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PICMET '11



PICMET

Dear PICMET Guests:

It is a great pleasure for us to welcome you to PICMET '11.

As the global economic growth becomes increasingly dependent on energy, we are learning to move from an energy-hungry world to an energy-smart world. The realization of the scarcity of resources, the environmental concerns about the future of the planet, the race toward increasing technical capabilities by pushing away technological barriers, the pressure to maintain an economically feasible energy portfolio to become the engine for growth, the social impacts of the development and deployment of energy technologies, and the political realities



and constraints are all contributing to making energy the focus of attention throughout the world.

PICMET defines the primary role of Technology Management as the management of the technologies to assure that they work for the betterment of humankind. Development of energy policies, identification of the appropriate energy technologies for a sustainable future, evaluation of existing and emerging energy technologies along STEEP (social, technical, economic, environmental and political) dimensions are the drivers in the energy-smart world. These are all in the domain of Technology Management.

It is the responsibility of the Technology Management community to guide technology effectively to provide the world with the framework to respond to the changes taking place around us, and to move continuously toward better futures through innovation and technology development.

This is a big challenge for the leaders and emerging leaders in the Technology Management field. Recognizing this challenge, the PICMET '11 Conference explores the role of technology management in making the world an energy-smart world.

More than 760 papers were submitted to PICMET '11. After they were reviewed by at least one referee from the 119-member Program Committee, 344 were included in the conference. The referees are from universities, industrial organizations and

government agencies from around the world. The authors represent about 300 organizations in 37 countries.

The PICMET '11 Conference has two outputs:

This *Conference Bulletin* includes an up to 200-word abstract of each paper to enable the participants to select the sessions to attend and the presentations to follow. The Bulletin is intended as a reference book for an overview of the field, in general, and the conference, in particular.

The *Proceedings* is a flash drive containing full-length presentations included in the conference. Its purpose is to give full access to the entire conference for many years after the conference is over. The *Proceedings* is divided into 46 sections, listed below, each containing several papers on the topic of the section.

- **Technology Management Framework**
- **Strategic Management of Technology**
- **Science and Technology Policy**
- **Technology Management Collaborations**
- **Technology and Industry Convergence**
- **Technology Forecasting**
- **Technology Roadmapping**
- **Technology Planning**
- **Technology Assessment and Evaluation**
- **Technology Adoption**
- **Technology Diffusion**
- **Technology Transfer**
- **New Product Development Management**
- **New Venture Management**
- **Technology Marketing**
- **Decision Making in Technology Management**
- **Social Networks**
- **Technology Management Education**
- **Entrepreneurship/Intrapreneurship**
- **Technical Organizations and Workforce**
- **Management of Technological Change**
- **Innovation Management**
- **Open Innovation**
- **Radical Innovations**
- **Emerging Technologies**
- **Management of Information Technology**
- **Knowledge Management**

PICMET '11

- **Project/Program Management**
- **Software Process Management**
- **R&D Management**
- **Manufacturing Management**
- **Resource Management**
- **Productivity Management**
- **Supply Chain Management**
- **Sustainability**
- **Cultural Issues**
- **Environmental Issues**
- **Global Issues**
- **Technology Management in Energy Industry**
- **Technology Management in Semiconductors Industry**
- **Technology Management in Telecomm Industry**
- **Technology Management in Health Industry**
- **Technology Management in Service Industry**
- **Technology Management in Biotechnology Industry**
- **Technology Management in Transportation Industry**
- **Technology Management in Government**

A large number of colleagues around the world contributed to the success of PICMET '11.

The PICMET Board of Directors set the strategic direction; the Advisory Council provided guidance for the implementation of the strategies for the conference.

Ann White coordinated the overall planning for PICMET '11; Liono Setiowijoso designed, maintained and managed the information systems, and formatted the papers for the *Proceedings* and the *Bulletin*; Kenny Phan managed the registration process; Songphon Munkongsujarit and Inthrayuth Mahaphol coordinated the on-site activities; and Jeff Birndorf of endesign developed graphic arts for the conference.

Vince Reindl and Mike Storch of Omnipress worked with PICMET from the beginning to the end of the conference planning effort. Their professionalism and superb expertise assured the high quality production of the PICMET Proceedings on schedule.

The Country Representatives, under the leadership of Kiyoshi Niwa of the University of Tokyo and Dilek Cetindamar of Sabanci University, provided linkages between PICMET and the regions they represented. The Program Committee reviewed the papers and provided valuable assistance to assure the highest quality of presentations.

The 119 members of the Program Committee reviewed the papers in a double-blind refereeing process.

We acknowledge the support of all of these colleagues and hundreds of others who contributed to PICMET's success, and express our gratitude to all.

We also offer special thanks to Dean Renjeng Su of Portland State University's Maseeh College of Engineering and Computer Science for his support.

We believe the PICMET '11 *Bulletin* and this *Proceedings* contain some of the best knowledge available on Technology Management for addressing the challenges and opportunities in a world becoming smarter in the development and utilization of energy technologies. We hope they will contribute to the success of technology managers and emerging technology managers throughout the world.



Dundar F. Kocaoglu
President and CEO, PICMET



PICMET '11

EXECUTIVE COMMITTEE

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Portland State University

Executive Director and Conference Coordinator

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Portland State University

Co-director of Technical Activities and Program Co-chair

Timothy R. Anderson
Portland State University

Co-director of Technical Activities and Program Co-chair

Tugrul U. Daim
Portland State University

IEEE Representative and Program Co-Chair

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PermanTech

Director of Operations

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Portland State University

Director of International Activities

Kiyoshi Niwa
University of Tokyo

Co-director of International Activities

Dilek Cetindamar
Sabanci University

Co-director of On-site Coordination

Inthrayuth Mahaphol
Portland State University

Co-director of On-site Coordination

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Portland State University

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Antonie Jetter
Portland State University

Director of Awards

Charles M. Weber
Portland State University

Director of Registration

Kenny Phan
Portland State University

Director of External Activities

Paul R. Newman
Portland State University

Organizing Committee Member

Kelly Cowan
Portland State University



DEDICATION

PICMET '11 is dedicated to all researchers, educators and practitioners of Technology Management who are contributing to the establishment and growth of this field throughout the world.

PICMET '11

ORGANIZED BY

Department of Engineering and Technology Management
Portland State University
Maseeh College of Engineering & Computer Science

SPONSORS

Portland State University
PSU Office of Information Technologies
IKON Office Solutions
Travel Portland

COOPERATING SOCIETY

IEEE Oregon Technology Management Chapter

ADVISORY COUNCIL

PICMET has an International Advisory Council, which provides advice and counsel on critical issues and strategic directions. The members are listed below.

Dr. Bulent Atalay, University of Mary Washington and the University of Virginia – USA

Dr. Klaus Brockhoff, Otto Beisheim School of Management – Germany

Dr. Andre J. Buys, University of Pretoria – South Africa

Mr. Jim Coonan, Kentrox, Inc. – USA

Dr. Ibrahim Dincer, University of Ontario Institute of Technology – Canada

Dr. Pichet Durongkaveroj, Nat'l. Science, Technol. and Innovation Policy Office – Thailand

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Dr. David M. Steele, San Jose State University – USA

Dr. Nuket Yetis, TUBITAK – Turkey



PICMET '11

PROGRAM COMMITTEE

The Program Committee consisted of 119 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.

Richard Albright
Yasser Alizadeh
Joao Amato Neto
Hacer Ansal
Jean-Pierre Auffret
Nuri Basoglu
Nima A Behkami
Rian Beise-Zee
John Bers
Frederick W Betz
Ali Bilge
Ricarda Bouncken
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Renzo E Bustamante
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Dilek Cetindamar
Kah Hin Chai
Leong Chan
C M Chang
Shann-Bin Chang
Yu-Shan Chen
Hongyi Chen
Yu-Shan Chen
Mario M Coccia
Kelly R Cowan
Scott W Cunningham
Clive-Steven Curran
Pranabesh Dash
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Ozgur Dedehayir
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Robert Dryden
Jason Durfee

Alptekin Durmusoglu
Alptekin Erkollar
M Hosein Fallah
Clare Farrukh
Janice Forrester
Eliezer Geisler
Nathasit Gerd Sri
Anatole Gershman
Clandia M Gomes
Fredy A Gomez
Mohammad Halimi
Robert R Harmon
Bill Hefley
Jonathan C Ho
Liliya Hogaboam
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Boonkiart Iewwongcharoen
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Walter Leal
Scott A Leavengood
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Gerry Williams
Viviane A Winkler

PICMET '11

PICMET LEADERSHIP IN TECHNOLOGY MANAGEMENT (LTM) AWARD RECIPIENTS

The PICMET Leadership in Technology Management (LTM) 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.

The Award was established in 1991. The recipients between 1991 and 2010 with their affiliations and positions at the time of the award are listed below.

1991

Dr. Andrew S. Grove, CEO of Intel, USA

1997

Norman Augustine, Chairman of Lockheed Martin, USA

1999

Jack Welch, CEO of General Electric, USA

Dr. Richard M. Cyert, President of Carnegie Mellon University, USA

2001

Dr. Modesto A. Maidique, President of Florida International University, USA

Ms. Carleton S. Fiorina, Chairman and CEO of Hewlett-Packard Co., USA

Ms. Donna Shirley, Manager of the Mars Exploration Program, USA

2003

Mr. Jong-Yong Yun, Vice Chairman and CEO of Samsung Electronics, Inc., Korea

Dr. Joseph Bordogna, Deputy Director of the National Science Foundation (NSF), USA

Dr. Chun-Yen Chang, President of National Chiao Tung University, Taiwan

2004

Dr. Kwan Rim, Chairman of Samsung Advanced Institute of Technology (SAIT), Korea

Dr. Gunnar Hambræus, member of the Swedish Royal Academy of Science and former President and Chairman, Royal Swedish Academy of Engineering Sciences, Sweden

2005

Dr. Morris Chang, Founding Chairman, Taiwan Semiconductor Manufacturing Company Ltd. (TSMC), Taiwan

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, USA

Prof. Dr.-Ing. Dr. Sc. h.c. Bacharuddin Jusuf Habibie, former President, Indonesia, and founder and chairman, The Habibie Center, Indonesia

2006

Dr. Youngrak Choi, Chairman, Korea Research Council of Public Science & Technology (KORP), Korea

Dr. Tsuneo Nakahara, Adviser to CEO (past Vice Chairman) of Sumitomo Electric Industries, Ltd., Japan

Dr. Mehmet Nimet Ozdas, Dept. of Mechanical and Control Engineering, Istanbul Technical University, Turkey

Dr. Edward B. Roberts, David Sarnoff Professor of the Management of Technology and Chair, Massachusetts Institute of Technology (MIT) Entrepreneurship Center, USA

2007

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

Dr. 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

2008

William P. Venter, Chairman, Allied Electronics Corporation Limited, South Africa

Gideon de Wet, Professor Emeritus, University of Pretoria, South Africa

2009

Dr. Klaus Brockhoff, Professor, Otto Beisheim School of Management, Germany

Anne M. Mulcahy, Chairman and Former CEO, Xerox Corporation, USA

Prof. Muhammad Yunus, Managing Director, Grameen Bank, Bangladesh

2010

HRH Princess Maha Chakri Sirindhorn, Thailand

PICMET '11

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.

2004

Dr. Daeje Chin, Minister of Information and Communications, Seoul, Korea

Dr. Kiyoshi Niwa, Professor in the Department of General Systems Studies at the University of Tokyo, Japan

Rosalie A. Zobel, Director of Components and Systems in the Information Society and Media Directorate-General of the European Commission.

2005

Bob Colwell, President, R & E Colwell and Associates; and former Fellow, Intel Corporation.

2006

Dr. Frederick Betz, Former Program Officer, NSF

Dr. Fariborz Maseeh, Founder and President, The Massiah Foundation

Dr. T. Nejat Veziroglu, Director, Clean Energy Research Institute, University of Miami.

2007

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

2009

Dr. Albert H. Rubenstein, Founder and President, International Applied Science and Technology Associates (IASTA)

Professor Emeritus, Industrial Engineering and Management Sciences, Northwestern University.

2010

Kiran Mazumdar-Shaw, Chairman and Managing Director, Biocon Limited, India

Prof. Dr. Nuket Yetis, President, Scientific and Technological Research Council of Turkey (TÜBİTAK).

SHARE THE PICMET EXPERIENCE



THE PICMET EXPERIENCE

Joining the world's leading technology management experts from academic institutions, industrial corporations and government agencies for discussions on cutting-edge topics.

PICMET '11

PICMET FELLOWS

On its 20th Anniversary, PICMET is creating a Fellow category as a new award to recognize outstanding contributions to the development and growth of the Engineering and Technology Management discipline. The first recipients of this new award are those who provided leadership in the establishment of PICMET and those who completed their 6-year terms in serving the PICMET Advisory Council. The Fellows in subsequent years will be selected from nominees from around the world.

The 2011 Fellows are listed in alphabetical order below.

Mr. Charles Allcock, PGE, USA
Dr. Daniel Berg, Rensselaer Polytechnic Institute (RPI), USA
Dr. Frederick Betz, Portland State University, USA
Dr. Joseph Bordogna, University of Pennsylvania, USA
Dr. Youngrak Choi, Korea University, Korea
Dr. Robert Colwell, DARPA, USA
Dr. Joseph Cox, Distinguished Public Service Professor and Chancellor Emeritus, OUS, USA
Ms. Charmagne Ehrenhaus, Portland Community College, USA
Mr. Les Fahey, Fahey Ventures, USA
Dr. Gunnar Hambræus, Royal Swedish Academy of Engineering Sciences, Sweden
Dr. Dundar Kocaoglu, Portland State University, USA
Mr. Thomas Lipscomb, The Center for the Digital Future, USA
Dr. Tom Long, Tektronix Vice President, Retired, USA
Mr. John McDougall, Alberta Research Council, Canada
Dr. Graham Mitchell, University of Pennsylvania, USA
Dr. Kiyoshi Niwa, The University of Tokyo, Japan
Dr. Kwan Rim, Samsung Corporation, Korea
Dr. Frederick Rossini, George Mason University, USA
Mr. Terry Rost, The Franchise Group, USA
Dr. Nam Suh, KAIST, Korea
Dr. Nejat Veziroglu, University of Miami, USA
Dr. Eric von Hippel, MIT, USA
Dr. Seiichi Watanabe, Terumo Corporation, Japan
Dr. Rosalie Zobel, European Commission, Belgium



STUDENT PAPER AWARD

PICMET NAMES ITS OUTSTANDING STUDENT PAPER AWARD

An endowment has been created to name the PICMET Outstanding Student Paper Award after **Brad W. Hosler**, who was a dedicated engineer and technology leader with 25 years of service at Intel, as well as a proud and loving family man. Brad Hosler lived by his motto: "Work hard, play hard."

AWARD CRITERIA

The **Brad W. Hosler PICMET Outstanding Student Paper Award** is bestowed upon a paper based on the student's research toward a graduate degree in the area of Engineering and Technology Management. Eligibility is restricted to currently enrolled students and those who have received their master's or doctorate degrees after January 1, 2009. The paper is nominated by the advising professor and selected by the Awards Committee. The award consists of \$1,000, complimentary conference registration and a plaque



for the student, as well as a plaque and complimentary registration for the nominating professor. The winner may not be nominated again for the same award in subsequent years.

for the student, as well as a plaque and complimentary registration for the nominating professor. The winner may not be nominated again for the same award in subsequent years.

ABOUT BRAD W. HOSLER

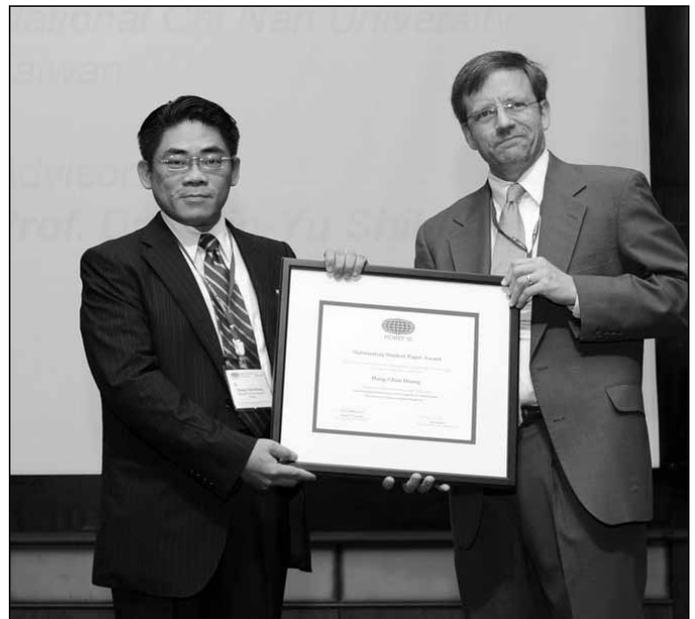
Brad Hosler passed away on August 31, 2007, at his home in Portland, Oregon, after several years of battling cancer. He received his undergraduate degree from Bucknell University and completed his graduate studies at Carnegie Mellon University. Brad joined Intel in 1980 to work on the architecture and implementation of the I/O subsystem

and had key roles in the Plug & Play BIOS definition and its implementation on Intel's first PCI chipset, Saturn. He formed the Compliance Workgroup to establish the PC industry's first multi-vendor I/O compliance program. The innovative methods and practices that he architected and implemented have become the benchmark for the computer industry. Brad was among the pioneers recognized for his industry contributions at the 10-year anniversary of the PCI-SIG, which has a worldwide membership of about 900 companies.

Brad's signature accomplishments are associated with the Universal Serial Bus (USB) family of technologies. He received two Intel Achievement Awards, one in 2003 and another in 2006, for his outstanding work. The success of the USB interface and market of platforms and peripherals that sell in multiple billion units today is a measure of his impact.

Brad was promoted to Principal Engineer in 2006 and was vested with the informal authority of Chief Technical Officer for the USB Implementers Forum.

PICMET is proud to recognize Brad Hosler's accomplishments, as an engineer and a technology leader, by naming the Outstanding Student Paper Award after him.



STUDENT PAPER AWARD



**BRAD W. HOSLER
OUTSTANDING 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

Zhongquan Xie

ADVISOR & CO-AUTHOR

Prof. Kumiko Miyazaki

UNIVERSITY

Tokyo Institute of Technology, Japan

PAPER TITLE

“Dynamics and Heterogeneity of Product Innovation in Embedded Software: The Case of Japanese Automotive Software”

ABSTRACT

This paper contributes to the research on dynamics and heterogeneity of product innovation in embedded software in the case of Japanese automotive software (ASW). Functions of embedded software are realized by being embedded into hardware, so if we know the functions of an embedded system, we know the functions of its embedded software. Therefore, based on the advantage of using patenting in large third countries as a good proxy measure for national innovation activities, we use ASW related patents in the USPTO patent database as an indicator of ASW product innovation. The results show that heterogeneous actors have had different roles and propensities to innovate in several fields of ASW functions, namely power train control, battery and electric power control, safety control, body control and ICT system over the period 1981 to 2010. There was a shift beginning in the early 1990s when suppliers were becoming more and more important in product innovation of ASW. Increasing cooperation happened mainly between the automotive makers and suppliers, especially big suppliers. To conclude, the heterogeneous requirements for real-time operation and accumulation of specific knowledge that are technologically difficult and complex are the main reasons for heterogeneity of product innovation in embedded software.



LTM AWARD

THE RECIPIENT OF THE PICMET '11 LEADERSHIP IN TECHNOLOGY MANAGEMENT (LTM) AWARD IS DAVID M. STEELE

David M. Steele

Dean, College of Business and Lucas Graduate School of Business, San Jose State University, USA

Dr. David M. Steele joined San Jose State University (SJSU) as Dean, College of Business and Lucas Graduate School of Business, in July, 2008. He is building on the College's strengths by enhancing academic quality and student success; and by emphasizing practical business knowledge and global business education, including the new Thompson Global Internship Program.



Previously, he was Dean of the Silberman College of Business at Fairleigh Dickinson University, which includes

the prestigious Rothman Institute of Entrepreneurial Studies; and Professor and Dean of the College of Business at Florida Institute of Technology.

Dr. Steele rose through the ranks of Chevron Corporation (ranked Fortune # 3 today) to become President of Chevron Latin America. He had a broadly diversified career track in R&D, project engineering, finance, strategic planning, and IT before moving to senior executive management positions. After leaving Chevron, Dr. Steele was an Executive Consultant to the founders of four international early-stage ventures, serving as Interim CEO of one of these ventures, a software startup.

Dr. Steele attended Birmingham University in England, receiving BS and Ph.D. degrees in Chemical Engineering. He later completed graduate business training at UC Berkeley and at the Wharton School.



MEDAL OF EXCELLENCE

THE RECIPIENT OF THE PICMET '11 MEDAL OF EXCELLENCE IS ALEJANDRO CRUZ

Alejandro Cruz

Minister of Science and Technology, Costa Rica

Alejandro Cruz was appointed Minister of Science and Technology of Costa Rica on February 15, 2011. Previously, he was involved in various positions with the Costa Rica Institute of Technology, a public university that started in 1973. He served as a President of the University from 1995 to 2003.

During his term in the Costa Rica Institute of Technology, the University acquired a strategic position in the development of Costa Rica by introducing new technology programs and building strong ties with the attraction of foreign direct investment and the support of small and medium enterprises.



Mr. Cruz has also been associated with the National Rectors Council (CONARE) and the National Center of High Technology (CENAT), both supported by the State Universities. Another important academic challenge for Mr. Cruz, was the creation and initial operation of the Central American Council for Accreditation of Higher Education (CCA), where he served as Founder and Vice President.

In the area of planning and developing a country vision for Costa Rica, Mr. Cruz was coordinator for the initiative called "Estrategia Siglo XXI," which is a long-term strategy based on science, technology and innovation. This effort was supported by numerous professionals from academia, industry and government.

Mr. Cruz worked for the Latin American Energy Organization (OLADE) from 1983 to 1987. He has also served as both advisor and consultant for various government agencies, academic institutions and private companies.

Since his retirement in 2009, Mr. Cruz was dedicated to his family farm and business until President Laura Chinchilla designated him Minister of Science and Technology.

Mr. Cruz has a degree in Chemical Engineering from the University of Costa Rica and a Master of Science from the State University of New York (SUNY) and Syracuse University.

He is married to Isabel Guzmán and they have four children.



GENERAL INFORMATION

CONFERENCE FOCUS

Just as the agricultural revolution shaped the 19th century, and the industrial revolution became the signature of the 20th century, energy is emerging as the defining characteristic of the 21st century. With the rise of Asia as a new economic power, and the increased recognition of the environmental constraints throughout the world, we are seeing a dramatic increase in the need for new energy technologies for a sustainable future.

There is no shortage of efforts for developing energy technologies throughout the world. As the technologies develop, it becomes the responsibility of the Technology Management community to guide those technologies effectively for the betterment of humankind. This is a big responsibility for the leaders and emerging leaders in the Technology Management field, but it is critical that they accept the responsibility and meet the challenges head on. That is the focus of the PICMET '11 Conference. The role of Technology Management in the Energy-Smart World is highlighted throughout the conference.

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 '11 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 '11 program consists of

- Optional short courses on Saturday, July 30, and Sunday, July 31, where experts from around the world share their knowledge and ideas with the participants
- Ph.D. Colloquium, "Getting Your PhD... and Beyond," Sunday, July 31, 13:00 - 17:00, Broadway Rooms
- Plenary sessions by global leaders from industrial corporations, academic institutions and government agencies in the Pavilion Room
- Two special meetings:
 1. Country Representatives Meeting, Wednesday, August 3, 12:00-14:00, Alexander's Restaurant (23rd floor)
 2. PICMET '12 & '13 Planning Session, Thursday, August 4, 16:00-17:30, Pavilion West
- 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 are two publications at PICMET '11:

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

The publications will be available to PICMET '11 attendees at the registration desk.

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 registration fee does not include the evening social events. The student registration fee does not include Monday and Tuesday evening events. Pre-conference short courses and site visits are not included in the registration fee. Tickets for these events may be purchased at the registration desk.*

GENERAL INFORMATION

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: Parlor-C 12: Parlor-B 13: Parlor-A

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.

WIRELESS ACCESS

Wireless access will be available 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 system includes MAX (Metropolitan Area Express) light rail, Tri-Met buses, and the Portland Streetcar. MAX and the streetcar are free within the downtown area and east across the Willamette River as far as the Lloyd Center stop. Outside this "Fareless Square," fares range from \$2.05 - \$2.35, less for seniors ("honored citizens"), the disabled and youths. Tickets are interchangeable among the three and can be purchased aboard buses or from ticket machines along the MAX or Streetcar lines.

Complete information about Portland's public transportation system is available at <http://trimet.org>.

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.

If you are traveling light and do not mind walking two blocks, you can board the MAX (Metropolitan Area Express, <http://trimet.org>) Red Line on the baggage claim level of the Portland International Airport (follow the signs to MAX Light Rail). 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 \$2.35 ("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 gratuities are voluntary. Tips are rewarded for services performed (gratitude) and are a supplement to an employee's income.

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.

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 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.



Downtown Portland and the Willamette River

The State of Oregon is famous for its award winning wineries and golf courses, as well as its breathtaking coastline, rivers and mountains. We hope you will venture out and experience Portland and the surrounding countryside while you are in Oregon.

Following is a sampling of events and destinations while you are visiting. For a complete list, visit www.travelportland.com (provided by Travel Portland).

PORTLAND EVENTS

First Thursday Gallery Walk

"First Thursday" is an after-hours evening gallery walk that takes place on the first Thursday of each month. On Thursday, August 4, galleries and shops in Old Town, the Pearl District and downtown will stay open late, inviting the public to mingle with the artists and explore new exhibits. The streets buzz with performers, sidewalk artists and enthusiastic crowds, and many galleries offer free appetizers and wine.

CITY OF ROSES

Flicks on the Bricks

On five Friday evenings in July and August, Pioneer Courthouse Square will be transformed into an outdoor movie theater for the entire community to enjoy. Each Flicks on the Bricks event will kick off at 7 pm with live entertainment provided by KINK.FM followed by movies which will begin at dusk. Admission is free and attendees are encouraged to bring low back chairs, pillows, cushions or bean bags to truly make the Square their 'living room.' Food and beverages will be available for purchase on-site. *(July 29th: Indiana Jones and the Last Crusade; August 5th: Westside Story; Pioneer Courthouse Square, 701 SW 6th St.; free)*

Noon Tunes Summer Concert Series

Since 2002, Pioneer Courthouse Square has celebrated summer with two free lunchtime concerts every week in July and August. The popular Noon Tunes Concert Series showcases the best in regional and local musical talent each Tuesday and Thursday from noon-1 p.m. *(Tuesdays and Thursdays; Pioneer Courthouse Square, 701 SW 6th Ave.; 12:00-13:00; free)*

Oregon Brewers Festival

The 24th Annual Oregon Brewers Festival, July 28-31, is one of the nation's longest running and best loved craft beer festivals. Situated on the west bank of the Willamette River, with towering Mt. Hood as a backdrop, it is the ideal venue for anyone who loves craft beer. With a laid back attitude and scores of award-winning beers, the festival reflects the essence of the city of Portland.

The Oregon Brewers Festival exists to provide an opportunity to sample and learn about a variety of craft beer styles from across the country. Eighty-four craft breweries from all parts of the nation offer more than 30 styles of handcrafted brews to nearly 80,000 beer lovers during the four-day event. A Buzz Tent offers another 50+ rare and specialty beers.

The festival's focus is craft beer, but there's more than sampling involved. The event features live music all four days, beer-related vendors, beer memorabilia displays, beer writers and publishers, homebrewing demonstrations, and an assortment of foods from a variety of regions. *(Tom McCall Waterfront Park; Main entrance at S.W. Oak Street and Naito Parkway, www.oregonbrewfest.com)*

Oregon Zoo Summer Concerts

Chris Isaak, Béla Fleck & the Flecktones with Bruce Hornsby and the Noisemakers, and Big Bad Voodoo Daddy are just a few of the concerts scheduled for the Oregon Zoo's annual summer series. *(Oregon Zoo, 4001 SW Canyon Rd.; for schedule and ticket prices visit www.oregonzoo.org/Concerts)*

Portland Saturday Market

Stroll down row upon row of local handcrafted items and homemade foods. The Portland Saturday Market—open Sundays too—is the nation's largest open-air craft market. Talk directly to the artists and learn about their creative styles and products. *(Waterfront Park and Ankeny Plaza in Historic Old Town Chinatown; Saturdays 10:00-17:00; Sundays 11:00-16:30; www.portlandsaturdaymarket.com)*



Farmers Market

Portland Timbers Soccer

Major League Soccer's newest addition, the Portland Timbers, will host Toronto on July 30 and Los Angeles on August 3 in the newly remodeled JELD-WEN Field. *(JELD-WEN Field, 1844 SW Morrison; for schedule and ticket information visit www.portlandtimbers.com)*

Saturday Portland Farmers Market

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

Wednesday Portland Farmers Market

Local farmers provide fresh produce, flowers and other items to the business crowd and downtown residents. *(South Park Blocks between SW Salmon and SW Main behind the Arlene Schnitzer Concert Hall; 10:00—14:00; Wednesdays only)*

CITY OF ROSES

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. 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.

Oregon Historical Society

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

Oregon Museum of Science and Industry (OMSI)

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. (1945 S.E. Water Avenue, Portland, Oregon; www.oms.edu)

Pittock Mansion

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. (3229 N.W.

Pittock Drive, Portland, Oregon 97210; for hours and admission charge visit www.pittockmansion.org)

Portland Art Museum

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

Portland Classical 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 historic Old Town Chinatown, the "Garden of Awakening Orchids" is a collaboration with Portland's Chinese sister city, Suzhou. (Northwest 3rd Ave. at Everett Street; hours: 10:00—18:00; admission, \$8.50; www.portlandchinese-garden.org)

Portland Spirit

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. (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)

Portland Walking Tours

Portland Walking Tours is the #1 ranked attraction and tour in Portland. These fun and award-winning tours explore the excitement, history, food, architecture, neighborhoods, bridges, parks, fountains, artwork, and just plain weird places in Portland, Oregon.

The Epicurean Excursion, Best of Portland, Underground Portland, and Roses Gone Wild tours are available seven



Pittock Mansion

CITY OF ROSES

days a week; and the Chocolate Decadence and Beyond Bizarre tours are every weekend year-round. Join the award-winning, leisurely walks with no hills and discover what guests and the media are talking about. (www.portland-walkingtours.com)

Powell's City of Books

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. (1005 W. Burnside; www.powells.com/locations/powells-city-of-books)

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 east end of SW Salmon St.

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 also wonderful surprises such 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. (www.washingtonparkpdx.org)

Oregon Zoo

Trek through the tropics amid the sounds of birds, monkeys and other creatures. You're not in West 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. Five minutes from downtown on Hwy. 26 West, or take MAX light rail. (Washington Park, 4001 S.W. Canyon Road, for hours and admission price visit www.oregon-zoo.org)



Japanese Garden

Japanese Garden

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. (Washington Park; for hours and admission price visit www.japanesegarden.com)

World Forestry Center

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. (Washington Park, 4033 S.W. Canyon Road; for hours and admission price, visit www.worldforestry.org)

Hoyt Arboretum

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. (Washington Park, 4000 SW Fairview Blvd.)

CITY OF ROSES

International Rose Test Garden

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. (*Washington Park, 400 SW Kingston Ave.*)

Willamette Jetboat Excursions

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

SHOPPING

Downtown Portland

In the heart of downtown, you will find Pioneer Place – four city blocks filled with shopping, dining and entertainment. (*700 SW Fifth Ave.; www.pioneerplace.com*)

Nordstrom and Macy's department stores are adjacent to Pioneer Square, and specialty shops are scattered throughout downtown Portland.

Northwest/Nob Hill

This district's main streets (Northwest 23rd and 21st Avenues) are packed with boutiques selling Portland-designed clothing and housewares.

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 into sleek loft apartments, cutting-edge art galleries and vibrant international restaurants.

