especially IT function, once aligned with the core business, lose the alignment dynamics after a period of time. An alignment framework based on organization's maturity time scale and capital allocation methodologies provides a premise on how business and IT can be aligned strategically over time. A transparent value system that allows business and IT to assess the results of collaborative actions acts as a measuring scale of the effectiveness of that framework. The main theme of this paper is to propose a strategy framework that can be utilized by the core business and IT function continually over the entire maturity life cycle.

WD-05.3 [A] How Firms Leave a Mark in the Industry?: A Business Transformation Perspective - Definitions, Concepts and Frameworks

Hema Prem; Infosys Technologies Limited, India
George Eby Mathew; Infosys Technologies Limited, India

Much of what is done by firms to achieve business transformation need not be rocket science. Ideas can be simple but their execution makes all the difference, be it the example of Wal Mart's cross-docking technique or Progressive Insurance's competitive price tracking. The authors have observed about 90 firms undertake some form of transformation. About 15 firms are studied and referred to in the paper for their stated accomplishments in business transformation to find common patterns and trends. The rest of the 75 firms were studied by virtue of the entries for the Wharton Infosys Business Transformation Awards (WIBTA). The research team looked at data including competitor pitches, analyst reports, and boutique consulting organizations that focus in the area, client inputs, academic journals and trade press. The authors brought out an analysis of how various firms define business transformation, compared with available definitions within Infosys, and presented the business transformation definition and its concepts. The authors further present a framework that highlights the process of transition of firms possessing a 'potential' to transform to being 'truly' transformational. The detailed step-by-step process underlying the framework is presented. A first cut draft was created and bounced off with a small team of senior practitioners within Infosys. Thus an eclectic approach comprising 15 detailed case studies, delphi method using purposive and snowball sampling together with a questionnaire was adopted to present the definitions, concepts and underling frameworks of Business Transformation.

WD-06 Technology Transfer-1
Wednesday, 8/8/2007, 14:00 - 15:30 Room: Broadway-4
Chair(s): John Dismukes; University of Toledo

WD-06.1 [R] 'Repeat Commercializers' in University-Industry Technology Transfer: A Minority of Faculty Inventors Account for a Majority of Commercialized Inventions

Kate Hoye; University of Ottawa, Canada
Fred Pries; University of Guelph, Canada

Are academic faculty equally likely to commercialize new technologies arising from their research, or are there a class of 'repeat commercializers' who account for a disproportionate share of commercialized technologies arising from university research? In a survey of 172 engineering, mathematics, and science faculty members from a major Canadian university, we found evidence that a class of repeat commercializers does exist. Further, we found that the 12 percent of the faculty who are repeat commercializers account for 80 percent of the commercialized innovations. An in-depth interview study with six repeat commercializers in the same disciplines at the same institution suggests that these repeat commercializers hold commercialization-friendly attitudes, are high achievers in a research context, and engage in boundary-spanning activities. This finding implies that repeat commercializers exist because a subset of the faculty have greater access to a stock of commercializable inventions and are better able to identify and acquire resources for the commercialization of their inventions. Since repeat commercializers account for such a large percentage of commercialization activity, it is important that programs and policies associated with technology transfer address the needs of this subpopulation of the faculty.

WD-06.2 [A] An MBA Graduate Curriculum on Technology Transfer: Pedagogical Design and Needs Assessment

Elliot A Fishman; Stevens Institute of Technology, United States

For the past several years, we have been developing a unique educational curriculum in the field of technology transfer for executive level MBA students. This application paper reviews the finding and status of several pilot course offerings intended to imbue 21st century MBA students with a theoretical foundation and set of best practices for managing intangible assets of the firm. We explore the best way to teach intellectual property law, intellectual property finance, technology licensing, asset sales, and venture backed spin-offs to MBA students. This application paper considers how these topics are treated within four separate graduate courses at school of technology management.

WD-07 Knowledge Management-4
Wednesday, 8/8/2007, 14:00 - 15:30 Room: Forum Suite
Chair(s): Eliezer Geisler; Illinois Institute of Technology

WD-07.1 [R] Learning Adjustment Speeds and the Cycle of Discovery: A Case Study in Defence-Related State/Industry/Academic Research Interaction

David W Versailles; Research Center of the French Air Force, France
Valerie Merindol; Research Center of the French Air Force, France

March's and Nooteboom's contributions to the analysis of the dynamics of innovation have made an analysis of the learning processes possible on the basis of the mechanisms associated to exploration and exploitation. This contribution develops an approach of the dynamics of innovation between heterogeneous actors committed to stable and recurring relationships. Defense R&D illustrates easily the interplay between actors from the industry, the various parts of the administration and from academic research. They interact in networks where their interests and learning trajectories are closely embedded. This contribution elaborates on the consistence of the agents' learning curves during the interplay in the innovation network. The initiatives in the network depend on the capacities to foster the exploration of new technological solutions. Broadly stated, the reference to learning determinants favoring explorative or absorptive capacities seems unavoidable in order to understand the various roles in the innovative process.

WD-07.2 [R] Knowledge Codification and Technological Innovation Success: Empirical Evidence from Spanish Biotech Companies

Fernando E García-Muiña; Rey Juan Carlos University, Spain
Eva Pelechano-Barahona; Rey Juan Carlos University, Spain
José E Navas-López; Complutense de Madrid University, Spain

This paper analyzes the influence of knowledge codification on technological innovation firm results. Based on a sample of biotechnological Spanish firms, the effect of codification on incremental and radical technological innovations is tested, taking into account that in some cases codification practices may include legal protection mechanisms too. In addition, in this research we studied the effect of such knowledge management decisions on barriers to imitation and substitution. Results show, on the one hand, that knowledge codification is of great interest in developing incremental innovation only. On the other hand, maintaining the exclusive character of innovations demands knowledge codification and its legal protection simultaneously.

WD-07.3 [A] A Study of Knowledge Succession in Engineering Process Management

Gaku Ishii; Toshiba Corporation, Japan

Our objective is to retain competitiveness in the context of the retirement of the baby boomers who spurred the technological aptitude of Japanese industry. Toshiba Corporation has developed DFACE for Knowledge Management (DFACE-KM), which extends Design for Six Sigma (DFSS) as a process design tool of knowledge management. We have applied DFACE-KM to process innovation of design development and begun a project designed to transfer experts' knowledge in practice to the next generation, focusing on the original technical standards. A feature of this project is construction of a framework allowing young engineers to internalize knowledge in practice by embedding it in a CAD platform and handing on in a com-

munity of practice. It is important to select knowledge to be embedded in the CAD platform in accordance with logicality, invariance and versatility. Therefore, we have endeavored to research the knowledge-based behavior of engineers from the perspectives of work breakdown structure (WBS) and engineering standard architecture for product lifecycle management (PLM). In this paper, we propose our paradigm for the design of the knowledge succession process and report on the proceedings and results of a project in a mechatronics engineering department of Toshiba Corporation.

WD-08 Project/Program Management-6
Wednesday, 8/8/2007, 14:00 - 15:30 Room: Council Suite
Chair(s): Michael Poli; Stevens Institute of Technology

WD-08.1 [R] Evaluating Project Robustness through the Lens of the Business Model

Justin Reginato; University of the Pacific, United States

The success of large-scale innovative projects is increasingly a function of the marriage of multiple complex technologies and the ability to articulate and capture economic benefits. For corporations, the decision to pursue particular projects often hinges on the creation of, or the ability to appropriate, requisite technologies in a manner that will allow for an adequate return on investment for project shareholders. The business model is a tool that can be used to help determine whether or not a project has the necessary components for successful completion. A business model articulates a business venture's value proposition, market segment, cost and profit structure, value chain, value network, and competitive strategy. While business models are commonly used at the corporate level, they can also be applied to projects in order to convey how the potential of multiple converging technological inputs lead to the creation of sustainable economic value outputs, often in the face of technical and market uncertainty. Empirical observations from the biopharmaceutical and aerospace industries reveal that projects with incomplete business models face considerable complications, while projects with complete business models face less difficulty with respect to execution. As such, companies can use business models as a tool for making project go/no go decisions whereby only projects with complete business models are allowed to progress through the development process.

WD-08.2 [R] Successful Management of Highly Innovative and Urgent Projects: Analyzing Project Management Practices to Reveal Strategic Directions

Thomas G Lechler; Stevens Institute of Technology, United States
Emily Groce; Stevens Institute of Technology, United States

This study addresses managerial differences and similarities between highly urgent and innovative projects versus routine projects with low urgency. The Project Management Body of Knowledge (PMBOK) does not differentiate between distinct contextual dependent project management approaches and leaves the appropriate adaptation open to its users. For this reason, we are drawn to this area of research to gain new understanding. Using data from 192 diverse projects collected in the U.S., we analyze the question of whether the management approach for managing successfully urgent and innovative projects differs from routine projects. Several empirical and well-confirmed key success factors are analyzed for perspective on intra and inter group differences. By identifying the differences between extreme groups of projects, we can provide results which lead to recommendations about how highly urgent, highly innovative and regular projects should be managed differently.

WD-08.3 [R] Risk Identification Step of the Project Risk Management

Deniz Kasap; TUSSIDE, Turkey
Murat Kaymak; TUSSIDE, Turkey

Risk management is an integral part of project management because projects always go along with various kind of risks. The risk identification step of risk management plays an important role by determining which risks are likely affect the project and documenting the characteristics of each. This paper aims to study the risk identification step in detail.

WD-09 Global Issues in Technology Management-3
Wednesday, 8/8/2007, 14:00 - 15:30 Room: Directors Suite
Chair(s): Kenny Phan; Portland State University

WD-09.1 [R] An Evolutionary Systems Approach to Construction Engineering in Mozambique

JMS Ruas; University of Johannesburg, South Africa
Leon Pretorius; University of Johannesburg, South Africa
J A Watkins; University of Johannesburg, South Africa

The construction engineering industry in Mozambique is close to collapse, which calls for dynamic interventions into the various sectors which impact adversely on the industry. This paper proposes that an Evolutionary Systems Approach model has the potential to mitigate the adverse situation and save the Mozambican construction engineering industry to become a viable entity to the benefit of the country and its people, often referred to as 'the poorest of the poor". More specific, while the failure of businesses invariably points to a plethora of valid business reasons, which includes weak management, the Evolutionary Systems Approach model proposed in this paper will address complex, controllable external factors deeply rooted in culture and government, which adversely impact upon the success of the Mozambican construction engineering industry.

WD-09.2 [R] Absorptive Capability of MNCs: Balance between Autonomy and Control of Foreign R&D Subsidiaries

Seiko Arai; University of Oxford, United Kingdom

This paper analyzes the capability of Japanese and European multinational companies (MNCs) to absorb technological knowledge from the United States through their R&D operation in the US. Employing the notion of "absorptive capacity" [10], we define the capability of a firm to absorb technological knowledge from abroad as "absorptive capability (AC)." We examine the components of AC and their inter-relationships using patent and sales data in the context of R&D management of Japanese and European MNCs at home and in the US.

WD-09.3 [R] Research on the Quality Assurance Model of Engineer Formation Under Globalization

ShiMei Jiang; Zhejiang University, China
Zhong-Wei Zheng; Zhejiang University, China
Fang-Zhen Yu; Zhejiang University, China
Pei-Min Wang; Zhejiang University, China

The article compares three characteristic quality assurance models of the U.S., UK and Germany, and analyzes their features and influences to the formation of innovative engineers under globalization. The paper then points out that the Engineer Registration Institution of the UK is more flexible and more effective to encourage more innovative engineers compared with the U.S., and it is easier to harmonize compared with the decentralization of the U.S. Germany has no Engineer Registration Institution now; the new Engineer Registration system is in the process of construction. The paper finally proposes that China may found the top organization of engineering to harmonize the ongoing establishment of the Engineer Registration Institution, and may ponder over and design carefully the systemic institution under globalization, which not only assures the quality of engineer formation but also cultivates more innovative engineers, and is flexible and effective to regulate the formation of engineers.

WD-10 Technology Assessment and Evaluation-3
Wednesday, 8/8/2007, 14:00 - 15:30 Room: Studio Suite
Chair(s): Harold A Linstone; Portland State University

WD-10.1 [A] Economic Valuation of R&D Programs in Consideration of Strategic Flexibility

SeogWon Hwang; STEPI, Korea, South
Jongwook Jeong; Seoul National University, Korea, South

Under the circumstances of increasing uncertainty, strategic flexibility has become an essential element on which any R&D management system should be based. Unfortunately, however, the present R&D management system for government sponsored R&D programs cannot

be said to be flexible enough to effectively respond to various threats such as technological failure, significant changes in competition environment, and so on. This paper presents a new scheme for R&D planning and economic assessment with strategic flexibility, which has been applied to a real R&D program. According to the newly presented R&D management system, economic valuation has been conducted for various alternative scenarios based on the real option theory. Each of the alternative scenarios has a different scheme for R&D process, and the assessment results have been fed back to choose a superior strategic scheme. In conclusion, introducing strategic flexibility into R&D planning and economic assessment can enhance the value of R&D project remarkably.

WD-10.2 [R] Internal Technology Valuation: Real World Issues

Francis H Hunt; University of Glamorgan, United Kingdom
Valerie Thorn; Cambridge University, United Kingdom
Rick Mitchell; University of Cambridge, United Kingdom
David R Probert; University of Cambridge, United Kingdom
R. Phaal; University of Cambridge, United Kingdom

Although well-known, methods for valuing projects in the face of uncertainty, such as decision trees, do not seem to have been widely adopted by industry. This is despite widespread academic confidence that they should produce more realistic financial valuation of projects than naive use of discounted cash flow (DCF) techniques. An obvious question is why these tools have not been more widely adopted. In this paper we propose one reason for this. We argue that the ambiguity (i.e. the uncertainty about the uncertainties) in most technology valuations prevents significant increases in confidence in the financial valuations produced by techniques more sophisticated than DCF, although there may well be better understanding of the underlying issues. We illustrate this argument by considering the uncertainties in a technology development at an SME. We then reflect on the role of financial valuations at the early stage in technology projects, suggesting that they are to help create a credible story rather than provide definitive figures. We then suggest some avenues of further research. First of all, however, we review the literature on uncertainty and ambiguity, and on valuation of technology projects in the face of these challenges.

WD-11 Technology Management in Telecommunications-1
Wednesday, 8/8/2007, 14:00 - 15:30 Room: Galleria-1
Chair(s): Eok-Soo Han; ETRI

WD-11.1 [R] A Study of the Realtime Message Report Procedures and Management Schemes for the Quality Guaranteed VoIP Services

Hyun-woo Lee; ETRI, Korea, South
Jinsul Kim; ETRI, Korea, South
Won Ryu; ETRI, Korea, South
Byung-sun Lee; ETRI, Korea, South

This paper provides message report procedures and management schemes to guarantee QoS on the Internet telephone. In order to establish and release for managing quality guaranteed VoIP services, we present 8 critical message procedures with RTCP-based packet structures BTs, which are based on standard RTCP-XR format to perform better monitoring of quality factors such as jitter, delay, loss, etc. For the reporting quality parameters optimally during establishing call sessions of VoIP service, we design two main critical management module blocks for call session and for quality reporting. To prove the proposed method, we apply reporting procedures and management schemes based on a case by case in various experiments. The experimental environment is composed as follows: VoIP-Quality Management server, SoftPhones, 1-port G/W, and Softswitch for managing and measuring an end-to-end speech quality over IP network. Overall, for the evaluation with scientific exactitude of quality factors, we examine the proposed technique based on the real time phone-call service through heterogeneous network systems: PSTN to SIP gateways. The experimental results confirm that real time message report procedures and management schemes are sufficient for reporting and managing of quality factors for the quality guaranteed real time VoIP services.

WD-11.2 [R] Enhanced 911 Mechanism for Internet Telephony Service

Sun-Ok Park; ETRI, Korea, South
Mi Young Huh; ETRI, Korea, South
Jae Cheon Han; ETRI, Korea, South
Shin Gak Kang; ETRI, Korea, South

Internet users are rapidly increasing, and various services which use the Internet have been invented. Internet telephone service is one of them. As Internet services become an ever more important part of people lives – backed by a marked increase in the Internet population – a flow of value-added Web services has been introduced to the market. Internet telephone service was born as a more economical means than Public Switched Telephony Network (PSTN) service in terms of call charge, but more recently is being hailed as an efficient means to create new added values integrating various Internet multimedia services such as video phone, multi-party conference, and instant messaging. After emerging as a star player in the market with innovative technologies, however, VoIP has recently been challenged as the U.S. Federal Communications Commission (FCC) issued an order "requiring all VoIP providers to provide their customers with emergency call service" in May 2005. Internet telephone users have an expectation to be able to initiate a request for help in case of an emergency. The problem arises for originating calls made to emergency services, where VoIP devices move while identifiers remain the same and the caller's location cannot be provided. So, unfortunately, the existing mechanisms to support emergency calls that have evolved within the PSTN are not appropriate to handle evolving IP-based telephone service. In this paper, we introduce E911 service and suggest the mechanisms that solve the problem of E911 service calling on SIP-based VoIP systems.

WD-11.3 [A] Facility Sharing in the Telecommunications and Broadcasting Convergence Market

Jong Yong Lee; ETRI, Korea, South

This paper seeks to examine current critical issues of facility sharing under the convergence environment between telecommunications and broadcasting. The facility sharing issue is mixed with various issues around it so that various features are to be considered. According to the study, facility sharing is not an asymmetric regulation of incumbent telecommunications providers but a symmetric regulation of the companies that are holding the telecommunications facilities. And, existing telecommunications facilities, especially basic telecommunications facilities, such as ducts, poles and rights-of-way, can play an important role of providing competitive strength to telecommunications providers because installation of those requires huge capital investment and takes a long time. However, from a national point of view, overlapping investment of the same kind of infrastructure can be the squanderer of the nation's resources, so the government authorities are likely to induce both sides to share existing facilities with appropriate compensation.

WD-11.4 [R] A Look into the Future of Wireless Technology

Kim, Jisun; Portland State University
Daim, Tugrul U.; Portland State University
Anderson, Timothy R.; Portland State University

The number of wireless communication subscribers is expected to reach 2 billion in 2008 and the revenue worldwide already exceeded $376 billion in 2004. A large number of studies have been done to forecast the growing market and provide the vision of new generation technology, the Beyond 3 Generation (B3G). However, none of them has tried to forecast when a certain new technology will be commercialized. Therefore, this paper discusses the technical framework for forecasting B3G technologies. The result shows that combined measures of technical parameters can explain heterogeneous wireless communication technologies. A forecasting model is developed for B3G with three parameters, number of channel, number of channel, and data capacity, using an extrapolative forecasting method.

WD-13 Supply Chain Management-4
Wednesday, 8/8/2007, 14:00 - 15:30 Room: Galleria-3
Chair(s): Jamie Rogers; University of Texas at Arlington

WD-13.1 [R] Regulating Bullwhip Effect in Supply Chains through Modern Control Theory

Berrin Agaran; Dogus University, Turkey
Walter W Buchanan; Texas A&M University, United States
Murat K Yurtseven; Yeditepe University, Turkey

Modeling and control of supply chain management (SCM) systems are still problematic today even though we have relatively powerful methods and IT tools available at our disposal. The complexity and the multi-disciplinary nature of the problem attracted the attention of many researchers from various different disciplines. It is possible to classify the available approaches to supply chain management as Ad-hocacy, What-if-simulation, Control Theory, Filter Theory, and Operations Research Theory. The studies that are based on the control theoretic approach are limited to what is known as Classical Control Theory; the modeling and control study presented in this work is based on the so-called Modern Control Theory. As far as the authors know, this is the first study of its kind. Through the use of Modern Control Theory, the limitations that are imposed by its classical counterpart can be overcome, providing the opportunity to extend the modeling and control work to non-linear, time-varying, stochastic, adaptive, and large-scale systems, effectively. In the present study, a supply chain system is modeled through state-space techniques; the model is linear, discrete-time, and stochastic. The model is then analyzed to study the stability, controllability, and observability properties of the system, which are vitally important in control system design. Finally, a Linear Quadratic Gaussian (LQG) controller is designed with the aim of regulating the bullwhip effect in the system. The initial analyses suggest that the controller structure developed is well equipped to regulate the bullwhip effect in a supply chain system effectively.

WD-13.2 [R] Clustering of Suppliers' Quality-based Strategies in Italy: The Case of the Automotive, Telecommunication, and Electromechanical Industries

Corrado Lo Storto; Universita' di Napoli Federico II, Italy

This paper presents a study aimed at investigating how supplier firms translate the vision of quality as a strategic tool that their entrepreneurial/management groups develop over time into a set of actions which define the firm's quality-based strategy in the customer-supplier relationship. A survey was carried on collecting data from a sample of 139 suppliers selling goods to the automotive, telecommunication, and electromechanical industries. All the firms of the sample are located in the South of Italy. Results show that: the typology of industry affects the way quality is perceived as a strategic leverage in customer-supplier relationships, while quality perceived as a strategic means affects the way small supplier firms attempt to implement a quality-based strategy and interact with the customer.

WD-13.3 [R] Building a Strategic Business Framework for Proactive Decision-Making in the Supply Chain Industry

Jinho Kim; Temple University, United States
Jamie Rogers; University of Texas at Arlington, United States

The supply chain has become an essential part of any industry and it already has been regarded as a separate big industry. Any company in a contemporary business arena must be involved in the supply chain industry entirely or partly. Some companies use their own resources and others outsource various functions from professional service providers. As the supply chain industry becomes mature and complex, the competition in the industry is much stronger than before. High performance in the back-end of the supply chain is not enough to guarantee the success of a company in the dynamic market. It should be integrated and coordinated with the front-end of the company's supply chain, and all these plans should be considered strategic business factors as a whole. From this point of view, this paper has adopted the techniques of strategic and competitive analysis typically used for enterprise consulting and has applied them to the supply chain industry. From this study we have constructed a strategic business framework which we propose for companies to use as a basis for proactive decision making.

WE-01 Technology Management in the Service Sector-3

Wednesday, 8/8/2007, 16:00 - 17:30 **Room: Pavilion East**
Chair(s): Daniel Berg; Rensselaer Polytechnic Institute

WE-01.1 [R] Today and Tomorrow of Service Business Models in Japanese Manufacturing Industry

Tadao Sumi; Shoin University, Japan

The importance of service business has been increasing recently in the Japanese manufacturing industry because of shortening the production periods at the original factory while extending the service and maintenance periods at the customer site. This is accompanied by shifting added value generation from production to customer service in the industry and social infrastructure field. Therefore, several business models for customer service have been enjoying wide acceptance in the Japanese manufacturing industry since the middle of the 20th century. However, today's service business involves many serious issues of service quality, economical justification of the balance between products and services, investment and return of investment for training of staff and facilities, etc. The paper discusses improvement of the service business today, future business models for win-win solutions between product suppliers, service companies and customers, as well as prospects for cooperation between the 2nd and 3rd sector industries.

WE-01.2 [A] Process and Services Fusion Impact Assessment

Haluk Demirkan ; Arizona State University, United States
Michael Goul; Arizona State University, United States

SOE is about people, the ways that they engage with computing to execute processes, and it is about the semantics that put people and machines together in new ways. It's about executable semantics and preparing for commoditization of processes, services and computing horsepower. These paradigm shifts – services science, management and engineering and SOA – are not about a specific technology or a product; they represent a major cultural change for organizations.

WE-01.3 [R] The Isomorphic Development of Insurance

Kuei-Kuei Lai; National Yunlin University of Science and Tech. , Taiwan
Calvin S Weng; Takming College, Taiwan

In the insurance industry, different companies come to share similar technological bases of process. They not only share the same financial knowledge, but also utilize similar actuarial techniques to design products and assess insurable risks. This paper proposes an approach to look at the phenomenon of isomorphism of technological development in insurance. The result of this research also found the technological isomorphism in insurance already occurs. The contribution of this paper is to introduce the social network analysis into patent citations to foresee the technological development.

WE-01.4 [A] Service Science Innovation Study in the Industry Group

Akira Kondo; JAIST-Tokyo MOT, Japan
Kotaro Nakamura; JAIST-Tokyo MOT, Japan

In Japan, in spite that conventional product makers try shift to be service oriented companies, there are not certain methods for that and they have not studied about service businesses. However, several industry groups started to study service businesses. This paper introduces the activity of "Service Science Innovation Study Working Group (SSIS-WG)" in CIAJ, Communications and Information network Association of Japan. In the CIAJ, sub organizations work building a standard, to making proposal for government, making consensus of future business and so on. The SSIS-WG working group focuses on how to implement the knowledge of service science to business and organizes workshops and research projects. Those activities are useful for such production companies. This paper describes about details of discussion theme and result of a current situation survey.

WE-03 E-Business-2

Wednesday, 8/8/2007, 16:00 - 17:30 **Room: Broadway-1**
Chair(s): Rosine H. Salman; Portland State University

WE-03.1 [R] Implementation of Activity-Based Costing in e-Businesses

Zeynep Iltuzer; Istanbul Technical University, Turkey
Oktay Tas; Istanbul Technical University, Turkey

Sıtkı Gozlu; Istanbul Technical University, Turkey

In the early 1980s, management accounting practices were being questioned since it was realized that traditional cost accounting practices were not appropriate for allocating indirect costs that were not associated with a specific product or customer. Activity–Based Costing (ABC) was developed to overcome problems that were leading to poor management decisions such as investing in unprofitable customers or products, etc. Although manufacturing companies have firstly used Activity-Based Costing, in fact ABC is a very appropriate cost control method for e-businesses whose activities are nearly all associated with the indirect cost category. The fact that one of the reasons why many dot.com companies went through bankruptcy in the 2000s was not using an effective cost control system has rendered ABC more important for e-businesses. The aim of this paper is to implement ABC in an e-auction company, to determine unprofitable and promising customers accordingly. In the first part, theoretical information about ABC is presented and then implementation is explained step by step. In the last part results are evaluated and some recommendations are proposed.

WE-03.2 [R] The Role of Value Proposition and Value Co-Production in New Internet Startups: How New Venture e-Businesses Achieve Competitive Advantage

Su Chuang Li; National Chengchi University, Taiwan

Many of the successful e-businesses during the era didn't necessarily possess the original idea. Some of them duplicated their predecessors' ideas and then re-implemented them with more advanced technologies and resonating value propositions to create value for their users, and successfully "captured" the value of the original ideas from its predecessors. Once the entrepreneurs in e-business gain marginal advantage over their competitors, they seek to widen the lead by building effective value co-production mechanisms. The issues raised above are what entrepreneurial strategists would be concerned about: what a successful new venture in network economy should do to create, protect and appropriate value? The purpose of the present paper is to emphasize the role of value proposition and value co-production in new venture development. Value proposition, which has been a buzzword among managers in the real world for awhile, is actually a new concept to the academic world as well as value co-production. This paper argues that a properly constructed value proposition is essential to the value creation process in e-business, and value co-production is the building block for a value protection mechanism in a network economy. The discussion of value creation and value appropriation in e-business won't be complete unless the two concepts are included.