Though the neighborhood features outstanding brewpubs, delicious international cuisine and the world's larg-

est 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. (*www.explorethepearl.com/*)

Portland's Mall Scene

Bridgeport Village offers an exclusive mix of local, regional and national shops unlike any other shopping experience in Oregon. (*7455 SW Bridgeport Rd., Tigard, Oregon; www.bridgeport-village.com*)

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; www.premiumoutlets.com/outlets/outlet.asp?id=28*)

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; http://jantzenbeachsupercenter.com*)

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; www.lloydcenter.com)

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

Woodburn Company Stores, Oregon's largest outlet center, features over 100 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; www.woodburncompanystores.com*)



Pioneer Place Food Court

IEEE TMC RECEPTION

IEEE TECHNOLOGY MANAGEMENT CHAPTER RECEPTION

DATE: WEDNESDAY, AUGUST 3
TIME: 19:00 – 19:30 DESSERT
19:30 – 21:30 PRESENTATION,
Q & A, NETWORKING
LOCATION: PAVILION BALLROOM EAST
SPEAKER: CHARLIE ALLCOCK, DIRECTOR
OF ECONOMIC DEVELOPMENT,
PORTLAND GENERAL
ELECTRIC, USA

Mr. Charlie Allcock is the Director of Economic Development at Portland General Electric. Recognized by *Automotive News* as an “electrifying leader,” Mr. Allcock is the electric vehicle point man for Portland General Electric and has helped put the utility at the center of some of the largest vehicle-grid projects to date. Portland General Electric and Ford Motor Co. announced a collaborative deal in August 2010 to prepare Portland’s grid for EVs and study the introduction of plug-in vehicles to the grid. That same month, Portland General Electric installed the nation’s first quick-charging system at its headquarters. Portland General Electric also has installed a number of charging stations throughout greater Portland.



There is no fee for this event for those registered for the PICMET conference. Advanced registration is required, however. Please visit http://meetings.vtools.ieee.org/meeting_registration/register/7549/ to register.

For further information, please contact Chris Dennis, Registration Volunteer, 503-803-7627, christopher.dennis@ieee.org.

This event is jointly sponsored by the IEEE – Oregon Technology Management Council Chapter and PICMET.

SOCIAL EVENTS

To facilitate the informal interaction of the participants, several social events have been scheduled during PICMET '11.

RECEPTION/BUFFET

DATE: SUNDAY, JULY 31
TIME: 19:00—22:00
LOCATION: HILTON PAVILION
DRESS: INFORMAL

Meet other conference attendees, renew old acquaintances, begin new friendships and collaborations, and celebrate PICMET's 20th anniversary at this opening reception/buffet in the Hilton Pavilion. Included in the registration fee.*

DINNER AT DIRECTOR PARK

DATE: MONDAY, AUGUST 1
TIME: 19:00—22:00
LOCATION: DIRECTOR PARK,
815 SW PARK AVENUE
DRESS: INFORMAL



Enjoy a sumptuous buffet of dishes prepared with locally grown ingredients while you mingle and network with colleagues.

“Before its completion in 2010, Director Park was a parking lot. Now, it’s a European-style piazza, a square-block expanse of honey-hued granite, a bosque of yellowwood trees, a burbling fountain, sculpted benches, and a 1,000-square-foot glass canopy that hovers far above,” says Sunset Magazine, which picked Director Park as one

of the top-10 urban parks in the USA.

Singer Kenny Phan (PICMET's registration chair), Ricky, Dong-Joon, and Fredy will perform a variety of pop, country, and international songs. Included in the registration fee.*



AWARDS BANQUET

DATE: TUESDAY, AUGUST 2
CASH BAR: 18:30—19:00
(IN THE PLAZA FOYER)
BANQUET: 19:00—22:00
LOCATION: HILTON PAVILION
DRESS: BUSINESS ATTIRE

This is the premier social event of the conference. The PICMET '11 Leadership in Technology Management, Medal of Excellence, Outstanding Student Paper, and PICMET Fellow awards will be presented at the banquet. Included in the registration fee.*

**The one-day registration fee does not include the evening social events. The student fee does not include the Monday and Tuesday evening events. Tickets for these events may be purchased at the registration desk.*



SITE VISITS

Site visits to the following companies are offered during PICMET '11. Seating is limited, so sign up early (\$45).

The times below include travel time. A bus will board passengers on SW Salmon Street next to the Hilton. A PICMET volunteer will be in the hotel lobby by the 6th Avenue entrance to guide you to the bus.

DAIMLER TRUCKS NORTH AMERICA

MONDAY, AUGUST 1, 12:45-17:00

Daimler Trucks North America LLC, a Daimler company, is the largest heavy-duty truck manufacturer in North America and a leading producer of medium-duty trucks and specialized commercial vehicles.

Headquartered in Portland, Oregon, USA, Daimler Trucks North America LLC manufactures, sells and services several renowned commercial vehicle brands. Through the company's affiliates, Daimler Trucks North America 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 Daimler Truck Financial and TravelCenters of America.

In addition to all corporate support functions, Portland, Oregon, is home to Daimler Trucks North America's Styling and Test Centers, which house the industry's most advanced engineering and design systems. This site visit includes a tour of the Materials Lab and Prototype Parts Development, the Cab and Full Vehicle Shaker Lab, the Cold Chamber, Climatic Wind Tunnel, Components Test Lab, Structures and Dynamics Lab, and Wind Tunnel. (<http://www.daimler-trucksnorthamerica.com>)

SHOREPOWER TECHNOLOGIES / REDCLOUD EV / CLEAREGE POWER

TUESDAY, AUGUST 2, 09:30-14:00

This tour will visit three companies that are on the cutting edge of green technologies.

Shorepower Technologies is currently deploying Electrified Parking Spaces (EPS) across North America. Shorepower provides EPS for Truck Stop Electrification (TSE) as well as electric vehicles and plug-in hybrid electric vehicles. Shorepower TSE allows truck drivers to turn off their engines and plug into all weather electrical and communication outlets during mandatory rest periods.

This reduces fuel costs, toxic exhaust emissions, maintenance costs and provides a better night's rest. (<http://www.shorepower.com>)

REDCLOUD Electric Vehicle Development shares the facilities with ShorePower, so tour attendees will meet executives and tour both facilities. REDCloud is a fleet electrification and management company serving cities, universities and commercial customers with offices in Southern Oregon and Portland. (<http://www.redcloudev.com>)

ClearEdge Power is leading the way in clean energy innovation that allows home and business owners to save money and protect the environment. With operations up and down the West Coast of the United States, the company is creating new, green jobs and promoting the growth of clean energy.

Established in 2003, ClearEdge Power possesses extensive knowledge of fuel cells, fuel processing and systems integration. Its innovative products enable customers to significantly reduce their electricity bills, improve the energy efficiency of their home or business, and reduce their carbon emissions profile. (<http://www.clearedgepower.com>)

TEKTRONIX

TUESDAY, AUGUST 2, 12:45-17:00

Whenever you view a web site, click a mouse, make a cell phone call, or turn on a TV you touch Tektronix' work. As a world leader in test, measurement and monitoring technology, Tektronix enables its customers to do more than they ever have. Technical innovators of all kinds benefit from the company's products and expertise.

Tektronix is a leading supplier of test and measurement equipment such as oscilloscopes, logic analyzers, protocol analyzers, bit error rate testers, signal generators, spectrum analyzers, digital multimeters, DC power supplies, and frequency counters and timers.

Tektronix, which is celebrating its 65th anniversary this year, was founded in Beaverton, Oregon, and is still headquartered there today.

This visit to Tektronix' Beaverton campus includes a presentation on the history of innovation at Tektronix, a tour through the Tektronix Heritage center, and a tour of the component manufacturing facilities to view lean production in action. (<http://www.tek.com>)

TECHNICAL PROGRAM

PROGRAM OVERVIEW

The PICMET '11 technical program consists of 123 sessions including 5 plenaries, 5 tutorials, 2 panel discussions, 2 special sessions and 109 paper sessions.

The plenaries are scheduled from 08:30 to 10:00 every morning, Monday, August 1 through Thursday, August 4; and on Monday, August 1, from 14:00-15:30, 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 for 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 '11 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 73 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 Monday from 14:00-15:30, which is a plenary session.

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 order to give you a breakdown of the sessions by time of day, followed by a schedule of sessions by room.

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 '11.



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DAILY SCHEDULE

MONDAY, AUGUST 1, 2011

	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 Parlor-C	12 Parlor-B	13 Parlor-A
Monday 8/1/2011 08:30-10:00	Plenary - 1												
Monday 8/1/2011 10:30-12:00	Innovation Management-1	Technology Management in Energy Industry-1	TUTORIAL: To Succeed in Services by Creating Strategic Differentiation and Operational Excellence	Software Process Management-1	Project/Program Management-1	Management of Technological Change-1	Knowledge Management-1	R&D Management-1			Sustainability-1	Manufacturing Management-1	Technology Adoption-1
Monday 8/1/2011 12:00-14:00													
Monday 8/1/2011 14:00-15:30	Plenary - 2	Technology Management in Energy Industry-2	Technology Management Collaborations	Software Process Management-2	PANEL: Contemporary Practices and Challenges in Project Management	Decision Making in Technology Management-1	Technology Management in Semiconductor Industry	R&D Management-2	Open Innovation-1	Technology Management in Health Industry	Sustainability-2	Technology Management in Service Industry-3	Management of Technological Change-2
Monday 8/1/2011 16:00-17:30	Innovation Management-2												

DAILY SCHEDULE

TUESDAY, AUGUST 2, 2011

	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 Parlor-C	12 Parlor-B	13 Parlor-A
Tuesday 8/2/2011 08:30-10:00	Plenary - 3												
Tuesday 8/2/2011 10:30-12:00	Innovation Management-3	Technology Management in Energy Industry-3	Technology Management Framework-2	Environmental Issues-1	Project/Program Management-2	Technology Management in Biotechnology Industry-1	Social Networks-1	R&D Management-3	Cultural Issues-1	Technology and Industry Convergence	Technology Management in Transportation Industry	Manufacturing Management-2	Radical Innovations
Tuesday 8/2/2011 12:00-14:00													
Tuesday 8/2/2011 14:00-15:30	Innovation Management-4	Technology Management in Energy Industry-4	Building Effective Alliances and Winning the Innovation Race	TUTORIAL: Visual Strategy: Exploring The Visual Format Of Roadmaps	Project/Program Management-3		Technology Management in Education-1	Technology Management Framework-3	Open Innovation-2	Technology Forecasting-1	Technology Transfer-1	Manufacturing Management-3	
Tuesday 8/2/2011 16:00-17:30	Innovation Management-5	Technology Management in Energy Industry-5	Technology Management in Government	Strategic Management of Technology-1	Technology Management in Telecommunication Industry	Decision Making in Technology Management-2	Social Networks-2	Technology Management Framework-1	Entrepreneurship / Intrapreneurship	Technology Roadmapping-1		Supply Chain Management	Technology Assessment and Evaluation-1

DAILY SCHEDULE

WEDNESDAY, AUGUST 3, 2011

	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 Parlor-C	12 Parlor-B	13 Parlor-A
Wednesday 8/3/2011 08:30-10:00	Plenary - 3												
Wednesday 8/3/2011 10:30-12:00	Innovation Management-6	Technology Management in Energy Industry-6	Science and Technology Policy-1		Emerging Technologies-1	Technology Marketing-1	Technology Management in Biotechnology Industry-2	Technology Planning	New Product Development-1	Technology Forecasting-2	Environmental Issues-2	New Venture Management	Technical Organizations and Workforce-1
Wednesday 8/3/2011 12:00-14:00													
Wednesday 8/3/2011 14:00-15:30	Innovation Management-7	Technology Management in Energy Industry-7	Science and Technology Policy-2	Strategic Management of Technology-2	Emerging Technologies-2	Cultural Issues-2	Knowledge Management-2	Technology Management in Service Industry-1	New Product Development-2	Technology Roadmapping-2	Technology Management in Education-2	PANEL: Meet the Editors	Technology Adoption-2
Wednesday 8/3/2011 16:00-17:30	Innovation Management-8	Technology Management in Energy Industry-8	Science and Technology Policy-3	Strategic Management of Technology-3	Project/Program Management-4	Technology Marketing-2	Knowledge Management-3	Technology Management in Service Industry-2	Productivity Management	TUTORIAL: Technology Forecasting using DEA	Technology Transfer-2	Manufacturing Management-4	Technology Assessment and Evaluation-2

DAILY SCHEDULE

THURSDAY, AUGUST 4, 2011

	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
Thursday 8/4/2011 08:30-10:00	Plenary - 5									
Thursday 8/4/2011 10:30-12:00	Innovation Management-9	Technology Management in Energy Industry-9		Global Issues	Project/Program Management-5	Technical Organizations and Workforce-2	Management in Information Technology-1	R&D Management-4	New Product Development-3	Technology Forecasting-3
Thursday 8/4/2011 12:00-14:00										
Thursday 8/4/2011 14:00-15:30		Technology Management in Energy Industry-10	Science and Technology Policy-4	Strategic Management of Technology-4		Decision Making in Technology Management-3	Management in Information Technology-2	R&D Management-5	Technology Transfer-3	Technology Diffusion
Thursday 8/4/2011 16:00-17:30		PICMET 2012 Planning Session								

SCHEDULE OF SESSIONS

SCHEDULE OF SESSIONS BY DATE

MONDAY, AUGUST 1, 2011

Session Number	Day	Time	Room	Session Title
MA 01	Monday	08:30 - 10:00	Pavilion	PLENARY: "Plenary - 1"
MB 01	Monday	10:30 - 12:00	Pavilion East	"Innovation Management-1"
MB 02	Monday	10:30 - 12:00	Pavilion West	"Technology Management in Energy Industry-1"
MB 03	Monday	10:30 - 12:00	Broadway-1	TUTORIAL: "To Succeed in Services by Creating Strategic Differentiation and Operational Excellence"
MB 04	Monday	10:30 - 12:00	Broadway-2	"Software Process Management-1"
MB 05	Monday	10:30 - 12:00	Broadway-3	"Project/Program Management-1"
MB 06	Monday	10:30 - 12:00	Broadway-4	"Management of Technological Change-1"
MB 07	Monday	10:30 - 12:00	Forum Suite	"Knowledge Management-1"
MB 08	Monday	10:30 - 12:00	Council Suite	"R&D Management-1"
MB 09	Monday	10:30 - 12:00	Directors Suite	TUTORIAL: "Metrics and Methods for Managing Payment Fraud"
MB 11	Monday	10:30 - 12:00	Parlor-C	"Sustainability-1"
MB 12	Monday	10:30 - 12:00	Parlor-B	"Manufacturing Management-1"
MB 13	Monday	10:30 - 12:00	Parlor-A	"Technology Adoption-1"
MD 01	Monday	14:00 - 15:30	Pavilion	PLENARY: "Plenary - 2"
ME 01	Monday	16:00 - 17:30	Pavilion East	"Innovation Management-2"
ME 02	Monday	16:00 - 17:30	Pavilion West	"Technology Management in Energy Industry-2"
ME 03	Monday	16:00 - 17:30	Broadway-1	"Technology Management Collaborations"
ME 04	Monday	16:00 - 17:30	Broadway-2	"Software Process Management-2"
ME 05	Monday	16:00 - 17:30	Broadway-3	PANEL: "Contemporary Practices and Challenges in Project Management"
ME 06	Monday	16:00 - 17:30	Broadway-4	"Decision Making in Technology Management-1"
ME 07	Monday	16:00 - 17:30	Forum Suite	"Technology Management in Semiconductor Industry"
ME 08	Monday	16:00 - 17:30	Council Suite	"R&D Management-2"
ME 09	Monday	16:00 - 17:30	Directors Suite	"Open Innovation-1"
ME 10	Monday	16:00 - 17:30	Studio Suite	"Technology Management in Health Industry"
ME 11	Monday	16:00 - 17:30	Parlor-C	"Sustainability-2"
ME 12	Monday	16:00 - 17:30	Parlor-B	"Technology Management in Service Industry-3"
ME 13	Monday	16:00 - 17:30	Parlor-A	"Management of Technological Change-2"

TUESDAY, AUGUST 2, 2011

TA 01	Tuesday	08:30 - 10:00	Pavilion	PLENARY: "Plenary - 3"
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SCHEDULE OF SESSIONS

TB	01	Tuesday	10:30 - 12:00	Pavilion East	“Innovation Management-3”
TB	02	Tuesday	10:30 - 12:00	Pavilion West	“Technology Management in Energy Industry-3”
TB	03	Tuesday	10:30 - 12:00	Broadway-1	“Technology Management Framework-2”
TB	04	Tuesday	10:30 - 12:00	Broadway-2	“Environmental Issues-1”
TB	05	Tuesday	10:30 - 12:00	Broadway-3	“Project/Program Management-2”
TB	06	Tuesday	10:30 - 12:00	Broadway-4	“Technology Management in Biotechnology Industry-1”
TB	07	Tuesday	10:30 - 12:00	Forum Suite	“Social Networks-1”
TB	08	Tuesday	10:30 - 12:00	Council Suite	“R&D Management-3”
TB	09	Tuesday	10:30 - 12:00	Directors Suite	“Cultural Issues-1”
TB	10	Tuesday	10:30 - 12:00	Studio Suite	“Technology and Industry Convergence”
TB	11	Tuesday	10:30 - 12:00	Parlor-C	“Technology Management in Transportation Industry”
TB	12	Tuesday	10:30 - 12:00	Parlor-B	“Manufacturing Management-2”
TB	13	Tuesday	10:30 - 12:00	Parlor-A	“Radical Innovations”
TD	01	Tuesday	14:00 - 15:30	Pavilion East	“Innovation Management-4”
TD	02	Tuesday	14:00 - 15:30	Pavilion West	“Technology Management in Energy Industry-4”
TD	03	Tuesday	14:00 - 15:30	Broadway-1	TUTORIAL: “Building Effective Alliances and Winning “
TD	04	Tuesday	14:00 - 15:30	Broadway-2	TUTORIAL: “Visual Strategy: Exploring The Visual Format of Roadmaps”
TD	05	Tuesday	14:00 - 15:30	Broadway-3	“Project/Program Management-3”
TD	07	Tuesday	14:00 - 15:30	Forum Suite	“Technology Management in Education-1”
TD	08	Tuesday	14:00 - 15:30	Council Suite	“Technology Management Framework - 3”
TD	09	Tuesday	14:00 - 15:30	Directors Suite	“Open Innovation-2”
TD	10	Tuesday	14:00 - 15:30	Studio Suite	“Idea Generation with Delphi Methods”
TD	11	Tuesday	14:00 - 15:30	Parlor-C	“Technology Transfer-1”
TD	12	Tuesday	14:00 - 15:30	Parlor-B	“Manufacturing Management-3”
TE	01	Tuesday	16:00 - 17:30	Pavilion East	“Innovation Management-5”
TE	02	Tuesday	16:00 - 17:30	Pavilion West	“Technology Management in Energy Industry-5”
TE	03	Tuesday	16:00 - 17:30	Broadway-1	“Technology Management in Government”
TE	04	Tuesday	16:00 - 17:30	Broadway-2	“Strategic Management of Technology-1”
TE	05	Tuesday	16:00 - 17:30	Broadway-3	“Technology Management in Telecommunication Industry”
TE	06	Tuesday	16:00 - 17:30	Broadway-4	“Decision Making in Technology Management-2”
TE	07	Tuesday	16:00 - 17:30	Forum Suite	“Social Networks-2”
TE	08	Tuesday	16:00 - 17:30	Council Suite	“Technology Management Framework-1”
TE	09	Tuesday	16:00 - 17:30	Directors Suite	“Entrepreneurship / Intrapreneurship”
TE	10	Tuesday	16:00 - 17:30	Studio Suite	“Technology Roadmapping-1”
TE	12	Tuesday	16:00 - 17:30	Parlor-B	“Supply Chain Management”
TE	13	Tuesday	16:00 - 17:30	Parlor-A	“Technology Assessment and Evaluation-1”

SCHEDULE OF SESSIONS

WEDNESDAY, AUGUST 3, 2011

WA	01	Wednesday	08:30 - 10:00	Pavilion	PLENARY: "Plenary - 4"
WB	01	Wednesday	10:30 - 12:00	Pavilion East	"Innovation Management-6"
WB	02	Wednesday	10:30 - 12:00	Pavilion West	"Technology Management in Energy Industry-6"
WB	03	Wednesday	10:30 - 12:00	Broadway-1	"Science and Technology Policy-1"
WB	05	Wednesday	10:30 - 12:00	Broadway-3	"Emerging Technologies-1"
WB	06	Wednesday	10:30 - 12:00	Broadway-4	"Technology Marketing-1"
WB	07	Wednesday	10:30 - 12:00	Forum Suite	"Technology Management in Biotechnology Industry-2"
WB	08	Wednesday	10:30 - 12:00	Council Suite	"Technology Planning"
WB	09	Wednesday	10:30 - 12:00	Directors Suite	"New Product Development-1"
WB	10	Wednesday	10:30 - 12:00	Studio Suite	"Technology Forecasting-1"
WB	11	Wednesday	10:30 - 12:00	Parlor-C	"Environmental Issues-2"
WB	12	Wednesday	10:30 - 12:00	Parlor-B	"New Venture Management"
WB	13	Wednesday	10:30 - 12:00	Parlor-A	"Technical Organizations and Workforce-1"
WD	01	Wednesday	14:00 - 15:30	Pavilion East	"Innovation Management-7"
WD	02	Wednesday	14:00 - 15:30	Pavilion West	"Technology Management in Energy Industry-7"
WD	03	Wednesday	14:00 - 15:30	Broadway-1	"Science and Technology Policy-2"
WD	04	Wednesday	14:00 - 15:30	Broadway-2	"Strategic Management of Technology-2"
WD	05	Wednesday	14:00 - 15:30	Broadway-3	"Emerging Technologies-2"
WD	06	Wednesday	14:00 - 15:30	Broadway-4	"Cultural Issues-2"
WD	07	Wednesday	14:00 - 15:30	Forum Suite	"Knowledge Management-2"
WD	08	Wednesday	14:00 - 15:30	Council Suite	"Technology Management in Service Industry-1"
WD	09	Wednesday	14:00 - 15:30	Directors Suite	"New Product Development-2"
WD	10	Wednesday	14:00 - 15:30	Studio Suite	"Technology Roadmapping-2"
WD	11	Wednesday	14:00 - 15:30	Parlor-C	"Technology Management in Education-2"
WD	12	Wednesday	14:00 - 15:30	Parlor-B	PANEL: "Meet the Editors"
WD	13	Wednesday	14:00 - 15:30	Parlor-A	"Technology Adoption-2"
WE	01	Wednesday	16:00 - 17:30	Pavilion East	"Innovation Management-8"
WE	02	Wednesday	16:00 - 17:30	Pavilion West	"Technology Management in Energy Industry-8"
WE	03	Wednesday	16:00 - 17:30	Broadway-1	"Science and Technology Policy-3"
WE	04	Wednesday	16:00 - 17:30	Broadway-2	"Strategic Management of Technology-3"
WE	05	Wednesday	16:00 - 17:30	Broadway-3	"Project/Program Management-4"
WE	06	Wednesday	16:00 - 17:30	Broadway-4	"Technology Marketing-2"
WE	07	Wednesday	16:00 - 17:30	Forum Suite	"Knowledge Management-3"
WE	08	Wednesday	16:00 - 17:30	Council Suite	"Technology Management in Service Industry-2"

SCHEDULE OF SESSIONS

WE	09	Wednesday	16:00 - 17:30	Directors Suite	“Productivity Management”
WE	10	Wednesday	16:00 - 17:30	Studio Suite	TUTORIAL: “Technology Forecasting using DEA”
WE	11	Wednesday	16:00 - 17:30	Parlor-C	“Technology Transfer-2”
WE	12	Wednesday	16:00 - 17:30	Parlor-B	“Manufacturing Management-4”
WE	13	Wednesday	16:00 - 17:30	Parlor-A	“Technology Assessment and Evaluation-2”

THURSDAY, AUGUST 4, 2011

HA	01	Thursday	08:30 - 10:00	Pavilion	PLENARY: “Plenary - 5”
HB	01	Thursday	10:30 - 12:00	Pavilion East	“Innovation Management-9”
HB	02	Thursday	10:30 - 12:00	Pavilion West	“Technology Management in Energy Industry-9”
HB	04	Thursday	10:30 - 12:00	Broadway-2	“Global Issues”
HB	05	Thursday	10:30 - 12:00	Broadway-3	“Project/Program Management-5”
HB	06	Thursday	10:30 - 12:00	Broadway-4	“Technical Organizations and Workforce-2”
HB	07	Thursday	10:30 - 12:00	Forum Suite	“Management in Information Technology-1”
HB	08	Thursday	10:30 - 12:00	Council Suite	“R&D Management-4”
HB	09	Thursday	10:30 - 12:00	Directors Suite	“New Product Development-3”
HB	10	Thursday	10:30 - 12:00	Studio Suite	“Technology Forecasting-2”
HD	02	Thursday	14:00 - 15:30	Pavilion West	“Technology Management in Energy Industry-10”
HD	03	Thursday	14:00 - 15:30	Broadway-1	“Science and Technology Policy-4”
HD	04	Thursday	14:00 - 15:30	Broadway-2	“Strategic Management of Technology-4”
HD	06	Thursday	14:00 - 15:30	Broadway-4	“Decision Making in Technology Management-3”
HD	07	Thursday	14:00 - 15:30	Forum Suite	“Management in Information Technology-2”
HD	08	Thursday	14:00 - 15:30	Council Suite	“R&D Management-5”
HD	09	Thursday	14:00 - 15:30	Directors Suite	“Technology Transfer-3”
HD	10	Thursday	14:00 - 15:30	Studio Suite	“Technology Diffusion”
HE	02	Thursday	16:00 - 17:30	Pavilion West	“PICMET 2012 Planning Session”

SCHEDULE OF SESSIONS BY ROOM

Session Number	Day	Time	Room	Session Title	
MA	01	Monday	08:30 - 10:00	Pavilion	PLENARY: “Plenary - 1”
MD	01	Monday	14:00 - 15:30	Pavilion	PLENARY: “Plenary - 2”
TA	01	Tuesday	08:30 - 10:00	Pavilion	PLENARY: “Plenary - 3”
WA	01	Wednesday	08:30 - 10:00	Pavilion	PLENARY: “Plenary - 4”

SCHEDULE OF SESSIONS

HA	01	Thursday	08:30 - 10:00	Pavilion	PLENARY: “Plenary - 5”
MB	01	Monday	10:30 - 12:00	Pavilion East	“Innovation Management-1”
ME	01	Monday	16:00 - 17:30	Pavilion East	“Innovation Management-2”
MB	02	Monday	10:30 - 12:00	Pavilion West	“Technology Management in Energy Industry-1”
ME	02	Monday	16:00 - 17:30	Pavilion West	“Technology Management in Energy Industry-2”
MB	03	Monday	10:30 - 12:00	Broadway-1	TUTORIAL: “To Succeed in Services by Creating Strategic Differentiation and Operational Excellence”
ME	03	Monday	16:00 - 17:30	Broadway-1	“Technology Management Collaborations”
MB	04	Monday	10:30 - 12:00	Broadway-2	“Software Process Management-1”
ME	04	Monday	16:00 - 17:30	Broadway-2	“Software Process Management-2”
MB	05	Monday	10:30 - 12:00	Broadway-3	“Project/Program Management-1”
ME	05	Monday	16:00 - 17:30	Broadway-3	PANEL: “Contemporary Practices and Challenges in Project Management “
MB	06	Monday	10:30 - 12:00	Broadway-4	“Management of Technological Change-1”
ME	06	Monday	16:00 - 17:30	Broadway-4	“Decision Making in Technology Management-1”
MB	07	Monday	10:30 - 12:00	Forum Suite	“Knowledge Management-1”
ME	07	Monday	16:00 - 17:30	Forum Suite	“Technology Management in Semiconductor Industry”
MB	08	Monday	10:30 - 12:00	Council Suite	“R&D Management-1”
ME	08	Monday	16:00 - 17:30	Council Suite	“R&D Management-2”
MB	09	Monday	10:30 - 12:00	Directors Suite	TUTORIAL: “Metrics and Methods for Managing Payment Fraud”
ME	09	Monday	16:00 - 17:30	Directors Suite	“Open Innovation-1”
ME	10	Monday	16:00 - 17:30	Studio Suite	“Technology Management in Health Industry”
MB	11	Monday	10:30 - 12:00	Parlor-C	“Sustainability-1”
ME	11	Monday	16:00 - 17:30	Parlor-C	“Sustainability-2”
MB	12	Monday	10:30 - 12:00	Parlor-B	“Manufacturing Management-1”
ME	12	Monday	16:00 - 17:30	Parlor-B	“Technology Management in Service Industry-3”
MB	13	Monday	10:30 - 12:00	Parlor-A	“Technology Adoption-1”
ME	13	Monday	16:00 - 17:30	Parlor-A	“Management of Technological Change-2”
TB	01	Tuesday	10:30 - 12:00	Pavilion East	“Innovation Management-3”
TD	01	Tuesday	14:00 - 15:30	Pavilion East	“Innovation Management-4”
TE	01	Tuesday	16:00 - 17:30	Pavilion East	“Innovation Management-5”
TB	02	Tuesday	10:30 - 12:00	Pavilion West	“Technology Management in Energy Industry-3”
TD	02	Tuesday	14:00 - 15:30	Pavilion West	“Technology Management in Energy Industry-4”
TE	02	Tuesday	16:00 - 17:30	Pavilion West	“Technology Management in Energy Industry-5”
TB	03	Tuesday	10:30 - 12:00	Broadway-1	“Technology Management Framework-2”
TD	03	Tuesday	14:00 - 15:30	Broadway-1	TUTORIAL: “Building Effective Alliances and Winning “
TE	03	Tuesday	16:00 - 17:30	Broadway-1	“Technology Management in Government”

SCHEDULE OF SESSIONS

TB	04	Tuesday	10:30 - 12:00	Broadway-2	“Environmental Issues-1”
TD	04	Tuesday	14:00 - 15:30	Broadway-2	TUTORIAL: “Visual Strategy: Exploring The Visual Format of Roadmaps”
TE	04	Tuesday	16:00 - 17:30	Broadway-2	“Strategic Management of Technology-1”
TB	05	Tuesday	10:30 - 12:00	Broadway-3	“Project/Program Management-2”
TD	05	Tuesday	14:00 - 15:30	Broadway-3	“Project/Program Management-3”
TE	05	Tuesday	16:00 - 17:30	Broadway-3	“Technology Management in Telecommunication Industry”
TB	06	Tuesday	10:30 - 12:00	Broadway-4	“Technology Management in Biotechnology Industry-1”
TE	06	Tuesday	16:00 - 17:30	Broadway-4	“Decision Making in Technology Management-2”
TB	07	Tuesday	10:30 - 12:00	Forum Suite	“Social Networks-1”
TD	07	Tuesday	14:00 - 15:30	Forum Suite	“Technology Management in Education-1”
TE	07	Tuesday	16:00 - 17:30	Forum Suite	“Social Networks-2”
TB	08	Tuesday	10:30 - 12:00	Council Suite	“R&D Management-3”
TD	08	Tuesday	14:00 - 15:30	Council Suite	“Technology Management Framework - 3”
TE	08	Tuesday	16:00 - 17:30	Council Suite	“Technology Management Framework-1”
TB	09	Tuesday	10:30 - 12:00	Directors Suite	“Cultural Issues-1”
TD	09	Tuesday	14:00 - 15:30	Directors Suite	“Open Innovation-2”
TE	09	Tuesday	16:00 - 17:30	Directors Suite	“Entrepreneurship / Intrapreneurship”
TB	10	Tuesday	10:30 - 12:00	Studio Suite	“Technology and Industry Convergence”
TD	10	Tuesday	14:00 - 15:30	Studio Suite	“Idea Generation with Delphi Methods”
TE	10	Tuesday	16:00 - 17:30	Studio Suite	“Technology Roadmapping-1”
TB	11	Tuesday	10:30 - 12:00	Parlor-C	“Technology Management in Transportation Industry”
TD	11	Tuesday	14:00 - 15:30	Parlor-C	“Technology Transfer-1”
TB	12	Tuesday	10:30 - 12:00	Parlor-B	“Manufacturing Management-2”
TD	12	Tuesday	14:00 - 15:30	Parlor-B	“Manufacturing Management-3”
TE	12	Tuesday	16:00 - 17:30	Parlor-B	“Supply Chain Management”
TB	13	Tuesday	10:30 - 12:00	Parlor-A	“Radical Innovations”
TE	13	Tuesday	16:00 - 17:30	Parlor-A	“Technology Assessment and Evaluation-1”
WB	01	Wednesday	10:30 - 12:00	Pavilion East	“Innovation Management-6”
WD	01	Wednesday	14:00 - 15:30	Pavilion East	“Innovation Management-7”
WE	01	Wednesday	16:00 - 17:30	Pavilion East	“Innovation Management-8”
WB	02	Wednesday	10:30 - 12:00	Pavilion West	“Technology Management in Energy Industry-6”
WD	02	Wednesday	14:00 - 15:30	Pavilion West	“Technology Management in Energy Industry-7”
WE	02	Wednesday	16:00 - 17:30	Pavilion West	“Technology Management in Energy Industry-8”
WB	03	Wednesday	10:30 - 12:00	Broadway-1	“Science and Technology Policy-1”
WD	03	Wednesday	14:00 - 15:30	Broadway-1	“Science and Technology Policy-2”
WE	03	Wednesday	16:00 - 17:30	Broadway-1	“Science and Technology Policy-3”