WE-04 Innovation Management-8
Wednesday, 8/8/2007, 16:00 - 17:30 **Room: Broadway-2**
Chair(s): Antonie Jetter; Portland State University

WE-04.1 [R] Is Inventors Network Structure a Predictor of Cluster Evolution?

Jiang He; Stevens Institute of Technology, United States
M. Hosein Fallah; Stevens Institute of Technology, United States

Geographical clusters are significant drivers of regional economic growth and competitiveness in today's economy. Recent studies have shown that geographically limited knowledge diffusion which results from inventor movements within clusters is a facilitating factor to regional innovation output and therefore to the development of clusters. However, it remains unclear whether the dynamics of inventor movements can be used as indicators for different stages of cluster progression. In this study, using patent co-authorship data, we construct inventor networks for two telecom clusters, New Jersey and Texas. Based on the longitudinal analysis of inventor network properties and interviews with the key inventors maintaining the networks, we seek to gain a better understanding of 1) how the properties of inventor networks across the two clusters reflect their difference in fundamental "typology" of clusters; and 2) are the patterns of inventor network structures and properties over time indicative of the change in viability of the clusters.

WE-04.2 [R] Sectoral Systems of Innovation in Asia: The Case of Software Research Activities

Kumiko Miyazaki; Tokyo Institute of Technology, Japan
Krysztof Klincewicz; Warsaw University, Poland

The article compares sectoral systems of innovation (SSI) related to software in the selected Asian countries - China, India, Japan, Korea, Singapore and Taiwan - focusing on industry-academia relations. It attempts to answer a question about the relevance of scientific research in each of the countries for local software companies, using the tech mining research method. The analysis focuses on relevant scientific output of individual countries: publications from Compendex database in a 5-year time frame (2000-2004). The paper characterizes the involvement of the private sector in scientific research, identifying the leading regional science-based software firms as well as key foreign vendors, conducting software research in Asia. It subsequently analyzes the balance between basic and applied research by clustering applied research topics and verifying contributions to dominant software domains. Finally, it measures the responsiveness of researchers to emerging technologies. The analysis helps identify potential inefficiencies and strategic threats in the software sectors of the concerned countries.

WE-04.3 [R] Management of Sectorial Technology Chains and Integral Evaluation of Potential Projects on Innovation Technology

Juan A Ortega; Universidad del Valle, Colombia

This work presents a conceptual proposal about the genesis and management of sectorial technology chains and their application in the development of new products. The proposal is based on the identification of knowledge and convergent technologies within the process of innovation technology, considering the study of existing products and processes and the analysis of technological and marketing trends. We report on a case-study based research carried out in Colombia on biopolymer chitin and chitosan applications. We also present a set of criteria for the integral evaluation of ideas and product concepts with potential for developing technological innovation.

WE-04.4 [A] Dynamic Cooperation Network for Technology Management and Innovation Process: The Case of the Brazilian Aeronautic Sector

Cristiane G Bueno; University of Sao Paulo, Brazil
Joao Amato Neto; University of Sao Paulo, Brazil
Mauro Catharino V da Luz; University of Sao Paulo, Brazil

The articulation of the science, technology and innovation actors and the development of collaborative actions are essential to improve the efficiency and the effectiveness of the Brazilian aeronautic process and to maintain its global competitiveness. This paper analyzes the dynamic cooperation network model of the Brazilian aeronautic sector based on the case study executed jointly with the Industrial Promotion and Coordination Institute (IFI), an organization responsible for the industrial support and infrastructure programs to improve the quality and the training of this sector. As a result, this work identifies some critical factors for success related to the cooperation network model for the growth of the sector's competitiveness potential.

WE-05 Strategic Management of Technology-3
Wednesday, 8/8/2007, 16:00 - 17:30 **Room: Broadway-3**
Chair(s): Jasper Steyn; University of Pretoria

WE-05.1 [A] Implementing the Balanced Scorecard to Achieve Strategic Management Objectives: The Case of the Small Engineering Consultancy

Woodie A Spivey; UTSA, United States
J. Michael Munson; University of Santa Clara, United States
Alberto King; UTSA, United States

The objective of this research is to explore the relationship between the balanced scorecard framework and revenue growth among technology-driven, consulting enterprises. Consulting engineers alone are an important part of the US economy, generating about $250 billion annually in GDP, nearly 1 percent of the total. Moreover, they represent about 17 percent of the total workforce. They fight for survival in a dynamic and turbulent environment where the critical strategic resource is an individual's ability to manage the convergence of rapidly evolving technologies. Operations are dominated by exceptions, rather than routine replica-

tions of standardized procedures. To study the application of the framework, a telephone survey of a random sample of enterprises ranked by the Zweig Letter Hot Firm List, emphasizing growth among US architecture, engineering, and environmental consulting firms, was conducted. The focus was on enterprises that changed classification, based on gross revenue between 2001 and 2004, from disadvantaged to small, and from small to medium. Statistical analyses highlight not only the advantages of pursuing a balanced approach to growth, but also the importance of client intimacy as a key to generating wealth in knowledge-driven, innovative societies.

WE-05.2 [R] The Study on the Technology Finance Policy for Technology Development on the Value Chain Based Innovation System

Haeyoung Byun; Seoul National University, Korea, South
Jeong-Dong Lee; Seoul National University, Korea, South

The more information asymmetry is growing up, the more inefficiency of the financial allocation increases. This inefficiency becomes larger in the financial allocation of technology innovation because technology innovation has the characteristic of high risk and it makes the capital for technology riskier. The government intervention gets the justification in that it can correct this market failure and it enables the fast catching up, especially in the developing country. The important point is how the political intervention of government for the financial allocation is managed efficiently. Each country has used the various finance systems to strengthen the national competitiveness and to promote the innovation activities. The government of Korea has supported the technology-based firm using the government policy funds. This study aims at the effect of several kinds of financing on the activities of technology-based firms and at the resolution for promoting the activities of these firms in technology financing policy. Further, econometric analysis based on the survey data in this paper will be able to help suggest the role of the government system for financing of innovation firms.

WE-05.3 [A] Strategic Management in a Multi-Program Technology Program Involving Convergence and Divergence of Programs: Observations from NASA

Tim Kotnour; University of Central Florida, United States
Tim Bollo; Kennedy Space Center, United States

This paper contributes a framework for dealing with complex, technical program transitions. This paper offers a framework of strategic management tools. Tools such as scenario planning, organizational roadmaps, objectives, and measures are integrated into a systematic planning process. Using the KSC response to the new NASA Vision for Space Exploration, this paper offers a framework of strategy tools that leads from initial analysis to the business plan. An engineering manager can use this paper to follow a simple set of steps and tools to help manage strategy for an organizational transformation.

WE-06 Technology Management in the Public Sector-1
Wednesday, 8/8/2007, 16:00 - 17:30 Room: Broadway-4
Chair(s): Paul R Newman; Portland State University

WE-06.1 [R] An Empirical Study on Citizen Relationship Management in Japan

Takanori Sasaki; Iwate Prefectural University, Japan
Yoshikazu A Watanabe; Iwate Prefectural University, Japan
Ken-ichi Minamino; Iwate Prefectural University, Japan

Many local governments have been actively promoting implementation of their services and information systems in various ways. The main issues of this approach are "how e-local government can manage effectively" and "be more citizen-oriented." In this paper, focusing on the latter, we surveyed their administrative services and channels to improve citizen satisfaction with CiRM (Citizen Relationship Management), which applies CRM (Customer Relationship Management) for the private sector to government management. Then we specially introduced the contact center, one of the administrative services which is in the spotlight in Japan, and surveyed how the environment of government organization needs to change for establishment of the contact center. We examine the future of CiRM for the local public sector in Japan through this research.

WE-06.3 [R] The LIP – A Technical Innovation within the Legislative Information System in Madagascar

Iharantsoa Z Ramangason; University of Antananarivo, Madagascar
Elisé A Raveloson; University of Antananarivo, Madagascar
Etienne Rakotomaria; University of Antananarivo, Madagascar
Sylvain Ramananarivo; University of Antananarivo, Madagascar

A Parliamentary Information Software (LIP) has been conceived to be integrated in the Legislative Information System of the Malagasy National Assembly. Evolving from the knowledge of the information needs of potential users (representatives, lawyers, students, etc.), we have exploited scientific methods to discover a quality solution. In this work, we have mainly used the method of arborescence, the method of the logical framework, the competitive intelligence, the value analysis and UML (Unified Modeling Language) diagrams. Thus, we have produced the LIP, which is an investigation software used to find information concerning bills which have existed, which exist and which are being examined at the parliament. The LIP uses the technology of the Internet for a permanent access, at any place and at any moment. In addition, the LIP offers the possibility to consult information recorded on multimedia supports. In the future, the LIP should become a Parliamentary intelligence Software (LIP second generation).

WE-07 Information Management-1
Wednesday, 8/8/2007, 16:00 - 17:30 Room: Forum Suite
Chair(s): Tamer Cagatay; Bogazici University

WE-07.1 [R] IT Governance: Organizational Capabilities' View

Hiroaki Itakura; Kagawa University, Japan

IT governance is a relatively new concept. In Japan, annually, many discussions on IT governance are held among businesspeople. However, there have been few academic studies in Japan; too many debates on IT governance from different positions with various perspectives are held that are simply confusing. Furthermore, the decision-making process at Japanese corporations tends to be unclear and thus difficult to understand. Another difficult aspect is that the concept of governance originated in the United States, and it is yet not clear if this concept is applicable to Japanese corporations. There have been a number of academic studies on IT governance with a focus on decision-making authority (Sambamurthy & Zmud, 1999; Ross & Weill 2002; Weill and Ross, 2004). However, there have been few empirical studies on organizational capabilities. In this paper, an integrated approach was adopted combining the aforementioned organizational capabilities and decision-making authority, then an empirical study was conducted using statistical analysis based on survey results to examine the relationship between IT Governance components and performance.

WE-07.2 [R] The Influence of Financialization in Information Technology (IT) Management: Evidences from the Outsourcing Decision-Making Process in Brazilian Companies

Andre M Dias Ferreira; University of Sao Paulo, Brazil
Mauro Zilbovicius; University of Sao Paulo, Brazil
Fernando Jose B Laurindo; University of Sao Paulo, Brazil

In financialization times, the management of several companies that have equities in the "hands" of their shareholders underwent deep changes. Companies that were formerly managed seeking their products market started to use financial indicators to measure the increase in the company's value for their shareholders. Some authors argue that these changes altered not only the management of the companies, but also the managers' role. In this scenario, this article tries to evaluate the impact of financialization in the Information Technology (IT) management. By using the outsourcing decision-making process of IT functions as an analysis unit, this paper uses a survey as a method of data collection to verify whether Brazilian companies that have shares in the stock market take their outsource decisions of IT functions differently from those that do not have shares in the stock market. Hence, to verify if the financialization has influence on the IT management, six decision aspects will be analyzed: strategic subjects, costs, risks, contracts and administration of suppliers, benchmarking, and new management forms.

WE-07.3 [A] Innovative Performance of the Industrial Companies: An Analysis of the Impact on the Management of External Sources of Information

Isak Kruglianskas; University of São Paulo, Brazil
Clandia M Gomes; Santa Maria Federal University, Brazil

The study objective is to analyze the impact of some practices for managing external sources of information on the innovative performance of the enterprise. The research can be characterized as quantitative. The data was collected by questionnaires from enterprises with substantive technological innovation activities. The results signal a trend toward the increase in the use of external sources of information. The companies search to acquire and to develop technology from diverse sources, such as the acquisition of technology from other firms or from partnerships (co-sourcing). The process of management of external sources of information for innovation has, in general, little formalization. In some cases, some degree of formalization is evidenced and, in these, a more explicit integration with the technological strategy can be detected. In general, there is clear lack of a strategic perspective for managing external sources of information for the innovation.

WE-08 Project/Program Management-7

Wednesday, 8/8/2007, 16:00 - 17:30 **Room: Council Suite**
Chair(s): Peerasit Patanakul; Stevens Institute of Technology

WE-08.1 [R] Project Manager-Project (Pm-P) Fit and Project Success

Ayala M Pines; Ben-Gurion University, Israel
Dov Dvir; Ben-Gurion University, Israel
Arik Sadeh; Holon Academic Institute of Technology, Israel

Person-Environment Fit, the match between individuals and the environments in which they work, has been the focus of much research. P-E fit occurs when there is a good match between the characteristics/requirements of a particular work environment and the characteristics/expectations of the person working in that environment. Individuals tend to prefer environments that have the same "personality" that they do. The current study extended P-E fit to the fit between project mangers' (PM) personality and the types of projects (P) they manage, and focuses on the relationship between PM-P Fit and project success. Two hundred eighty nine Israeli PMs responded to a specially designed questionnaire that included three parts: 1. classified projects along three dimensions: Novelty, Complexity and Technology. 2. focused on PM's personality traits relevant to these dimensions (e.g. Novelty was assessed using Openness to Experiences items.) It was hypothesized that the greater the PM-P Fit, the greater the project success. Findings supported this hypothesis. PMs whose personal profile was close to the ideal PM profile for a particular project type were more successful (both in terms of customer satisfaction and in terms of overall success). The theoretical as well as practical implications of these findings will be discussed.

WE-08.2 [A] A Review of IT Implementation into Construction Project Communications Management

Jang W Ra; University of Alaska Anchorage, United States
Chris Briggs; Prestige Development, United States

This paper analyzes the communication breakdown experienced in construction and real-estate development projects on four levels to provide better understanding of how online project collaboration tools can be utilized to solve the communication breakdown. These four levels of analysis are: 1) "Root Cause" analysis of the communication breakdown between key project stakeholders that is present in the "off-line" project management model. 2) Research and analysis of the methodology and framework that comprises some of the commonly available online tools. 3) Development of an online collaboration tool to be utilized in a $3.8 million real-estate development project currently under construction. The final version of this tool will be provided free online to benefit project managers that may be able to utilize such a tool. The tool will utilize phpBB©, an open source internet application, widely available for free on the internet, to achieve its core functionality. 4) Research and analysis of future trends for online project management collaboration tools and technology. The project collaboration tool developed in this paper sought to demonstrate how even a simple tool can have profound positive impacts on project communication between key project stakeholders. The implementation of this tool for the construction phase of a private real-estate development project clearly demonstrated an increase in effectiveness of communication between key project stakeholders.

WE-08.3 [R] Sources of Changes in Design-Build Contracts for a Governmental Owner

Robert A Perkins; UAF Civil and Environmental Engineering, United States

Use of design-build contracting has been gaining popularity for government procurement of construction. An oft-touted advantage is fewer change orders due to design errors, since the designer (A/E) and contractor are one entity. A comparison of transportation-related design-build projects with roughly comparable design-bid-build (traditional) contracts indicated there was little difference in the amount of change orders and their cost. Overall, recent literature presents little statistically sound evidence that design-build contacting "reduces cost growth." Changes might arise from: owner-requested additions or deletions to the work; the actions of third parties beyond the control of the owner or contractor; delays in owner-supplied access, permits, or equipment; differing site conditions; as well as discrepancies in the original design-build specifications that the owner developed to form the basis for the request for design-build proposals. This research reports on the changes in twenty-three government design-build construction projects, and categorizes their causes. Overall, the number of changes due to design error in design-build construction is statistically significantly lower than that of the traditional design-bid-build construction. Design-build construction also experiences a lower number of changes in sources other than design error, albeit not statistically significant.

WE-09 Technology Management in Telecommunications-2

Wednesday, 8/8/2007, 16:00 - 17:30 **Room: Directors Suite**
Chair(s): Jing Zhang; Beijing University of Posts and Telecommunications

WE-09.1 [A] The Changing Landscape of the Korean Local Telephone Service Market: A Competition Analysis

Pang Ryong Kim; ETRI, Korea, South

In this paper, the authors analyze a model of duopolistic competition in a local telephone service market, played out between the incumbent and the new entrant in Korea. By extending the scope of the model to include mobile telephone service, known to have a substitutive relationship with local fixed telephony, the authors also assess the competition effect. The study indicates that the new entrant has a relative competitive advantage over the incumbent in the duopolistic model but that the latter has a relative competitive advantage over the former in the extension model, which means that the effect of competition varies with the range of market.

WE-09.2 [R] The Telecommunications Carriers' Dilemma: Innovation vs. Network Operation

Thomas G Lechler; Stevens Institute of Technology, United States
BJ Taylor; Stevens Institute of Technology, United States
Beate Klingenberg; Marist College, United States

As the telecommunications industry moves out of its traditional monopolistic environment to a highly competitive one, incumbent service carriers struggle with legacy networks, outdated regulations, and technology silos that don't easily integrate with each other. Additionally, many new equipment and software vendors as well as new competitors (that use incumbents' networks to offer their services) threaten incumbent firms. The objective of this study is to understand what is viewed as sources of competitive advantage in this industry, specifically for carriers. The key question in particular is how operational competencies and innovation competencies are perceived in influencing future performance. While managers state that innovation is critical to the success of the carrier business, the firms' business objectives and metrics tell a different story. The study shows that the respondents, while commenting on the importance of innovation to stay competitive, really emphasize the network operations. This result exemplifies a dilemma carriers are facing to stay competitive: main-

taining operational excellence while pursuing an innovation-driven strategy.

WE-09.3 [R] A Study of Business Models and Strategic Alliance in the Home Network Industry in Korea: Analysis and Suggestions

Sung-sik Shin ; ETRI, Korea, South
Myung-Hwan Rim; ETRI, Korea, South
Yeong Wha Sawng; ETRI, Korea, South

In Korea, the home network industry has been the object of great expectations among the government and business community. Thus far, however, it has proved unable to fulfill these expectations. In this study, we categorize three classes of services and five participant industry sectors with regard to Korea's home network industry. We consider that the differences in their business models from these three different participant industry sectors hinder the growth of the home network industry. Hence we analyze business alliance theories for the home network industry to cooperate with each other in order to complement the differences between their business models. We propose five cooperation strategies for the three classes of home network services and two related issues. Finally, we offer some suggestions to help remove the obstacles to business cooperation among the participant industry sectors of the home network industry.

WE-10 Technical Workforce-2
Wednesday, 8/8/2007, 16:00 - 17:30 **Room: Studio Suite**
Chair(s): Eppie E Clark; University of Warwick

WE-10.1 [R] Virtual Team Effectiveness Using Dyadic Teams

Gamze Karayaz; Isik University, Turkey
Charles B Keating; Old Dominion University, United States

The importance of effectiveness for virtual teamwork continues to gain momentum as technology and globalization of work accelerate. The implementation of virtual teams provides one approach to enhance competitiveness, overcoming the disadvantages of space and time differences through collaborative technologies. The influence of structure to virtual team performance has not been clearly established in the literature. The purpose of this research study was to investigate the effectiveness of a dyad structured approach for virtual teams using a quasi-experimental research design. A virtual dyadic team is considered as two person-structured teams working on a particular task in a virtual collaborative environment. This research investigated four questions related to the influence of structure on virtual team effectiveness related to task performance, communication frequency, and team satisfaction. The results showed significant differences between the two virtual teams. Dyadic teams performed better in arriving at the task solution using less communication to finish the task. Dyadic teams were also more satisfied with their task solution than the self-structured teams. However, results indicated that dyadic teams were not satisfied with operating as a dyadic team in this study. The research also demonstrated that team satisfaction was the most significant predictor of virtual team effectiveness. The paper concludes with implications for technology managers and suggests guidance for improved effectiveness in design and implementation of virtual teams.

WE-10.2 [R] Effect of Virtualization Level on Team Effectiveness in Information and Electronic Industries: The Moderating Effect of Task Characteristics

Bi-Fen Hsu; National Yunlin University of Science & Technology, Taiwan
Mei-Ling Wang; National Yunlin University of Science & Technology, Taiwan
Wan-Yu Chen; Transworld Institute of Technology & YunTech , Taiwan
Hui-Yun Yu; National Yunlin University of Science & Technology, Taiwan

Because of the development of information technology, the types of organizations and the nature of management have changed, and boundaries between organizations have disappeared. "Virtual team" is the newest type of work group. However, many managers only care about the advantages of the internet and information technology, and ignore that the members of virtual teams might doubt and distrust each other. The purpose of this study is to explore the effect of the virtualization level of team and task characteristics on team effectiveness. The samples of this study consisted of 49 enterprises in information and electronic industries. Questionnaires were used to survey them, and there were 62 complete team samples (including 62 team leaders and 234 team members). The results of this study are as follows: 1) The virtualization level of a team has a significant influence on the team's effectiveness; 2) on the moderating effects of task interdependence, while the higher task interdependence, the higher virtualization level of team, and the lower task performance; 3) on the moderating effects of task uncertainty, while the higher task uncertainty, the higher virtualization level of team, and the higher task performance.

WE-10.3 [R] How Human Resource Practices Impact Knowledge Sharing in R&D Teams

Bi-Fen Hsu; National Yunlin University of Science & Technology, Taiwan
Wan-Yu Chen; Transworld Institute of Technology & YunTech, Taiwan
Mei-Ling Wang; National Yunlin University of Science & Technology, Taiwan
Hui-Yun Yu; National Yunlin University of Science & Technology, Taiwan

Within organizations, employees create, accumulate, and share knowledge, often within teams. To increase team effectiveness, today's organizations seek to promote knowledge sharing among their employees. Previous studies of knowledge sharing within organizations have ignored a critical factor: human resource management (HRM). To address this oversight, we recruited 172 research-and-development (R&D) teams (made up of 860 individuals) to participate in a study of the relationship between HRM and the willingness of team members to share knowledge. Fifty-two sets of completed questionnaires from 203 employees formed the basis of our empirical analysis. We classified team members according to their work values and focused on exploring whether the HRM of teams with different work values would differentially impact knowledge sharing. We discuss our findings in terms of their implications for management practices and future research.

WE-10.4 [R] Implementation of Future-Focused People-Management in a Large Japanese Automobile Company

Kunio Shirahada; The University of Tokyo, Japan
Kiyoshi Niwa; The University of Tokyo, Japan

Companies have to keep achieving challenging objectives with clear responsibilities in mind to survive in highly competitive environments. Consequently, managers are urged to obtain serious commitments, including long-term motivations, from their subordinates in the workplace. We suggested a behavioral mechanism that describes the relationship between future-oriented needs and motivated behavior at PICMET '06. According to this mechanism, workers can become highly motivated by associating their future aspirations with the tasks they are currently facing. To motivate technical workers with different activation levels, we incorporated our mechanism in the design of new future-focused people-management measures including three time-based topics: current, short-term future, and long-term future. We analyzed the effects of measures on the activations of 104 workers in the technology development sector of a large Japanese automobile company. As a result, the use of our measures by management had a large impact on subordinates' activation. Furthermore, we confirmed that long-term future-related discussions have a stronger effect on the activations of initially low-activated technical workers than do short-term future-related discussions. This paper shows how managers should communicate differently with activated or inactivated technical workers.

WE-11 Technology Management for Sustainability-2
Wednesday, 8/8/2007, 16:00 - 17:30 **Room: Galleria-1**
Chair(s): Charles M Weber; Portland State University

WE-11.1 [A] Sustainable Transit Mode Choices in Urban Areas: Psychological Insights on the Adoption and Selection Processes

Brent A Zenobia; Portland State University, United States
Charles Weber; Portland State University, United States

In urban transportation studies transit mode choice is often expressed in terms of rational choice models; psychological case studies of transit mode adoption are comparatively rare.

We present a progress report for ongoing research on the psychology of adoption for sustainable transit modes such as bicycles, car sharing, and mass transit. Case studies were conducted with current and former participants in PSU's 'Passport Plus' transit pass program, as well as a longitudinal cohort study of first-time winter bicycle commuters. Composite sequence analysis was used to construct a model of the adoption and selection processes for these transit modes. Preliminary findings suggest that transit mode adoption is cognitively distinct from transit mode selection and has different information requirements. We conclude that public and private organizations could improve the adoption rate for sustainable transit mode innovations such as Flexcar by tailoring their communication strategies to match the commuter's stage of adoption.

WE-11.2 [A] Portland General Electric (PGE): Clean Power Generation Wind Project in Biglow Canyon & Boardman Coal Plant

Diane Yates; Portland State University, United States
Bertha T Jimenez; Portland State University, United States
Yicheng Peng; Portland State University, United States

This study looks at technology assessment regarding clean power generation for a Northwest utility company. Two types of technology assessments are considered: one is for a renewable energy source (wind) and the other is for a traditional, fossil-fuel based energy source (coal). Both possess unique, non-overlapping criteria and issues that are considered in the technology selection. Both are part of the company's energy portfolio. AHP is used to asses the feasibility of both the wind energy and clean burning coal energy technologies. AHP is a decision-making tool in which criteria is ranked and weighted so that a best choice or choices are determined based upon what is deemed to be most important to the decision makers. From this method we determined what method to choose regarding cleaning SO2 emissions for the Boardman plant, and which wind turbine to select for the Biglow Canyon wind farm. Criteria were chosen that represented each technology's location, cost, feasibility, and availability. For the wind energy, cost was determined to be the most important criterion when making a technology decision. For the SO2 emissions technology, the regenerative process was determined to be the best technology to scrub SO2 emissions from the air. The AHP process can be adjusted to use any criteria and is a useful tool when used alone or with other technology assessment tools. AHP was the only decision-making tool used in this paper's technology assessment.

WE-12 New Product Development-4
Wednesday, 8/8/2007, 16:00 - 17:30 **Room: Galleria-2**
Chair(s): Samuli Kortelainen; Lappeenranta University of Technology

WE-12.1 [R] Price Sensitivity Measurement and New Product Pricing: A Cognitive Response Approach

Robert R Harmon; Portland State University, United States
Ramaprasad Unni; Portland State University, United States
Timothy Anderson; Portland State University, United States

Understanding the price sensitivity of potential buyers is a requirement for successfully determining the price for a new product. Marketers desire to set a price that will maximize demand and ensure a profitable business result. The price sensitivity measurement approach to price setting provides a methodology for mapping the upper and lower bounds of acceptable prices from the customer's perspective. Price sensitivity measurement is based on value perceptions and is a useful tool for pricing new products. This paper explores the role of cognitive response theory as a primary construct underlying the determination of the price customers are willing to pay. Potential customers for a new software service generated significantly more support arguments at the optimum price point than they did at price points above or below the acceptable pricing range. Concomitantly, counterarguments were significantly higher at prices above the upper price threshold and below the lower price threshold. The implications of these findings are discussed. The complementary use of price sensitivity measurement and cognitive response methodologies provides a convenient and easily implemented set of customer-value based tools for pricing new products.