SCHEDULE OF SESSIONS

WD	04	Wednesday	14:00 - 15:30	Broadway-2	“Strategic Management of Technology-2”
WE	04	Wednesday	16:00 - 17:30	Broadway-2	“Strategic Management of Technology-3”
WB	05	Wednesday	10:30 - 12:00	Broadway-3	“Emerging Technologies-1”
WD	05	Wednesday	14:00 - 15:30	Broadway-3	“Emerging Technologies-2”
WE	05	Wednesday	16:00 - 17:30	Broadway-3	“Project/Program Management-4”
WB	06	Wednesday	10:30 - 12:00	Broadway-4	“Technology Marketing-1”
WD	06	Wednesday	14:00 - 15:30	Broadway-4	“Cultural Issues-2”
WE	06	Wednesday	16:00 - 17:30	Broadway-4	“Technology Marketing-2”
WB	07	Wednesday	10:30 - 12:00	Forum Suite	“Technology Management in Biotechnology Industry-2”
WD	07	Wednesday	14:00 - 15:30	Forum Suite	“Knowledge Management-2”
WE	07	Wednesday	16:00 - 17:30	Forum Suite	“Knowledge Management-3”
WB	08	Wednesday	10:30 - 12:00	Council Suite	“Technology Planning”
WD	08	Wednesday	14:00 - 15:30	Council Suite	“Technology Management in Service Industry-1”
WE	08	Wednesday	16:00 - 17:30	Council Suite	“Technology Management in Service Industry-2”
WB	09	Wednesday	10:30 - 12:00	Directors Suite	“New Product Development-1”
WD	09	Wednesday	14:00 - 15:30	Directors Suite	“New Product Development-2”
WE	09	Wednesday	16:00 - 17:30	Directors Suite	“Productivity Management”
WB	10	Wednesday	10:30 - 12:00	Studio Suite	“Technology Forecasting-1”
WD	10	Wednesday	14:00 - 15:30	Studio Suite	“Technology Roadmapping-2”
WE	10	Wednesday	16:00 - 17:30	Studio Suite	TUTORIAL: “Technology Forecasting using DEA”
WB	11	Wednesday	10:30 - 12:00	Parlor-C	“Environmental Issues-2”
WD	11	Wednesday	14:00 - 15:30	Parlor-C	“Technology Management in Education-2”
WE	11	Wednesday	16:00 - 17:30	Parlor-C	“Technology Transfer-2”
WB	12	Wednesday	10:30 - 12:00	Parlor-B	“New Venture Management”
WD	12	Wednesday	14:00 - 15:30	Parlor-B	PANEL: “PANEL: Meet the Editors”
WE	12	Wednesday	16:00 - 17:30	Parlor-B	“Manufacturing Management-4”
WB	13	Wednesday	10:30 - 12:00	Parlor-A	“Technical Organizations and Workforce-1”
WD	13	Wednesday	14:00 - 15:30	Parlor-A	“Technology Adoption-2”
WE	13	Wednesday	16:00 - 17:30	Parlor-A	“Technology Assessment and Evaluation-2”
HB	01	Thursday	10:30 - 12:00	Pavilion East	“Innovation Management-9”
HB	02	Thursday	10:30 - 12:00	Pavilion West	“Technology Management in Energy Industry-9”
HD	02	Thursday	14:00 - 15:30	Pavilion West	“Technology Management in Energy Industry-10”
HE	02	Thursday	16:00 - 17:30	Pavilion West	“PICMET 2012 Planning Session”
HD	03	Thursday	14:00 - 15:30	Broadway-1	“Science and Technology Policy-4”
HB	04	Thursday	10:30 - 12:00	Broadway-2	“Global Issues”
HD	04	Thursday	14:00 - 15:30	Broadway-2	“Strategic Management of Technology-4”
HB	05	Thursday	10:30 - 12:00	Broadway-3	“Project/Program Management-5”

SCHEDULE OF SESSIONS

HB	06	Thursday	10:30 - 12:00	Broadway-4	“Technical Organizations and Workforce-2”
HD	06	Thursday	14:00 - 15:30	Broadway-4	“Decision Making in Technology Management-3”
HB	07	Thursday	10:30 - 12:00	Forum Suite	“Management in Information Technology-1”
HD	07	Thursday	14:00 - 15:30	Forum Suite	“Management in Information Technology-2”
HB	08	Thursday	10:30 - 12:00	Council Suite	“R&D Management-4”
HD	08	Thursday	14:00 - 15:30	Council Suite	“R&D Management-5”
HB	09	Thursday	10:30 - 12:00	Directors Suite	“New Product Development-3”
HD	09	Thursday	14:00 - 15:30	Directors Suite	“Technology Transfer-3”
HB	10	Thursday	10:30 - 12:00	Studio Suite	“Technology Forecasting-2”
HD	10	Thursday	14:00 - 15:30	Studio Suite	“Technology Diffusion”



PERSONAL SCHEDULE

	Sunday July 31, 2011	Monday August 01, 2011	Tuesday August 02, 2011	Wednesday August 03, 2011	Thursday August 04, 2011
08:00 – 08:30 Bright Start					
08:30 – 10:00 (A)		Plenary (Hilton Pavilion)	Plenary (Hilton Pavilion)	Plenary (Hilton Pavilion)	Plenary (Hilton Pavilion)
10:00 – 10:30 Coffee Break					
10:30 – 12:00 (B)					
12:00 – 14:00 Lunch Break					
14:00 – 15:30 (D)		Plenary (Hilton Pavilion)			
15:30 – 16:00 Coffee Break					
16:00 – 17:30 (E)					PICMET '12 and PICMET '13 Planning Session (Pavilion)
19:00 – 22:00	Welcome Reception (Hilton Pavilion)	Dinner at the Director Park (2 blocks from the Hilton)	Awards Banquet (Hilton Pavilion)		

PLENARIES

PLENARY SESSION—1

DATE: MONDAY, AUGUST 1, 2011
TIME: 08:30-10:00
ROOM: PAVILION ROOM, PLAZA LEVEL

Session Chair: Ralph Quinsey, CEO, Triquint Semiconductor, Inc.

KEYNOTE -1

Amir Aghdaei, President, Tektronix; and Danaher Group Executive

“The Future of Engineering and Why Innovation Matters”

2011 marks the 65th anniversary of innovation and technology management at Tektronix. Amir Aghdaei, President of Tektronix, will discuss how an engineer’s job is being impacted by the technology trends driving our world today. He will also share his views on the importance of pro-active technology management and describe some of the practices used at Tektronix to address the expected acceleration of technology trends in the future.

Amir Aghdaei was appointed president of Tektronix in May 2009 and was promoted to Danaher Group Executive in May 2011. He joined Danaher, the parent company of Tektronix, in October 2008, and completed immersion learning about the company culture and the Danaher Business System. Mr. Aghdaei has more than 20 years of experience in the test and measurement industry. Prior to joining Danaher, he was with HP/Agilent and held a variety of positions in life science and test/measurement businesses. During his tenure with HP/Agilent, Mr. Aghdaei lived in Pennsylvania, Germany, Holland, Colorado, and Singapore. His last position at Agilent was as the general manager/vice president of the Measurement Systems Division.



Most recently, Mr. Aghdaei worked at Credence as the senior vice president of sales and marketing in California. He was accountable for developing Credence’s short- and long-term strategy, refining/repositioning the company’s product portfolio, and developing/executing its world-wide channel strategy.

KEYNOTE-2

Dr. Wilfred Pinfold, Director, Extreme Scale Programs, University and Government Programs, Intel Corporation, USA

“Introducing Systemic Technology Shifts”

New technologies often find a hostile environment when they are introduced into a world dominated by old technology standards. This keynote will explore techniques that require systemic change before real customer benefits are realized. Efficient energy use will be explored in this context.

Dr. Wilfred Pinfold is Director, Extreme Scale Programs, University and Government Programs at Intel Corporation. He is responsible for developing long-range research programs in areas relating to extreme parallelism, resilience, and energy-efficiency. He leads Intel Labs government research relationships and academic programs. He has 25 years of experience in high performance computing, including leadership roles in Intel’s Supercomputing Systems Division, server products, communications products and analytic solutions.



He received his Ph.D. in Computational Fluid Dynamics from the University of Strathclyde, Glasgow. He is a member of ACM, IEEE, RINA, and SNAME as well as being both C.Eng in Britain and P.E. in Virginia. In 1999, he attended the Stanford Executive Program.

PLENARY SESSION—2

DATE: MONDAY, AUGUST 1, 2011
TIME: 14:00-15:30
ROOM: PAVILION ROOM, PLAZA LEVEL

Session Chair: TBA

KEYNOTE-1

Professor André Buys, Graduate School of Technology Management, University of Pretoria, South Africa

“Leonardo da Vinci’s Telescope - Lessons From History”

PLENARIES

Leonardo da Vinci is widely considered to be one of the greatest painters of all time and revered for his technological ingenuity. He conceptualized aircraft, the parachute, the battle tank, machine guns, clocks, the automobile, the submarine and a host of other inventions decades before they became realities. A project that investigated his work on the astronomical telescope, including a replica telescope built and tested according to his drawings and notes, will be presented. The tragedy of Leonardo lies in the fact that although he made many important discoveries in mechanical and civil engineering, astronomy, optics, hydrodynamics and anatomy, none of his work had a direct influence on later science and engineering. In conclusion, some lessons for technological innovation that can be learned from his life and work will be presented.



Professor André Buys is a nuclear engineer and held various senior management positions in the South African Nuclear and Armaments Industries.

After 27 years in industry he joined the University of Pretoria as director of the Institute for Technological Innovation and is currently a professor at the Graduate School of Technology Management. He lectures on the management of technology and innovation, innovation strategy, strategic management and research methodology. He is also an ardent campaigner for nuclear non-proliferation.

Professor Buys is a keen amateur astronomer and has a private observatory at the Rooideplaat Dam Nature Reserve near Pretoria. His astronomy interests are astrophotography, astronomy education and the history of astronomy. He holds a Doctorate in Engineering from the University of Pretoria and is accredited as an established researcher by the South African National Research Foundation. He is a regular participant at the PICMET conference and has authored and co-authored 14 papers at PICMET conferences since 2005.

KEYNOTE-2

Krishna Singh, SRII President, Strategic Programs Director, IBM Almaden Research Center

“Driving Innovation for IT-enabled Services”

TBA

Mr. Krishna Singh is the Director of Strategic Programs at the IBM Almaden Research Center in Silicon Valley, California, where he leads a global organization, Service Research &

Innovation Institute (SRII) as the President (www.thesrii.org).

Mr. Singh has over 25 years of experience in the high-technology industry as well as in academia. Before IBM Research, he worked with Intel, AMD and National Semiconductor in various technology development and product management roles such as Director of Server Architecture & Planning and Data Center Technology at Intel, Director in the CTO Office at AMD, and senior technical management roles at National Semiconductor.



Mr. Singh has also been an Industry Fellow in the College of Engineering at UC Berkeley, California, and an adjunct professor in the Electrical Engineering and Computer Science Department at Santa Clara University, California. He is also on the Advisory Board at major universities globally.

Mr. Singh has been an invited speaker at major IT conferences around the world

PLENARY SESSION—3

DATE: TUESDAY, AUGUST 2, 2011

TIME: 08:30-10:00

ROOM: PAVILION ROOM, PLAZA LEVEL

Session Chair: TBA

KEYNOTE-1

Dr. David M. Steele, Dean, College of Business and Lucas Graduate School of Business, San Jose State University, USA

“Crises in the Middle East and Japan – Implication for the US Economy and Technology Management”

Since about 40 percent of the energy consumption in the U.S. is crude oil, and the U.S. is by far the largest consumer of oil, any crises in the Middle East and North Africa are unsettling. The history of the last 40 years shows that high oil prices and/or instability in the Middle East have led to U.S. economic crises. Moreover, the U.S. has the highest number of nuclear reactors producing electricity, accounting for roughly 10 percent of the energy consumption in the U.S. Yet the Fukushima reactor disaster in Japan has cast a pall over the nuclear power industry and questioned the future role of this “clean” energy source. So what are the implications for our economy and

PLENARIES

for other energy sources such as solar and natural gas in shale formations? And what are the implications for technology management, given that “technology” failed us in both the Gulf of Mexico oil platform and the Fukushima disasters?

We will explore the role of various energy alternatives in the U.S. and the critical role that technology will play in 1) ensuring our economic stability; 2) exploiting other energy sources; and 3) addressing the issue of global warming.

Dr. David M. Steele joined San Jose State University (SJSU) as Dean, College of Business and Lucas Graduate School of Business, in July, 2008. He is building on the College's strengths by enhancing academic quality and student success; and by emphasizing practical business knowledge and global business education, including the new Thompson Global Internship Program.



Previously, he was Dean of the Silberman College of Business at Fairleigh Dickinson University, which includes the prestigious Rothman Institute of Entrepreneurial Studies; and Professor and Dean of the College of Business at Florida Institute of Technology.

Dr. Steele rose through the ranks of Chevron Corporation (ranked Fortune # 3 today) to become President of Chevron Latin America. He had a broadly diversified career track in R&D, project engineering, finance, strategic planning, and IT before moving to senior executive management positions. After leaving Chevron, Dr. Steele was an Executive Consultant to the founders of four international early stage ventures, serving as Interim CEO of one of these ventures, a software startup.

Dr. Steele attended Birmingham University in England, receiving BS and Ph.D. degrees in Chemical Engineering. He later completed graduate business training at UC Berkeley and at the Wharton School.

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, University of Michigan, Missouri University of Science and Technology

“Trends of Smart Battery and Mobility Service Innovation in Future EVs”

The current battery technology faces continuing issues including energy density and weight. Current EV batteries can provide limited power capacity that constrains long-distance driving. In addition, battery performance is highly impacted by traffic jams, driving behavior, and A/C usages, especially in the cases of cold and hot weather.

This presentation will introduce the Smart Battery Health Management Systems, which not only predict the remaining battery capacity, but also monitor the battery status in real time. Through smart learning and analysis of the driving behavior pattern, the remaining useful life and the necessary service can be precisely estimated with the optimized driving and route plan for the battery charging and exchange services. In addition, smart battery and analytics provide the optimized routes with navigation by using the features extracted from real-time driving behavior and conditions and can also estimate the energy consumptions for different routes, slope, brakes, and traffic jams, which can greatly improve the precision of the mobility battery analysis. Finally, mobility service innovation using dominant innovation will be introduced.



Dr. Jay Lee is Ohio Eminent Scholar and L.W. Scott Alter Chair Professor at the University of Cincinnati and is founding director of National Science Foundation (NSF) Industry/University Cooperative Research Center (I/UCRC) on Intelligent Maintenance Systems (IMS, www.imscenter.net), a multi-campus NSF Industry/University Cooperative Research Center which consists of the University of Cincinnati (lead institution), the University of Michigan, and Missouri University of Science and Technology. Since its inception in 2001, the Center has been supported by over 70 global companies including P&G, GE Aviation, Eaton, National Instruments, Boeing, Caterpillar, Siemens, Chevron, Honeywell, Parker Hannifin, Spirit AeroSystems, Ingersoll Rand, Goodyear, Army Research Lab, Forcam (Germany), Alstom (France), ITRI (Taiwan), Omron (Japan), Nissan (Japan), Delta Electronics (Taiwan), HIWIN (Taiwan), PMC (Taiwan), III (Taiwan), Shaanxi Auto Group (China), Tekniker (Spain), FMTC (Belgium), and Kistler (Switzerland). His current research focuses on dominant innovation tools for product and service design as well as intelligent prognostics tools and smart predictive analytics for equipment reliability assessment and smart product lifecycle management.

PLENARIES

Dr. Lee serves as honorary professor and visiting professor for a number of institutions, including Shanghai Jiao Tong University, City University of Hong Kong, Cranfield University in the UK, Lulea University of Technology in Sweden, Hong Kong Polytechnic University, Xian Jiao Tong University and Harbin Institute of Technology (HIT) in China. He also serves as advisor to a number of global organizations, including the Manufacturing Executive Leadership Board of U.S., IBM MAXIMO Executive Advisory Council, Industrial Technology Research Institute (ITRI) in Taiwan, Academy of Machinery Science & Technology in China, and the Scientific Advisory Board of Flanders' MECHATRONICS Technology Centre (FMTC) in Leuven, Belgium. In addition, he serves as editor and associate editor for a number of journals including IEEE Transaction on Industrial Informatics, the International Journal on Prognostics and Health Management, and the International Journal on Service Operations and Informatics.

Previously, he served as Director for Product Development and Manufacturing at United Technologies Research Center (UTRC), East Hartford, Connecticut, USA; as well as program director 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. He also served as an advisory member for a number of institutions including Johns Hopkins University and Cambridge University.

He is a frequently invited speaker and has delivered over 150 invited keynote and plenary speeches at major international conferences. He is a Fellow of ASME, SME, as well as a Founding Fellow of the International Society of Engineering Asset Management (ISEAM).

PLENARY SESSION—4

DATE: WEDNESDAY, AUGUST 3, 2011
TIME: 08:30-10:00
ROOM: PAVILION ROOM, PLAZA LEVEL

Session Chair: Roy Hemmingway, Energy Consultant

KEYNOTE-1

Phil Keisling, Director, Center of Public Service, Mark O. Hatfield School of Government, Portland State University, USA

“Building a Smarter Grid: The Intersection of Policy, Technology, and Economics”

Phil Keisling, an ex journalist and Oregon's former Secretary of State, readily admits he is no smart grid expert. But in the fall of 2009, he was a co-founder of Smart Grid Oregon, one of the nation's first state trade associations focused on promoting smart grid-related businesses and innovations. In his presentation, he will describe the critical importance of linking policy, technology, and economic considerations together as states forge innovative new approaches to energy policy and practice.

Phil Keisling currently serves as the Director of the Center of Public Service at Portland State University, which is located within the Mark O. Hatfield School of Government. The Center's mission is to connect the faculty, students, and other resources of the Hatfield School with the real-world needs and challenges of public and non-profit sector leaders and managers in local, state, federal, tribal, and international settings.



Mr. Keisling's public service career includes work as a campaign aide to former Governor Tom McCall (1978); six years as a journalist for Portland's Willamette Week (1978-81) and The Washington Monthly Magazine in Washington, D.C. (1982-84); and as a legislative staff assistant to then-Oregon House Speaker Vera Katz (1985-88). He served one term in the Oregon House of Representatives (1989-91) and nearly a decade as Oregon Secretary of State (1991-99). From 2000 to 2009 he was an Executive Vice President with CorSource Technology group, a Beaverton, Oregon-based software services company.

In 2009, Mr. Keisling was a co-founder of Smart Grid Oregon, an Oregon-based trade association focused on promoting Smart Grid businesses and policies.

Mr. Keisling received a B.A. in American Studies from Yale University in 1977.

KEYNOTE-2

Margie Harris, Executive Director, Energy Trust of Oregon, Inc., USA

“Energy Conservation as a River: Delivering Energy Efficiency in Oregon and the Northwest”

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The Northwest has used energy conservation programs and technologies over the last 30 years to meet growing energy demand with the lowest-cost, least-risk resource available while moderating the impacts of energy development on the region's rivers.

Nearly 40 years ago, the Northwest was putting the finishing touches on the last of its major hydropower dams, completing the transformation of wild rivers into a power system. This system of dammed rivers spread inexpensive electric energy to the entire region, connected inland areas to the ocean and protected urban centers from devastating floods. But the species that inhabited the wild rivers paid a heavy toll. Today, river flows and fish and wildlife habitats are being restored. Energy conservation has not driven this restoration, but it has helped make it possible. Instead of narrowing energy options as the dams' firm generating capacity was reduced, energy conservation has helped meet the region's growing energy demand. After 40 years, the rivers work better for native species and their energy supplies do more work for people.

Energy conservation strategies and techniques deliver ongoing benefits without building new, more costly generation sources. In Oregon, Energy Trust of Oregon is a nonprofit organization that provides energy conservation programs for four investor-owned utilities, and works with other organizations, utilities and governments throughout the region to bring technologies and energy solutions to consumers. Energy Trust's programs and lessons learned provide valuable guidance for developing or enhancing energy conservation programs elsewhere in the nation and worldwide.

Margie Harris is Executive Director of Energy Trust of Oregon, Inc. Ms. Harris began work in November 2001 as the first permanent staff member hired by Energy Trust of Oregon. Margie serves as vice chair and executive committee member of the Northwest Energy Efficiency Alliance; executive committee member of the Northwest Energy Efficiency Task Force; member of the Oregon Green Jobs Council appointed by Governor Kulongoski; and board and executive committee member of Clean Energy Works Oregon. Margie was awarded the Portland Business Journal Women of Influence: Woman Executive of the Year (nonprofit) Award in 2011.



Ms. Harris helped craft Oregon's first energy conservation legislation and programs while working at the Oregon Department of Energy in the 1970s. Subsequently, she was

the marketing and outreach director promoting renewable energy at one of four regional solar energy centers established by then-President Carter.

As assistant to former Portland Commissioner Mike Lindberg, Margie was instrumental in establishing the City of Portland's first energy policies and programs, including the formation of Portland Energy Conservation, Inc. Prior to joining Energy Trust, Margie was a management consultant with Arthur Young & Company, finance and administration director for Portland Parks and Recreation, and executive director of marketing and customer service at TriMet.

A graduate of the University of Michigan with a B.S. in Natural Resources, Margie spends her limited recreational time singing in a local band, gardening, cooking and kayaking in pursuit of whales. She is the proud mother of twin daughters who share her commitment to preserving the natural world.

PLENARY SESSION—5

DATE: THURSDAY, AUGUST 4, 2011
TIME: 08:30-10:00
ROOM: PAVILION ROOM, PLAZA LEVEL

Session Chair: TBA

KEYNOTE-1

Dr. Jim Spohrer, IBM Innovation Champion and Director of IBM University Programs World Wide (IBM UP)

“University and Industry Interactions”

How are university and industry interactions evolving? This talk describes IBM's University Programs, and the five R's of university-industry interactions: research, readiness, recruiting, revenue, and responsibilities. University-industry interactions are evolving as universities become more and more important to nations and regions competing in a global knowledge economy. For example, the percentage of world-wide gross domestic product (GDP) of a nation is highly correlated with the percentage of top-ranked universities from that nation

Dr. James (“Jim”) C. Spohrer is IBM Innovation Champion and Director of IBM University Programs World Wide (IBM UP). He works to align IBM and universities in regional innovation ecosystems globally. Previously, he helped

PLENARIES

found IBM's first service research group, the global Service Science Community, and was founding CTO of IBM's Venture Capital Relations Group in Silicon Valley. During the 1990s while at Apple Computer, he was awarded Apple's Distinguished Engineer Scientist and Technology



title for his work on next-generation learning platforms. Dr. Spohrer has a PhD in Computer Science/Artificial Intelligence from Yale University, and a BS in Physics from the Massachusetts Institute of Technology (MIT). His current research priorities include applying service science to create smarter (less waste and more capabilities) universities and cities, also known as tightly coupled holistic

service systems that provide "whole service" to the people within them. He has more than 90 publications, he has been awarded six patents, and he is a Fellow of the Service Research and Innovation Institute (SRII).

KEYNOTE-2

Keith D. Kulper, President, KULPER & COMPANY, LLC, USA

"The Nexus of Academic Research & Corporate Entrepreneurship: How Leadership Selection Drives Innovation & Performance"

The intersection of academic research and corporate entrepreneurship drives the discovery of new knowledge, globally; this is why we have chosen to specialize on this area in our professional executive search consulting practice at KULPER & COMPANY, LLC. The selection of the *right leaders* is vital to stimulating successful implementation of strategic imperatives for the higher education institution or company. Our efforts in this area have consistently yielded leaders with average tenure of five years or longer, accompanied by a record of promotion and significant added responsibilities; two very key metrics of success for our profession. My remarks will touch on how we are able to achieve specific outcomes in our area of specialization and will present supporting data to show how an efficient executive search process leads to the achievement of long-term developmental goals for the organization or institution as a whole.

Keith D. Kulper is president of KULPER & COMPANY, LLC, (www.kulpercompany.com), a retained executive search firm located in Morristown, New Jersey, which he founded in 1997. The firm focuses on serving the senior level hiring needs of universities with a commitment to entrepreneurship/innovation and corporations that work closely with universities to help them develop more effective and profitable product/service solutions. KULPER & COMPANY completes search assignments at the CEO, President and VP levels for companies; and President, Provost, Dean and VP levels for universities.



Prior to founding KULPER & COMPANY, Mr. Kulper had a long career with Midlantic National Bank where he rose to the level of Group Manager, Vice President in the Corporate Banking Division. In that capacity he held sales, marketing, product management and client relationship development responsibilities. At the outset of his career, Mr. Kulper was a member

of the Financial Systems Division of Chemical Bank in New York City. He is a "cum laude" graduate of Boston College. In 1993, he completed his studies at The Stonier Graduate School of Banking: University of Delaware.

Mr. Kulper is a member of the Harvard College Parents Leadership Committee and the Dean's Advisory Board of Cotsakos College of Business at William Paterson University in Wayne, New Jersey. He is also a founding member of the Liberty Science Center finance committee and a co-founder of the Technology Management Education Association.

PHD COLLOQUIUM

GETTING YOUR PH.D.... AND BEYOND

Critical Stages and Career Paths for the Ph.D. Student

DATE: SUNDAY, JULY 31, 2011

TIME: 13:00—17:00

LOCATION: BROADWAY III/IV

REGIST: \$25

The PICMET Ph.D. Colloquium is targeted at students in all stages of the Ph.D. process, as well as recent graduates. Through guest lectures and workshop discussions, we will cover various aspects of PhD education and career opportunities in engineering and technology management, including:

- 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. (lack of time or motivation, problems with advisers, insufficient time for family and friends, etc.)
- What's next - academia or industry?
- Entering the academic job market as future junior faculty
- Landing your first industry job
- To publish or to perish?

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 meet colleagues, share experiences and ideas, and network with students and faculty 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.



TUTORIALS

TO SUCCEED IN SERVICES BY CREATING STRATEGIC DIFFERENTIATION AND OPERATIONAL EXCELLENCE

DATE: MONDAY, AUGUST 1
TIME: 10:30-12:00
LOCATION: BROADWAY I

SPEAKER: C. M. Chang, State University of New York at Buffalo, USA

As the service sectors play an increasingly important role in both developed and developing economies, engineers and service professionals are well advised to become prepared with the knowledge and skills needed to enhance the strategic differentiation and operational excellence of their service enterprises. This tutorial offers a specific pathway to generate creative ideas, select the profitable ones to pursue, justify projects financially, manage development projects of innovative services, reach out to customers, and support service customers. Examples of achieving operational excellence are illustrated by standardizing work processes, enhancing quality and time-to-market (e.g., applying tools, such as Lean Six Sigma, value stream mapping, quality assurance, FMEA, web-based enablers, and SOA-based emerging productivity tools), involving staff based on the profit-chain model,



seeking productivity utilizing emerging technology, and adopting and constantly improving known best practices. This tutorial summarizes the key skills and knowledge in a Three Decker framework comprised of engineering management, business management and service leadership, cumulating in a “Take Charge” model. After attending this tutorial,

participants will know how to focus their efforts on selected activities to maximize their contributions in creating strategic differentiation and operational excellence for their service employers.

A modified stage-gate process is used to discuss the key factors affecting the development and commercialization of innovative service offerings in order to create strategic differentiation. Multiple tools, both established and emerging, are reviewed to prepare participants in driving for operational excellence of service enterprises. A total of 12 engineering management subfields, as summarized in a Triple-Decker Leadership Architecture, are outlined

to ready service professionals for meeting these challenges in the future. These subfields represent a mutually exclusive and collectively exhaustive set of fundamental skills important for all aspiring service professionals to master.

Dr. Carl Chang is President of CChang, LLC, an engineering management consulting firm that specializes in product/service development, creativity and innovation, and project management. He was with Praxair for 25 years and is now on the faculty of the State University of New York (SUNY) at Buffalo, New York, where he served briefly as the Director of the Service Systems Engineering degree program in the Department of Industrial and Systems Engineering. He is the author of *Engineering Management: Challenges in the New Millennium* (Pearson Prentice Hall, 2005), which won the “Best Book Award 2007” of IAMOT and was translated into Korean. His new book, titled *Service Systems Management and Engineering: Creating Strategic Differentiation and Operational Excellence* (John Wiley, 2010), forms the basis of this tutorial. Dr. Chang received the “Person of the Year Award” from Technical Societies on the Niagara Frontier in 1986, has five US patents, and is listed in *Who’s Who in Science and Engineering*, *Who’s Who in America*, and *Who’s Who in the World*. He is a licensed Professional Engineer and holds a Ph.D. in Engineering from the Technological University Aachen, Germany, and an MBA in General Management from SUNY Buffalo, USA.

METRICS AND METHODS FOR MANAGING PAYMENT FRAUD

DATE: MONDAY, AUGUST 1
TIME: 10:30-12:00
LOCATION: DIRECTORS SUITE

SPEAKER: Michael Freiling, Sigma Investment Management Co., USA

In today’s environment, fraud impacts every business, governmental organization, and non-governmental organization (NGO). Fraud takes many forms including payment fraud, claims fraud, and identity theft. This tutorial will provide an overview of the world of fraud and illustrate several common types of fraud with typical fraud scenarios. We will then introduce the Fraud Management Life Cycle, a comprehensive methodology

TUTORIALS

for managing fraud that focuses on the different activities (deterrence, prevention, detection, mitigation, and investigation) that can help control and manage fraud. We present metrics that can be used to manage performance for these activities, as well as help determine where investments in additional capabilities will have the greatest payoff. We will discuss software tools for managing fraud, including neural network models and social network analysis. Finally, we will illustrate how ordinary desktop tools like spreadsheets can be powerful aids in analyzing and managing fraud.



Dr. Michael Freiling joined Sigma Investment Management Co. in November 2000 as a portfolio manager. Prior to joining Sigma, he developed software products for the pension and investment industry. He also maintains an active consulting practice independent from Sigma, advising large financial institutions and retirement plans. His quarterly report on the investment markets is distributed to over 100 of the nation's largest pension and 401(k) plans. Dr. Freiling is a Chartered Financial Analyst charterholder (CFA®) and holds a Ph.D. in applied mathematics from MIT. In 1977 he was named a Henry Luce Scholar with an appointment to Kyoto University in Japan. He was adjunct faculty member in the Oregon Graduate Institute's Computational Finance Program, where he taught the portfolio management course.

BUILDING EFFECTIVE ALLIANCES AND WINNING THE INNOVATION RACE

DATE: TUESDAY, AUGUST 2

TIME: 14:00-15:30

LOCATION: BROADWAY I

SPEAKER: Ron Khormaei, General Manager, Lensbaby, LLC, USA

This tutorial is targeted to practitioners and researchers with interest in increasing effectiveness of external alliances. The content and case studies dissect models to maximize innovation and R&D returns through outsourcing. Participants are encouraged to bring in specific cases they are faced with in order to extract immediate returns from this tutorial in addition to the

concepts for future use.

Successful organizations focus on their core competencies, to not only survive, but to emerge as even stronger players in the market place. This success requires innovating and improving products and business processes with all the internal and external resources available. This tutorial will cover the elements for a successful alliance and provide the framework for the participants to apply the concepts to their own specific circumstance. The types of relationships, structure, IP protection, subtle pitfalls, and measures of success are discussed during this talk. The Capability Life Cycle (CLC) model is used along with two case studies to demonstrate use of external alliances in successful R&D. The objective is to provide managers and educators with a fresh look at the external alliances as a tool to succeed in a challenging business environment.

Dr. Ron Khormaei is the General Manager at Lensbaby, LLC, in Portland, Oregon. Previous to his current role, Dr. Khormaei was the Director of Engineering at Logitech's Audio Business. Prior to joining Logitech, he was Director of Engineering at Hewlett-Packard's OEM Printer Division, managing a global engineering team of over 100 and multiple external design partners. Dr. Khormaei started his career at Planar Systems in Beaverton, Oregon, leading development of advanced displays. Since 1995, he had held various management roles in HP and has led technology developments resulting in numerous consumer and commercial products. He has a Ph.D. in Electrical Engineering in Solid State Electronics from Oregon State University and has led multidisciplinary programs in display systems, IC and imaging development areas. He has served on multiple advisory boards and is an adjunct professor at Portland State University's Department of Engineering and Technology Management. Dr. Khormaei has established and led multiple successful external consortiums as well as global university and industry partnerships.



TUTORIALS

VISUAL STRATEGY: EXPLORING THE VISUAL FORMAT OF ROADMAPS

DATE: TUESDAY, AUGUST 2
TIME: 14:00-15:30
LOCATION: BROADWAY II

SPEAKERS: Clive Kerr, University of Cambridge, UK; Michèle Routley, University of Cambridge, UK; Dr Robert Phaal, University of Cambridge, UK

Roadmapping is widely used in industry to support innovation, strategy and policy in order to help organizations respond to the opportunities and challenges they face. The key distinguishing feature of the technique is the use of structured visual templates to support strategic dialogue and communication. However, the visual aspects of roadmaps have not been extensively researched. The focus of this tutorial is to explore the visual aspects of roadmaps, based on a set of published examples, addressing questions such as: what visual elements result in a 'good' roadmap?