WE-12.2 [R] Revenue-Based Metrics for Managing the New Products Introduction Process

C. Neil Berglund; Portland State University, United States
Robert R Harmon; Portland State University, United States

Strategic competitiveness and profitability are heavily dependent on how rapidly a company is able to bring its new products to market. Fast companies can enjoy higher product prices and achieve larger market shares. However managers throughout a company organization, particularly in marketing, manufacturing and product development, face situations in their daily operations where actions or decisions that improve a new product's time-to-market can result in increased costs. These managers need to make judgments concerning when an action or decision to improve a product's time-to-market justifies this additional cost and any associated additional risks. This, in turn, requires the managers to place a value on time-to-market improvements in order to make informed value-based tradeoffs between short-term costs and longer-term revenue and market-share-related benefits. In this paper a simple revenue-based model, using parameters available early in a product life cycle, is employed to propose financial metrics to enable managers to make these tradeoffs more objectively. These metrics assess the impact on lifetime revenue and average market share of per-month changes in the three relevant time parameters impacting the new product introduction process – new product development time, manufacturing cycle time, and production ramp time.

WE-12.3 [A] Intellectual Property Protection in a Combined Academic and Private Enterprise Collaborative Environment

Diane C Ferington; Energy Trust of Oregon, United States

This paper is based on efforts by Portland State University's (PSU) Biomedical Microdevices and Nanotechnology Laboratory lead by Dr. Shalini Prasad. As universities innovate technologies to meet specific industry needs, the process of attempting to move closer to commercialization while protecting the core disruptive technology is crucial. Commercialization of technologies is often not possible without the assistance of private market companies; however, steps need to be taken along the process to protect the developer's intellectual property. This case study will convey the business case findings that justify pushing the technology toward commercialization and discuss the knowledge management decision points encountered while working with an electronic nanotechnology in the academic realm for the development of a bioscience-based product. It explores new knowledge creation during intellectual collaborative efforts with private sector companies in a fashion that protects individual intellectual property rights developed under the academic realm while encouraging innovation into the private sector. If conducted properly, technology innovations that evolve into a successful market product through private partnerships can lead to licensing royalties to the university or academic institution who discovered and developed the core unique technology. The private market partner in turn has a competitive advantage in the marketplace. The more disruptively the end product is to the market and if it is hard for others to imitate, the more valuable the core technology is to the market partner. When entering into an agreement from an academic perspective, there are decisions to be made about the handling of the knowledge associated with the intellectual property, especially if potential end products may disrupt an existing markets' current way of doing business and/or bring a break through product to market. The paper includes details to keep in mind during a technology's development to protect the knowledge or intellectual property that is developed with the various approaches to royalty and/or licensing to be considered in evolving to deal with a market partner. The entire paper is conveyed in a case study approach based on a real technology innovation developed at Portland State University (PSU) that is at the point of early private partner efforts toward commercialization. The author discusses intellectual capital management decisions explored as options for Bio-SENS along their path to an actual market product. This paper builds on previous work done in spring 2005 by a team of MBA students of which the author was a member. The team of MBA majors was partnered with Bio-SENS to determine the best path and opportunities for commercialization of the technologies. While the lab has many studies underway, it was found that one technology in particular has significant market potential with the ability to be disruptive in the current market because of its unique advantages compared to current market practice. While involved in the entire research investigation the focus was on the intellectual property issues and the management of the new knowledge as it was discovered to be applicable as disruptive end mar-

ket products with significant advantages to current practice or products.

HA-01 PLENARY - 5

DATE: THURSDAY, AUGUST 9
TIME: 08:30 - 10:00
ROOM: PAVILION
CHAIR: CHIK ERZURUMLU, PORTLAND STATE UNIVERSITY, UNITED STATES

KEYNOTE

Rosalie Zobel; European Commission, Belgium

"Joint Technology Initiatives in ICT: A New Approach to Foster Research Efforts in Europe"

The European Commission is prepared to spend over 9 billion in research on information and communications technologies (ICT) in the next seven years. ICT is the largest single research area within Europe's 7th Framework Programme for research and development, accounting for 18% of the total Community budget. The ICT research work programme for 2007-2008 aims to raise European research performance and help keep Europe's ICT sector at the forefront of technology developments and advanced ICT use. The work programme focuses on key areas where Europe has competitive advantages and established strengths: communications, electronics and photonics, and software systems and architecture. It also aims to ensure that ICT research will benefit not only the European economy but also society by improving everyday life in areas such as transport, energy efficiency and healthcare. The European Technology Platforms active in ICT, through their industry-led Strategic Research Agendas, have contributed significantly to the focus of the new work programme. These platforms aim to speed up innovation, in particular by building consensus around technology development strategies. They are poles for attracting more research investment and help transfer new technologies to the market. Nine ICT European Technology Platforms have already been launched. Two of them will provide the basis of Joint Technology Initiatives, in which, for the first time ever, EU, Member State and industry funds will be pooled in public-private research partnerships to boost European cutting-edge research in areas such as nanoelectronics and embedded systems – both vital areas for competitiveness in many end user industries. The paper will present recent activities to set up Joint Technology Initiatives in Europe with the aim to structure R&D efforts around focused technology objectives to achieve competitiveness goals.

KEYNOTE

Yong-In Shin; Samsung Electronics , Korea, South

"IT/BT/NT Convergence Technology and its Business Managerial Considerations"

In recent years, a technical level of IT has been heading toward its maturity, and many convergences have taken place among different IT technologies such as computation, communication, consumer & entertainment electronics, and content of digital information & broadcasting. These convergences have formed many new functions for the cell phone, TV, PC, etc. As the technical advancement of BT and NT has recently been making a good inroad, a convergence of IT, BT and NT is on its course to create many unprecedented applications. The well-advanced IT provides a function of input and output interfaces, algorithms and networks, the NT provides new capabilities in a quantum level of material manipulations (bottom up) and nano-electronics (top down), and the BT provides many new understandings of genes and diseases for plants, animals and humans. A combination of IT and NT will provide tools and materials for a much better understanding of BT, and a convergence of these three technologies will definitely provide many possibilities to enrich human lives (e.g., understanding how the human brain works to prevent brain related neural diseases). Dr. Shin will review the status and progress of these three technologies and their future markets with two examples for the convergence technology: the biochip and the ubiquitous health. Both are examples of convergence technologies that presently are in a process of being incubated by many venture companies and some MNC's. Dr. Shin will provide some details of the new technology and the associated business possibilities of these two new industries. Assuming that the needed technical and market breakthroughs will be accomplished in time, a market for a combination of both the biochips of micro array genechip and the proteinchip will likely grow to a vicinity of a one hundred billion dollar market in its maturity (from the present half billion dollar market). When a social ecosystem will be in place for ubiquitous connections in the health industry, it will extensively revolutionize the present four trillion dollar health industry, and change human lifestyles extensively. Just as the hardware, software, semiconductors, computers and internet technology of IT have created new wealth and many billionaires, these convergence technologies will undoubtedly produce many new industries and new billionaires as well. Dr. Shin will address some of the major managerial concerns for the convergence business in terms of disparities between these three technologies, and business executives' social responsibilities; IT business is applicable to a technology business model, while BT is applicable to a science business model. Since these technical and business progresses will affect all the aspects of human life for a healthier and longer life span, the leaders of the society need to provide proactive measures for the benefit of the society, and to minimize possibilities of wrongful and unethical usage of these new technologies and businesses. In conclusion, Dr. Shin will provide some recommendations that he sees pertinent for educators, business executives and government officers at this point. However, managerial responsibilities need to be continually updated as this convergence technology and business progress.

HB-01 Technology Management in the Service Sector-4

Wednesday, 8/9/2007, 10:30 - 12:00 **Room: Pavilion East**
Chair(s): Norman G Einspruch; University of Miami

HB-01.1 [R] Integrating Decision Trees and Cognitive Maps for Market Segmentation in Service Sector

Senay Sadıc; Istanbul Technical University, Turkey
Gulgun Kayakutlu; Istanbul Technical University, Turkey

Customer data is the key to marketing success, and this is why data mining has become an inevitable tool. Data mining is used to detect the knowledge in the accumulated data for which various analytical methods are used. The knowledge is further used to support the predictions for the future of the customer portfolio. This study aims to illustrate a framework for integrated implementation of cognitive maps and decision trees in the development of customer segments. The first step is to identify the company specific factors, which are effective in marketing. The second step is to determine the interactions among these factors through a cause and effect map, which enables the classification of the data. As the third step, decision trees are developed based on these classes and the data. The last step is the preparation of customer segments to be used by sales and marketing departments. This paper also represents a pilot application of the framework for a digital TV channel trying to market subscriptions. This study will not only contribute to the data mining field but also to the area of customer relations.

HB-01.2 [A] Analysis and Design Methodology for Recognizing Opportunities and Difficulties for Product-based Services

Naoshi Uchihira; Toshiba Corporation, Japan
Yuji Kyoya; Toshiba Corporation, Japan
Sun K Kim; Stanford University, United States
Katsuhiro Maeda; Toshiba Corporation, Japan
Masanori Ozawa; Toshiba Corporation, Japan
Kosuke Ishii; Stanford University, United States

Recently, manufacturing companies have been moving into product-based service businesses in addition to providing the products themselves. However, it is not easy for engineers in manufacturing companies to create new service businesses because their skills, mental models, design processes, and organization are optimized for product design and not for service design. In order to design product-based services more effectively and efficiently, systematic design methodologies suitable for the service businesses are necessary. Based on

the case analysis of more than 40 Japan-US product-based services, this paper introduces a product-based service design methodology called DFACE-SI. DFACE-SI consists of five steps from service concept generation to service business plan description. Characteristic features of DFACE-SI include (1) visualization tools to facilitate stakeholders' recognition of new opportunities and difficulties, and (2) service design patterns and failure mode checklists extracted from the service case analysis to assist in designing and evaluating service concepts and schemes. We apply DFACE-SI to a pilot project and illustrate its effectiveness.

HB-01.3 [A] Public Services Innovation through Technology

David Pym; Hewlett-Packard, United States
Richard Taylor; Hewlett-Packard, United States
Chris Tofts; Hewlett-Packard, United States

Governments struggle to understand how technologies can be used to innovate in the development and delivery of public sectors. Frequently, technologies are seen as quick and effective fixes for problems that may run far deeper than obvious process and user dynamics. As often, solutions are considered as 'point provision' and, as such, fail to recognize the complex co-evolution of society, economics, the world outside a government's borders and control, and the technologies themselves. This paper summarizes a number of key areas that must be understood in order to effectively innovate through the introduction and management of services mediated by new technologies.

HB-02 PANEL: Engineering & Technology Management Journal Editors
Thursday, 8/9/2007, 10:30 - 12:00 Room: Pavilion West
Moderator: Timothy R Anderson; Portland State University
Panelist(s): George Farris; Rutgers University
Timothy G Kotnour; University of Central Florida
Harold A Linstone; Portland State University
Jonathan Linton; University of Ottawa

Editors of the leading journals in Engineering and Technology Management will discuss their journal's editorial philosophies and practices for prospective authors. Questions about how to publish articles will be welcome.

HB-03 Outsourcing-1
Thursday, 8/9/2007, 10:30 - 12:00 Room: Broadway-1
Chair(s): Tugrul Daim; Portland State University

HB-03.1 [R] Reasons for Not Offshoring IT Services in Swedish Banks

Narcisa Jonsson; KTH Royal Institute of Technology, Sweden
Oscar Möller; KTH Royal Institute of Technology, Sweden
Joakim Lillieskold; KTH Royal Institute of Technology, Sweden

The ongoing process of globalization drives the offshoring trend of IT-development and services in Sweden as well as in other industrialized countries. In contrast to the industrial companies that lead the trend, Swedish banks are extremely restrictive in this sense. In comparison to the US banking business, this is considered atypical behavior. In this paper we present the results of an investigation stemming from interviews of the four largest Swedish banks and their main reasons not to offshore IT services.

HB-03.2 [R] The ICT-Supported Unified Process Model of Offshore Outsourcing of Software Production: Exploratory Examination and Validation

Anicet Yalaho; University of Jyväskylä, Finland
Nazmun Nahar; University of Jyväskylä, Finland

Various important benefits can be achieved through the successful management of offshore outsourcing. Numerous studies exist on outsourcing in general, yet the large extant literature on offshore outsourcing has dealt with information technology (IT) outsourcing from the client's perspective. Several frameworks, focusing on guiding information systems managers, for IT outsourcing have been developed. However, none of these frameworks attempted to provide a holistic guideline to manage the entire process of offshore outsourcing of software production. There is a significant lack of studies dealing with the management of offshore outsourcing of software production from both the vendor's and client's perspectives. Thus, there is a great need for studying such a multifaceted and complex phenomenon more deeply from both scenarios to find out the best practices for managing the unified process. In this study, we utilize the conceptual framework of The ICT-supported Unified Process Model of Offshore Software Production Outsourcing as our research model. We then validate this model by reviewing the large extant literature, and conducting multiple case studies from both the vendor's and client's viewpoints, where professionals with extensive experience in managing offshore outsourcing of software production are interviewed. The implications of the findings are discussed for both practical and research purposes.

HB-03.3 [R] Critical Success Factors in Outsourcing: Case of Software Industry

Rosine H Salman; Portland State University, United States
Tugrul Daim; Portland State University, United States

In the software development arena, offshore outsourcing currently plays a dominant role in the composition of today's business environment. From the smallest startups to most major corporations, offshore outsourcing is touted as having major benefits for these companies alike. Offshore outsourcing allows businesses the ability to reduce costs, increase shareholder value, gain competitive advantage, decrease cycle time, improve customer loyalty, gain staffing flexibility, increase revenue, and ultimately allows a business to focus on its core competencies. In theory, these facets should equal a successful venture when applied correctly. However, things are not always as they appear. There are a multitude of challenges that await each offshore outsourcing endeavor. Just as there are a plethora of software programmers from a large number of developing nations waiting to capture a portion of this maturing trend, there are also a variety of challenges that await their prospective employers. The objective of this research paper is to investigate the fundamental role of managers in guiding and growing the relationships of the offshore outsourcing partnership.

HB-03.4 [A] Managing Risks and Maintaining a Competitive Edge in Today's Outsourcing Environment

Dan Itkis; Portland State University, United States
John Arbak; Portland State University, United States
Henry Robar; Portland State University, United States
Elizabeth Kennedy; Portland State University, United States

In today's highly competitive market and rapidly changing economy, businesses must continually make choices if they are to survive, choices that set themselves apart from the pack. Consequently, some of the most important choices a company must make are strategic and are the responsibility of management. For this reason, taking into consideration the current business environment where the creation of value in the eyes of the customer and the shareholder is paramount, it is nearly impossible to survive without outsourcing some part of the business. In fact, manufacturing outsourcing is one area in particular, due to the competitive pressures, that very few companies can afford to ignore. However, outsourcing is not a risk-free adventure. Two of the most substantial risks that companies face when outsourcing to a manufacturing contractor are creating a competitor and counterfeiting. Thus, the objective of this research is to determine the risks companies have encountered when outsourcing their manufacturing by specifically focusing on current academic literature, case studies, and empirical data, then propose a framework for evaluating and mitigating those risks.

HB-04 Innovation Management-9
Thursday, 8/9/2007, 10:30 - 12:00 Room: Broadway-2
Chair(s): Jeong-Dong Lee; Seoul National University

HB-04.1 [R] Determinants of Enterprise Performance in Small Technology-Intensive Enterprises: Intellectual Capital and Innovation Capability in the Firm

George Tovstiga; Henley Management College, United Kingdom
David W Birchall; Henley Management College, United Kingdom
Ekaterina Tulugurova; Henley Management College, United Kingdom

The findings of an empirical study that examines the impact of intellectual capital on enterprise performance in small innovative enterprises (SIEs) are presented in this developmental paper. The study examines the impact of effective intellectual capital exploitation against

the background of key external (socio-political, technological, and economic) factors. This research reported in this study is part of a greater effort that is examining intellectual capital practices in regions of high-technology clusters including St. Petersburg (Russia), the so-called "Medicon Valley" of Denmark, the Silicon Valley in the USA, and German and Swiss "Mittelstand" clusters in Southern Germany and the Zurich region, which are compared and analyzed for patterns, similarities and differences. This paper focuses on the findings of the Russian part of the study. The key questions of this research address the relative impact of intellectual capital practices (internal factors) and prevailing socio-political, economic, and technological factors on the performance of small innovative enterprises. This work seeks to provide new insights in several areas: 1) While a number of studies have looked at the impact of intellectual capital on enterprise performance per se, relatively little work to date has focused on the specific case of intellectual capital deployment in small innovative enterprises (SIEs); 2) Very little, if any, work has focused on the impact of intellectual capital and its implications for private enterprise performance in transitional economies (Bruton and Rubanik, 2002). This study provides empirical evidence suggesting that internal factors have a greater impact on enterprise performance than external ones – even in the transitional economy of Russia. In this paper the notion of the knowledge-based theory of the firm forms the conceptual basis of a framework that is developed to relate intellectual capital (human capital and structural capital) and key external factors (socio-political, economic and technological) to enterprise performance in SIEs. A survey instrument designed on the basis of this model was applied in the field research involving SIEs in the various regions. The research data was subjected to exploratory and confirmatory factor analysis using standard and advanced statistical analysis based on regression, correlation analysis. In a final step, structural equation modeling on the basis of a partial least squares technique was used for examining the validity of the hypothesis in view of the research findings.

HB-04.2 [R] Evaluation of the Effectiveness in Applying Cognitive Approach towards Selecting Multimedia Elements

H. Idyawati; Universiti Malaysia Sabah, Malaysia
Esmadi Abu Abu Seman; Universiti Malaysia Sabah, Malaysia

As new technologies are developed, complex functions and various user tasks require that more design options and design disciplines are applied. Realizing the importance of these technologies, many design methods and guidelines have been developed and refined by testing in industry. These methods and guidelines cover analysis and specification on information requirements, mapping information requirements to media resources, scripting multimedia dialogues, and design for attention-directing effects. To improve the effectiveness of these methods and guidelines, a designer's assistant toolset is required. Creation of such design techniques as hypermedia links and attention directing design effects needs to be supported by a design assistant that details and defines attention-directing guidelines for different types of media. The tool works from a specification of logical links between information components and design best practices. The tool suggests appropriate highlighting and emphasis effects for a design.

HB-04.3 [R] Innovation and Technology Management in Brazilian Subsidiaries in the Electro-Electronic Industry

Muriel O Gavira; State University of Campinas, Brazil
Ruy Quadros; State University of Campinas, Brazil

In an increasingly competitive and challenging market, multinational corporations have evolved to allow or to actively encourage subsidiaries to become more involved in the local generation of knowledge and innovation for the benefit of the global corporation. Subsidiaries, in turn, seek more responsibilities and opportunities in order to acquire more complex types of competences and to assure their survival and competitiveness. Thus, subsidiaries have been active contributors to the decisions and competitiveness of their wider corporate groups. In subsidiaries that acquire competence-creating mandates, the way in which technology and innovation are managed changes with their expanded responsibilities. This paper draws on an on-going case study of six subsidiaries installed in Brazil operating in the electro-electronics industries. The objective of the research is to compare these subsidiaries in order to better understand their actual technological innovation management practices (TIP), and to comprehend the connection between TIP and evolution towards more strategic roles on the subsidiaries. The preliminary research findings suggest significant TIP differences between the subsidiaries studied, and that the practices of innovation management are closer to the market (mostly product development related). Indeed, there is little presence of practices related to longer-term technology research.

HB-05 Strategic Management of Technology-4

Thursday, 8/9/2007, 10:30 - 12:00 **Room: Broadway-3**
Chair(s): J. Michael Munson; University of Santa Clara

HB-05.1 [R] The Controllability of the Profit Structure of a Product: A Case Study of the Canon Inkjet Printer Business

Yoichi Matsumoto; Keio University, Japan

Implementing innovations is important for firms to grow, but appropriating the returns from the innovations is also important. The ability to appropriate the returns from innovations is said to vary between industries, and yet it can also vary between firms in the same industry. This study is interested in inter-firm differences in the appropriability. Some firms in the same industry may enjoy a higher appropriability, but others may suffer from a lower one. Canon, a Japanese corporation, seems to be the former case. Why Canon's appropriability is higher than its competitors is answered via analyses of its inkjet printer business practices. In the analyses, Canon's inkjet printers which were sold mainly in the 1990s come under discussion. The study suggests and uses the idea "profit profile." This is a concept of grouping the product architecture with the profit allocation of the product. Based on a profit profile, product architecture can be used as the framework for analyzing the profit structure of the product. The study shows that Canon used three types of architectures and they change them flexibly, according to their competitive environment. Through the concept of "profit profile," it is explainable why Canon's appropriability is higher than its competitors.

HB-05.2 [R] Dynamics of Innovation Strategies in the Optical Memories Industry: An Analysis Based on Patent Indicators

Corrado Lo Storto; Universita' di Napoli Federico II, Italy

Technological innovation is characterized by a searching activity of optimal alternatives which is fundamentally dominated by an intense activity addressed to identify and solve technical problems. As components recombination is a very efficient source of innovation that firms widely resort to, the capability to recombine pieces of knowledge available in the organization or transferable from the outside becomes an important lever in the technological innovation strategy of the firm. Here a conceptualization which considers technological innovation as an outcome of a change of either the technological components or a diverse combination of the components themselves is adopted. Data relative to granted patents were considered. The assumption is that every patent is the outcome of the combination of a number of technological components associated to the sub-classes of the classification standard adopted. These sub-classes can be indirectly utilized to observe the search and the dynamics of technological innovation strategies. The sample includes 438 patents granted between 1975 and 2004 to 15 leading firms in the optical memory devices industry. The Fleming familiarity and Herfindahl concentration indexes are calculated to analyze innovation strategies.

HB-05.3 [A] Analyzing eBay Platform Strategies: An Application of Meyer's Platform Strategy Model

Linda Lin; Portland State University, United States
Ardthawee Tanyavutti; Portland State University, Thailand
Songwut Jindrapacha; Portland State University, Thailand

Nowadays, it is no longer possible to dominate large markets by developing one product at a time. Increasingly, high-technology companies are turning to platform-based product development in their quest to manage the complexity of offering greater product variety. Like the traditional automobile industry, where product platforms are used pervasively, companies that make nonphysical or intangible products, such as software and computer-based information services, can also benefit from adopting an effective product platform strategy. eBay is such a company that uses its platform strategies to support its rapid growth and its wide array of e-commerce based products: software and services to handle auction transactions,

process payment transactions, and provide peer-to-peer communication for its user community over the Internet. This paper looks at eBay's three platform strategies: eBay platform, PayPal platform, and Skype platform; uses Marc Meyer's product platform strategy model to illustrate these platforms; discusses the implications of these strategies to eBay's overall success as an industry leader; and offers product platform management insights and recommendations for eBay's platform future.

HB-06 Technology Management in the Public Sector-2
Thursday, 8/9/2007, 10:30 - 12:00 **Room: Broadway-4**
Chair(s): Paul Newman; Portland State University

HB-06.1 [R] Innovation in e-Government Initiatives: New Website Service Interfaces and Market Creation – The Taiwan Experience

Jorden Wen; National Chengchi University, Taiwan
Li-hung Cheng; National Chengchi University, Taiwan

The beauty of e-government initiatives goes well beyond enhancing the access to and delivery of government information and services to citizens and businesses by leveraging information technology, particularly the Internet. The Internet enables genuine service innovation in the e-government context. New website interfaces, facilitated by website structures which represent the relevant internal delivery systems and organizational arrangements, create new market benefits for citizens and businesses in the form either of integrated information platforms or full online transactions. For a decade now, Taiwan has employed the Internet as an enabler to speed up public services online and has earned a top ranking worldwide for its achievements. This paper identifies Taiwan's major e-government projects, which include e-tax-filing, e-housekeeping, etc., and stakeholders in these e-initiatives, including technology providers, heads of project, IT staff, domain experts, etc. respond to semi-structured interviews. This paper applies the principles of innovation studies to the Taiwan government's use of the Internet. We propose a framework to address innovation activities in the use of technology and examine the dynamics of service innovation. This paper will contribute to innovation studies by describing the proactive potential of service innovation in e-government initiatives. In practice, the study of public sector innovation processes throws light on innovation policies across the whole economy.

HB-06.2 [A] eGovernment Services: How to Develop Them, How to Manage Them?

Ahto Kalja; Tallinn University of Technology, Estonia
Kristiina Kindel; Tallinn University of Technology, Estonia
Riina Kivi; Estonian Informatics Centre, Estonia
Tarmo Robal; Tallinn University of Technology, Estonia

eGovernment services in Estonia are based on secure data transport backbone, X-Road. Portals, elements of public key infrastructure (PKI) and a special service administration system RIHA supports developing and managing of the services. RIHA is the environment, which was initially developed for managing only the X-road data exchange services. Today, RIHA will expand to managing all eGovernment services in the public sector. The activities connected with eGovernment services will be described.

HB-08 Technical Workforce-3
Thursday, 8/9/2007, 10:30 - 12:00 **Room: Council Suite**
Chair(s): Gamze Karayaz; Isik University

HB-08.1 [A] Personnel Resource Scheduling

Nader M Ayoub; Avianco, United States

In today's global economy, service providers are under increasing pressure to maximize margins and streamline operational efficiency to remain competitive. In order to do this, providers are turning to new technologies, advanced collaboration with partners and creative service strategies to ensure a well-managed workforce. They are also creating virtual workforces where resources may work from home or on the road over a disparate geographic region. To this end, service providers are seeking to reduce or all together eliminate the brick and mortar office, and replace it with a loose coalition of people with diverse skill sets. As this shift continues in the service industry, so do their requirements. For example, they are now required to handle the entire service order management process by continually updating their offerings to stay competitive against others in the same industry; i.e., doing more with less. In this context, a trustworthy solution is one that enables management to automate and streamline all aspects of the field service operations, which allows providers to offer additional services, with greater accessibility, to ensure growth and fitness for service. We demonstrate the solution by reviewing its implementation for the Catholic Community Services and its Community Outreach Program for the Deaf.

HB-08.2 [A] Value Assessment of Workers of ON, AMKOR and HITACHI Firms in the Philippines

Eppie E Clark; University of Warwick, United Kingdom

Values are part of the cognitive substructure of an organizational culture. Cultural values are those considered essential to the welfare of the group; they constitute models or goals of personal behavior in social interaction; they are common to the members of a given social group; and they are the people's conception of the desirable, the basis of choice between alternatives, direction of interest, attention or emphasis. Previous research has demonstrated links between cultural values and job attitudes and behaviors. Hofstede has identified four cultural values which differentiate people across nations: collectivism/individualism, power distance, uncertainty avoidance and femininity/masculinity. The paper focuses on the assessment of work values based on interviews and the application of a value survey tool. The survey tool was based on Hofstede's work describing the individuals in societies at either extreme of the cultural dimensions. The intention was to assess the values of the workers in three semiconductor firms, ON, AMKOR and HITACHI. The study resulted in the following findings: there is a need to understand the values of the workers from the viewpoint of the foreign and local managers, the survey tool was able to provide a general feel of the workers' values but was still blunt in identifying and effecting behavioral correction.