The format of the tutorial will be an introductory presentation, small group exercise and a plenary feedback discussion. The presentation will outline the fundamental principles of visual design and provide guidance on how to apply them to roadmapping graphics. The topics that will be covered include composition layout; perception of spatial proximity and concentration; psychology of similarity and continuity; basic visual variables (position, size, shape, value, color, orientation, texture); pop-out effects; color associations, color set selection and contrast; and typeface and font recommendations.

The exercise will ask delegates to reflect on the overall composition and visual elements of a set of selected roadmap examples. In small groups, participants will discuss the features of each roadmap in terms of how they either support or hinder effective communication. The outcome of the tutorial will be a visual critique of the roadmaps highlighting good/bad practice, the sharing of experiences and guidance on visual design.

Dr. Clive Kerr joined the Centre for Technology Management at the University of Cambridge as a Research Associate in 2005. His current research interests are visual strategy, roadmapping, technology intelligence, technology insertion and through-life capability management. Prior to joining Cambridge, he was a Research



Officer in Engineering Design at Cranfield University. Dr. Kerr has a First Class Honours degree in Electrical and Mechanical Engineering co-awarded together with a Diploma in Industrial Studies, a Diploma degree in Economics, a Postgraduate Certificate in the Social Sciences, and a Doctorate in Engineering. He is a Chartered Engineer with professional memberships of the IMechE, IET, RAeS and the AIAA.

Dr. Michèle Routley joined the Institute for Manufacturing (IfM), University of Cambridge, as a Research Associate in the Centre for Technology Management in 2009, to undertake research on emerging industries. She is interested in developing practical tools to assist with navigating industrial dynamics. She has over 10 years of consultancy experience, working with industrial organizations facilitating technology strategy analysis, new product introduction, technology roadmapping, design reviews, and industry/market trends analysis. She has an MSci in Physics with Electronics from the University of St. Andrews, a Ph.D. in Microelectronics from the University of Southampton, and an MBA in Technology Management from the Open University.



Dr Robert Phaal joined the Centre for Technology Management at the University of Cambridge in 1997. As a Principal Research Associate he conducts research in the field of strategic technology management. Areas of interest include roadmapping, the emergence of technology-based industry, technology evaluation, strategic visualization, and the development of practical management tools. He has a mechanical engineering background, a Ph.D. in computational mechanics from Cambridge (1990), together with industrial experience in technical consulting, contract research and software development at TWI, a leading UK research and technology organization.



TUTORIALS

TECHNOLOGY FORECASTING USING DEA

DATE: WEDNESDAY, AUGUST 3
TIME: 16:00-17:30
LOCATION: STUDIO SUITE

SPEAKERS: Timothy R. Anderson, Portland State University, USA; Yonghee Cho, Portland State University, USA; Tugrul U Daim, Portland State University, USA; Alptekin Durmusoglu, University of Gaziantep, Turkey; Oliver Inman, Aisle Five Consulting, Inc., USA; Jisun Kim, Portland State University, USA; Dong-Joon Lim, Portland State University, USA

A new approach for technology forecasting was first reported on at PICMET 2001. This approach uses a popular management science technique, data envelopment analysis, to provide a tool incorporating multiple trade-offs in technologies. This session will describe the applications conducted, use of this approach, new developments, challenges, and future research directions.



Dr. Timothy R. Anderson is an Associate Professor of Engineering and Technology Management at Portland State University. He was educated at the Georgia Institute of Technology and received the degrees of M.S.I.E. and Ph.D.I.E. after receiving his B.E.E. from the University of Minnesota. He has worked for and consulted with a variety of companies including Honeywell, Nike, Menlo Logistics, Oki Electric, and the U.S. Postal Service. He is Director of Technical Activities for the Portland International Conference on Management of Engineering and Technology (PICMET). His current research interests are productivity analysis, operations research, service engineering, technology forecasting, and new product development. Recent journal articles have been published in the *IEEE Transactions on Engineering Management, Technological Forecasting and Social Change, International Journal of Innovation and Technology Management, Journal of Productivity Analysis* and *Technovation*.

SPECIAL SESSIONS

COUNTRY REPRESENTATIVES MEETING

DATE: WEDNESDAY, AUGUST 3
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 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, Professor Emeritus, 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 '12 AND '13 PLANNING SESSION

DATE: THURSDAY, AUGUST 4
TIME: 16:00-17:30
ROOM: PAVILION WEST

This panel session will provide an opportunity to give feedback on PICMET '11 and to get involved in the planning for PICMET '12 and '13 conferences. PICMET '12 will be held July 29-August 2, 2012, in Vancouver, British Columbia, Canada.

SESSIONS

MA-01 PLENARY - 1

DATE: MONDAY, 8/1/2011
TIME: 08:30 - 10:00
ROOM: PAVILION
CHAIR: TBA

MA-01.1 [K] The Future of Engineering and Why Innovation Matters

Amir Aghdaei; Tektronix, United States

2011 marks the 65th anniversary of innovation and technology management at Tektronix. Amir Aghdaei, President of Tektronix, will discuss how an engineer's job is being impacted by the technology trends driving our world today. He will also share his views on the importance of pro-active technology management and describe some of the practices used at Tektronix to address the expected acceleration of technology trends in the future.

MA-01.2 [K] Introducing Systemic Technology Shifts

Wilfred Pinfold; Intel Corporation, United States

New technologies often find a hostile environment when they are introduced into a world dominated by old technology standards. This keynote will explore techniques that require systemic change before real customer benefits are realized. Efficient energy use will be explored in this context.

MB-01 Innovation Management-1

Monday, 8/1/2011, 10:30 - 12:00

Room: Pavilion East

Chair(s) Kiyoshi Niwa; The University of Tokyo

MB-01.1 [R] Serendipity Management Model for Technology Companies

*Kazuhiko Itaya; Toshiba Corporation R&D Center, Japan
Kiyoshi Niwa; The University of Tokyo, Japan*

This paper aims to present a management model to promote serendipity in technology companies. First, we analyzed six cases of serendipity that had been collected over two years of participatory observation in a Japanese technology company. Evaluating each case from the point of view of collaborative activities, it is revealed that the key factors are different according to the type of serendipity (pseudo or true). For pseudo-serendipity, loose communication or informal exchanges among engineers having similar background knowledge is important. Meanwhile, for true serendipity, it is desirable to show the element technology that is the result of pseudo-serendipity to a gatekeeper operating in subsystems or system hierarchy, and to promote collaborative activities around him/her at its center. A management model that encourages and promotes serendipity based on these factual findings is presented, as well as considering a strategy for effective and successful collaborative activities for gatekeepers.

MB-01.2 [A] Innovation Topology: The Dimensions and Their Characteristics That Drive Innovation

*Jeff A Forsythe; Portland State University, United States
Ron Khormaei; Portland State University, United States*

A key failure mode for businesses of all sizes is application of an otherwise good innovation strategy at the wrong time. It is a well-known but little understood fact that good strategies and managers from one environment fail miserably in delivering successful innovations under a different condition. A systematic tool for evaluating and selecting a strong and appropriate set of innovation strategies is needed for any organizations success. In this paper, Global Innovation Map (GIP) is introduced as a tool to decide on effective approaches where strategy vectors are included with optimum approaches mapped to the company lifecycle from start up, to growth and maturity stages. The initial vector mapped using the GIP approach is drive-to-market activities. Mapping of this vector highlights similarities and differences (where pitfalls are) from the initial creative spark to the obsolescence.

For example, whereas in a start up frequent obsolescence is required to avail resources for the next concepts, in the growth phase a chaotic obsolescence needs to be tolerated to support production growth, while in the mature phase a planned obsolescence maintains the fine-tuned efficiencies. Application of this tool is demonstrated using case studies of a Fortune 500 company and a start up. Future GIP extensions to vectors like value chain and management are also introduced.

MB-01.3 [R] An Empirical Analysis on Academic Innovation

Hiromi Saito; Chiba University, Japan

This paper aims to explain empirically the effects of basic science outcomes by universities and public institutes on a firms' performance. Although we believe that the basic science of universities and public institutes contributes to product innovation for firms, it is not necessarily explained based on evidence. We think that it is a contribution for innovation management to explain empirically how basic science helps firms' performance. Therefore, we obtained data through an original questionnaire survey we had delegated an investigation company to carry out. Those surveyed comprised 20,455 firms registered as Internet monitors throughout the country and covering all industries. In this paper, we used the data of 5,360 of these firms (response rate was about 25 percent). Based on this data, we analyzed using ordered probit model and poisson model according to distribution of response results. As a result, we found that larger firms tend to produce goods or services based on basic research outcomes of universities and public institutes in manufacturing while it is not true for non-manufacturing firms. In addition, we found that the accumulation of researchers of science and technology in each area has some effects only in manufacturing.

MB-01.4 [R] 5 'S' Experience: A Case Study

Vinod K Khanna; Mayur Uniquoters Ltd., India

To be competitive in the liberalized economy, organizations must be supported by both an efficient and effective 5 S management system. Manufacturing organizations, in particular, often operate at less than full capacity, quality and productivity are low, customer problems are high, leading to increases in manufacturing costs of products. The experience has indicated that a large percentage of the total cost of doing business is due to poor handling of 5 S related activities in the organization. One approach to improve the performance of the organization is to implement and develop a sustainable 5 S system suitable to one's own organization. 5 S has been successfully implemented in Japan over the past three decades, and more recently in India. Inherent within the 5 S concept is the successful journey towards implementing total quality management (TQM) in the organization. In turn, this will help the organization to be competitive in the domestic and global market. This paper shares some of the experience of 5 S implementation in Mayur Uniquoters, India's leading synthetic leather manufacturer in Rajasthan. This paper will discuss achievements made by the organization while adopting and implementing 5 S and how it has helped in the TQM journey. It also identifies some of the difficulties faced during its implementation, relates with the concept of 5 S and proposes some solutions to eliminate them.

MB-02 Technology Management in Energy Industry-1

Monday, 8/1/2011, 10:30 - 12:00

Room: Pavilion West

Chair(s) Dietmar H Winzker; University of Pretoria

MB-02.1 [R] Dimensions of Innovation During the High Growth Stage of Materials and Energy Production

*J. A Sekhar; University of Cincinnati, United States
Michael C Connelly; University of Cincinnati, United States
Brian Davies; University of Cincinnati, United States
John P Dismukes; University of Toledo, United States*

Life-cycles studies provide a comprehensive insight into innovation behavior and innovation constants. The study has led to making the connections between Green energy and Green materials. The authors have noted in the past that production and patent activities

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may be correlated to such an extent that they may be superimposed to a large degree, for all growth stages, simply by an origin-shift (OR) in the life cycle. The relative drive-force (defined as the ratio of the production and patent growth constants, DF) is noted to scale with the origin-shift. The value of this drive-force determines the amount of production of materials or energy that is influenced by patents. The slope of drive-force against the origin-shift ratio curve is noted to be a constant across all materials and energy categories. We find that even early stage production displays an origin-shift. The life-cycle approach collapses the energy categories/sources into two groups. Group 1, containing coal, natural gas, wind, renewable, fossil fuel, solar and total energy, is composed of energy categories/sources whose patent activity could be inferred as driving their production. On the other hand energy production from biomass, biofuel, geothermal and nuclear energy are identified in Group 2, in which patent activity is driven by the production activity. Retaining Stage III behavior occurs when the (OR) is slightly less than one and the (DF) less than one as this leads to a situation where with time, a higher innovation enhanced growth stage is possible. A very low (OR) and a low (DF) on the other hand lead to a transition from high-growth Stage III to a no-growth Stage IV with time. We discuss our findings in the Schumpeterian framework of constructive and destructive innovation and the Sekhar model of innovation-enhanced production. Green Materials are identified as those aligned with Green Energy. This article also focuses on disruptive and radical innovation during the Stage III life thus making connections with radical innovation concepts introduced by Dismukes.

MB-02.2 [R] The Influence of Raw Material Prices on the Development of Hydrogen Storage Materials: The Case of Metal Hydrides

Nathalie Sick; University of Muenster, Germany

Matthias Blug; University of Muenster, Germany

Jens Leker; University of Muenster, Germany

Hydrogen holds a prominent role as a renewable energy carrier of the future due to its high gravimetric energy density. However, the most urgent technological challenge, especially concerning mobile applications in fuel cell vehicles, is the development of appropriate hydrogen storage options. In this context, metal hydrides are a promising candidate, especially concerning development potential and storage density. Our research outlines the so far neglected influence of raw material prices on the decision, which metal hydride is to date the most promising option to pursue. Using scenario analysis, we picture the impact of possible price developments depending on the diffusion speed of fuel cell technologies into the automotive market, further applications of the corresponding raw materials and other external influence factors. The main practical implication of our approach consists of enhancing the understanding of constantly changing market conditions, in our case scarcity, and prices of the needed raw materials and their impact on technology assessment in an early stage of the innovation process. In a superior context, our results in terms of metal hydrides can be adapted to further technologies and thus contribute to design a general model illustrating the influence of raw material prices on the development of energy technologies.

MB-02.3 [R] A Patent Analysis of Hydrogen Storage Techniques in Taiwan: A Preliminary Study of the Overall Industry

Hui Yu Shih; Feng Chia University, Taiwan

Shang-Yung Yen; Feng Chia University, Taiwan

Energy consuming is an essential issue to all human beings. Along with the emerging threat of environmental crisis, finding out the most efficient and effective way to use the limited energy is becoming an urgent issue to the world. Hydrogen is one of the most well-known alternatives to the present energy. The difficulty of developing hydrogen storage technologies is one of major factors hindering the utilization of hydrogen energy into people's daily lives. To conduct a research regarding technology development of hydrogen storage has an extraordinary meaning. The present study implements a deep and comprehensive patent analysis, which is devoted to recognizing the building blocks constituting the technologies of hydrogen storage. The scope of this study is limited to the countries which are the best players of developing hydrogen storage technology, i.e. United States, Canada, Japan, and

European Union. By means of data collection from the major patent databases of each country, this research has plenty of resources which not only improve the completeness of the study but also help generate valuable insights. With the result provided by this study, energy researchers could easily identify the most potential technology trajectory and improve the quality and utilizability of the research output.

MB-03 TUTORIAL: To Succeed in Services by Creating Strategic Differentiation and Operational Excellence

Monday, 8/1/2011, 10:30 - 12:00

Room: Broadway-1

Speaker(s) C M Chang; State University of New York at Buffalo

As the service sectors play an increasingly important role in both developed and developing economies, engineers and service professionals are well advised to become prepared with the knowledge and skills needed to enhance the strategic differentiation and operational excellence of their service enterprises. This tutorial offers a specific pathway to generate creative ideas, select the profitable ones to pursue, justify projects financially, manage development projects of innovative services, reach out to customers, and support service customers. Examples of achieving operational excellence are illustrated by standardizing work processes, enhancing quality and time-to-market (e.g., applying tools, such as Lean Six Sigma, value stream mapping, quality assurance, FMEA, web-based enablers and SOA-based emerging productivity tools), involving staff based on the profit-chain model, seeking productivity utilizing emerging technology, and adopting and constantly improving known best practices. This tutorial summarizes the key skills and knowledge in a Three Decker framework comprising of engineering management, business management and service leadership, cumulating in a "Take Charge" model. After attending this tutorial, participants will know how to focus their efforts on selected activities to maximize their contributions in creating strategic differentiation and operational excellence for their service employers.

MB-04 Software Process Management-1

Monday, 8/1/2011, 10:30 - 12:00

Room: Broadway-2

Chair(s) Siri-on Setamanit; Chulalongkorn University

MB-04.1 [R] Dynamics and Heterogeneity of Product Innovation in Embedded Software: The Case of Japanese Automotive Software

Zhongquan Xie; Tokyo Institute of Technology, Japan

Kumiko Miyazaki; Tokyo Institute of Technology, Japan

This paper contributes to the research on dynamics and heterogeneity of product innovation in embedded software in the case of Japanese automotive software (ASW). Functions of embedded software are realized by being embedded into hardware, so if we know the functions of an embedded system, we know the functions of its embedded software. Therefore, based on the advantage of using patenting in large third countries as a good proxy measure for national innovation activities, we use ASW related patents in the USPTO patent database as an indicator of ASW product innovation. The results show that heterogeneous actors have had different roles and propensities to innovate in several fields of ASW functions, namely power train control, battery and electric power control, safety control, body control and ICT system over the period 1981 to 2010. There was a shift beginning in the early 1990s, when suppliers were becoming more and more important in product innovation of ASW. Increasing cooperation happened mainly between the automotive makers and suppliers, especially big suppliers. To conclude, the heterogeneous requirements for real-time operation and accumulation of specific knowledge that are technologically difficult and complex are the main reasons of heterogeneity of product innovation in embedded software.

MB-04.2 [R] Eliciting Process Conception Contradictions in Software Process Improvement

Harri Keto; Tampere University of Technology, Pori, Finland

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Timo Mäkinen; Tampere University of Technology, Pori, Finland
Petri Linna; Tampere University of Technology, Pori, Finland

Software process implementation fails if adequate mutual understanding about the process model is missing. We are assuming that this happens because of differences and conflicts between the mental images of the process in question. We call this mental image subjective process conception of a process in case. In this paper, we introduce a method in order to elicit possible contradictions between subjective conceptions about the evolution state of a process. First we define an interview framework, which is based on The Basic Modelling Situation, The Process-Ontological Model and identification of five evolution qualities of a process. The dimensions of five qualities are defined. Then, based on the adopted framework we will present questions for a semi-structured interview which focus the interviewer on themes to be explored. Identification of contradictions and differences between process conceptions is based on simple measurement and visual presentation of data.

MB-04.3 [R] Managing Software Changes in a Web Based Multistage Environment in a Small Enterprise

Francois Scheffer; University of Pretoria, South Africa
Marie-Louise Barry; University of Pretoria, South Africa

Change in software is considered the most prominent source of risk, affecting quality, cost and time. Managing software change is a resource consuming activity, and is particularly daunting when financial and human resources are limited. The complexity and necessity of properly managing software change has been highlighted in literature, but the process of managing it with limited resources still needs more exploration. This research entails the use of structured interviews with experts, followed by surveys and an analysis in the form of a case study. It sets out to investigate key shortcomings in solutions for small enterprises, as described in current literature. Practical recommendations are identified in terms of how small enterprises can improve their software management in theory and in processes in order to improve their quality of deliverables, without losing their competitive advantage. Identifying these key factors and ascertaining the manner in which they should be addressed will help in better understanding software change and make it possible to improve quality and reliability without sacrificing precious resources.

MB-05 Project/Program Management-1

Monday, 8/1/2011, 10:30 - 12:00

Room: Broadway-3

Chair(s) Peerasit Patanakul; Stevens Institute of Technology

MB-05.1 [R] The Role of Team Collaboration in Complex Product Developments

Hans J Thamhain; Bentley University, United States

Cross-functional collaboration has become a critical success factor for new product teams to succeed in today's intensely competitive business environment. It is especially essential for complex and geographically dispersed developments helping to integrate subsystems, creating visibility throughout the project organization, and unifying team members behind the requirements, keeping the project effort focused and synchronized. This paper reports the results of a recent field study examining the conditions promoting collaboration in 23 technology-intensive product developments tracked over their lifecycles. The paper discusses the leadership challenges, managerial actions, organizational conditions and work processes that foster collaboration in a complex and culturally diverse team environment.

MB-05.2 [A] Grand Challenges and Projects: Facilitating Knowledge, Learning, and Innovation

Ed Hoffman; NASA Academy of Prog/Proj & Engineering Ldrship, United States

The development of sustainable sources of energy is the grand challenge of the early 21st century, much as the moon landing was the first grand challenge of the Space Age. The organizational approach to these challenges, which require significant knowledge, learning,

and innovation, is project-based: project management teams coordinate diverse discipline experts, scientists, engineers, business professionals, suppliers, and other partners in the design, development, and implementation of one-of-a-kind solutions to highly complex problems. The NASA Academy of Program/Project & Engineering Leadership helps build NASA's capability to tackle grand challenges by facilitating learning at the individual, team, and organizational levels. Through strategies that emphasize technology-enabled learning, direct support to project teams, and knowledge sharing, the Academy creates multiple "touch points" for professional development. In the process, individuals build their competencies and skills, teams get the support they need in the field, and the agency matures as a learning organization. It is a flexible model that is highly adaptable to project-based organizations pursuing the grand challenge of our time.

MB-05.3 [R] Resource Allocation in Multi-Project Environments: Planning vs. Execution Strategies

Tal Ben-Zvi; Stevens Institute of Technology, United States
Thomas G Lechler; Stevens Institute of Technology, United States

One of the challenges in multi-project environments is the question how to allocate resources to assure a timely completion of all planned projects. In order to increase resource utilization, managers try to allocate all available resources at the beginning of a new cycle to all planned projects. This strategy would not allow for acting on potential risks and uncertainties. Thus, current literature on multi-project planning considers buffer concepts in various forms. The problem with these strategies is their complexities and consequently their general rejection by practitioners. In this study we address the problem of resource allocation under uncertainty by developing a counter-intuitive heuristic that is simple and effective. We developed a simulation tool allowing us to test resource allocation strategies in realistic environments. Surprisingly, the results demonstrate that resource allocation strategies with less than 100 percent resource allocation in the planning stage enable an overall value for a project portfolio that is close to the ideal maximum. This means that managers should keep a certain percentage of resources in the planning stage idle to encounter variations in the execution phase, enabling a maximal project portfolio value.

MB-05.4 [R] Project Management Assets and Project Management Performance: Preliminary Findings

Kam Jugdev; Athabasca University, Canada
Gita Mathur; San Jose State University, United States
Tak Fung; University of Calgary, Canada

The objective of this research is to examine the degree of competitive advantage from project management assets by exploring the link between the characteristics of project management assets as independent variables and project management performance outcomes as dependent variables. This paper analyzes data from responses to an online survey by 198 North American Project Management Institute members. Factor analysis is used to identify the characteristics of project management assets and the project management performance outcome factors. Seven factors that comprised the characteristics of project management assets, three factors that comprised organizational support for project management assets, and two factors that comprised the project management performance outcomes were extracted from the data analysis. Preliminary findings are presented in the paper. We draw on the Resource Based View of the firm as a lens to examine and validate project management capabilities as a source of competitive advantage. This paper contributes an improved understanding of project management as a source of competitive advantage for scholars and practitioners interested in project management.

MB-06 Management of Technological Change-1

Monday, 8/1/2011, 10:30 - 12:00

Room: Broadway-4

Chair(s) Abrar Haider; University of South Australia

MB-06.1 [R] Information and Operational Technologies Nexus: An Integrated

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Governance Model

Abrar Haider; University of South Australia, Australia

Technologies utilized in management of an asset lifecycle consist of a variety of operational and information technologies. Although operational technologies are, by nature, information technologies, they are not classed within information technology infrastructure. In fact, most of the operational, financial, and administrative systems require information from operational technologies, e.g. control systems, to accomplish a variety of tasks relating to asset lifecycle management. Nevertheless, this isolation is the major contributor of integration and interoperability issues in the technological infrastructure utilized in enabling and supporting asset lifecycle processes and management regime. Asset managing organizations evolve along the continuum of standalone technologies, processes enabled by these technologies, as well as the skills associated with their operation. As a consequence, information resources could best be described as isolated pools of useful data that could potentially provide strategic support to asset lifecycle management. This paper proposes that operational technologies should be treated as information technologies, and proposes a model for governance of these technologies utilized for enabling and supporting asset lifecycle. The proposed model facilitates generative learning and argues for continuous alignment of asset management strategy with technology, and acts as a strategic enabler as well as a translator.

MB-06.2 [R] Environment Effects on Patterns of Network Change: The Flat Panel Display Industry Network Evolution

Hung-Chun Huang; National Chi Nan University, Taiwan

Hsin-Yu Shih; National Chi Nan University, Taiwan

Pai-Yu Liu; National Chi Nan University, Taiwan

As strategic management and economic policy making highly prioritize understanding how industry networks evolve, this study discusses how environmental changes affect the evolution of industrial networks, especially in the flat panel display sector. Different environmental scenarios through the changes of environmental munificence and environmental uncertainty simultaneously affect industrial network transition and reshape distinctive network formations. This investigation then utilizes data of 71 countries during 1976 to 2008 to empirically examine their network relationship. This study thus demonstrates a longitudinal evolutionary trajectory of the PFD industry and finds the essential transition of technological competition via international technological co-evolution. The analytical results demonstrate that different environmental scenarios provide different countries to develop their niche competence of the PFD industry. Results of this study provide a valuable reference for policy makers and multinational businesses involved in theoretical development to strategize technological planning.

MB-06.3 [R] Identify Technology Main Paths by Adding Missing Citations Using Bibliographic Coupling and Co-citation Methods in Photovoltaics

Mu-Hsuan Huang; National Taiwan University, Taiwan

Dar-Zen Chen; National Taiwan University, Taiwan

Huei-Ru Dong; National Taiwan University, Taiwan

The objective of this research is to study the technology main paths by adding missing citations through the use of bibliographic coupling (BC) and co-citation (CC). Core patents are identified and used for patent citation network (PCN) analysis. In the citation network, patents with strong links are analyzed to construct the technology main paths. Previous research has shown that both bibliographic coupling and co-citation may help in finding missing citation patents, so this study will utilize bibliographic coupling and co-citation to add missing citations into the original citation network and construct the technology main paths in the field of photovoltaic by connecting the strong links. The time duration of the main paths from the original photovoltaic patent network has been relatively short. Furthermore, the number of patents has not exceeded three. A possible reason to explain the short time duration may be the nature of patents that is focused on technological innovation. On the contrary, the photovoltaic network after adding the missing citations has contained more links and presented a more complete trail for the main paths. Moreover, the network has

sustained for longer in time duration. The results indicate that utilizing BC and CC methods to supply missing citations is an effective way in constructing the technology main paths.

MB-07 Knowledge Management-1

Monday, 8/1/2011, 10:30 - 12:00

Room: Forum Suite

Chair(s) Charles M Weber; Portland State University

MB-07.1 [R] Knowledge Management in Embedded Software Development through Offshore Outsourcing: A Theoretical View

Nataliia Samoilenko; University of Jyväskylä, Finland

Nazmun Nahar; University of Jyväskylä, Finland

Knowledge management in offshore outsourcing projects is a very important topic, but this area of research has received limited academic attention, leading to a lack of studies existing on the management of both clients and service providers' knowledge for developing embedded software. The main goal of this study is to fill in this gap by analyzing clients' generic and specific knowledge as well as the service providers' generic and specific knowledge and how this knowledge could be effectively managed in this endeavor. We conducted an extensive literature review on the major topics related to this field. From the analysis, an integrative model of knowledge management for embedded software development through offshore outsourcing is developed which deals with both parties' generic and specific knowledge. We posit that through the provision of adequate training, where the outsourcing client takes the main responsibilities in planning and conducting what kind of distinctive knowledge types should be delivered to service provider and how it should be performed, it is possible to facilitate effective knowledge transfer and management for the development of high quality embedded software through offshore outsourcing.

MB-07.2 [R] Organizational Capability for Quality Management Focusing on Japanese Automobile Industry: An Empirical Study on Quality Accident

Ken Kitazawa; The Japan Institute for Labour Policy and Training, Japan

Hiroshi Osada; Tokyo Institute of Technology, Japan

In recent years, the product recall cases of Japanese companies which had organizational quality accidents have been seen frequently, and these cases have made significant impact on corporate management. The study focuses on the Japanese automobile industry and aims to analyze relations between quality management and organizational capability by focusing on product defects and recalls data. First, the comparative analysis of a trend of automakers, regarding especially four major companies in Japan, is conducted by using the recall data reported to the Ministry of Land, Infrastructure and Transport Japan (MLIT). Based on this analysis, the business strengths and weaknesses of these companies are clarified. In addition, the representative two companies among four sample companies were selected and analyzed the relation between the product defect problems and the trends in organizational structure and capability according to the literature and interview research. Company A's product defects and recalls problems led to social problems in 2004. On the other hand, same problems by Company B were not limited in Japanese society but spread to the United States from 2009 through 2010. Based on these analyses, an appropriate organizational management is proposed for quality accidents in the automobile industry.

MB-07.3 [A] Accumulation of Technological Capabilities in the Brewing Industry

Sergio Garcilazo-Lagunes; Universidad Panamericana, Mexico

The accumulation of technological capabilities is one of the fundamental features of competitiveness. At the firm level it implies a dynamic process for obtaining and building domestic capacity, as well as the available technological expertise in other companies and institutions, and economical context where the company participates and competes. This paper analyzes the skills accumulation patterns through the use of an array of technological capabilities that measures the technical functions of investment, production, product and equipment for the Mexican company "Grupo Modelo." The study period extends from

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the foundation of the company until 2009. The information sources are from interviews in depth, direct observation and technical information from the company. The questions to be answered are: What has the accumulation pattern of technological capabilities followed by the company been during its life? How has the accumulation pattern of technological capabilities followed by the company been during its lifespan? What has the characteristic level (operational improvement) in the accumulation pattern of technological capabilities through routine and innovation levels been? And how can the differences in the acquisition and conversion of underlying organizational knowledge and learning processes be explained? The main conclusion of this research is that Grupo Modelo has undertaken internal learning processes and premises that have enabled an increase in building technological capabilities in a gradual and differentiated manner (acquisition, assimilation and adaptation), thus improving its competitiveness.

MB-08 R&D Management-1

Monday, 8/1/2011, 10:30 - 12:00

Room: Council Suite

Chair(s) Frederick Betz; Portland State University

MB-08.1 [R] The Modeling and the Affecting Factors for Patent Examination Durations: The Biotechnology Patents of Taiwan and South Korea at the USPTO

Ming-Yeu Wang; National Chiayi University, Taiwan

Jei-Heng Lin; National Chiayi University, Taiwan

Patents enable enterprises to monopolize the innovation by prohibiting the usage of other organizations and to gain benefit in economy. However, enterprises can exercise the monopoly rights of innovations only when the applications pass the examination and are granted by the patent offices. During the examination periods, enterprises are uncertain about the legal positions of applications, which carry the uncertainty in financial and strategic planning. Therefore, the factors which might affect the durations provide useful information for enterprises on reducing the uncertainty in strategic and financial planning. In previous studies, the conclusions considering the affecting factors and their affecting directions are inconsistent, which implies that the factors and their affecting directions vary with the technology fields and patent offices. As a result, this study focuses on studying the patents of the United States Patent and Trademark Office and investigates the factors which might affect the examination durations of biotechnology patents granted from 2000 to 2009 for Taiwan and South Korea. This study examines three groups of determinants: indicators representing patent value, applicant characteristics and determinants affecting the complexities of the examination tasks. Based on the survival analysis, the results show that in the examination durations of the biotechnology patents there are no significant difference between Taiwan and Korea. Moreover, the higher value patents have significantly shorter examination durations. The basic research patents and the patents with wider technology fields have significantly longer examination durations than applied research patents and those with narrower technology fields. Finally, this study discusses the directions and sizes of the affecting factors of examination durations for strategic planning.

MB-08.2 [A] Development of Performance Evaluation in Publicly Funded Institute in Korea

Hong Bum Kim; KISTEP, Korea, South

Gil-Woo Lee; KISTEP, Korea, South

Recently, as expansion of private sector R&D scale and growth of the research capabilities of universities, the publicly funded research institute in Korea is faced in terms of competitiveness with changing research conditions, research specialization and improvement of quality of research performance. In addition, performance evaluation system has been changed as qualitative performance evaluation. Under these circumstances, we suggested and applied the proper qualitative performance indicators for research quality improvement of the publicly funded research institute.

MB-08.3 [A] Research on Strengthening Independent Innovation Capability

of Internet of Things Enterprises: A Case Study on the R&D of 2-Dimensional Barcode Technology in Newland Computer Co., Ltd.

Zhirong Yang; Fuzhou University, China

Guocheng Zou; Fuzhou University, China

With the rise and continuous development of the Internet of Things, people have paid close attention to the two-dimensional barcode technology, which is the core and one of the most pivotal technologies in the Internet of Things industry. First, this article analyses the impetuses of the Newland strengthening independent innovation capability based on the research of the two-dimensional barcode technology. Second, it probes into how it innovates independently combining its own situation. Finally, it describes briefly that independent innovation capability has brought favorable opportunities to the Newland.

MB-09 TUTORIAL: Metrics and Methods for Managing Payment Fraud

Monday, 8/1/2011, 10:30 - 12:00

Room: Directors Suite

Speaker(s) Mike Freiling; Sigma Investment Management Co.