HB-09 Technology Management in Telecommunications-3
Thursday, 8/9/2007, 10:30 - 12:00 **Room: Directors Suite**
Chair(s): Beate Klingenberg; Marist College

HB-09.1 [R] A Study of Adopting Warshaw's Purchase Intention Model in Mobile-RFID Services and on Moderating Effect of Personal Innovativeness

Nae-Yang Jeong; Korea University of Science and Technology, Korea, South
Youngsang Yoo; ETRI, Korea, South

The telecommunication market in Korea is becoming saturated in terms of the number of service subscribers and the industry growth rate. As the market becomes more competitive and the customers' expectation to service or product increases, strategies based on customer data analysis have become more important. In order to understand customers' behavior and intentions, researchers have applied the theory of reasoned action (TRA) across a wide variety of areas. Since the TRA, however, is quite general, it should be tailored for specific behavior. Warshaw (1980) has argued that TRA has weak predictive power in marketing applications, and thus he has suggested a new intention model specialized in product purchase situations. In this preliminary study, we attempt to explore the intention of purchasing mobile-RFID services by adopting the Warshaw's purchase intention model. In order to examine the adoptability, we have compared the adjusted R2 of Warshaw's model with that of technology acceptance model (TAM), which is one of most popular theories examining the intention of information system usage. Secondly, as characteristics of telecommunication services become increasingly sophisticated, personal innovativeness could be a key factor of telecommunication services usage. Thus, we examine whether the personal innovativeness in the domain of IT has a moderation effect on purchasing mobile-RFID services.

HB-09.2 [R] Trends in and Prospects for the HSDPA Service Market: With a Focus on the HSDPA-based Video Service

Eok-Soo Han; ETRI, Korea, South
Choon-Soo Ahn; ETRI, Korea, South
Jung-Hwan Lee; KETI, Korea, South

HSDPA (High Speed Downlink Packet Access) is drawing great attention as the 3.5G technology capable of providing the wireless data service 3 ~ 4 times faster than WCDMA. Recently, HSDPA business has been expanding continuously from the perspective of network development and investment efficiency, in line with the global trend. As HSDPA looks set to account for about 16 percent of the entire number of subscribers in 2008, the market is expected to be re-arranged around HSDPA. With the introduction of HSDPA, various services can be provided, including video conferencing, international roaming, IMS, and a USIM-based service, as well as the current voice communication service. Despite these bright prospects, the mobile communication industry and professional experts have pointed out that the HSDPA service's marketability faces many limitations and tasks that need to be resolved. This study is designed to analyze the features, quality, coverage, pricing scheme, and customer response of the HSDPA-based video service in Japan, and the future prospects for the HSDPA service market.

HB-09.3 [R] Comparative Analysis of Optional Calling Plans for Fixed-Line Telephone Services

Seong Ho Seol; ETRI, Korea, South
Byung-Woon Kim; ETRI, Korea, South
Moon-Soo Kim; Hankuk University of Foreign Studies, Korea, South

With the growth of competition in the telecommunication market, Optional Calling Plans were introduced in the 1980s, have expanded dramatically in the 1990s, and now have become widespread rate systems in many countries. The Korean fixed operators currently provide OCPs. Compared to other countries, however, the special optional calling plan has activated in the Korean market. It is a unique calling plan where rates are based on previous calls made. That plan provides high market performance, yet it arouses criticism in the industry. There are questions raised by professionals in the industry if a plan based on previous calls made is fair to consumers and is it more effective than other types of calling plans. Considering this circumstance, we theoretically analyzed and compared rate systems based on previous calls made and different rate systems, including unlimited flat-rate and BOT, by mainly the perspective of efficiency. Results of our study show that a rate system based on past calling patterns will be economically effective compared to other types of calling plans. Therefore, it is necessary not to prohibit this rate system; rather, selectively regulating or other flexible means of regulation is desirable. Nevertheless, it has some weak points.

HB-09.4 [A] 3G in China: Environment and Prospect

Jing Zhang; Beijing University of Posts and Telecommunications, China
Xiongjian Liang; Beijing University of Posts and Telecommunications, China

3G has been the focus of China telecom industry since 2000. In the past six years, the involved parties have made a lot of preparations for 3G, which has greatly changed the environment of 3G in China. In this paper, we discuss the possible developing paths of 3G in China, based on the results from 3G investigations and interviews with concerned experts in the government and operating companies. Firstly, based on a brief introduction of China wireless market, the key problems about developing 3G in China are listed. In the second section, a PEST analysis on the general environment of 3G in China is given, which shows that the conditions for 3G seem ripe now. In the third section, we discuss the attitudes and preparations of different parties including the government, network operators, technology developers, equipment and application suppliers, supplementary product and service providers, and customers. The fourth section focuses on the possible strategy and policies that may be adopted by the government and operators and discusses several developing paths. Then the consequences of the paths are predicted. In the fifth section, the key factors in making decisions in developing 3G are summarized. Finally, the revelations in the 3G development in China are concluded.

HD-01 Technology Management in the Service Sector-5
Thursday, 8/9/2007, 14:00 - 15:30 Room: Pavilion East
Chair(s): Charles Weber; Portland State University

HD-01.1 [R] Technology Management: Power Women and the Global Economic Sectors

Daniel Berg; Rensselaer Polytechnic Institute, United States
Norman Einspruch; University of Miami, United States

As part of continuing studies of management of technology for the developing Service Sector, a recently developed analytical technique, Data Surface Mining (DSM), has been applied to a variety of databases. In this study, the Forbes database of the world's 100 most powerful women was analyzed to ascertain the relative presence of the Service Sector and the Goods Sector. It was found that 84 percent of the power women operate in the Service Sector and 16 percent operate in the Goods Sector. The 16 percent in the Goods Sector were also observed to be disproportionately present in companies related to food, health and personal products. It was further found that 32 (35 percent) of the women in the Service Sector were in public service or government, pointing to these areas providing upward mobility career paths for women. The implications for technology management in the two economic sectors and the issue of minor involvement of power women in technology management are reviewed.

HD-02 TUTORIAL: New Product Development Training for Technical Entrepreneurs
Thursday, 8/9/2007, 14:00 - 15:30 Room: Pavilion West
Speaker(s): Terry R Schumacher; Rose-Hulman Institute of Technology

Published literature reports that NPD processes in general, and technological entrepreneurs (TEs) in particular, under-emphasize marketing in NPD. An interactive computer simulation was created to introduce participants to published NPD best practices, primarily greater marketing early in NPD. Simulation participants are placed in the role of an entrepreneur with a product vision and limited money. Participants move from the initial product vision, through customer interviews, focus groups, trade shows, break-even analysis, product feature selection, pricing and customer segmentation. The simulation concludes with product launch and feedback. The speaker will run the simulation with participants viewing projected screen images. They will be asked to discuss and make the necessary decisions (Should we attend a trade show now? Talk with more potential customers? Select additional product features? etc.). A full simulation requires two to three hours depending on the amount of discussion. It has been used in our graduate marketing class and our entrepreneurship class where initial results indicate students learned to integrate the various choices into a coherent NPD strategy. They enjoyed the exercise. The workshop also presents a summary of the NPD best practices found in the literature.

HD-03 Science and Technology Policy-3
Thursday, 8/9/2007, 14:00 - 15:30 Room: Broadway-1
Chair(s): David Versailles; Research Center of the French Air Force

HD-03.1 [R] U.S. National Innovation System for Biotechnology: From the Korean Perspectives

Kidong Kim; Sejong University, Korea, South
ByungHwan Hyun; Korea Res. Inst. of Bioscience and Biotech, Korea, South
Sunyang Chung; Sejong University, Korea, South

Biotechnology is the generic technology in the 21st century. It has a strategic importance for the development of companies, industries and nations in the near future. Therefore, many countries have been making a great effort to promote and develop biotechnology. The U.S. has been the leading country in the world in promoting biotechnology. However, U.S. biotechnology policy is very diverse, so that there have been no comprehensive and systematic studies on it. In our paper, therefore, we will discuss the U.S. biotechnology policy in detail. For the effective analysis, we will rely on the concept of a national innovation system, which emphasizes the institutional settings of innovation actors and their interaction. This paper deals with U.S. national innovation system for biotechnology. We will analyze the role of major actors, academia, public research institutes, and industry and their interaction. According to our study, the U.S. biotechnological innovation system is composed of diverse actors, and there are lots of start-up companies in the biotechnology industry. In addition, there are many diverse policy programs for promoting biotechnology. In the analysis of U.S. biotechnological system and policy, we would like to maintain the Korean perspectives. Because of country-specific frame conditions, Korea and the U.S. have different institution-

al settings and policies for promoting biotechnology. Therefore, our paper will render meaningful implications for Korea and the U.S. We also think that this paper will be of interest for international readers.

HD-03.2 [R] India's Rise as a Software Power: Governmental Policy Factors

Tad Drozdowski; Portland State University, United States
Hai Huynh; Portland State University, United States
Brian Lininger; Portland State University, United States
Yi-Cheng Peng; Portland State University, United States
Naruedom Sakulyong; Portland State University, United States

The Indian government's policies toward an open, global market, support of educational institutions, and enhancement of appropriate infrastructure helped enable its software industry to become a critical component of India's economic growth in the 1990s. The Technical, Organizational, and Personal perspective (T, O, and P) model is utilized to examine different effects each perspective, inclusive of government policies, has on a socio-technical system (software development in India). The Indian government has provided substantial economic liberalization to support its software industries, though continued reform is necessary to ensure that it remains a software superpower.

HD-03.3 [R] A Comparative Analysis of Innovation Policy in Mexico, Spain, Chile and Korea

Jose Luis Solleiro Rebolledo; Universidad Nacional Autonoma de Mexico, Mexico
Rosario Castanon Ibarra; Universidad Nacional Autonoma de Mexico, Mexico
Katya Luna; Cambiotec, Mexico
Alejandra Herrera Mendoza; Universidad Nacional Autonoma de Mexico, Mexico
Mariana Montiel; Cambiotec, Mexico

In the last decades, innovation has become a very significant strategy for competitiveness. Some governments have implemented public policies oriented to science, technology and innovation to stimulate the technical development in industrial sectors and strengthen their national innovation systems. The main objective of analyzing the economic and industrial performance of Mexico, Spain, Chile and Korea in the cycle of the mid-1980's - 2002 is to find the best practices issued from the innovation policy and the relevant practices that split success or failure in economic and science and technology indicators. The comparative analysis between these countries is based on the technological and innovation strategies, tools and competencies identification. Our study has shown that Korea developed planned industrial consortiums in strategic sectors. Spain, under the European Union policies definition, has consolidated collaboration networks that involve industry, research centers and universities. The efforts of Chile are based on a conservative but effective innovation policy through the technology acquisition strategy. Perhaps the main difference is the resources availability and the promotion of an innovation culture. This paper presents the main results of this analysis as well as recommendations for the Mexican innovation policy makers. We strongly believe that timely and appropriate response will depend on the adoption of the recommendations provided.

HD-04 Innovation Management-10
Thursday, 8/9/2007, 14:00 - 15:30 Room: Broadway-2
Chair(s): David W Birchall; Henley Management College

HD-04.1 [R] Benchmarking the Turkish Business Incubators: Supporting Innovation through Innovative Infrastructures

Dilek Cetindamar; Sabanci University, Turkey

As business incubators (BI) are one of the infrastructures used to promote and support entrepreneurs throughout the world in order to support the realization of innovative ideas, this paper will present a benchmark study of the Turkish business incubators to understand the existing infrastructure and to develop policy suggestions for the improvement of this infrastructure. Even though the main focus of the paper will be the Turkish BI, the comparison will be based on two international studies. One of them is an international study of 12 selected countries (Armenia, Canada, Croatia, Hungary, Norway, Poland, Ukraine, Republic of Moldova, Republic of Serbia, Romania, Slovakia and Slovenia). The second study is carried out in 269 BI across European member countries and around 2000 companies. Seven key factors seem to be used as indicators for benchmarking BIs: 1) the role of stakeholders, 2) locational and physical aspects of incubator operations, 3) the definition of the incubator's 'mission', 4) the tenants companies they attract as clients, 5) issues relating to the financing of incubator start up and operating cost, 6) governance, and 7) sustainability of BI. The empirical part introduces the Turkish case by presenting the survey results of 11 business incubators, representing 27% of business incubators operating in Turkey. Based on the benchmarking analysis, three main results can be driven for policy makers. First, Turkish BIs have higher share of partnership structure as well as private BIs, but business involvement seems restricted to being a formal partner, except for the business-owned BIs. Second, firms in BIs focus in manufacturing related technologies, demanding more involvement of universities in order to change firms orientation into technology. Third, Turkish BIs need to establish more professional management. Privately owned BIs in Turkey employ professionals, while government-owned BIs in Turkey are run with appointed managers.

HD-04.2 [R] Updating a Firm's International Competitiveness through Total Innovation Management: A Case Study from a Certain Manufacturing Firm of China

Jin Chen; Zhejiang University, China
Shiyang Wei; Zhejiang University, China
Gang Zheng; Zhejiang University, China
Yubing He; Zhejiang University, China
Tingting Tao; CIMC, China

In such a new economic era full of fierce competition, a firm's survival and development depend on innovation, especially total innovation. Based on the latest theoretical achievement of Total Innovation Management (TIM), the paper addresses the basic experience of the CIMC (China International Marine Containers (Group) Co., LTD) maintaining its sustainable competitive advantage through TIM. It is argued that a basic manufacturing firm absolutely has the ability to cultivate its dynamic core competitiveness, improve its capability of innovating, and thus advance its international competitiveness under the new economic background.