In today's environment, fraud impacts every business, governmental organization, and non-governmental organization (NGO). Fraud takes many forms including payment fraud, claims fraud, and identity theft. This tutorial will provide an overview of the world of fraud and illustrate several common types of fraud with typical fraud scenarios. We will then introduce the Fraud Management Life Cycle, a comprehensive methodology for managing fraud that focuses on the different activities (deterrence, prevention, detection, mitigation, and investigation) that can help control and manage fraud. We present metrics that can be used to manage performance for these activities, as well as help determine where investments in additional capabilities will have the greatest payoff. We will discuss software tools for managing fraud, including neural network models and social network analysis. Finally, we will illustrate how ordinary desktop tools like spreadsheets can be powerful aids in analyzing and managing fraud.

MB-11 Sustainability-1

Monday, 8/1/2011, 10:30 - 12:00

Room: Parlor-C

Chair(s) Breno Nunes; Aston Business School

MB-11.1 [R] Service Cost Optimization in Supply Balance of Sustainable Power Generation

Junzo Watada; Waseda University, Japan

Yu-Lien Tai; Waseda University, Japan

Yingru Wang; Waseda University, Japan

Jaeseok Choi; Gyeongsam National University, Korea, South

Mitsushige Shiota; MOT Consulting, Japan

With recent trends in utilizing renewable power to develop sustainable energy sources, WTG and PV are increasingly viable economic alternatives for sustainable power generation from conventional fossil fuels. Therefore, multi-state models are being generated to solve the intermittent power production problem of wind turbine generator (WTG) and photo voltaic (PV). However, a disadvantage of these units is the generation of highly variable electricity at several different timescales from hourly, daily, and seasonally. Related to variability is the short-term (hourly or daily) predictability of wind plant output. These problems result in serious damage to sustainable service concerns in both the design and operation of WTG and PV systems. Large-scale systems can provide a solution to overcome sustainable service problem but are costly. A sufficient design will cause outages that lead to certain cost losses on the customer side. Therefore, planning a reasonable size is a major dilemma. For this objective, the three models of load model, generation model, and service cost model should be built. For the first two models, the loss of load expected (LOEE) and the loss of load expected (LOLE) can be calculated. Then, this reliability characteristic is evaluated with the existing system of generation units to decide the range of required renewable generators. Finally, the cost model is constructed with consideration of the sustainable service cost. The

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fuel and operation costs obviously contribute a rather large portion to the utility cost. From the total service cost chart, the amount that the sustainable service is worth is tremendous when forced outage at a high level occurs and the customer is not fulfilled. However, the utility cost becomes the primary of the total service costs when sufficient capacity is constructed in the system, which is invested mainly to the conventional generating. The utility cost of renewable energy changes with increases in WTG and PV but remains steady. With regard to the excessive variable cost, fixed cost, and capital cost of a conventional generating system, the investment cost and maintenance cost are relatively insignificant. If renewable energy replaces conventional generators, particularly thermal sources, this component of utility costs will not occur. Also, a certain service level is ensured to supply the load.

MB-11.2 [R] Specifying International Research Network Diagram in Growing Field

Ichiro Sakata; The University of Tokyo, Japan
Hajime Sasaki; The University of Tokyo, Japan
Naoki Shibata; The University of Tokyo, Japan
Yuya Kajikawa; The University of Tokyo, Japan

An innovation model providing a solution for climate change and sustainable economic growth is required. In this scenario, clean energy is the most promising technology. The research requires a considerable amount of R&D expenditure and various core technologies. Therefore, international research collaboration is effective for prompt and efficient development. With countries and organizations contributing to the rapid growth of knowledge, the meta-structure of international research and collaboration has become ambiguous. Our paper aims to establish a knowledge base that can help to prepare international research collaboration policies for solving global challenges effectively. We demonstrate research capacity and international research collaboration in solar cell, fuel cell technologies and service science, using global research network diagrams gathered from 35,322; 33,136 and 50,035 academic papers respectively. The diagram includes the data of research competency of countries or institutions and of co-authorship. More than 6,000 institutions and 100 countries are involved in each field. Based on the diagrams, the clean energy technologies and service science are compared and international collaboration is analyzed. A valley of research collaboration in Asia and a gap between the collaboration structures of both technologies are identified. Then, science and education policies which influence the structures are discussed.

MB-11.3 [R] Key Drivers for Sustainable Operations in Developing Countries: A Textile Case Study from Egypt

Sherwat E Ibrahim; German University in Cairo, Egypt
Karim H Ahmed; German University in Cairo, Egypt

There has been a recent paradigm shift towards sustainable development of business operations worldwide. Limited resources and the need for a cleaner and unpolluted global environment, along with recent developments in governmental legislations, have made it difficult for international companies to take advantage of developing countries' more lenient environmental policies. This paper presents an in-depth case analysis of a leading company's role in sustainable development in the textile industry in Egypt (Hesni Group, HG). While the Egyptian government has recently conducted several adjustments to the legislations that govern the textile industry in terms of emissions and water usage, HG responds to more stringent regulations enforced by the top management and governed by the regulations of its clients. Literature reviews and comprehensive interviews with the different stakeholders suggest a three-pillar model presenting the different key drivers that promote sustainable operations in developing countries. We aim to motivate organizations in developing countries to think greener, and to contest the notion that sustainability means giving up on current processes and incurring irredeemable losses.

MB-12 Manufacturing Management-1

Monday, 8/1/2011, 10:30 - 12:00

Room: Parlor-B

Chair(s) Jamie Rogers; University of Texas at Arlington

MB-12.1 [R] An Empirical Study on the Indicators and Factors for Successful Six Sigma Deployment in the Mining Industry: A South African Case

Alan L Keeley; University of Pretoria, South Africa
Cornelis C van Waveren; University of Pretoria, South Africa
Kai-Ying Chan; University of Pretoria, South Africa

The Six Sigma continuous improvement methodology has been successfully deployed in many organizations on a global basis. This has resulted in significant reductions in cost and increases in revenue as a result of the improvement in operational excellence associated with improved business practices, the removal of variance in systems and processes and the reduction in waste generation and poor product quality. A series of indicators that determine the level of a Six Sigma deployment and a set of key success factors have been identified within the operational context of a specific deployment undertaken by Lonmin PLC, one of the largest mining houses, which operates within the South African mining environment. Two deployment models exist, these being the integration of Six Sigma into the organizational strategy and operational philosophy with the second approach being operating the program as an independent decentralized system which provides Six Sigma technical support, Six Sigma training, coaching and mentoring to the business and its operational departments. Data was collected using semi-structured interviews and questionnaires. Factor analysis and OLS regression were used to explore the relationship between the factors and the indicators. The empirical result has confirmed that the factors are equally applicable to the South African mining industry and that their absence will impact negatively on the success and sustainability of a deployment. Practical recommendations are made regarding the approach to be followed during a Six Sigma deployment, and an integrated model is suggested which integrates the concepts of Six Sigma, change management, balanced score card and strategy into a single deployment plan should an integrated deployment approach be contemplated.

MB-12.2 [R] Resource Efficiency: Visualizing Energy Consumption to Optimize Tool Design

Günther Schuh; RWTH Aachen University, Germany
Till Potente; RWTH Aachen University, Germany
Heiner H Heimes; RWTH Aachen University, Germany

In many areas of engineering development, resource efficiency is an important quality characteristic. Customers pay more attention to energy consumption caused by the production of the desired products. Products that require a lot of energy in the production are referred to as critical by politics and society. Especially the field of tool and die industry despite the implementation of initial measures to increase resource efficiency has immense potential. Significant opportunities for improvement can be achieved by visualizing the energy consumption of tools and their components. In particular, the analysis of the relationship between the energy required to produce tools and the energy consumption of used tools has great potential. Taking account of resource efficiency, the overall optimum is desired. Rising electricity prices and the increased sensitivity on this part of industry, society and politics allow the economic realization of these improvements. The Innovation Alliance Car Body Green Technologies (InnoCaT) is one out of 10 innovative alliances that are financed by the Ministry of Education and Research (BMBF). In the focus of InnoCaT is the resource efficiency of tools. One main research objective based on the dependencies of the energy consumption in the individual life cycle phases is to develop a model which optimizes the design of a tool. The aim is to minimize the energy consumption over all life cycle phases. In this paper the latest research findings of InnoCaT are presented and needs for further research are identified.

MB-12.3 [R] Determinants of the Technology Commercialization of the Government-Sponsored Firms: Empirical Evidence from Korean Manufacturing

Jimin Kang; Sungkyunkwan University, Korea, South

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Seong-hoon Gwon; Sungkyunkwan University, Korea, South
Sukchul Hong; Sungkyunkwan University, Korea, South
Youngwoo Kim; Sungkyunkwan University, Korea, South
Keuntae Cho; Sungkyunkwan University, Korea, South

Understanding how scientific knowledge is transformed into commercial products in the market place and how to profit from technological innovations are important research issues. A key management challenge is how to transform promising technologies into economic returns by their commercialization. This study investigates the commercialization of government-sponsored firms and analyzes the relationship between their performance and determinants of the successful commercialization such as their internal and external capabilities. The empirical results show that the innovative capabilities, the investment on external R&D as the open innovation activities in the internal capability, and government funding for R&D and its commercialization in the external capability have significantly positive impacts on the commercialization. Moreover, it is found that the determinants of successful commercialization performance in the large-sized firm are different from those of the small- and medium-sized firm. This study is expected to contribute to the firms' formulation of their commercialization strategies to profit from their technological innovation and, in addition, the policy formulation to raise the firms' performance of technology commercialization.

MB-12.4 [R] Best Practices in Quality Management for Innovation Performance

Scott A Leavengood; Oregon State University, United States
Timothy R Anderson; Portland State University, United States

In many business sectors today, focus on quality as a competitive tool is being replaced by a focus on innovation. Research exploring connections between quality management, innovation, and company performance suggests that quality is necessary but insufficient in business today. In short, managers need to know how to adapt their quality management practices to achieve innovation performance in addition to quality performance. West Coast U.S. forest products manufacturers were surveyed about their quality management practices and performance with respect to both quality and innovation. Results were analyzed to identify two categories of high-performing firms: those achieving primarily quality outcomes and those achieving both quality and innovation outcomes. Executives from firms in each category were interviewed to provide detail on management practices. Results suggest firms must first change how they view innovation; firms that were primarily focused on quality rather than innovation viewed innovation as an end rather than the means to some other business goal. The most significant finding is related to how firms interact with customers: firms focused on innovation proactively seek to identify and meet customers' needs, whereas quality-focused firms primarily emphasize reacting to customer complaints. Findings suggest several areas where managers can focus to improve innovation performance.

MB-13 Technology Adoption-1

Monday, 8/1/2011, 10:30 - 12:00

Room: Parlor-A

Chair(s) Jacques G Bourque; Portland State University

MB-13.1 [R] The Style of Communication is Decisive! Results of Different Kinds of Relationships with Innovation Averse Customers When Launching New Products

Ann-Marie Nienaber; University of Munster, Germany
Gerhard Schewe; University of Munster, Germany

The communication of something new and unknown requires an innovative approach to reach not only those people affine towards innovations anyway but also those innovations averse. This challenge needs highly sensible communication. Trust is able to reduce uncertainties of the customers as well as increase the disposition to buy. Therefore, the question arises of how trustful communication should be designed in order to stabilize trust of late followers in the long run and therefore supporting the introduction of new products to the market. This paper calls for a complex experiment design due to its pioneer nature. A

multitude of expert interviews is being followed by a multistage empirical analysis on the basis of 490 returned questionnaires, identifying two types of innovation-averse persons, based on their attitude towards trust (averse or affine). Therefore, this study develops an interdisciplinary approach representing an entirely new research field, showing the effect of the correct use of trustful communication on the adoption of new products by innovation-averse customers. Here, persons averse to innovation and trust prefer primary information instead of interactivity with the partner (preference of people affine towards trust). Concrete implications for business management are given at the end of the paper.

MB-13.2 [R] Effects of Emotions and Self-Efficacy on Technology Usage Behavior

Henri Suur-Inkeroinen; Tampere University of Technology, Finland
Marko Seppänen; Tampere University of Technology, Finland

An information system can be a valuable resource for a company. Everyday usage of the system realizes the benefits for the company. Recent research has focused on technology adoption and the concept of intention to use. In this study, employing psychological theories, we explain reasons affecting habitual usage behavior. A model for predicting habitual technology usage is developed and analyzed in detail. The results show that self-efficacy has a tight statistical and theoretical dependency with usage level, and a positive emotion seems to increase usage level as well.

MB-13.3 [R] The Adoption of New, More Efficient Technologies and Consumer Behavior: The Case of Home Video Entertainment in Mexico

Humberto Merritt; National Polytechnic Institute (IPN), Mexico

In recent years, there has been a growing pressure on consumers to adopt energy-efficient electronic devices as a way to reduce CO2 emissions. Although Blu-ray high definition disc players (BD) are viewed as better electronic devices than the standard DVD players, they have not yet massively pervaded. That is because the penetration of this new, more efficient technology is determined by factors such as the cost-benefit of BD players as well as the advantages consumers still attribute to the incumbent technology. This paper analyzes the barriers that consumers face to adopt the newer DVD technology in the case of Mexico. Drawing on a survey of Mexican users of DVD technology, it was possible to identify the main factors that deter users from buying BD players. According to the empirical analysis, the chief deterrents are the higher price of Blu-ray combos (players and discs), the lack of information regarding this technology, and, quite surprisingly, the confidence users are said to have with the former technology. These results might suggest that Mexico's demand for standard DVDs will continue unabated in years to come in spite of the better quality attributes and energy-efficient features of the Blu-ray technology.

MD-01 PLENARY - 2

DATE: MONDAY, 8/01/2011

TIME: 14:00 - 15:30

ROOM: PAVILION

CHAIR: TBD

MD-01.1 [K] Leonardo da Vinci's Telescope - Lessons From History

Andre Buys; University of Pretoria, South Africa

Leonardo da Vinci is widely considered to be one of the greatest painters of all time and revered for his technological ingenuity. He conceptualized aircraft, the parachute, the battle tank, machine guns, clocks, the automobile, the submarine and a host of other inventions decades before they became realities. A project that investigated his work on the astronomical telescope, including a replica telescope built and tested according to his drawings

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and notes, will be presented. The tragedy of Leonardo lies in the fact that although he made many important discoveries in mechanical and civil engineering, astronomy, optics, hydrodynamics and anatomy, none of his work had a direct influence on later science and engineering. In conclusion, some lessons for technological innovation that can be learned from his life and work will be presented.

MD-01.2 [K] Driving Innovation for IT-enabled Services

Krishna Singh; IBM Almaden Research Center, United States

TBA

ME-01 Innovation Management-2

Monday, 8/1/2011, 16:00 - 17:30

Room: Pavilion East

Chair(s) Kazuhiko Itaya; Toshiba Corporation R&D Center

ME-01.2 [R] The Role and Typology of Innovation Intermediation in the Context of Technological Regime and Service Pattern

Chia-Han Yang; Tung Hai University, Taiwan

Joseph Z. Shyu; National Chiao Tung University, Taiwan

This research aims to explore the role and typology of innovation intermediation in the context of technological regime and service pattern, especially focusing on the difference of functional roles in each category. To answer the research question concerning innovation intermediaries, the research consists of several parts utilizing both qualitative and quantitative approaches of factor analysis, cluster analysis, and expert interview, respectively. In light of this research design, the results of this research are therefore threefold, namely, constructing a framework of technological regime, providing a typology and business model analysis of innovation intermediaries in terms of technological regime and service pattern, and identifying the specialized roles of public intermediary, private intermediary and TLOs in universities in this typology.

ME-01.3 [R] A Meta Analysis of Consumer Innovativeness Models

Reza A Nasution; Institut Teknologi Bandung (ITB), Indonesia

Nita Garnida; Institut Teknologi Bandung (ITB), Indonesia

There are three major research perspectives about consumer innovativeness. The first one perceives consumer innovativeness as a general trait which is applicable across different product categories. The second one sees consumer innovativeness as category-specific predisposition, which is not transferrable to other categories. The third one combines the two previous perspectives by taking the general characteristic of individual in innovation adoption and category-specific factors that will moderate the role of general innovativeness in the adoption process. The three streams provide us with multiple and sometimes conflicting interpretations of the antecedence and influence of consumer innovativeness in reality. This research contains meta-analysis of the existing streams, which results in an integrated consumer innovativeness model. The model depicts significant antecedents and impacts of consumer innovativeness.

ME-02 Technology Management in Energy Industry-2

Monday, 8/1/2011, 16:00 - 17:30

Room: Pavilion West

Chair(s) Erik Pruyt; Delft University of Technology

ME-02.1 [A] Compare Costs of Different Fuels for Drying Lumber

James E Reeb; Oregon State University, United States

Drying lumber is the highest operational cost for sawmills, and those mills should be able to closely estimate that cost. Cost estimation is important for those mills that are thinking of changing from one energy source, such as natural gas, to another energy source such as wood hogged fuel: sawdust, trim ends and bark. Different sources of energy, such as natural gas, electricity, propane and wood, can be compared using their heat content. In

the US, the most common measure of heat content is the British thermal unit (Btu). One Btu is the amount of energy needed to raise the temperature of one pound of water one degree Fahrenheit, and at sea level it takes 1,000 British thermal units of energy to evaporate one pound of water. Based on this information, an Excel spreadsheet was developed to help sawmills estimate their drying costs. This paper will discuss how lumber drying costs are estimated and how a mill can compare costs of using one energy source versus another.

ME-02.2 [A] Patent Alert System for Wind Turbine Technology

Ibrahim Iskin; Portland State University, United States

Xin Li; Beijing University of Technology, China

Casey Zielsdorff; Portland State University, United States

Elvan Bayraktaroglu; Istanbul Technical University, Turkey

By using two different variations of the Patent Alert System (PAS), this paper will analyze two different technologies based on wind energy. These variations include linear regression based PAS and fuzzy logic based PAS. Each approach uses a different methodology to evaluate the available data and generate a trend that will be used to predict future values of patent counts in the applied area of technology. The results of these different approaches are compared in order to determine if either method produces more reliable results which would then lead to better decisions by the organization. In order to connect the results with real-world events, trend changes will be evaluated against global events which should have an impact on technological development in this area.

ME-02.3 [A] Development of Fuzzy Cognitive Map (FCM) Based Scenarios

Muhammad Amer; Portland State University, United States

In the present era characterized by uncertainty, innovation and change, increasing emphasis is being placed on the use of scenario planning techniques because of their usefulness in times of uncertainty and complexity. Scenario planning outlines the possible futures, stimulates strategic thinking about the future and helps to overcome thinking limitations by presenting multiple futures. Developing fuzzy cognitive maps (FCM) based scenarios is a very new approach recently proposed in the literature. FCM is based on causal cognitive map, which is an accepted intuitive method. This approach combines the benefits of both qualitative and quantitative analysis. In this study, FCM-based scenarios are developed for the deployment of wind energy in a developing country to illustrate the usefulness of this approach. This study also describes the utilization of various tools proposed in the scenario planning literature to select and validate raw scenarios. Moreover, a comparison of the FCM-based scenario development approach with other important techniques for developing quantitative scenarios is also presented.

ME-02.4 [R] Using Grey Model to Predict the Achievement of Policy Objectives

Chiung-Wen Hsu; Feng Chia University, Taiwan

Pao-Long Chang; Feng Chia University, Taiwan

Owing to the pressures of decreasing CO2 emissions and establishing a sustainable environment, many nations have set specific goals for conserving energy and reducing CO2 emissions. Governments have implemented various policies to achieve these goals. The assessment of policies that can effectively lead to energy conservation and CO2 reductions is becoming a critical issue. Hence, the aim of this paper is to develop an assessment model that can be used to predict the achievement of policy objectives. In this paper, a brief introduction of the background and the fundamentals of the grey model are presented. This is followed by a report on the application of the grey model to predict the achievement of Taiwan's subsidy policy. This paper uses data on Taiwan's solar water heater coverage area for the subsidized period (2001-2009) to assess the achievement of the subsidy policy. Taiwan has set a policy objective of covering an area of six million m² by 2020. Considering Taiwan's achievement from 1978 to 2009, representing a completion of 32 percent, the coverage is predicted to increase to 62 percent during the period from 2010 to 2020. Further, since China's coverage area for solar water heaters is the world's largest, this study also uses the grey model to predict its achievement of policy objectives to provide

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a comparison with reference to Taiwan. It is predicted that by 2020, China's achievement will reach 124 percent of its policy objectives. Compared to China's achievement, Taiwan's prediction shows that the current policy will fail to achieve its objectives. Therefore, early prediction may provide Taiwan's decision makers with a reference for an early response.

ME-03 Technology Management Collaborations

Monday, 8/1/2011, 16:00 - 17:30

Room: Broadway-1

Chair(s) Robert Harmon; Portland State University

ME-03.1 [R] Japanese Firms' Standardization Strategies in the Case of Wireless Communication

Kumiko Miyazaki; Tokyo Institute of Technology, Japan

Hitoshi Oshima; Tokyo Institute of Technology, Japan

In wireless communication systems, the importance of standardization has been recognized for a long time. In this paper, an analysis is made of the factors which affect promotion and support of the standardization scheme for wireless communication systems by Japanese firms. The standardization process is split into four phases, pre-standardization, early standardization, mid-standardization, and post-standardization periods, and major factors are assumed and validated in each phase. The five factors are a) technical superiority, b) awareness of technology, c) role of leading firm, d) external cooperation and e) firm's competences. Having conducted in-depth interviews at ARIB (Association of Radio Industries and Businesses), a questionnaire to ARIB members was carried out and 12 responses were received from the key firms. From the statistical analyses, different factors, depending on the phase of standardization process, were identified. The importance is put on technological superiority in the pre- and early standardization phases, while the firm's competence and customer requirements were identified to be important in the mid-standardization phase. Some differences were identified between the operators and communications equipment makers.

ME-03.2 [R] Characteristics of Technology Dependence in Semiconductor Technological Alliance Companies

Chun-chieh Wang; National Taiwan University, Taiwan

Dar-zen Chen; National Taiwan University, Taiwan

Mu-hsuan Huang; National Taiwan University, Taiwan

The purpose of this study is to analyze the characteristics of technology dependence in semiconductor companies forming technological alliances from 1997 to 2010, the so-called 12-inch microchip era. The companies are classified into four types in the light of technological crowdedness and technological prestige: technological leaders, brokers of new technology, technological followers, and isolated companies. Then we examine the patent citation among these four technology network positions in order to find out as well as to figure out which type of companies and what quality of patents in citations are more likely to form technological alliances. Finally, this study argues that relationships of technology dependence do not always promise technological alliance. Company position and patent quality in citation do not show similarities to technological alliance relationship. Besides, observing followers' higher quality patents may help understand the technological alliance relationship among them.

ME-03.3 [R] Network Ontology and Dynamics Analysis for Collaborative Innovation in Digital Services

Yee-Yeen Chu; National Tsing Hua University, Taiwan

Shih-Wei Lin; National Tsing-Hua University, Taiwan

With the advances of digital technologies and participative webs of services, knowledge-intensive digital services have thrived on a rapidly expanding platform-based network economy. There is a great need for a comprehensive research on knowledge based analysis on social network and business network evolution to facilitate collaborative development of digital services. This research aims to develop an ontology-guided analysis of networking

to facilitate the formation of the innovation network to create new digital services. Central to the research is a dynamic ontology construct that could articulate the evolution of the social and business networks driven by the prospects of value creation with networking structure and routines contributing to recognizing, engaging, and mobilizing key actors and resources. Based on a prototype model and a series of case studies of the emerging knowledge-intensive service industries, this research explores the potential of the model in adapting to the heterogeneity of the service demands and collaboration mechanisms in the service network. Through in-depth model-based analysis and synthesis of the emerging digital service activities, this research expects to develop an ontology-based platform for knowledge creation and network management system to capture the extensive opportunities for value creation in participative webs of services on experience economics.

ME-03.4 [A] International Technological Collaboration of China from 2004 to 2008 Based on Patent Analysis

Jia Zheng; Institute of Scientific and Technical Information, China

Zhi-yun Zhao; Institute of Scientific and Technical Information, China

Xu Zhang; Institute of Scientific and Technical Information, China

Dar-zen Chen; National Taiwan University, Taiwan

Mu-hsuan Huang; National Taiwan University, Taiwan

Xiao-ping Lei; Institute of Scientific and Technical Information, China

Ze-yu Zhang; Institute of Scientific and Technical Information, China

Yun-hua Zhao; Institute of Scientific and Technical Information, China

Wei Cui; Institute of Scientific and Technical Information, China

Ever since China adopted an open-up and reform policy for the global collaboration, China's economy and technology have experienced astounding growth. Patents encompass valuable information relating to technological development and collaborative efforts. Therefore, this paper studies China's international technological collaboration (ITC) from the perspective of patent analysis in order to provide an objective statistic reference to future policy directions and academic research. The results show that as the patents issued by the U.S. to China continuously increased from 951 in 2004 to 2,653 in 2008, the internationally co-invented patents between China and other countries (regions) also exhibited a steady growth during the past five years, except in the year of 2007. USA and Taiwan are China's most important partners. Among other countries (regions) that have strong cooperation relation with China, the importance of Japan and Germany to China has been strengthened year by year, while that of Singapore has dropped sharply. Furthermore, as the citation impact of China's total patents keeps decreasing, the international cooperation plays an active role in raising China's total citation impact. However, the raising effect gradually weakened and disappeared after 2006.

ME-04 Software Process Management-2

Monday, 8/1/2011, 16:00 - 17:30

Room: Broadway-2

Chair(s) Rosine H Salman; Portland State University

ME-04.1 [A] Study on Management of Software Engineering through Statistical Analysis and Simulation

Yasuo Kadono; MSI, Tokyo University of Foreign Studies, Japan

Surveys on software engineering excellence (SEE) of the Japanese software industry were designed and administrated in 2005 through 2007 with the Japanese Ministry of Economy, Trade and Industry. In the survey, the software engineering capability was measured from the seven viewpoints of deliverables, project management, quality assurance, process improvement, research and development, human development, and customer contacts. Through a cross-section analysis of the SEE data from 151 IT firms in Japan, we found superior deliverables and business performance to be significantly correlated with the effort expended on human resource development, quality assurance, research and development, and process improvement. Based on the results of the panel analysis of the SEE data, we found that most SEE factors for a particular year had significant positive influences on the

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same factors the following year, although several negative paths were observed, which implies that the effort put into a particular factor did not pay off in the short-term. Finally, we assessed the current state of affairs and futures of the software industry in Japan through a panel analysis, including financial data of the IT firms as well as an agent-based simulation model.

ME-04.2 [R] Key Barriers of Globally Distributed Software Products Development

*Milla Helén; Uponor Corporation, Finland
Nazmun Nahar; University of Jyväskylä, Finland*

Despite the high importance of global software products' development for companies, almost no research has been done on the phase-specific barriers that companies face in this endeavor. Thus, there is a great need for studying such a multifaceted and complex phenomenon more deeply. We review applicable theories (i.e. cooperation and network theories) and analyze the extant literature on global software development and the related issues. This study provides insights to the literature by developing two integrative conceptual models, namely the globally distributed software development process and the phase-specific barriers of this process. These models are developed based on the in-depth literature review, background theories and our long practical experience in managing of international software/systems development projects in a distributed environment. The conceptual model of the phase-specific barriers may have wide applications in industrial and research settings. The implications of the findings are also discussed for research.

ME-05 PANEL: Contemporary Practices and Challenges in Project Management

Monday, 8/1/2011, 16:00 - 17:30

Room: Broadway-3

**Panelist(s) Jeffrey Busch; Jeffrey S. Busch PMP Portland State University
Dov Dvir; Ben Gurion University of the Negev
Hans Thamhain; Bentley University**

Project management (PM) topics at PICMET have encompassed some tremendous research as well as industry applications and evolving trends. The paper and tutorial presentations have commonly included some lively Q&A's and discrete opinions and perspectives on the findings, practices, and techniques. This panel aims to address the trends, contemporary practices and perceptual controversies that surround the application of PM in engineering, technology and industry. Topics expected to be addressed include personality and project characteristics that impact project success; agile project management verses traditional full project planning; PM leadership and sustainable commitment from stakeholder groups; the human side of risk management, including team behavior and organizational dynamics; project delivery within strict program and portfolio management methodologies; the PM discipline – who is responsible; and trends in academic research and industry applications. A particular panel question may be, "Are the perspectives and applications just changing modern project management or are they reinventing it?" The panel will consist of leading academic and practitioner specialists who will present abbreviated perspectives on the topics followed by both seeded and audience questions and challenges.

ME-06 Decision Making in Technology Management-1

Monday, 8/1/2011, 16:00 - 17:30

Room: Broadway-4

Chair(s) Opinderjit Bhella; Portland State University

ME-06.1 [R] Simulating Health Networks: Decisions and Performance

*Tal Ben-Zvi; Stevens Institute of Technology, United States
Donald Lombardi; Stevens Institute of Technology, United States*

This study uses a simulation as a vehicle for social networks research application in healthcare. More than 300 graduating MBA students participated in the creation of Accountable Care Organizations (ACOs), simulating a healthcare industry. Our results suggest that or-

ganizations positioning themselves at pivotal points within the ACOs' network outperform organizations that do not. The findings show the applicability of network theory and the use of simulations in the study of ACOs.

ME-06.2 [A] Decision Model for Portland Metro Bike Commuters

*Justin Thompson; Indian Health Service, United States
Bennett Barnwell; Portland State University, United States
Timothy A Calderwood; PLEXSYS Interface Products Inc., United States
Arvind Kumar; Portland State University, United States
Sath Vang; Daimler Trucks North America,LLC., United States*

Many people commute to work in Portland via various modes of transit. However, we focus on the bike commuters and develop a model that could be used to select a commuter bike. To do so, we developed a hierarchical decision model containing the important criteria. We chose this model because it allows the user to have multiple levels of criteria, and manufacturers can use it to clearly see where they can improve their products. This paper will look at the main features of a typical bicycle: the frame, cost, and basic components. Though many features are available that would make one bike or the other more suitable for commuting, we felt that this was representative of the factors for the typical commuter. The members of our team, after extensive research, are the self-styled experts for evaluation of bicycle features using a pairwise comparison. Using the model and inputting a few new bicycles revealed the top choice to be a full-suspension Marin Bridgeway followed by the Novara Big Buzz.

ME-06.3 [A] A Combined Fuzzy MCDM Approach for Exploring the Roadmap of R&D Alliance in Taiwan's Enterprises

*Hua-Kai Chiou; China University of Science and Technology, Taiwan
Chia-Chin Wan; Hug Idea International Co., Ltd., Taiwan*

While entering the WTO, Taiwan has become one of the members in the international community of globalization. The medium and small enterprises (M&SE), which account for 98 percent of Taiwan industries, are facing even more competition due to insufficient capital, human resources, and limited organization scale. To achieve competitive edges for the globalization requires efficiency in doing business and scale in industry development; meanwhile, M&SE should aggressively form strategic R&D alliances so as to effectively consolidate resources to jointly develop technical capabilities to multiply the synergy. In this paper, we propose a compromise optimization method called VIKOR, revised the popular TOPSIS technique, for solving multiple criteria decision making (MCDM) problems. To illustrate this procedure, we established a fuzzy analytic hierarchy process for evaluating the utility of an R&D consortium and then solve the optimal strategy assuming that the optimal compromise solution to comparing the synergy among proposed R&D consortia strategies. Through this research, we successfully demonstrate that VIKOR is a good assessment for evaluation of multiple criteria decision-making problems. Finally, we summarize some findings of this study and provide some suggestions for the development direction of M&SE in the near future.

ME-07 Technology Management in Semiconductor Industry

Monday, 8/1/2011, 16:00 - 17:30

Room: Forum Suite

Chair(s) Charles M Weber; Portland State University

ME-07.1 [A] Study of Technology Oriented New Business Creation: A Case Study of Two Layer 'Chip-On-Substrate' Business Development

*Hirofumi Sone; Kochi University of Technology, Japan
Osamu Tomisawa; Kochi University of Technology, Japan*

It is crucial to enhance capability to create products having potentiality to be de facto standards or to be used as platforms. This paper discusses issues of the business creation process from technology seeds. We have investigated a Japanese copper smelting manufacturer, which expanded its business domain to semiconductor packaging utilizing COF

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(chip-on-film) technology, and succeeded to grow the business with world-wide market share of 80 percent. Currently, COF is a key technology for flat panel displays. The company started a research project of COF according to a customer's request in 1986. As opposed to the conventional 3-layer TCP composing of metal and polyimide substrate bonded by glue, the company developed 2-layer COF by direct metal plating on polyimide substrate. Unfortunately, the first customer withdrew the research request. The company decided to continue its R&D effort despite the fact that there was not a clear visible application at the time. In 2000, the company was approved as a qualified vendor of COF from a couple of customers, and COF business launched gradually. Business development process based on the new technology will be discussed focusing on three major issues: deterring new entrants, aiming industry standards, and rapid starting mass production.