HD-04.3 [R] Technological and Economic Dynamics of a Brazilian Ceramic Tiles Cluster

Solange A Machado; Research Technological Inst. of Sao Paulo State, Brazil
Guilherme Ary Plonski; University of Sao Paulo, Brazil
Joao Pizysieznig Filho; Research Technological Inst. of Sao Paulo State, Brazil

This paper proposes a general model to explain the birth and evolution of industrial clusters that could contribute not only to the phenomenon knowledge but also to public policies and private strategies fundamentals. The model was validated with the case of Santa Gertrudes' cluster, which produces ceramic tiles in Sao Paulo State. The main hypothesis is that a revolutionary innovation, combined with specific local conditions, is the very origin of a new cluster. In this model, an industrial cluster presents an evolutionary cycle that encompasses embryonic, growth, and maturity phases, each phase having distinctive competitive patterns. The Santa Gertrudes' cluster had an evolutionary trajectory as predicted by the model. The cluster was born of a process innovation and developed specific trajectories in each phase. Nowadays, the cluster is passing through the turning point from the growing phase to the maturity phase.

HD-05 Strategic Management of Technology-5
Thursday, 8/9/2007, 14:00 - 15:30 Room: Broadway-3
Chair(s): Corrado Lo Storto; Universita' di Napoli Federico II

HD-05.1 [R] Evaluation of Business Value of IT-System Scenarios: A Case Study at a Large North European Power Company

Magnus Gammelgard, KTH Royal Institute of Technology, Sweden
Mathias Ekstedt, KTH Royal Institute of Technology, Sweden
Per Narman, KTH Royal Institute of Technology, Sweden

This paper presents a method, the KTH IT Investment Evaluation Method, to assess the busi-

ness value of IT investments. The method aims at a priori and at a relative low cost of investigation assesses the business value of IT-systems scenarios, i.e. alternative combinations of IT-systems intended to support a particular business area. First, the scenarios are evaluated with respect to their technical quality. Second, the technical attributes used for this technical evaluation are related to business value dimensions, i.e. it is determined in what ways certain functions and non-functional attributes generate business value. Third, the business value dimensions are prioritized by the business managers. Finally, the business value of each scenario is established by combining the technical assessments with the relations to the business value dimension found in the second step and the prioritizations done by business managers. All parts of the method have been verified in a comprehensive case study at a large European power company, and the results are presented in the paper.

HD-05.2 [A] Technology Management in the Nuclear Industry: The Pebble Bed Modular Reactor Experience

Jorg Lalk; Pebble Bed Modular Reactor (Pty) Ltd, South Africa

This paper addresses a technology management process model that will augment the effectiveness of the technology program (a focused grouping of technology projects) of the Pebble Bed Modular Reactor (PBMR) project. The PBMR is a high temperature gas cooled nuclear reactor that fulfils the requirements of a Generation IV reactor. Put into perspective, most operational nuclear reactors today are either Generation II or Generation III with a few Generation III+ developments nearing operational use. The project is generally described as being some five or more years ahead of other Generation IV efforts underway in South Korea, China and the USA. This places the South African PBMR project in a class of its own, invariably causing a situation where it is difficult to compare key technologies directly with current operational reactors. The PBMR project is sometimes described as a so-called "First of a Kind Engineering" or FOAKE project making an effective technology management model all the more important. This paper describes the development of such a model from a successful technology program that initially focused mostly on specific technology projects with scant regard of the effective management of these from a technology management perspective. It is generally accepted that it is poor practice to attempt developments of new unproven technologies as part of the critical path of capital projects such as the PBMR. It is desirable to move such technology projects to a dedicated technology program where the focus will remain on the specific technologies, and should these turn out to be less than successful, not influence the large project too negatively. This said, the challenge lies in being able to identify the correct mix of technology projects, driving these to success and, importantly, identify appropriate insertion points of the outcomes of these technology projects into the capital project. This paper describes such a management model, its implementation and offers a glimpse into the first results of its application.

HD-05.3 [A] Mergers and Acquisitions: Team Performance

Richard Sperry; Portland State University, United States
Antonie Jetter; Portland State University, United States

Many mergers and acquisitions in high technology do not yield the expected results, and acquired technologies fail to create value as planned. One explanation is the difficulty to transfer and integrate the tacit components of technological knowledge when work groups and teams are disrupted. Mergers force work group and team members to redefine their roles, change their working approaches, and develop a shared vision and culture. The paper, therefore, researches high-tech mergers from a team perspective through an exploratory case study of two formerly separate quality assurance groups that were integrated into one. The case study identifies three factors that impact team performance after a merger: strong vision, clear communication, and operational synergy built on an open team culture and a common working approach.

HD-06 Technology Management for Sustainability-1
Thursday, 8/9/2007, 14:00 - 15:30 **Room: Broadway-4**
Chair(s): Brent A Zenobia; Portland State University

HD-06.1 [R] Green Patent: Promoting Innovation for Environment by Patent System

Mu-Yen Hsu; National Chengchi University, Taiwan

People usually emphasize the novelty and economic usefulness of an innovation but neglect its environmental impacts. This ideology was embodied into the institutional design of the patent system. In general, an innovation could be granted a patent if it can pass the examination of only three criteria: novelty, non-obviousness and usefulness. This kind of institutional design constrains the thinking process of the innovator in return - they strive to invent something new and profitable regardless of the environmental impacts. As a result, the environment is sacrificed. In this study, we try to explore a kind of institutional remedy. In order to alter the direction of technological development, we suggest refining the policy context of innovation, especially the patent system which motivates the innovation and diffuses the information. We introduce a new examination criterion, greenness, into the patent system, and discuss its feasibility and possible impacts. By incorporating this environmental concern into the patent examination, the patent system may encourage the innovator to invent "new, useful and green" products and processes. We call this kind of patent design "the Green Patent."

HD-06.2 [A] The Market Case for Green Energy: A Multiple Perspectives Approach

Kelly R Cowan; Portland State University, United States
Robert R Harmon; Portland State University, United States

This research is an examination of the business case for various "alternative energy" sources, known in the industry as "green energy." These energy sources are considered more environmentally friendly or to have less ecological impact than many conventional energy sources. Green energy is discussed as a form of new product development, which would enable organizations to meet specific goals, including both economic metrics and any "green metrics" which they may choose to establish. Given present energy trends, it could form the basis of strategy which may lead to long-term competitive advantage. The paper will assume a target audience of business managers and policy makers who need common sense, plain-spoken recommendations on the energy choices they should make in the near future.

HD-06.3 [A] Technology Assessment and Selection of Renewable Energy Sources in the Galapagos Islands - Ecuador

Bertha T Jimenez; Portland State University, United States
Audrey Alvear; Portland State University, United States
Abdulazi AlYabes; Portland State University, United States
Akin Olaoye ; Portland State University, United States

The Galapagos Islands are known throughout the world for their scientific importance, wildlife, beautiful scenery, tourism and fragile environment. Today, the islands depend on diesel to produce electricity. The use of diesel could cause serious problems to the environment, as oil spills have happened in the past. This is a subject that needs to be addressed, especially because of the nature of these islands. Furthermore, the current production does not cover the electricity demand of the islands. The objective of this paper is to assess and select an environmentally friendly renewable energy solution that will replace or at least reduce the load of diesel generators currently used. This paper provides background information and the electrical condition of the main islands as well as the candidate technologies. Furthermore, the renewable energy resources considered are: hydro, geothermal, solar, and wind energy. Finally, the methodology selected for conducting this study is pairwise comparison; and the model is based on concepts well established in the literature as well as expert judgment.

HD-07 Information Management-2
Thursday, 8/9/2007, 14:00 - 15:30 **Room: Forum Suite**
Chair(s): Kiyoshi Niwa; The University of Tokyo

HD-07.1 [R] The Similarity of Stock Prices and Indices in Progressing Information Technology Environment

Tamer Cagatay; Bogazici University, Turkey
Bertan Badur; Bogazici University, Turkey

Technological progress is an important aspect that affects the financial progress of enterprises. Due to high information share and on-line follow-up opportunities, response time

becomes shorter, resulting in the rapid change of the financial data of companies. The purpose of this paper is to find the similar patterns in the behavior of a company's shares and stock indices, which are triggered by information technology progress. Similar responses in financial time series data initiated by technological developments are expressed in the form of a similarity index, and behavior of this index is explored by time series data mining techniques. Technological progress indicators that are evaluated in the literature are considered, and the relationship between similarity index and technology progress indicators is investigated. Our hypothesis is that similarity in the company shares and stock indices behavior increases as information technology improves.

HD-07.2 [A] Corporate Competitive Advantage through Information Technology: Saudi Aramco Case

Baqer M Alali; Portland State University, United States

There are many articles that argue weather information technology has had any effect on or relationship with the competitive advantage of companies. Numerous papers addressed this issue when IT was advancing exponentially in the last decade. Some researchers came to the conclusion that IT would have no effect on a company's competitive advantage. On the other hand, some other papers proved the relationship between IT and IT performance with the corporate performance. This paper will discuss and analyze this relationship. More specifically, it will address the effect and the role of information technology on the strategic management of Saudi Aramco and how this would add an extra dimension to the corporate competitive advantage. Saudi Aramco is an oil production company producing and exporting oil from Saudi Arabia. The company also has various business lines that serve the country with oil-refined products. IT has been an integral part of the company strategy since it started producing oil in the 1930s.

HD-07.3 [R] Levels of Information Protocols Unit: A Production Management Point of View

Sandra L Pereira; Federal University of Paraiba, Brazil
Carlos Eduardo G Araujo; Federal University of Paraiba, Brazil

Key performance indicators play a very important role in the business scenario, providing strategic feedback, supplying information systems and giving support for decision-making. However, to get information to feed these indicators, modern systems have to collect data from a broad array of different systems and technologies, and that means operational risks and costs. Despite Enterprise Application Integration (EAI) tools and Extensible Markup Language (XML), protocols remain very diverse because of diversity of business processes and structures. Thus, this work aims to analyze information protocols and their usability, looking specifically to utilities industry as a starting point for a future expansion of analysis. Business structures and processes are described and respective associations with specific information protocols are made, building a framework of usability and relevance in production management. To reach the goals, this work starts by presenting theories and concepts from a background literature. The second part shows a typical business structure and processes for utilities in the Brazilian scenario, describing the set information protocols used and how these protocols may support the business. The third part presents analysis of protocols, verifying thru successful cases and pitfalls valuable contributions to production management. In the last part, some remarks and suggestions are presented according to the case and market trends.

HD-08 Technology Forecasting through Intelligence Mining
Thursday, 8/9/2007, 14:00 - 15:30 Room: Council Suite
Chair(s): Tugrul Daim; Portland State University

HD-08.1 [A] Exploring the Relationship between Research Funding and Science Innovation Indicators in Emerging Technologies

Pranabesh Dash; Intel, United States
Mitali Monalisa; Intel, United States
Neil Brown; Intel, United States
Tugrul U Daim; Portland State University, United States

Emerging technologies are observed to have similar growth patterns in terms of the number of published journals, conference articles and patents issued. This growth is triggered mostly by funded research. In this paper, we present an analysis of the research funding towards nanotechnology at the National Nanotechnology Initiative (NNI) and its relationship to the research output in Nanoscope, an application area of nanotechnology. Our paper analyzes the data collected from 1997 - 2006 and derives a definitive time lag between the allocation of research funds and issued patents and published journals. This assessment is achieved by identifying growth trends in patents, funds and publications and doing a curve-fit analysis using the Fisher-Pry model. We use linear regression analysis to show the correlation between the funding and research outputs. Alongside, non-linear programming objective function optimization technique is used to derive the time lag in years for each of the research outputs from the year of funds granted.

HD-08.2 [A] Technology Forecasting of RFID by Using Bibliometric Analysis and Bass Diffusion Model

J. Bae; Portland State University, United States
Karthik Suntharaman; Freightliner, United States
Patt Suntharasaj; Portland State University, United States
Yong Ding ; Portland State University, United States

Forecasting emerging technologies and identifying the rate of diffusion of products based on these technologies is difficult because of lack of data. Even here, techniques such as Bibliometric analysis and Bass model based on analogous products provide an opportunity to identify the technology growth and possible diffusion of the product. This paper uses Bibliometric analysis to forecast RFID technology and uses the adoption of barcode scanner to model the RFID scanner adoption in the US retail market.

HD-08.3 [A] Technology Forecasting with Science Indicators: The Case of Laptop Battery Futures

Stephen W Jordan; Portland State University, United States

This paper forecasts technological change for laptop batteries. Laptop performance has incrementally improved and power demand has increased, requiring batteries with higher energy densities. The most promising technology to replace laptop batteries emerging today is the fuel-cell. Currently, Li-ion batteries power laptop or mobile computers. Li-ion batteries, with their high charge potentials, promise to be the battery with the highest energy density. The problem is that there is currently a technical performance gap in the length of time that a battery can keep a laptop functioning.

HE-01 SPECIAL SESSION: PICMET 08 and 09 Planning Session
Thursday, 8/9/2007, 16:00 - 17:30 Room: Pavilion East
Speaker(s): Timothy R Anderson; Portland State University
Dilek Cetindamar; Sabanci University
Tugrul Daim; Portland State University
Antonie de Klerk; University of Pretoria
Antonie J Jetter; Portland State University
Dundar F Kocaoglu; Portland State University
Kiyoshi Niwa; The University of Tokyo
Liono Setiowijoso; Portland State University
Charles M Weber; Portland State University
Ann White; Portland State University

Every PICMET conference we try to make even better than the past conferences. Please come and give us feedback so we can all help to make future conferences even more successful. In particular, we will be discussing upcoming conferences such as PICMET '08 to be held in South Africa and PICMET '09, which will be held in Portland.

Note: [R] = Research paper; [A] = Industry Application

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