ME-07.2 [A] Characterizing the Value of Organizational Learning in Semiconductor Manufacturing

Charles M Weber; Portland State University, United States

An empirical study of organizational learning in semiconductor fabrication facilities finds that 1) the external economic environment strongly influences the value of different kinds of organizational learning; 2) the value of organizational learning varies over time; 3) the relative value of different kinds of learning varies over time; 4) the value of learning can be positive or negative; 5) the synergy between different kinds of learning can be positive or negative; and 6) useful theories of organizational learning must be value-driven and time sensitive. The approach described in this paper helps factory managers enhance profitability by choosing appropriate learning strategies for the particular product mix that a fabrication facility runs.

ME-08 R&D Management-2

Monday, 8/1/2011, 16:00 - 17:30

Room: Council Suite

Chair(s) Brent Dixon; Idaho National Laboratory

ME-08.1 [R] White Spot Analysis: The Potential of Patent Information for Research and Development

Yvonne Siwczyk; Fraunhofer IAO, Germany

Joachim Warschat; Fraunhofer IAO, Germany

Patents do not only offer legal protection, but also provide an extensive source of technical information: pre-processed in technology maps or patent maps, interesting technical details can be identified for the own development of new product ideas and business opportunities. The White Spot Analysis presented in this paper is based on a special patent map: building a problem solution matrix of patent data within a defined technology field, gaps, so called White Spots, can be identified, which lead to new business opportunities not described through patents yet. The manual analysis of numerous patents is very time consuming and thus very expensive. The approach presented in this paper utilizes a text mining based method in order to support the extraction of problems and solutions from patent text. For the purpose of identifying only White Spots with a high economic attractiveness, a special assessment method is combined with the patent data analysis process. The detailed process steps of the White Spot Analysis will be shown by a practical example regarding electric mobility, especially battery management systems for electric and hybrid cars.

ME-08.2 [R] Analysis of Trial and Error Mindset of Corporate R&D Personnel and Its Relationship to Organizational Factors

Kunio Shirahada; Japan Advanced Institute of Science and Technology, Japan

Kazuma Hamazaki; Arthur D. Little (Japan), Inc., Japan

The aim of this paper is to reveal the behavior and way of thinking of corporate R&D personnel when they break through a difficult problem and achieve an invention or discovery, and examine the relationship to organizational factors including the creative climate. We constructed a model of trial and error behavior and distributed a questionnaire on invention

and discovery activities to 706 corporate R&D personnel who had received awards from leading Japanese science academies. The results of qualitative data analysis indicated that high-achieving corporate researchers had three mindsets of trial and error behavior including an idea exploration oriented mind. The creative climate and other organizational factors did not have significant impacts on R&D personnel's idea exploration oriented mind. Our findings will contribute to R&D management in the area of invention and discovery.

ME-08.3 [R] The Positive Effects of Patent Performance, R&D Capability, and Employee Productivity on Firm Performance

Yu-Shan Chen; National Taipei University, Taiwan

This paper explores the influences of patent performance, R&D capability, and employee productivity upon firm performance. This study uses patent intensity, revealed technology advantage in the most important technological field (RTAMIT), and average output per employee as the proxy variables of patent performance, R&D capability, and employee productivity in the American chemical industry. The results indicate that patent intensity, RTAMIT, and average output per employee of firms are positively associated with their performance. This study verifies that patent performance, R&D capability, and employee productivity positively affect firm performance.

ME-09 Open Innovation-1

Monday, 8/1/2011, 16:00 - 17:30

Room: Directors Suite

Chair(s) Yasuo Ikawa; Japan Advanced Institute of Science and Technology

ME-09.1 [R] A Structure of Co-creation in an Open Source Ecosystem: A Case Study of Eclipse

Kazunori Mizushima; JAIST, Japan

Yasuo Ikawa; JAIST, Japan

However, in Eclipse open source community, a main role of OSS development activities is done by companies. The relationship of individuals and companies is reversed. Therefore, it becomes important to keep the motivation of the development community, promote innovation and link the activities to the profit of a company. In other words, management of co-creation and competition is being done at the same time. This paper attempts to identify a structure of co-creation in an OSS ecosystem led by companies considering Eclipse as one case. It also suggests a co-creation process model to promote sustainable development for open source ecosystem by two axes: 1) value sharing and value taking, and 2) quantitative development and qualitative development. Some mechanisms that drive this process are embedded everywhere in Eclipse ecosystem. In addition, some issues of Eclipse ecosystem that occurred by the reversal of the position of individuals and companies are discussed.

ME-09.2 [R] The Key Factors for Open Innovation: An Empirical Study from Taiwan CIS Survey

Hsin-Yi Hu; National Cheng Chi University, Taiwan

Wei-Ying Chen; National Cheng Chi University, Taiwan

In this paper, we provide an ex-ante explanation for what kind of partners the company cooperates with across facing innovation obstacles. Using a sample of Taiwanese manufacturing companies from Taiwanese Technological Innovation Survey derived from CIS4, we examine firm partners' exploration choices along three risk dimensions: the lack of technological opportunity, the lack of innovation and technical personnel and the lack of market opportunity. We argue that firm-level collaboration decisions find differing responses when received by the selection risk environment. In the results of this study, the companies do not prefer to collaborate with outsiders in the innovation process even if they involve into trouble in Taiwan. We find the manufacturing companies in Taiwan would like to collaborate with supply and demand sides in the innovation process, include innovation new to the firm and market, more than other real outsiders. This study contributes to modify the research methodology from marketing management to understand the relationship between collaboration decision and innovation risks.

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ME-09.3 [R] A Study on the Framework and Indicators for Open Innovation Performance via AHP Approach

Chien-Tzu Tsai; FengChia University, Taiwan

Wan-Fen Liao; FengChia University/WuFeng University, Taiwan

Innovation is the key for an organization to achieve sustainable development. Open innovation, which emphasizes the integration of internal and external resources in an organization, has brought about a new perspective in technological developments. In order to promote and ensure the performance of the open innovation, an assessment framework and evaluation indicators are required. This study extracted dimensions from the literature and developed performance indicators by compiling opinions from both academic researchers and business experts. The study then flowed into an analytic hierarchy process (AHP) for data analysis. The systematic level included technology execution, technology exploitation and technology exploration, and among all the sub-dimensions for open innovation performance, employee involvement was the most significant. This study identified three significant indicators that are suggested by academic and business experts: the percentage of successful cross-departmental staff participation in new product development, the degree of incentive/reward system implementation for innovation, and the degree of innovation sharing among employees.

ME-10 Technology Management in Health Industry

Monday, 8/1/2011, 16:00 - 17:30

Room: Studio Suite

Chair(s) Tugrul U Daim; Portland State University

ME-10.1 [R] Innovation in Health Services: Technology Transfer and Diffusion of Risk Assessment Tools for the Treatment of Pressure Ulcer

Hiro Matsushita; Tokyo University of Agriculture and Technology, Japan

With the growing challenge of an ageing population, healthcare systems are facing severe disease conditions, such as pressure ulcers, brought about by the increasing length of stays of elderly patients in hospitals. The clinical treatment of pressure ulcers is one of the fields in which significant health service innovation has emerged. For instance, the usage rate of energy-smart risk assessment tools in curing and caring for pressure ulcers amongst Japanese hospitals was 99.8 percent in 2008 compared with 0 percent in 1986. This research is an attempt to identify the underlying factors influencing the innovation and diffusion processes of risk assessment tools utilized in treating pressure ulcers. This work identified four factors contributing to this process: 1) international technological transfer with incremental improvements, 2) a policy-interventional translational research cycle embedded in the academia-government-hospital complex, 3) a product-centric translational research cycle embedded in the industry-academia-hospital complex, and 4) grass roots promotional activities performed by Enterostomal Therapy and Wound Ostomy Continence Nurses.

ME-10.2 [R] Exploring the Success Factors of Electronic Health Record Systems Adoption

Orhun M Kök; Bogazici University, Turkey

Nuri A Basoglu; Bogazici University, Turkey

Tugrul U Daim; Portland State University, United States

In our era with the innovations in the telecommunications and information technologies, use of e-electronic services has increased in many areas. Health is one of the areas affected by these technologies. In the last decades health information systems (HIS) have developed many new technologies. Telemedicine, telehealth and electronic health records can be counted as the main areas in this industry. Health information systems are used by many different types of users such as patients, doctors, administration and application developers. So they all have difficulties in both using and developing these systems. This research will focus on the factors that users are affected by in using the Electronic Health Record (EHR) from the technological and organizational perspective. Affecting factors of the adoption of EHR from the doctor's perspective will be analyzed. Then a model will be proposed.

ME-11 Sustainability-2

Monday, 8/1/2011, 16:00 - 17:30

Room: Parlor-C

Chair(s) Kai-Ying Chan; University of Pretoria

ME-11.2 [A] CSR Metrics: Do They Point to Cultural and Competitive Determinants that Influence Technologically Driven Companies Toward or Away from Corporate Socially Responsible Approaches?

Richard A Vicenzi; Governance Dynamics Institute, United States

Lorin Loverde; Planetary Design Foundation, United States

There is a high level of interest and a great deal of debate in the business world whether so-called "corporate social responsibility" positively or negatively impacts profitability, competitiveness, and sustainability. This paper examines current practices in measuring corporate social responsibility with several questions in mind about factors that influence technologically driven organizations to either promote or dismiss a multi-stakeholder perspective to social responsibility. These questions include: How do organizational cultural factors influence business philosophy, assumptions, values, behavior, and reward distribution, especially among different but mutual stakeholders? How do cultural factors, including ethics, drive our values and assumptions about legitimate business practices? What differences are common and consistent in companies that operate primarily on bottom line and efficiency metrics as opposed to those who explicitly consider the impact of business operations across the different stakeholders? Can societal non-economic preferences create a "directionality" that provides incentives for a corporation to structure policies and processes that favor sustainability and a positive return to all stakeholders?

ME-11.3 [A] Greening ITIL: Expanding the ITIL Lifecycle for Green IT

Saurabh Dubey; University of Pittsburgh, United States

William E Hefley; University of Pittsburgh, United States

An important strategic decision for CIOs is to contribute to the overall long-term sustainability of the organization and to build the capacity and capability to preempt the information technology (IT) roadmap of the industry and come up with an IT roadmap for the organization to keep it in front of the competition. With the current industry trends, IT organizations need to make environmental sustainability (or Green) a part of their strategy. This would mean that an extension of the industry frameworks to suggest the best green practices is also imperative. Our work in this paper is just one set of suggestions among many to come in the future. It addresses proposed extensions to the ITIL framework to address green IT in the full ITIL lifecycle.

ME-11.4 [R] A Bibliometric Analysis on Green Innovations, Green Investments and Green Venture Capital

Ilknur H Tekin; Portland State University, United States

Dundar F Kocaoglu; Portland State University, United States

This paper explores the engineering and technology management, and business management literature on green innovations, green investments and green venture capital by using bibliometric analysis and presents the trends in the scholarly literature and professional publications on these areas from 1990 to 2009. The 1990 to 2009 period, with more than five million publications, is analyzed by using the Fisher-Pry model. Projections are made for publication trends on the basis of Fisher-Pry model forecasts. The analysis indicates the emerging and rapid development stages for green technological innovations and green investments in global markets. The paper introduces a methodological approach to forecast the growth of publications as a means of understanding the trends in the increasing emphasis on sustainability in engineering and business publications.

ME-12 Technology Management in Service Industry-3

Monday, 8/1/2011, 16:00 - 17:30

Room: Parlor-B

Chair(s) Jamie Rogers; University of Texas at Arlington

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ME-12.1 [R] Bibliometric Analysis of Service Innovation Research: Identifying Knowledge Domain and Global Network of Knowledge

Ichiro Sakata; The University of Tokyo, Japan

Hajime Sasaki; The University of Tokyo, Japan

Masanori Akiyama; The University of Tokyo, Japan

Yuriko Sawatani; JST, Japan

Naoki Shibata; The University of Tokyo, Japan

It is widely recognized that the concept of service innovation is significant for innovation strategy and economic growth. However, since the term service innovation represents a broad sense, there does not exist common understanding about what is service innovation even among experts. We developed a methodology to determine the structure and geographical distribution of knowledge, as well as to reveal the structure of research collaboration in such an interdisciplinary area as service innovation, by performing journal information analysis, network analysis and visualization. Our results show that there are mainly two groups of elements relating to service innovation. Knowledge in these areas has been growing rapidly in recent years. In particular, the fields of ecosystem and IT and Web are exhibiting a high growth. We also demonstrated that the global network of knowledge is formed around the powerful hub of the US. The research competency of Asian countries lags behind that of the US and EU. With respect to research collaboration, we identify a big room left for enhancing international collaborations. Our methodology could be useful in forming policies to promote service innovation. Finally, we proposed creation of an international collaboration fund.

ME-12.2 [R] Benchmarking a Nationwide Non-Profit Service Organization Using DEA

Andreas Udbye; Portland State University, United States

We used 2009 data from a nationwide church organization to assess operational productivity and efficiency utilizing data envelopment analysis (DEA). This non-parametric methodology has been used to assess not-for-profit organizations before, but this is one of the first papers using this technique to study a religious organization and a network of 65 synods. Such homogenous decision making units (DMUs) and the uniform and measurable nature of their resources and deliverables (inputs and outputs) made this an ideal case for analysis. By using a variable returns to scale and output-oriented model with as many as three inputs and six outputs, as many as 60 percent of the synods were found to be efficient. Nevertheless, the model produces enough nuances to allow identification and further analysis of the DMUs deemed to be inefficient, as well as the selection of best practice performers to use in organizational improvement efforts. In addition to considering and discussing the practical use of slack variables and multipliers, the paper also introduces some statistical and graphical tools to further analyze the results.

ME-12.3 [R] Service Research Model for Value Co-Creation

Yuriko Sawatani; Japan Science and Technology (JST), Japan

Yuko Fujigaki; The University Tokyo, Japan

The shift to a service economy is ongoing globally by transforming the social structure. This affects the R&D organization as well. Manufacturing companies are shifting to service business; therefore, the R&D in manufacturing companies needs a transformation to respond the social change. However, macro-level surveys on service innovation do not capture the reality of service R&D activities yet. That is because most of the companies in the service sector do not have R&D, so that they do not recognize R&D activities in service innovation. It would be important to study service innovation in a manufacturing company transforming to service business which has a R&D organization, and to understand R&D activities which contribute to service innovation. Research on service innovation is rooted mainly in product development based on technology trajectory. The modern service marketing introduces service-dominant logic (S-D logic) perspective without separating services and goods, which is based on value co-creation between service providers and customers. In this paper, a new service research model focusing on value co-creation is proposed based on the S-D logic view. A set of hypotheses on service research model for value co-creation

is developed and tested using data on research activities of service innovation projects. We find that the technologies developed in the research, and the mutual organizational understanding of service and research contribute to the value co-creation interaction with customers and researchers.

ME-12.4 [R] Multiple Layered Network Structure of Regional Alliances in Japan: Implication for Regional Cluster Policy

Hajime Sasaki; The University of Tokyo, Japan

Yuya Kajikawa; The University of Tokyo, Japan

Ichiro Sakata; The University of Tokyo, Japan

In Japan, regional cluster policies are recognized as intensive projects to form effective knowledge networks. On the other hand, the methodology to evaluate these network structures is still under development. This paper clarifies that scope of the area significantly affects the evaluation of regional network structure by using network analysis. First of all, this paper evaluates an inter-firm network of Nagano prefecture in Kanto area by using trade data which includes 27,418 companies and 70,725 trades in Kanto area. Secondly, inter-firm network within Nagano is evaluated by using data which includes 1,309 companies in Nagano prefecture. Finally, this paper divides the Nagano network into four economic blocks and compares them. Inter-firm network in Nagano is comparatively evaluated a closed in Kanto area. On the other hand, the network within Nagano prefecture in its self has a small-world topology. Moreover, there is clear difference among the four economic blocks in each other connections. This paper concludes that there is a great reliance on the setup of the geographical boundary when evaluating the network structure. Our multi-layer analysis can contribute to the appropriate evaluation of network.

ME-13 Management of Technological Change-2

Monday, 8/1/2011, 16:00 - 17:30

Room: Parlor-A

Chair(s) Yoshitoshi Tanaka; Tokyo Institute of Technology

ME-13.1 [R] Knowledge Interaction, Adaptive Learning, Value Co-creation and Business Model Innovation

Chen-Yen Yao; Shih Hsin University, Taiwan

With the increase of customer demands and rapid development of information and communication technologies, companies are confronting intense competition. World-wide firms are currently engaged in innovation to compete and sustain themselves in the dynamic changing market. Innovation has become a significant factor in surviving keen competition, satisfying demanding customers, and leveraging technological advances. Researchers and practitioners have been paying much attention to business model innovation recently. In highly complex, uncertain and fast-moving environments, enterprises need to change business models to create value and competitive advantage. Business model innovation is more important than product or service innovation to achieve firms' competitive advantage. The objective of this research is to understand the impact of knowledge interaction and adaptive learning on value co-creation and business model innovation. To test the relationship between business model innovation and value co-creation, and investigate the effects of knowledge interaction and adaptive learning on business model innovation, this research will conduct the structural equation modeling (SEM) analysis. The results are expected to reveal the framework of knowledge interaction, adaptive learning, business model innovation, value co-creation and provide insights for managers and future researchers.

ME-13.2 [R] Information Technologies Implementation and Organizational Behavior: An Asset Management Perspective

Abrar Haider; University of South Australia, Australia

The rate of automation in managing engineering and infrastructure asset has gained momentum since the turn of the century. Introduction of information technologies to manage assets lifecycle, however, is fundamentally disruptive, one that requires effective change management to enable it to gain optimum advantage from the use of technology. It poses a

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substantial change in organizations that involves a break from existing routines and a shift to new kinds of competencies that challenge, complement, and enhance organizational knowledge. Implementation of technology is multi dimensional and its successful implementation depends on a variety of factors. Apart from the obvious issues of standardization and integration of new technology with the existing technological infrastructure, there are many human, social, and cultural issues that impede optimal utilization of technology. Change management, therefore, is critical to smooth transition and institutionalization of technology in the organization. This paper reports findings of an Australian study and concludes that implementation of information technologies for asset management is a humanistic process and is shaped by human action and interpretation.

ME-13.3 [R] What Are the Reasons Why Japanese Enterprises File so Many Patent Applications Without Request for Examination?

Minoru Masujima; Tokyo Institute of Technology, Japan
Yoshitoshi Tanaka; Tokyo Institute of Technology, Japan

Since Japan started in 2002 to become an intellectual property based nation, Japanese enterprises have tried to improve intellectual property strategies to contribute to the strength of global competitiveness. Japanese enterprises file many patent applications every year. However, about 35 percent of patent applications in Japan are withdrawn without requests for examination. We reached to the research questions, why Japanese enterprises have the tendency not to make requests for examination while they have filed many patent applications. We asked Japanese enterprises by questionnaires: What are the most critical reasons why they need to file many patent applications and why do they need to make requests for examination about many patent applications. We made analyses on the aggregate results by statistical methods. We found that filing many patent applications aiming at patent blocking is the critical factor for the increase in the number of patent applications without request for examination. Moreover, this factor, patent blocking, was initiated to increase the number of total patent applications in Japan. We assume that filing many patent applications aiming at patent blocking is a unique Japanese way to define their patent application strategy. Those findings will be helpful to promote an effective patent application strategy with global competitiveness for all global enterprises.

TA-01 PLENARY - 3

DATE: TUESDAY, 8/2/2011
TIME: 08:30 - 10:00
ROOM: PAVILION
CHAIR: TBA

TA-01.1 [K] Crises in the Middle East and Japan Implication for the US Economy and Technology Management

David M Steele; San Jose State University, United States

Since about 40 percent of the energy consumption in the U.S. is crude oil, and the U.S. is by far the largest consumer of oil, any crises in the Middle East and North Africa are unsettling. The history of the last 40 years shows that high oil prices and/or instability in the Middle East have led to U.S. economic crises. Moreover, the U.S. has the highest number of nuclear reactors producing electricity, accounting for roughly 10 percent of the energy consumption in the U.S. Yet the Fukushima reactor disaster in Japan has cast a pall over the nuclear power industry and questioned the future role of this clean energy source. So what are the implications for our economy and for other energy sources such as solar and natural gas in shale formations? And what are the implications for technology management, given that technology failed us in both the Gulf of Mexico oil platform and the Fukushima disasters? We will explore the role of various energy alternatives in the U.S. and the critical role that technology will play in 1) ensuring our economic stability; 2) exploiting other energy

sources; and 3) addressing the issue of global warming.

TA-01.2 [K] Trends of Smart Battery and Mobility Service Innovation in Future EVs

Jay Lee; University of Cincinnati, United States

The current battery technology faces continuing issues including energy density and weight. Current EV batteries can provide limited power capacity that constrains long-distance driving. In addition, battery performance is highly impacted by traffic jams, driving behavior, and A/C usages, especially in the cases of cold and hot weather. This presentation will introduce the Smart Battery Health Management Systems, which not only predict the remaining battery capacity, but also monitor the battery status in real time. Through smart learning and analysis of the driving behavior pattern, the remaining useful life and the necessary service can be precisely estimated with the optimized driving and route plan for the battery charging and exchange services. In addition, smart battery and analytics provide the optimized routes with navigation by using the features extracted from real-time driving behavior and conditions and can also estimate the energy consumptions for different routes, slope, brakes, and traffic jams, which can greatly improve the precision of the mobility battery analysis. Finally, mobility service innovation using dominant innovation will be introduced.

TB-01 Innovation Management-3

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Pavilion East

Chair(s) Youngjae Koh; Konan University

TB-01.1 [R] Inhibitors of Utilization of Disruptive Innovations in Incumbent Organizations

Hannu Lepomäki; Tampere University of Technology, Finland
Saku J Mäkinen; Tampere University of Technology, Finland
Marko Seppänen; Tampere University of Technology, Finland

Disruptive innovations are a major renewal force in society as they present opportunities for economic growth, new solutions to unresolved problems, and overall benefits for multiple stakeholders. However, utilizing the underlying potential of these innovations poses major challenges for incumbent organizations. In the literature, it has been recognized that disruptive innovations that are complex, networked, require heavy investments, and consist of new business models require an existing resource base of the established corporate parent. These innovations are difficult for start-ups as they lack power to legitimize their innovations due to the nascent nature of the newborn industries. A number of inhibiting attributes inside the established corporations prohibit the utilization of disruptive technological potential, for example, cannibalization of existing businesses, misfit with current capabilities, and differing requirements posed for business processes. This paper outlines a proposed framework for these inhibiting attributes at incumbent corporations in utilizing disruptive potential. The proposed framework considers structure, process, resource, capability, competence, and institutional factors that create the dynamics of risk aversion inside established corporations. The paper further discusses the managerial and research implications of the framework.

TB-01.2 [A] Technology Innovations and Customers' Knowledge Accumulations: An Analysis in a Case Study of Fujifilm Computed Radiography

Youngjae Koh; Konan University, Japan
Tomono Miki; Rikkyo University, Japan

In general, manufacturers make technology innovations to enhance the evaluation axis which is determined as core in terms of technology characteristics. By improving the performance of core evaluation axis, manufacturers satisfy customers' demands and enhance market competitiveness. On the other hand, a manufacturer can get competitive advantage without emphasizing the performance of evaluation axis, which would become core through innovation. The purpose of this paper is to describe the mechanism underlining that phenomenon. We use the case of developing Fujifilm Computed Radiography. From

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the case, we find that the evaluation axis recognized as core is different between a manufacturer and customers. Customers determine core axis by considering whether they can use their accumulated knowledge. As a result, the manufacturer should consider both core axes, recognized by the manufacturer and the customer, to survive a competition. As the previous research discussed already, we are in the same boat in respect of reference to the customer's voice and knowledge. However, our paper differs in the way that customer knowledge is not the only factor to define a core evaluation axis. We argue that evaluation axis recognized by the manufacturer technologically and customer knowledge interact and define core in the long run.

TB-01.3 [R] The Technology Innovation Evolution of Optical Component Industry in Taiwan

Fang-Chen Kao; Largan Japan Co., Ltd., Japan

Chun-Shou Chen; Hsiuping Institute of Technology, Taiwan

Justine Chang; Chaoyang University of Technology, Taiwan

The study is a longitudinal and qualitative case study of a single industry. An emphasis on the importance of the technology innovation process can be extended to the relative explanations in the theories of the competitive advantage sources that companies create. Through an exploration of the optical component industry, the study discloses and suggests that during the process of establishment and growth, business organizations must consider how to build, execute and examine an effective innovation method in order to adjust strategic establishment activities, including opportunities identification, positioning of market and technology, resources allocation, and developments of market and technology opportunities, thus creating competitive advantages and values.

TB-01.4 [R] The Process of Emergence of Innovation Capabilities: A Case Study

Carlos E Atoche-Kong; EGADE Business School, Mexico City, Mexico

Mainstream technology and innovation management (TIM) literature considers firms in a race competition on innovation activities to lead their markets requiring strong innovation capabilities. In this environment latecomer firms confront an additional challenge, to learn how to innovate, which requires the development of their first innovation capabilities. Studies on the emergence of innovation capabilities in emerging economies show the difficulties that they confront and identify the cumulative character of the process to acquire the ability to innovate. However, TIM literature does not explain how this process is developed, neither has it explained the heterogeneity in innovativeness that is found among firms and inside them nor why some strategic capabilities are more suitable to develop innovative activities than others. This paper analyzes innovation management literature, and then includes the technological capabilities creation literature that adds the accumulation of knowledge and abilities in order to explain the process of generating innovation capabilities. This research uses a single embedded case study design, and it covers the history of a Mexican steel company that could develop world-class innovation capabilities, even though it started as a laggard. It concludes by illustrating a long process of generating innovation capabilities, distinguishing distinctive stages in the process.

TB-02 Technology Management in Energy Industry-3

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Pavilion West

Chair(s) Ucel Haluk Buguner; Netyeri Bilisim Tasarim Ltd. Sti.

TB-02.1 [R] Literature Review on Adoption of Energy Efficient Technologies from a Demand Side Management Perspective: Taxonomy of Adoption Drivers, Barriers and Policy Tools

Ibrahim Iskin; Portland State University, United States

This paper attempts to grasp research streams in the context of energy efficient technology adoption literature from a demand side management perspective. Special emphasis has been put on taxonomy of adoption barriers, drivers and policy tools. A comprehensive list of

adoption barriers, drivers and policy tools has been presented; problem statements, findings, and further research initiatives studied by the field have been taken into consideration for proposing further research initiative suggestions.

TB-02.2 [R] Visualization of the Technology Evolution in Smart Grid

Ssu-han Chen; National Taiwan University, Taiwan

Mu-hsuan Huang; National Taiwan University, Taiwan

Dar-zen Chen; National Taiwan University, Taiwan

This paper attempts to demonstrate the technology evolution in the field of smart grid. Technology evolution is presented through visualizing the timeline plot where each community is drawn as a function of their size, age, and time. To connect inter-year communities, the relatively weak communities are eliminated, and then the temporal relations among them are created in terms of the overlapped percentages from communities of the previous year to those of the current year. Parts of relations with insignificant linkage strength are removed, leaving several community evolving trajectories for further analysis. The timeline plot clearly shows how communities of smart grid propagated and interrelated over time and could be used to explore the technological changes from the perspective of survival, birth, death, branching, or merging.

TB-02.3 [R] Research on the Behavioral Relationship between Workers and Management in Coal Mining Enterprises in Mainland China

Li He; China Research Institute for Science Popularization, China

In order to understand the situation of science literacy among coal mining employees in relation to their knowledge of production safety in the coal mines in which they are employed, we launched an investigative survey, from December 2007 to June 2008, in the main coal producing areas and provinces of Shanxi, Shandong, Hebei, Sichuan, and Heilongjiang in Mainland China. In addition, a research survey was done in order to explore coal mine related factors that affect scientific literacy practitioners. This investigation was accomplished by a questionnaire and interview survey, attained by the multi-stage stratified probability sample. This paper analyzes the behavioral relationship between the coal mine workers and managers with regards to the safety procedures employed in the coal mines. The awareness of production safety by the coal miners is a very important factor affecting the safety of the workers, as safety awareness is an integral part of scientific literacy, not only among the staff, but also for managers, as this is an important means of influence and control of employees' unsafe behavior. Managers' work motivation skills and capacity to determine management performance have an important impact on the safety of workers in coal mine production. This article's purpose is to utilize the survey data taken from workers and managers of state-owned coal mines in order to analyze the relationship between behavior and awareness.

TB-03 Technology Management Framework-2

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Broadway-1

Chair(s) Yi-Yu Chen; New Jersey City University

TB-03.1 [R] A Case Study of Leadership in Consulting Engineering

Funeka A Grootboom; University of Johannesburg, South Africa

Jan-Harm C Pretorius; University of Johannesburg, South Africa

Leon Pretorius; University of Pretoria, South Africa

The aim of this research paper is to determine the importance of leadership from engineering managers working in consulting engineering firms for a specific case study. This is achieved by discussing important factors relating to the development of leadership skills in these managers in a case study environment. These important factors are expertise of engineering managers in practice, leadership from engineering managers, with the required leadership theories and styles, and other factors that contribute to leadership development in engineering managers. The case study is applied to an engineering consulting organization that has approximately 800 professionals worldwide in more than 30 offices on six

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continents. Leadership styles from different leadership theories, which might be used in managing and leading team members at different designated levels, are suggested for the case study. The appropriateness and adequacy of the suggested leadership styles for team members were tested by team members using a questionnaire. The use of the questionnaire led to the determination of leadership styles which the engineering managers can adopt when leading team members.

TB-03.2 [A] Technology Innovation Risk Mitigation and Organizational Strategy: A Balanced Framework for Technology Managers

Andrea Graham; University of Texas at Arlington, United States

Jamie Rogers; University of Texas at Arlington, United States

The management of technology encompasses the ability of organizations to effectively manage the intersection of the creation and life cycle of technological innovations and business strategies. With aggressive efforts to transition to a more sustainable environment through energy-smart products and processes, it is critical that the leaders and managers leading the charge are effectively balancing the potential risks with the rewards, understanding that it is a gradual transformation, of use and behavior, over a period of time that holds the key in creating long-term change. This research seeks to create a framework of strategies and processes associated with technology risk mitigation, and organizational integration of cross functional/interdisciplinary teams and activities, both of which are critical in helping leaders have the right structure in place to ask the right questions, get the right answers and make the right decisions in effectively managing energy-smart innovations for a sustainable future.

TB-03.3 [R] Innovation Indices of the Colombian Industrial Groups from Two National Innovation Surveys

Jorge A Manrique Henao; Pontificia Bolivariana University, Colombia

Jorge Robledo Velásquez; National University of Colombia at Medellin, Colombia

This paper seeks to contribute to the analysis of innovation in the Colombian industry (at group or 3-digit ISIC level) using data from the first two national innovation surveys. This is pursued by means of innovation indices, from which it is sought to identify regional and national special features, while allowing international comparative analysis, along the lines of the Oslo Manual. The work highlights the limitations of the information available to carry out the calculation of innovation indices as proposed in the recent literature on the subject. As an alternative, a methodology based on the importance value indices (IVIs) is applied, which allows the calculation of new innovation performance indicators amenable to international comparisons. By applying multivariate statistical techniques, redundant information of a high number of variables is cleared to construct the IVIs; then, clustering and characterization of the different units of analysis is performed using a model that connects the variables refined. The paper concludes with an exercise of innovation analysis applied to industrial groups in Colombia, using IVIs constructed with data from the first two national innovation surveys.

TB-04 Environmental Issues-1

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Broadway-2

Chair(s) David Bennett; University of South Australia

TB-04.1 [R] Objective and Subjective Measures of Willingness to Pay for Green Electricity: Do They Measure the Same? Evidence from a South African Case

Kai-Ying Chan; University of Pretoria, South Africa

Leon A.G. Oerlemans; Tilburg University and University of Pretoria, Netherlands

Jako Volschenk; University of Stellenbosch Business School, South Africa

Henry Oliver; University of Stellenbosch, South Africa

A historic first step regarding green energy usage in Cape Town, South Africa, was taken in March 2010. The residents of Cape Town now have the opportunity to buy green electricity

from the city. However, the actual experience of renewable energy (green electricity (GE)) is new to many residents, especially in a developing country such as South Africa. For policy and feasibility purposes it is relevant to know how much extra users are willing to pay for this energy source. Therefore, this research investigates the relationship between residents' attitudes towards the environment and their willingness to pay. For this, subjective and objective measures of willingness to pay extra for GE are distinguished. Data from 405 residents was collected using questionnaire surveys. Multivariate analysis using OLS regression was performed and showed that positive attitudes towards the environment increased the residents' willingness to pay extra for GE (subjective measure). However, these environmental attitudes do not influence the maximum amount in ZAR that the residents are willing to pay extra (objective measure); monthly income plays the most significant role in this scenario. The findings in this research show on the one hand that predicting the willingness to pay extra for GE seems to depend on the type of measure applied. On the other hand, these findings indicate that policy makers should be careful using specific measures of willingness to pay when assessing the feasibility of the introduction of GE.

TB-04.2 [A] Prudence in a Nut Shell: For Technology Managers in the Middle Muddle between Right and Wrong Behavior

Charles W. N. Thompson; Northwestern University, United States

The wide world of ethics and law and related systems telling us how and what to do is well established, if not also clear and widely accepted. In a simplistic trine, it might be divided among things generally considered right, things generally considered wrong, and a no-man's land in between. For many of us, this in between is not all that clear and is complicated by the fact that we receive consequences for our decisions, sometimes because we just did not know or just disagreed with a client or stakeholder. Technology management, because of its direct involvement in changes to how and what we do, is understandably more likely to be faced with situations for which the rules of conduct were not designed or about which there is significant disagreement. This paper is not directed to rewriting the rules; it is directed to suggesting and identifying a number of areas in which there are better ways of evaluating situations and better methods for avoiding the risks of a less suitable choice. A checklist will be illustrated by examples, e.g., lying about your (hole) cards in poker is acceptable (or even better) but is not in a bridge game.

TB-04.3 [R] Green Innovation Performance: Antecedent and Consequence

Ching-Hsun Chang; Tamkang University, Taiwan

This study utilizes structural equation modeling (SEM) to explore the positive effect of corporate environmental ethics on competitive advantage in the Taiwanese manufacturing industry via the mediator: green innovation performance. This study divides green innovation into green product innovation and green process innovation. The empirical results show that corporate environmental ethics positively affects green product innovation and green process innovation. In addition, this study verifies that green product innovation performance mediates the positive relationship between corporate environmental ethics and competitive advantage, but green process innovation performance does not. The research results are beneficial to the manufacturing industry of Taiwan.

TB-04.4 [R] Remediation Technologies for Areas Contaminated with Organochlorine: A Preliminary Assessment of Their Worldwide Application Based on a Literature Review

Mauro S Ruiz; Institute for Technological Research of Sao Paulo, Brazil

Abraham S Yu; Institute for Technological Research of Sao Paulo, Brazil

Fernando E Martins; Institute for Technological Research of Sao Paulo, Brazil

This papers aim is to analyze the state of the art of the use of remediation technologies for areas contaminated with organochlorine based on a detailed literature review. The remediation technologies considered in this study are bioremediation, phytoremediation, nanotechnology, chemical oxidation, and thermal desorption. This survey has been undertaken as part of an ongoing project entitled Development and Validation of Technologies for Remediation of Soil and Groundwater Contaminated with Organochlorines that has been

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carried out by the Institute for Technological Research of Sao Paulo State, Brazil. Its purpose is to identify key problems for each of the five technologies and also to set up a referential for comparison among them. Remediation of sites contaminated with chemical products in general is a challenge for several countries since these sites are environmental derelict areas inherited from past industrial activities. Four databases were used in the preliminary literature review: Scopus, SciELO, Web of Science, and Science Direct. The major focus of the review was concentrated on the USA, China and European countries where most of both field and lab research has taken place. As part of the methodology, a survey questionnaire was designed to guide the preliminary search of information for all the five technologies. For each technology it asked questions about publication of recent scientific papers, patents, companies that have been using a specific technology or a combination of them, and cases of application, in a way that the compilation of all this information and data could provide the research team with a state of the art of the studied technologies. After the systematization of the results obtained from this questionnaire application, since the quality of the information and data were not satisfactory, a new approach for complementing them was undertaken. For this purpose, the Web of Science was selected by the research team to be the most adequate database to carry out the survey.

TB-05 Project/Program Management-2

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Broadway-3

Chair(s) Terry R Schumacher; Rose-Hulman Institute of Technology

TB-05.1 [R] Effectiveness in Project Portfolio Management: Toward a Conceptual Definition

Peerasit Patanakul; Stevens Institute of Technology, United States

While project portfolio management (PPM) has increased its significance in various business contexts, research on effectiveness of PPM is still limited. In fact, PPM effectiveness has not been clearly defined; factors contributing to PPM effectiveness have not been thoroughly investigated; and measurement criteria for PPM effectiveness have not been proposed. The lack of such research has practitioners continuing with a PPM approach that has not been measured as to its effectiveness and impact on business results. As part of a major research initiative, the objective of this study is to develop a conceptual definition of PPM effectiveness. Based on extensive literature review and case study research with three market-leading organizations in the US, the author proposes a definition of PPM effectiveness. After understanding what PPM effectiveness is, practitioners should be able to create organizational conditions that promote PPM.

TB-05.2 [R] Revealing the Truth about Project Change

Wendy L Peterman; Portland State University, United States

This work investigates the pervasive issue of project change in real-world practice. The focus is on the perception of the importance of such change and the data used to make decisions. This is a multiple case study to find indications of trends. The interviewees were selected for their wide range of viewpoints, from project manager to program manager and from group leader to president. Organizations included transportation, marketing, medical products, high technology, and two public works representing municipal governments rather than private industry. Overwhelmingly, change was perceived as important or vital for product success, and data used to evaluate project change was perceived as important. Cost was by far the most common data factor. The iron triangle of cost, quality, and time were the main factors examined. Expert judgment was the most important aspect of estimating the value of data. Decision processes and responsibilities varied with organization type and size. A major finding is that few data items were used to evaluate whether or not to go ahead with project change. It was most common to use just one item. This may be a good choice of focus on the part of the organization. Or, it could be a missed opportunity to make a better decision.

TB-05.3 [R] Adapting a Technology Firm to Changing Demands by Portfolio Implementation

Hélène Sicotte; University of Quebec at Montreal, Canada

Monique Aubry; University of Quebec at Montreal, Canada

It takes substantial efforts just to remain competitive today. As obsolescence is always a problem, the capacity to change not only technologies, products and services, and processes but also routines, structures, and skills is considered a factor for success. However, despite the many years of research on change and the manifest importance of learning to cope with it, the failure rate of organizational change initiatives is alarmingly high. The objective of this study is to discover how organizational project management (OPM) contributes to major transformation within an organization. The exploratory nature of this study on OPM and change lent itself naturally to a qualitative methodological approach. The analysis shows that OPM contributed less to strengthening the change enablers than to supporting the steps and overcoming obstacles. Project portfolio management was a vehicle of change, both as an end and as a change in itself: a response to a turbulent environment.

TB-06 Technology Management in Biotechnology Industry-1

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Broadway-4

Chair(s) Dilek Cetindamar; Sabanci University

TB-06.1 [A] Redefining the Concept of Standardization for Pluripotent Stem Cells

Shintaro Sengoku; Kyoto University, Japan

Koichi Sumikura; National Graduate Institute for Policy Studies, Japan

Toshihiko Oki; The University of Tokyo, Japan

In this report we review the concept of standardization and propose an exhaustive framework for the proper management of technology on pluripotent stem cells. There are two fundamental issues: first, these initiatives and attempts tend to be limited to currently existing categories of pluripotent stem cells, although the technological opportunity to enable clinical/commercial application is equally open to all stem cell types. Second, the subject to be examined for standardization is set to a quite narrow range compared to precedent practices in other industrial sectors. To address these issues, we propose a strategic framework for standardization with an emphasis on comprehensiveness covering various technological opportunities and consistency to learning in the management science. By utilizing this framework it is suggested that development of intellectual property rights not only through patents but through taking leadership in standardization be considered as means for improving research and development competence. Of particular concerns is the formation of quality standards for final products/services and core elemental technology, in particular, specific pluripotent stem cell lines. Furthermore, we inferred two stages of the standardization process, individualization where a particular product/service is firstly accepted by the market, then standardization where the elemental technology is subsequently established as standards.

TB-06.2 [A] The Survival of Dedicated Canadian Biotechnology Firms

Ayoub Moustakbal; Université du Québec à Montréal, Canada

Dedicated biotechnology firms (DBFs) are supposed to have a long life expectancy due to their links with venture capital, research universities and clusters. Our unique database on over 1000 Canadian DBFs shows that they are resilient; survival factors are the application (human health DBF survive better), venture capital support, location in clusters. Yet one half of Canadian DBFs that were created since 1980 have already disappeared. We develop hypothesis explaining their death. We rely on two streams of theoretical thinking (institutional theory and resource-based view) to address the dispartion or survival of startups.

TB-06.3 [R] R&D of Biotech Startups in Global Financial Uncertainty

Takao Fujiwara; Toyohashi University of Technology, Japan

As the research background, there is a high possibility of difficulty of R&D continuity for biopharmaceutical start-ups due to the deep valley of deficit, especially since the financial crisis in 2008. The research question is: How is it possible to promote the continuity of R&D

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projects of biotech start-ups at the trade-off situations between the passive attitudes of venture capital from financial markets and the continual progress of life science researches as aptamer, siRNA, iPS cells, and personal medicine. As the research approach, the effectiveness of real options is promising for applying to overcome the valley of deficit. We will examine the gap between the passive waiting option and the active learning option. Another research objective is to find the evidence of the flexible value of compound chooser option for switching chance between two types of projects, that both have independently each negative NPV, one is the base case and the other is inserting the indication expansion for the drug development. We could confirm the possibility of positive NPV by just creating only selection chance from both of these alternatives.

TB-07 Social Networks-1

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Forum Suite

Chair(s) Chalee Vorakulpipat; National Electronics & Computer Technology Center

TB-07.1 [R] Empirical Analysis of the Effect of Japanese University Spinoffs' Social Networks on Their Performance

Yuri Hirai; The University of Tokyo, Japan

Toshiya Watanabe; The University of Tokyo, Japan

Atsushi Inuzuka; Okayama University, Japan

Entrepreneurial firms are characterized as liability of smallness and liability of newness. University spinoff, regarded as one kind of entrepreneurial firms, also lacks internal capital such as financial capital and human capital. Therefore, it is crucial for university spinoffs to utilize external capital, especially social capital that can bring them important resources. In this study, using data of Japanese university spinoffs, we empirically examine the effect of university spinoffs' external advice networks on their performance. We focus on nonredundancy in their networks and the influence of the strength of ties in the business aspect and the private aspect to nonredundant contacts. Our results show that nonredundancy in university spinoffs' networks effects on their performance positively and the impact is enhanced by tie closeness as business relationships and tie weakness as private relationships. Thus, this research provides not only the insight about university spinoffs' performance but also an additional perspective in social network theory by adopting the interaction between structural and relational embeddedness.

TB-07.2 [R] Software Prototype for Presence Management of Special Groups

Pekka Sillberg; Tampere university of technology, Finland

Janne Raitaniemi; Bitec Oy, Finland

Petri Rantanen; Tampere university of technology, Finland

Jari Soini; Tampere University of Technology, Finland

Jari Leppaniemi; Tampere University of Technology, Finland

Timo K Varkoi; Tampere University of Technology, Finland

The emergence of special social groups that use networked media applications are largely based on knowledge of their status and presence information. This information can be retrieved by many different means and devices such as asking for user input, or using satellite or network positioning. The same methods can be used in the context of eldercare, helping disabled people, or monitoring other special groups. In this paper we introduce a new concept of presence management developed during an ongoing research project. The concept describes how location information can be used for automated presence status updates without user interaction. The aim of the study is to utilize new and advanced mobile technologies in the context of location-aware mobile applications which we believe is an emerging trend in mobile applications. As there are many ways to implement these applications we expect that the technologies studied in this paper are the most potential alternatives in the future. We also present the overall system architecture, provide an overview of the technologies used, and describe the features currently developed for the prototype system.

TB-07.3 [R] HotelOpinion: An Opinion Mining System on Hotel Reviews in Thailand

Alisa Kongthon; National Electronics & Computer Technology Center, Thailand

Choochart Haruechaiyasak; National Electronics & Computer Technology Center, Thailand

Chatchawal Sangkeetrakarn; National Electronics & Computer Technology Center, Thailand

Pornpimon Palingoon; National Electronics & Computer Technology Center, Thailand

Warunya Wunnasri; Thammasat University, Thailand

This paper reports on the extension of our previous work on feature-based opinion mining for Thai language. In this paper, we present an approach for automatically constructing two main lexicons: features and polar words based on syntactic pattern analysis. The evaluation is performed with a case study on hotel reviews. The experimental results show that our approach is effective in performing its task. To illustrate the potential application, we implement a system called HotelOpinion for summarizing the hotel reviews written in the Thai language. Our system can also generate a comparison between hotels based upon the users preferred features and then present the results in a user-friendly visualization. Results from our system can be used to determine public perceptions regarding selected hotels in order to allow the business to improve its customer intimacy and satisfaction.

TB-08 R&D Management-3

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Council Suite

Chair(s) Yvonne Siwczyk; Fraunhofer IAO

TB-08.1 [R] Commercialization of Government Funded R&D: Follow-up Research Survey on NEDO Research Projects

Yaichi Aoshima; Hitotsubashi University, Japan

Kazunari Matsushima; Hitotsubashi University, Japan

Manabu Eto; Hitotsubashi University, Japan

This paper draws on data obtained from a questionnaire survey conducted for the 242 private R&D projects supported by NEDO (New Energy and Industrial Technology Development Organization), Japan's public management organization promoting R&D, to explore how dependence on government support affects processes of private R&D projects and, in turn, the performance and commercialization of developed technologies. Our analyses show that projects receiving more than a half of their entire R&D expenditures from NEDO tend to be isolated from in-house departments. Such isolation, derived mainly from the projects' unique positions in double dependence structures, negatively affects project performance, especially those related to commercialization, in two ways. First, high dependence on government resources prevents project members from interacting with people outside the project within the company. This inhibits project members from effectively leveraging internal resources, both technological and human, to overcome technological problems. Secondly, such high dependence weakens internal controls over project activities. This causes delayed development of marketable technologies and makes it difficult for projects to achieve justification for further investment required for commercialization. Our findings suggest that for successful R&D leading to commercialization, both companies and public funding agencies should encourage projects to maintain close relationships with other internal departments.

TB-08.2 [A] Research on the Follow-up Evaluation Methodologies of National R&D Program Evaluation System in Korea

Ji Hyun Park; KISTEP, Korea, South

Hee Kwon Lee; KISTEP, Korea, South

Seung Jun Yoo; KISTEP, Korea, South

R&D budget has been recently increased rapidly by the Korean government's direction under the recognition that a strong R&D policy leads to the wealth of the nation. The methodologies for effective evaluation that have received great attention were increased. We had established the laws to evaluate and manage the performance of national R&D programs in 2005. The previous and current R&D evaluation programs were conducted in the middle

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of progress. Recently, the importance of evaluation of follow-up control conducted after finishing the program at the national level is increasing. The purposes of this study are to evaluate national R&D programs in terms of economic impacts and to develop the efficient methodologies by considering follow-up evaluation. This study will be effective to demonstrate the efficiency of the methodologies based on follow-up evaluation and the necessity of the evaluation of R&D programs after wrapping up the programs.

TB-08.3 [R] Defining the R&D Expatriate Assignment Strategies of Globalized High Technology Enterprises by Hybrid MCDM Models

Chi-Yo Huang; National Taiwan Normal University, Taiwan

Chih-Wei Wang; National Taiwan Normal University, Taiwan

Gwo-Hshiung Tzeng; Kainan University, Taiwan

Yi-Fan Lin; National Taiwan Normal University, Taiwan

During the past decades, R&D globalization has already become an emerging trend for the high technology firms due to the driving forces, including competitive situation, foreign market expansions, and available human resources. Albeit scholars tried to propose a lot of criteria for expatriate assignment evaluations, very limited decision frameworks were proposed. Further, most of the existing frameworks were based on an unreal assumption of independence of criteria. Thus, this research aims to resolve the above mentioned expatriate assignment problem. A Decision Making Trial and Evaluation Laboratory (DEMATEL) technique based hybrid multiple criteria decision making (MCDM) method with analytic network process (ANP), as well as the ViseKriterijumskaOptimizacija I KompromisnoResenje (VIKOR), will be proposed for selecting the most suitable candidate. A hybrid MCDM framework consisting of four dimensions, including background, capability, support and personality as well as 16 criteria, including work experiences, education level, and language skill, was proposed. An empirical study based on a Taiwan-based world leading information technology (IT) equipment manufacturer was introduced for verifying the feasibility of this framework. The empirical analysis result demonstrates the feasibility of the proposed analytic framework. Further, dimensions, including capability, personal background and personality, were regarded as the most important or important dimensions while language skill, social skill, personal willingness, communication skill, and execution capabilities were regarded as the most important criteria. In the future, the proposed VIKOR-based hybrid MCDM framework can be used for expatriate evaluation and staffing policy definitions.

TB-08.4 [R] A Study on Influencing Mechanism of R&D Team Creativity Based on Team Shared Mental Model

Liyang Wang; China Jiliang University, China

This empirical research about team creative atmosphere, team shared mental model and R&D team creativity functioning relations carried on in 215 R&D teams from 72 high-tech enterprises, involving a total of 651 R&D team members, covering Zhejiang, Beijing, Tianjin, Shanghai, Shenzhen and other regions in China, has obtained some significant conclusions. First, derived from the intensions of overlapping or consistency and distribution or complementariness, the study constructs and verifies assignment-based and collaboration-based shared mental models in R&D teams, and provides a research basis for the exploration of R&D team creative process mechanism based on cognitive perspective. Second, the study demonstrates the creative atmosphere in different teams will have an impact on R&D team creativity through the complete or partial intermediary roles played by two types of shared mental models, verifying and supporting that R&D team members perception of relevant creative atmosphere on the one hand contributes to the formation of shared expectations toward team creative tasks, the correct guidance of team creative activities and the simulation of team creativity; on the other hand, it is conducive to the formation of shared expectations toward the obtaining of various information and resources and the collaboration of members behaviors so that they will be adapted to the requirements of the creative tasks and other team members; in this way, through cross-thinking and resource complementariness, the enhancement of team creativity is facilitated, and the revealing of black-box in the teams creative process is provided with useful explorations and supplements. Third, the exploration and verification of the interactive relations between two types

of shared mental models further reveal the process mechanism of R&D teams creativity based on shared mental model, providing feasible paths and methods for the dynamic adjustment of shared mental model so as to continuously improve R&D team creativity. Finally, the paper discusses the implication of these findings on management practice and the prospect of future research.

TB-09 Cultural Issues-1

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Directors Suite

Chair(s) Ann-Marie Nienaber; University of Munster

TB-09.1 [R] Organisational Culture: The Elusive Piece in the Technology Management Puzzle

Richard V Weeks; University of Pretoria, South Africa

Siebert Benade; University of Pretoria, South Africa

Within the literature the people or human element in defining the concept technology is frequently encountered and central thereto is the importance of their role from a behavioral perspective in managing technology. In defining the concept organizational culture, its role as a perceptual and behavioral determinant assumes relevance, implying that it has a role to play in technology management. Organizational culture is, however, rather an elusive concept when it comes to the management thereof. It is suggested that the difficulty encountered stems from the traditional rational-analytical or Descartes-Newtonian approach adopted in dealing therewith and an alternative complex adaptive systems perspective is suggested as being more appropriate. With this in mind, an analysis of the concept organizational culture and its role in technology management is undertaken, both from a traditional and a more post-modern contemporary complex adaptive systems perspective. A key finding in this regard is that an institution's culture is emergent in nature and that it cannot be intentionally managed or changed to engender a so-called desired culture. At best management can intervene to influence the process and then monitor the culturally determined behavioral patterns that emerge so as to support positive and disrupt negative patterns that will impact on the technology management process.

TB-09.2 [A] Conserving and Promoting Thai Sword Dancing Traditions with Motion Capture and the Nintendo Wii

La-or Kovavisaruch; NECTEC, Thailand

Juthatip Wisanmongkol; NECTEC, Thailand

Taweesak Sanpechuda; NECTEC, Thailand

Anuwat Chaiwongyen; NECTEC, Thailand

Sodsai Wisadsud; NECTEC, Thailand

Thitipong Wongsatho; NECTEC, Thailand

Boonsak Tangkamcharoen; NECTEC, Thailand

Bodin Nagarachinda; NECTEC, Thailand

Chirachai Khiawchaum; NECTEC, Thailand

Thai sword fighting is more than just a martial art; it is a display of the uniqueness of Thai culture. Unlike sword fighting in other countries, Thai sword fighters must undergo ceremonial rituals before each match. Also, competitors must follow a distinct set of rules for each sword type. Before the match, each competitor performs a Thai sword dance to pay his respects to his teachers as well as the goddesses of protection. These ceremonies are considered to be a fundamental aspect of Thai heritage. Throughout history, there were many martial arts schools that taught sword fighting, each with its own inimitable style, as swords were considered to be a lethal weapon during war. However, to prevent the boredom of repeating every posture multiple times, many schools invented a ceremonial sword dance to lend diversity to practice. Thus, the invention of the sword dance birthed a tradition that allowed swords to be both destructive weapons of war, as well as ceremonial props for entertainment. As time passed, swords were no longer used in war, and interest in the art faded away. As a result, many sword fighting schools have disappeared, along with the Thai sword dance. In order to conserve this valuable component of Thai culture, Digitize Thai-

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land, one of NECTECs Flagships, have funded a project that will utilize a technology termed Motion Capture to reproduce the Thai sword dance in 3D. Compared with conventional methods, in which the materials are stored in video recording, the digitized aspects of 3D can give complete information from every viewpoint. Additionally, the digitized information provides convenience for the application of future work. Besides the conservation of precious Thai culture, we are also proposing the stimulation of interest in the disappearing Thai sword dance using the Nintendo Wii. Software with gesture recognition engines has been developed to enable a game-like experience for players learning the dance. We believe that the project will not only preserve our cultural treasures, but also educate future generations about the legacy of the Thai sword.

TB-09.3 [R] The Relationship between Job Characteristics and Workplace Friendships: Taiwan and China

Chun-Te Lin; Yu Da University, Taiwan
Chun-Ling Lu; Yu Da University, Taiwan

Past researchers have found job characteristics on in role job performance and scholars recently argued that the job performance have other extra role that should be expanded to organizational citizenship behavior. This study extended previous research that job characteristics will affect employees' behavior to get organizational goal that is workplace friendships. This paper is conducted by convenience sampling with 500 samples in total, and the respondents are all full-time employees in Taiwan and China. According to the findings of this study, job characteristics have a significant effect on workplace friendships. Additionally, this study proved the relationship between job characteristics and workplace friendships in Taiwan are stronger than those in China.

TB-10 Technology and Industry Convergence

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Studio Suite

Chair(s) Izad Khormae; e1 Solutions, Inc.

TB-10.1 [R] Impact of Science on Technology Applications in Converging Technological Environments

Matti Karvonen; Technology Business Research Center, Finland
Tuomo Kässi; Lappeenranta University of Technology, Finland

The complex interaction between science and technology provides a great need to develop tools for strategic R&D management. Patent data include citations to previous patents and to the non-patent literature. Scientific papers reflect to research activities, whereas patents are considered as indicators for industrial developments. This paper present experiences to the concept of convergence from a patent citation analysis viewpoint. The citations to non-patent literature have been used for tracing the linkages between scientific research and technological innovation in a converging technological environment. Patent data and their citations to non-patent literature were collected from the 87 main players operating in the RFID value chain. The analyzed firms had altogether 464,225 patent applications and 506,225 non-patent references (NPR) in the period 1978-2006. For the patents there were on average 4.2 references to patents and 1.1 references to non-patent literature. Non-patent references are a mixed set of references to scientific and technological references. The results of the analysis reveal great differences in the science intensity among different industry sectors. The patent indicators and the detailed analysis of the quota on non-patent citations give an insight into interaction between technological and science convergence.

TB-10.2 [R] Patent Citation Analysis as a Tool for Analysing Industry Convergence

Matti Karvonen; Technology Business Research Center, Finland
Tuomo Kässi; Lappeenranta University of Technology, Finland

The main goal of this paper is to provide conceptual lens for analyzing and anticipating the stages of convergence. Patent data include citations to previous patents and to the non-patent literature. These citations open up the possibility of tracing technological tra-

jectories of the industries. The paper uses patent citation data of the paper and electronics companies as a test environment to evaluate the importance of technological interfaces as a source of new radical innovations and industry transformation. Patent data was collected from the 84 main players operating in the radio-frequency identification value chain. The test environment of selected patent data base is only used to use, develop and illustrate the patent analysis tools for researching convergence of industries. Overall results from the study are that the citation analysis method sheds light on the technology competitive arena. The presented patent citation methodology provides new insights to the analysis of industry evolution, technological innovations and business development related to converging industries and technologies. Further research is needed to understand more deeply the relations and interaction between different stages in the convergence or fusion process.

TB-10.3 [R] The Importance of Access to Resources in a Setting of Industry Convergence: The Case of Agriculture and Chemistry

Nina Preschitschek; University of Muenster, Germany
Clive-Steven Curran; University of Muenster, Germany
Jens Leker; University of Muenster, Germany

Predicted shortages of fossil resources and the growing societal concern for sustainability have led to a significant interest in switching supplies to renewable resources, especially in the chemical and related industries. Chemical companies are investing heavily in the development of biofuels and have started to produce biopolymers from starch or plant oils. At the same time, agricultural companies, benefiting from their direct access to renewable resources, have entered the markets for biopolymers and biofuels and become new competitors for the chemical incumbents. An analysis of 819 patents on biofuels and bioethanol shows that agricultural companies have built up technological knowledge within this area in the recent past. Moreover, an exemplary presentation of five cross-industrial collaborations between oil/chemical, agricultural and biotechnological companies is taken as further evidence for a blurring of boundaries between these hitherto distinct industry sectors. Furthermore, we show that in this particular case, in addition to technological developments, access to the new raw material base as well as political and societal factors are the main drivers of convergence. For this reason, our study contributes to the research area of industry convergence, while at the same time providing valuable insights for managers and policy makers in these fields.

TB-10.4 [R] A Study on the Characteristics of ICT-based Converging Technologies

Pang Ryoung Kim; ETRI, Korea, South

The goal of this study is to examine the nature of converging technologies by finding the comparative empirical evidence on converging vs. non-converging technologies. This paper presents an operational definition of ICT-based converging technologies before examining the nature of ICT-based converging technologies. And the study follows the International Patent Classification (IPC) system for the classification of technologies.

TB-11 Technology Management in Transportation Industry

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Parlor-C

Chair(s) Ahm Shamsuzzoha; University of Vaasa

TB-11.1 [A] Technology Transfer to the People's Republic of China: A Focus on Services for Powertrain Design and Development

Scott L Ellis; Southwest Research Institute, United States
W. Austin Spivey; University of Texas at San Antonio, United States

This paper focuses on technology transfer issues that successful providers of services for powertrain design and development will consider as they build relationships with the Peoples Republic of China (PRC). Demand for all modes of transportation is growing rapidly in the PRC. Their auto industry claimed the title of highest-volume worldwide producer of motor vehicles in 2009; as of 2010, about 44 percent of passenger cars are domestic

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models, and private car ownership has been increasing at the rate of 25 percent per year. The exploding GDP not only brings great wealth to the nation as a whole, but also strains the infrastructure and the environment (as private car ownership climbs, congestion increases along with vehicular emissions). With this growth comes a commensurate need for know-how and experience. Participating in this growth requires sensitivity to the past. An ancient, complex history has resulted in a unique business culture, at least when viewed through the eyes of the typical Westerner. Steeped in tradition, decisions are driven by concepts such as guanxi (a social and business network), mianzi (the saving of face in business), and renqing (an unwritten code of reciprocity).

TB-11.2 [A] Logistics Tracking: An Implementation Issue for Delivery Network

Ahm Shamsuzzoha; University of Vaasa, Finland

Richard Addo-Tenkorang; University of Vaasa, Finland

Duy Phuong; Wapice Limited, Finland

Petri Helo; University of Vaasa, Finland

Tracking the logistics networks is considered as a highly motivated approach for distribution and delivery companies in recent days. It is nowadays considered as a prime concern for manufacturing companies to ensure safer and timely arrival of their shipments. In this paper, we have presented an overall approach to track the real-time delivery shipment from the starting point to the end customer. The state-of-the-art technologies and devices are implemented in this study in order to fulfill the tracking objectives. A pilot case is presented with the view to implement and manage the tracking technology in a practical point of view. Various tracking data from this pilot case was collected and analyzed in terms of location, temperature and humidity of the case shipment. In this research study, we have considered the operational ways of the tracking devices in respect to frequency of data transfer, interpretation of the data in a useable format, specification of the tracking devices (battery life, power consumption, data roaming, etc.), essential programming for the devices, etc., with the view to implement the tracking technology on delivery networks. The prospects and implications of the tracking technologies for managing the business logistics are discussed and presented in conclusion.

TB-11.3 [A] The Development of Ethanol as an Energy Source for Aircraft Engines of Small Aircraft

Manuel A Fagundes Perez; Instituto Tecnológico de Aeronautica, Brazil

Ligia Maria S Urbina; Instituto Tecnológico de Aeronáutica, Brazil

José Henrique S Damiani; Instituto Tecnológico de Aeronáutica, Brazil

Brazil, in the 1970s, created the national program of alcohol that aimed to reduce dependence on oil as main fuel source for automobiles. With the successful use of the alcohol engine, later with the use of flex technology, which enables the use of any mixture of ethanol and gasoline in combustion engines, we sought the expansion of this technology in other vehicles. Following in the footsteps of the program of the alcohol engine, companies and research centers in the state of Sao Paulo developed the aero engine running on ethanol. This new source of energy, already in use on an aircraft in agricultural production, provides a significant savings in using the aircraft as a tool in agriculture, as a function of ethanol is its lower cost and easy access to farmers. In addition, there are the environmental benefits, depending on the energy balance in its production and a lower rate of pollution during use. The development of the technology is now being tested in training aircraft of the Brazilian Air Force, which will encourage its use in small aircraft.

TB-11.4 [R] A Case Study on the Innovation and Production of China Railway High-speed: In the Perspective of Complex Product Systems Innovation

Yaqi Si; Zhejiang University, China

Jin Chen; Zhejiang University, China

Yisha Zhou; Zhejiang University, China

Wei Yao; Zhejiang University, China

The success of China Railway High-speed (CRH) has aroused international attention, while

literature on the innovation and production mode of CRH is rare. This paper makes a brief description of CRH's innovation and production process, in the perspective of complex product systems (CoPS) innovation process. Following the six steps of the CoPS innovation framework, this paper identifies and discusses the different role of the three main participating bodies during the process and reveals that the innovation system of CRH takes on a government-led, market-oriented feature which has some reference meaning for exploring CoPS management mode in concept and practice.

TB-12 Manufacturing Management-2

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Parlor-B

Chair(s) O. P. Sharma, G. B. Pant Govt. Engineering College

TB-12.1 [A] Proposal of Manufacturing Technology Management as a New Research Framework in Technology Management

Takehisa Seino; Toshiba Corporation, Japan

Nobuo Kyomasu; Seiko Instruments Inc., Japan

Takeo Nomura; Oki Electric Industry Co., Ltd., Japan

One of the most important issues facing manufacturing industries is the realization of value innovations, which create new value for customers by producing new products, systems and services. However, process innovations, which improve current activities and business processes, are as important as value innovations because most manufacturing companies depend on current business to earn sales and profits. Manufacturing technology has been playing an essential role in process innovations by producing high-quality, low-cost products with a short lead time. In recent years, manufacturing technology has also become important for achieving value innovations, especially by creating new devices and materials. In spite of the importance of manufacturing technology, management methods and approaches have not been sufficiently discussed from the viewpoints of manufacturing technology. In this paper, manufacturing technology management (MTM) is proposed as a new framework in technology management. Furthermore, research themes and an evaluation method of MTM are discussed.

TB-12.2 [A] Development of Search Support System for Aircraft Manufacturing Precision Fasteners

Yuichi Kubota; Nagoya Institute of Technology, Japan

Takanobu Otsuka; Nagoya Institute of Technology, Japan

Takayuki Ito; Nagoya Institute of Technology, Japan

Nobutaka Odake; Nagoya Institute of Technology, Japan

The purpose of this study is to implement a search system to improve the coupling efficiency of precision fasteners that require strict control. Currently, mainstream systems in aircraft manufacturing do not consider the work process or environment. In existing databases, only data on fasteners is viewable; it is inefficient because information such as bore diameter and the required tool manufacturing process is maintained separately. Also, the torque required when fastening a fastener is needed so the system can retrieve data quickly. In this study, we have designed a system that can search for various fastener information efficiently. Also, by implementing an alternative fastener system to calculate the similarity between the fasteners, we can improve the convenience of selecting a replacement fastener in the design department. In this paper, this system is shown to significantly reduce the cost of acquiring information on fasteners, and to provide some degree of benefit in terms of production cost.

TB-12.3 [R] Identification of Factors Affecting Production-Worker Effectiveness for Six Sigma Output Level in Small and Medium Size Manufacturing Enterprises

Nagraj L Hiregoudar; K.C College of Engineering & IT, India

Bhimasen Soragaon; Ballari Institute of Technology and Management, India

Small- and medium-sized enterprises (SMEs) are the driving force behind a large number

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of innovations and contribute to the growth of the national economy through employment creation, investments and exports. For manufacturing SMEs in countries like India, the production worker is one of the key elements in the conversion process of inputs to outputs. Therefore, it becomes imperative for such SMEs to focus on the production issue, namely, the importance of the role of production workers for turning out an output of near Six Sigma quality level for Six Sigma approach has been accepted as the standard for world class manufacturing. As a step towards achieving this level of output quality, production-worker related problems that afflict the growth and success of manufacturing SMEs, especially, in the North Karnataka, must be resolved. This paper focuses on developing a holistic approach for enhancing the output level of a manufacturing SME towards Six Sigma level by way of improving the overall effectiveness of production worker. This approach can help manufacturing SMEs across the nation to implement strategies like Six Sigma from the root level.

TB-13 Radical Innovations

Tuesday, 8/2/2011, 10:30 - 12:00

Room: Parlor-A

Chair(s) Claudia Brunner; University of Liechtenstein

TB-13.1 [R] Extending the Stage-Gate-System Model to Radical Innovation: The Accelerated Radical Innovation Model

John A Bers; Vanderbilt University, United States

John P Dismukes; University of Toledo, United States

Diana Mehserle; Vanderbilt University, United States

Christopher J Rowe; Vanderbilt University, United States

For new product development in established organizations, the Stage-Gate model is a widely accepted method for managing the three key factors of time, resources and risk. But for radical innovation, which is further out on the time-resource-risk curve and which may occur in either start-up or established firms, the innovator must simultaneously navigate a more complex space comprised of four environments: market-societal, technological-scientific, business and organizational, and the innovation ecosystem; and craft within this space a new business model, business systems and processes, a corporate strategy, an organization, and a value network. To address this more complex environment, the authors propose to extend Stage-Gate with a new approach, Accelerated Radical Innovation (ARI), which guides the innovator through the Stage-Gate stages across these four environments. The model also builds in additional stages needed to accommodate the extended time frame of radical innovation, such as strategy development, organizational design, and several periods of pre-inception and post-launch development. But to conserve the innovator's limited time/attention resources in this more complex environment, the ARI modal preserves the fundamental premise of Stage-Gate, partitioning the innovation process into stages so that downstream/second-order activities are deferred until first-order issues have been resolved. The theory and logic of ARI model is explained, and the model is now being tested through application to three ongoing radical innovations in the fields of medicine, environmental engineering, and electronics, and in the design and development of a university engineering management curriculum.

TB-13.2 [R] Factors Influencing Ex Ante Perception of Innovation Radicalness: An Experimental Design

Thomas G Lechler; Stevens Institute of Technology, United States

Jie Ren; Stevens Institute of Technology, United States

Selecting radical innovation projects is hard. One of the main problems is that ex ante measurement models to evaluate innovativeness are not reliable. The current literature is mainly focusing on retrospective measures, like technology cycles, expert panels and patent measures to differentiate radical innovations. Consequently, the evaluation of innovation radicalness is mainly based on personal perceptions. But in order to define a balanced project portfolio by controlling risks and uncertainty and to maximize its economic value, an unbiased perception of innovation radicalness is crucial. This study examines an

individual's ex ante perception of innovation radicalness to understand if a systematic bias of radicalness exists that might influence innovation selection and funding decisions. We conducted a two-factorial experimental design involving market and technology attributes of innovations. The experiments were conducted with over 100 managers. The findings clearly indicate a consistent perception bias. People, regardless of demographic characteristics, prefer technological attributes over market attributes when categorizing product innovations as radical. This suggests that market attributes of innovations might be underestimated and could lead to a mismatch between technology, market position and resource utilization and consequently risk project portfolio balance.

TB-13.3 [R] Innovation Criteria for Radical Nuclear Technology

Andre J Buys; University of Pretoria, South Africa

Paul A Sampson; University of Pretoria, South Africa

The introduction of a radical innovation is characterized with new skills and competencies, the setting up of new market linkages and overcoming barriers to enter the specific market. Therefore, new paths have to be created which fit the emerging new technology. This research report is based on a comparative case study between two industry players in nuclear technology: PBMR (PTY) Ltd. (South African based) and KEPCO (South Korean based). The study focuses on the failure of PBMR (PTY) Ltd. to attract sustained long-term investment which has led to downsizing and possible closure. At its inception, the goal of PBMR was to commercialize a Pebble Bed Nuclear Reactor utilizing High Temperature Reactor technology. The purpose of this research study was to identify the attributes and conditions which are important for nuclear innovation breakthroughs to make the new technology a success. The theoretical framework was based on organizational culture, infrastructural linkages and the client's role in the development process, and tested against data gathered from interview questionnaires sent to employees of the respective companies. The findings revealed that the organizational culture existing within PBMR and the infrastructural linkages in place did not support the new product development, and the client's role in the development process was counterproductive.

TD-01 Innovation Management-4

Tuesday, 8/2/2011, 14:00 - 15:30

Room: Pavilion East

Chair(s) Andre J Buys; University of Pretoria

TD-01.1 [R] Promoting Innovations in a Lean Organization through Innovative Value Stream Mapping

Brian Peek; University of Minnesota Duluth, United States

Hongyi Chen; University of Minnesota Duluth, United States

Lean management and innovation management both play important roles in today's business success by reducing waste and increasing profit. However, as previous studies show, conflicting ideas exist in the philosophies of these two areas, and being too lean may deteriorate a company's innovation capability in the long term. To achieve an optimal balance between lean and innovation, several core concepts in both areas need to be studied and compared. In this paper, we focus on bringing the definition of value in lean management to be in line with the definition in innovation management. Based on such a definition, innovation-driving activities can be properly incorporated into the value stream mapping process in a company's lean practice. As part of the improved value system, effective rewarding system and management style that encourage innovative activities in a lean organization are also suggested.

TD-01.2 [A] The Impacts of Country-of-Origin Effect, Endorser Expertise, and Product Involvement on Product Attitude and Purchase Intention

Lee-Yun Pan; Feng Chia University, Taiwan

Shih-Chi Chang; National Changhua University of Education, Taiwan

Under globalizing trend, consumers have many opportunities to purchase foreign goods. Consumers can easily search for product information via the internet and make purchasing

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decisions according to the information collected. Some consumers evaluate product quality according to the country of origin. Past research has shown customers take the country of origin of products as important criteria to make purchasing decisions. Generally speaking, consumers of developed countries would perceive higher risk for products from developing countries. Consumers of developing countries would have less confidence in their own products. Therefore, how to reduce the negative influences from inferior country of origin is an important research issue. In this paper, the authors take digital still camera (DSC) as our research object and conducted experimental design by manipulating the country of origin (high vs. low) and endorser expertise (high vs. low). We came to our hypothesis by source credibility and elaboration likelihood model (ELM). We found that country-of-origin image and endorser expertise had positive effects on product attitude and purchase intention. Additionally, respondents with lower product involvement are more easily influenced by country of origin and endorser expertise.

TD-01.3 [R] Firm-competitor Relationship: An Empirical Study of Its Impact on Innovation Performance

Aifang Guo; Zhejiang Sci-Tech University, China
Nan Yang; Zhejiang Sci-Tech University, China
Weile Wang; Zhejiang Sci-Tech University, China

In the dynamic environment, cooperative innovation has become increasingly important for firms to cope with the increasing speed, cost, and complexity demands. Most of the extant literature has focused on collaboration with suppliers, customers, universities and research institutions, etc. By contrast, little research has been engaged in firm-competitor relationship and its effect on innovation performance. Moreover, the limited studies on these relationships have drawn inconsistent conclusion which may cause confusion. The aim of this study is to examine how firm-competitor relationship affects focal firms' innovation performance. It analyzes the effect of firm-competitor relationship strength and relationship quality on focal firms' innovation performance. In addition, it considers the moderating effect of environmental dynamism. A series of hypotheses concerning these relationships is put forward based on relevant theories and literature. This paper, which reports the results of an empirical investigation based on data obtained from a random sample of Chinese manufacturing firms, will provides new findings.

TD-01.4 [R] Delivering Discontinuous Innovation through Modularity: The Case of Chinese Electric Vehicle Industry

Hailong Wang; Dalian University of Technology, China
Jianjie Xiao; Dalian University of Technology, China

The emerging alternative engine technologies with high environmental performance have increasingly gained managerial attention in the global automobile industry during the past two decades. These technologies, incorporating with other components, give rise to the creation of new energy vehicles. This paper explores how to deliver discontinuous innovation through cross-industry integration of previously distinct modular technologies. In contrast to much current research on modularity or discontinuous innovation individually, we propose a strategic framework linking modularity with discontinuous innovation together based on a case study. We argue that discontinuous innovation can be achieved by establishing an industry platform enabled by modular product architecture. The industry platform demands not only introducing new compatible technologies in essential components or subsystems of the whole product system in order to substitute for the counterparts in the existent dominant design, but also establishing universal interface to re-architect the relationships between the new core components and other parts. We contend that discontinuous innovation involves a variety of knowledge bases and technological capabilities spanning over a range of fields. We empirically examine this framework from the development of the electric vehicle industry in China.

TD-02 Technology Management in Energy Industry-4

Tuesday, 8/2/2011, 14:00 - 15:30

Room: Pavilion West

Chair(s) Paulo T Nascimento; University of Sao Paulo

TD-02.1 [R] An Exploratory Analysis of the Dutch Electricity System in Transition

Jan H Kwakkel; Delft University of Technology, Netherlands
Gönenç Yücel; Delft University of Technology, Netherlands

Recent contextual developments constitute a backdrop of change for the Dutch electricity system. Institutional change driven by liberalization, changing economic competitiveness of the dominant fuels, new technologies, and changing end-user preferences regarding electricity supply are some examples of these developments. This paper explores plausible transition trajectories in the face of these developments given technological uncertainty about investment and operating costs, and fuel efficiency of various alternative technologies; political uncertainty about future CO2 abatement policies such as emission trading; and socio-economic uncertainty about fuel prices, investment decisions of suppliers, and load curves. Various alternative developments for these uncertainties are specified. The consequences of each of these alternative developments are assessed using an agent-based model of the Dutch electricity system. The outputs are analyzed using various data-mining and data visualization techniques in order to reveal arch-typical transition trajectories and their conditions for occurring. Policy recommendations are derived from this. The results indicate that most transition trajectories point towards a future energy supply system that is reliant on clean coal and gas. Under the explored uncertainties, only rarely does a transition to renewables occur. The various sustainable energy support programs appear to be ineffective in steering the energy supply system towards a more sustainable mode of functioning across the various uncertainties.

TD-02.2 [R] The Relationship between Energy-Smart Exhibition and Customer Complaint Behaviors of Information Technology Industry in Taiwan

Pei-Ming Lee; De Lin Institute of Technology, Taiwan

Information technology industry was one of the key components for global economic growth in Taiwan. Especially, the enterprises of information technology industry make use of the energy-smart exhibitions to display products was a new approach in the technology management. No empirical study explained the relationship between energy-smart exhibition and customer complaint behaviors of information technology industry in Taiwan. This paper aimed to investigate relationship between energy-smart exhibition and customer complaint behaviors. Two hundred and sixty match data were analyzed to test the research hypotheses. The finding showed the positive relationship between energy-smart exhibition and customer complaint behaviors. Finally, implications of these findings and suggestions for future research will be discussed.

TD-02.3 [A] Energy Integration Program Using Renewable Energy in the South American Region

Leonardo Alcayhuaman; Universidad Ricardo Palma, Peru
Renzo E Bustamante; Universidad Ricardo Palma, Peru

This paper presents the current situation of renewable energy for electricity generation in the South American region, describing its potential and how it is currently used in the energy integration programs at the Andean Community of Nations (Comunidad Andina de Naciones CAN) and at Common South Market (Mercado Comn del Sur MERCOSUR). It also portrays the particular state of Brazil, which addresses in a very specific manner a renewable energy program for electricity generation, giving them a special treatment, from the regulatory framework to long-term energy auctions contracts. Within this framework, it is also discusses how Brazil takes regional leadership in the process of Energy Integration Programs, throughout its national mixed capital enterprise ELETROBRAS and the National Development Bank (Banco Nacional de Desenvolvimento BNDES) held responsible for financing these integration programs. In conclusion the paper presents the socio-environmental-political issues inherent to these kinds of Energy Integration Programs and gives suggestions on how to address these difficulties by looking for a sustainable and inclusive

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development program that all countries in the region could benefit from.

TD-02.4 [R] The Influence of Enterprise-University-Research Institute Collaboration on Innovation: Empirical Study on New Energy Industry in China

Qing Zhou; Hangzhou Dianzi University, China
Liqin Ren; University of Twente, Netherlands
Dan Zhu; Hunan University, China

The recent 12th Five-year Plan of China has given a strong focus and support on developing the energy industry in China. As an emerging industry, the new energy firms seem to encounter fewer constraints than those of conventional industries, and their dominant position in the enterprise-university-research institute collaboration innovation is not yet clearly known. This paper, based on a survey and later seminars to new energy firms in Zhejiang province, China, explores the new energy firms' position in enterprise-university-research institute collaboration innovation. It carries out principle components analysis and categorizes the new energy firms' main body innovation positions into three types. The statistical analysis shows that different types of firms as main body reveal different influences on innovation within the enterprise-university-research institute collaboration network. The paper further takes the successful Geely Automobiles as a case to summarize the firm-leading enterprise-university-research institute collaboration pattern and strategy for firms in the new energy industry.

TD-03 TUTORIAL: Building Effective Alliances and Winning the Innovation Race **Tuesday, 8/2/2011, 14:00 - 15:30**

Room: Broadway-1

Speaker(s) Ron Khormaei; Lensbaby, LLC; PSU-ETM

This tutorial is targeted to practitioners and researchers with interest in increasing effectiveness of external alliances. The content and case studies dissect models to maximize innovation and R&D returns through outsourcing. Participants are encouraged to bring in specific cases they are faced with in order to extract immediate returns from this tutorial in addition to the concepts for future use. Successful organizations focus on their core competencies, to not only survive, but to emerge as even stronger players in the market place. This success requires innovating and improving products and business processes with all the internal and external resources available. The tutorial will cover the elements for a successful alliance and provide the framework for the participants to apply the concepts to their own specific circumstance. The types of relationships, structure, IP protection, subtle pitfalls, and measures of success are discussed during this talk. The Capability Life Cycle (CLC) model is used along with two case studies to demonstrate use of external alliances in successful R&D. The objective is to provide managers and educators with a fresh look at the external alliances as a tool to succeed in a challenging business environment.

TD-04 TUTORIAL: Visual Strategy: Exploring The Visual Format of Roadmaps **Tuesday, 8/2/2011, 14:00 - 15:30**

Room: Broadway-2

Speaker(s) Clive Kerr; University of Cambridge

Michèle Routley; University of Cambridge

Robert Phaal; University of Cambridge

Roadmapping is widely used in industry to support innovation, strategy and policy in order to help organizations respond to the opportunities and challenges they face. The key distinguishing feature of the technique is the use of structured visual templates to support strategic dialogue and communication. However, the visual aspects of roadmaps have not been extensively researched. The focus of this tutorial is to explore the visual aspects of roadmaps, based on a set of published examples, addressing questions such as: what visual elements result in a 'good' roadmap? The format of the tutorial will be an introductory presentation, small group exercise and a plenary feedback discussion. The presentation will outline the fundamental principles of visual design and provide guidance on how to apply them to roadmapping graphics. The topics that will be covered include composition layout;

perception of spatial proximity and concentration; psychology of similarity and continuity; basic visual variables (position, size, shape, value, color, orientation, texture); pop-out effects; color associations, color set selection and contrast; and typeface and font recommendations. The exercise will ask delegates to reflect on the overall composition and visual elements of a set of selected roadmap examples. In small groups, participants will discuss the features of each roadmap in terms of how they either support or hinder effective communication. The outcome of the tutorial will be a visual critique of the roadmaps highlighting good/bad practice, the sharing of experiences and guidance on visual design.

TD-05 Project/Program Management-3

Tuesday, 8/2/2011, 14:00 - 15:30

Room: Broadway-3

Chair(s) Sabin Srivannaboon; Chulalongkorn University

TD-05.1 [R] Case Study: Merging Technology Management Methods

Pia Gustafsson; KTH, Royal Institute of Technology, Sweden
Evelina Ericsson; KTH, Royal Institute of Technology, Sweden

Nowadays, IT functions are an integrated part of organizations' business. One way to manage this integration is to make sure that both parties use similar words with the same meaning to everybody. A way to achieve this common vocabulary is to share methods and measurements to govern the activities. Unfortunately, many of these methods and frameworks are customized for a specific niche, especially the ones that are related to technology management. The decision of which framework to use is more often a result of culture or standard within the business category than of an analysis of which framework would be the most beneficial for the company as a whole. This paper describes the process of the Swedish public agency working on the implementation of a common process for business improvement from the three perspectives of project management, quality improvement and enterprise architecture. Using action research within an implementation project at the organization, difficulties during the merging process were identified. The studied project deals with methods for technology management and consequently this is the base for the article.

TD-05.2 [R] Culture and Performance of Global-Project Teams: A Study in Brazilian Multinational Companies

Ivete Rodrigues; Fundação Instituto de Administração, Brazil
Roberto Sbragia; FEA/USP, Brazil

The internationalization of Brazilian companies brings a new reality: the need for implementation of global projects. These, in turn, carry in their essence the challenge of managing multicultural teams. Being a recent phenomenon, with little theoretical development, this study aims to understand the relationships between cultural features and performance of project teams in global projects of Brazilian multinationals, in contexts of high and low cultural distance. Once these relations were identified, we tried to understand them in light of the team's management process. To carry out this discussion, we undertook a field study, with both quantitative and qualitative focus, of 34 global projects of 15 Brazilian multinationals, in which people from 22 countries took part. The results provided empirical evidence that there is an association between cultural characteristics and team performance, with femininity and hierarchical proximity being the standout. The first one would be more associated with low performance and culturally homogeneous teams. Hierarchical proximity is associated with high performance and culturally heterogeneous teams. These results show that individual and organizational intercultural competence gain importance. Final recommendations are made in order to help Brazilian multinational companies to manage their global teams and thereby achieve better results in their global projects.

TD-05.3 [R] Critical Success Factors in China's IT Project Management and the Comparison between China and US

Adi Zhang; Tianjin University, China

This paper discusses a comparative and empirical research on critical success factors in IT project management and analyzes the effect of environmental idiosyncrasies on their

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relative importance. Based on a survey and some cases, the study extracted five common success factors in China and the USA. They are, namely, marketing skills, project strategy and process, management methodology and organization, project idea and creative team. It was found that firms in China put more emphasis on marketing skills and put less emphasis on other factors, in comparison with the USA. Meanwhile, it is revealed that firms in manufacturing sectors pay less attention to project ideas and more attention to management methodology and organization. Finally, it is found that smaller firms' competitive advantage relies more on marketing skills.

TD-07 Technology Management in Education-1

Tuesday, 8/2/2011, 14:00 - 15:30

Room: Forum Suite

Chair(s) Marie-Louise Barry; University of Pretoria

TD-07.2 [R] The Assessment of Career Needs and Development Programs of Female Technology Talents

Ying-Chyi Chou; Tunghai University, Taiwan

Hsin-Yi Yen; Feng Chia University, Taiwan

Ju-Miao Yen; Tunghai University, Taiwan

The position of females in the job market has become more important than ever. Since the beginning of the 21st century, the subjects and issues of females developed in the science and technology field had also received more concerns than before. However, females still encountered many frustrations on their works in the field of scientific research and career histories. Within the science and engineering (S&E) fields, the actual contributions and potentials of female talents are often ignored. In analyzing the major reasons for this issue, it has been discovered that there still remains lots of barriers in the developments of the female careers and their career need have not been satisfied. This research studies the career development path of female technology talents in the academic field and industry field respectively. Base on a literature review and interviews, it divides the careers of the female technology talents into the stages of the exploration, establishment, maintenance, and disengagement. Besides, this study evaluates the cognition about received support from government, society, organization and family and compares the gap and difference between the career needs and the career development support programs. This paper proposes improvement suggestions aiming at dispelling such gaps for those female technology talents who have received higher education or obtained scientific specialties to continuously elaborate their specialties in the S&E fields.

TD-07.3 [A] Developing a STEM Talent Expansion Pipeline in Higher Education: A Work-in-Progress

Stephen P Hundley; Indiana University-Purdue University Indianapolis, United States

Charles Feldhaus; Indiana University-Purdue University Indianapolis, United States

Jeffrey X Watt; Indiana University-Purdue University Indianapolis, United States

Kathleen Marrs; Indiana University-Purdue University Indianapolis, United States

Andrew Gavrin; Indiana University-Purdue University Indianapolis, United States

Attracting, retaining, educating, and graduating science, technology, engineering, and mathematics (STEM) students is vital to the sustainability and competitiveness of technology management firms in the U.S. and elsewhere. There are hosts of educational practices that colleges and universities can undertake to find, keep, and develop STEM students, for the purpose of increasing baccalaureate degree production in these important fields. Funded by a multi-year grant from the National Science Foundation, the Central Indiana STEM Talent Expansion Program is a work-in-progress project that has activities, benchmarks, and outcomes associated at critical phases of an undergraduate student's journey through higher education at Indiana University-Purdue University Indianapolis (IUPUI), a large, urban institution where STEM disciplines are a dominant component of the portfolio. This paper describes the purpose and significance of the project, including the institutional context, history, and development of STEM-centric initiatives. Specific attention will be paid to orientation, on-boarding, and first-year programs; initial career and leadership development

components; STEM curriculum and pedagogical interventions; high-impact educational practices; co-curricular involvement in STEM-oriented organizations; and preparation for a variety of post-baccalaureate settings. The roles of a variety of project stakeholders will be discussed, and the present status and future directions of the project will be highlighted.

TD-08 Technology Management Framework - 3

Tuesday, 8/2/2011, 14:00 - 15:30

Room: Council Suite

Chair(s) Kathryn E Stecke; University of Texas at Dallas

TD-08.1 [R] Control System Design: A General Systems Theory Perspective

Murat Kudret Yurtseven; Izmir University, Turkey

Walter W Buchanan; Texas A&M University, United States

The aim of this paper is to look at some important issues involved in control system design from a general systems theory (GST) perspective, and propose a framework for the purpose. This particular framework is presented in the context of a soft system design methodology, which is general enough to include both hard and soft issues involved in the design of socio-technical systems. It includes a series of ongoing cybernetic and fluid design functions, guiding the designer through the policy making/pre-planning, evaluation, and action implementation phases systematically. The framework also includes a life-cycle methodology and a cybernetic control structure for structuring the design process. The paper also includes some considerations for the formation of the framework.

TD-08.2 [R] Dynamic Optimization in a Dynamic and Unpredictable World

Adil Baykasoglu; Dokuz Eylul University, Turkey

Zeynep D U. Durmuso lu; University of Gaziantep, Turkey

Dynamism is known as an attempt to explain the phenomena of the universe against some immediate change. All scientists dealing with the systems and phenomena of the universe have unsurprisingly been faced with a variety of immediate change. Therefore, they are usually obligated to ignore more than one variable to keep change at a time. However, with the storm of technological change, it has been difficult to deal with the increasing dynamism and the uncertainty with the existing manner. Providentially, new computing and programming utilities like agent technology have enabled more realistic modeling. In this respect, a typical operations research problem including constraints, objective functions and variables could have been altered with the more realistic ones where constraints, objective functions and domains of variables can be a matter of any kind of change at any time. To cope with such dynamism, there have been several efforts to adapt some of the meta-heuristics to work in a harmony and in integrity without ignoring the objective(s) of modeling. This usually requires agent-based approaches letting the elements (such as ants, bees or gens) to communicate and negotiate with each other in order to adapt themselves in parallel to the changes in the domain of variables, constraints and objective functions. Although meta-heuristic approaches for the solution of dynamic optimization problems are relatively new in the literature, this paper intends to review and analyze existing studies that are available in the literature. Our focus will be specifically on agent-based approaches which make use of negotiation metaphor for problem solving. It is safe to say that this emerging branch of operations research will find numerous applications in solving engineering and technology management problems.

TD-08.3 [R] A Genetic Algorithm Based Vehicle Management System for Reducing Greenhouse Gas Emission

King Lun Choy; The Hong Kong Polytechnic University, Hong Kong

David W.C. Wong; The Hong Kong Polytechnic University, Hong Kong

Hoi Yan Lam; The Hong Kong Polytechnic University, Hong Kong

Tak Chun Poon; The Hong Kong Polytechnic University, Hong Kong

Xiaodong Zhang; Beijing Jiaotong University, China

With the trend of manufacturing businesses moving from Hong Kong to Mainland China, the number of vehicles traveling between Hong Kong and southern China are increasing signifi-

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cantly. In such sense, the increasing amounts of corresponding greenhouse gases lead to more health concerns, such as hazard to the respiratory system of mankind. Therefore, it is essential to adopt a vehicle operation system for reducing greenhouse gas emissions. In this paper, a genetic algorithm based vehicle management model is proposed to determine green components of a new vehicle engine so as to reduce the greenhouse gases emission level.

TD-09 Open Innovation-2

Tuesday, 8/2/2011, 14:00 - 15:30

Room: Directors Suite

Chair(s) John A Bers; Vanderbilt University

TD-09.1 [R] Key Success Factors for Open Innovation Intermediaries for SMEs: A Case Study of iTAP in Thailand

Songphon Munkongsujarit; Portland State University, United States

Sabin Srivannaboon; Chulalongkorn University, Thailand

Open innovation has been a subject of major interest in technology management in recent years. Innovation intermediaries are considered to be an important part of open innovation. In this paper, we investigated the Industrial Technology Assistance Program (the so-called iTAP), one of the innovation intermediaries for small and medium enterprises (SMEs) in Thailand. The study identifies challenges facing by both SMEs and innovation intermediaries and offers major key success factors, which consist of competent people, problem identification, proper resource allocation, effective planning, strong alignment and management support, for the improvement of such operations. The contribution from the study could be useful for practitioners and academia of open innovation to enhance their operational efficiency and develop a better understanding and/or theoretical framework for open innovation.

TD-09.2 [R] How Open Innovation Strategy is Reflected in the Firm's R&D Efficiency DEA Ranking

Jiting Yang; Portland State University, United States

Timothy R Anderson; Portland State University, United States

The open innovation model, which refers to the use of external technology and the environment, has boosted the technology developing speed to a large extent. The term open innovation was launched by Chesbrough. In the open innovation model, firms utilize a wide range of both internal and external sources and channels to commercialize their ideas. The technology market is complicated. Therefore, open innovation is not a single, unique strategy. There are many different moves and approaches that can all lead to a firm's success in innovation competition. Previous studies in this field were usually done in a qualitative way. In this paper, we are aiming to study the open innovation approach with a qualitative method, data envelopment analysis (DEA). Eighteen companies, which are recognized as pioneers in open innovation, have been selected in this study of R&D efficiency evaluation and open innovation strategy discussion. Since R&D efficiency is always a key part of the innovation process, the objective of this paper is to analyze how a company's choice of an open innovation strategy model will influence its R&D efficiency DEA ranking, and how its R&D efficiency at different stages can be aligned with its open innovation strategy.

TD-09.3 [R] Determinants of Openness in Innovation Activities: Evidence from China

Hongru Xiong; Tsinghua University, China

Jizhen Li; Tsinghua University, China

Xuezhong Ling; Tsinghua University, China

Open innovation has received increasing research interest but so far it has mainly been analyzed in the context of the leading and mature economies. Extant research on open innovation still offers little systematic insight of how and why firms in developing countries differ regarding the extent to which they conduct open innovation activities as well as those in developed countries do. Due to the different innovation dilemmas of indigenous firms in

China, we focus on explaining the openness in innovation activities as a result of innovation weakness (includes firm-internal and firm-external), specifically, impediments to innovation. Based on our theoretical framework, three hypotheses are proposed on how different impediments to innovation determine the breadth and depth of open innovation. Then we test them by using an exceptionally large and detailed data set, the China Innovation Survey (2008). Our results provide support for most of the hypothesized relationships but fail one. It is found that market/institution-related impediments and finance/risk-related impediments will greatly increase openness. By contrast, knowledge/skill-related impediments do not show significant positive impact on promoting openness for most Chinese firms. We furthermore discuss the underlying reasons of these explorative findings and their significance to both academics and managers.

TD-10 Idea Generation with Delphi Methods

Tuesday, 8/2/2011, 14:00 - 15:30

Room: Studio Suite

Chair(s) Fred Y Phillips; Alliant International University

TD-10.1 [R] Using the Delphi-Method

Kari K Lilja; Tampere University of Technology, Finland

Kimmo Laakso; Tampere University of Technology, Finland

Jari Palomäki; Tampere University of Technology, Finland

The reliability and validity of the selected research method are subjects to which every researcher is bound to address himself when representing the findings and conclusions of his/her work. In this study we will discuss the reliability, validity and philosophical aspects of the Delphi method, first with a small literature review and then by representing two different surveys conducted using the Delphi method. The point of view in our report is the usability of Delphi in collecting qualitative data for software engineering research. The most significant features of the Delphi method are its recursion and the possibility to get immediate feedback and evaluate one's own answer. Although there are many forms of Delphi techniques, these features exist in one form or the other in all Delphi variations. In Delphi-based surveys, the minimum number of participants is smaller and participants are not selected at random but because of their particular expertise. Among the traditional research methods this is seen to cause the risk of bias and endangering both reliability and validity. In the Delphi method, the recursion produced by three or more rounds, the expertise and in most cases anonymity of participants, and the opportunity to evaluate and argue one's own answer after having seen the other opinions and arguments are thought to guarantee the quality of well-planned and well-conducted research.

TD-10.2 [A] Virtual Teams with Anonymity and Structured Interactions (VTASIs)

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

Creativity and innovation are critically important to the well-being of many enterprises, including those offering engineering- and technology-based services. Cross-functional teams are traditionally employed by companies to pursue projects involving creativity and innovation. These teams are comprised of participants in face-to-face settings. Alternatively, asynchronous virtual teams may also be engaged to enable identifiable participants to interact via digital means from a distance. Asynchronous virtual teams are especially convenient for participants at global locations in multiple time zones. The objective of this paper is to suggest a third kind of team, the virtual team with anonymity and structured interactions (VTASIs), in which participants remain anonymous, follow a modified Delphi brain-storming process, communicate with one another asynchronously via electronic means, apply a set of streamlined idea generation strategies, and conduct multiple rounds of structured interactions under the guidance of a knowledgeable team leader. Described in detail are the advantages of VTASI teams from the design teams perspectives, as supported by an original study conducted in 2010 at University at Buffalo involving two VTASI teams of a total of 14 graduate engineering students, who developed new ideas to enhance the operations of the United States Postal Service. Key results are presented and conclu-

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sions are offered. For global operations, the VTASI teams outlined in this paper represent an advanced form of team design and operation which has the potential to be especially effective for creative pursuits. Such teams could be particularly useful to enhance the relative competitiveness of many engineering- and technology-based global service firms.

TD-10.3 [A] The Comparison of Online Delphi and Real-Time Delphi

Chih-Hung Hsieh; Yuan Ze University, Taiwan

Fang-Mei Tzeng; Yuan Ze University, Taiwan

Chong-Guang Wu; Yuan Ze University, Taiwan

Jen-Shan Kao; Taiwan Institute of Economic Research, Taiwan

Yun-Yu Lai; Yuan Ze University, Taiwan

In this study, we compared some fundamental characteristics of online Delphi (OL) and real-time Delphi (RT). We established a set of variables through a literature review; a platform was built to gather data with the involvement of dozens of testers. The findings of this study are: 1) the time of use for RT is significant but the time pressure in RT survey made testers overwhelmed to manage progress of the exercise; therefore, some automatic functions are identified and suggested; 2) the RT cannot only reduce time and costs needed for OL, but also can obviously increase the level of consensus in general; 3) the RT assisted in increasing convergence and consensus among testers. Furthermore, we proposed that the RT could have some potential applications which are leading to further studies.

TD-11 Technology Transfer-1

Tuesday, 8/2/2011, 14:00 - 15:30

Room: Parlor-C

Chair(s) Nasir Sheikh; Portland State University

TD-11.1 [R] Exploring Intra-firm Technology Transfer in the IC-Industry: Case Study of an International Firm

James K Chen; Asia University, Taiwan

Massoud M Mosehpour; Asia University, Taiwan

Austin C Lin; Asia University, Taiwan

Bulgan Bayaraa; Asia University, Taiwan

Technological advancement in IC manufacturing continues to increase in demand by about 8-10 percent per year. Due to the continued and rapid growing market for IC industry, extension of semiconductor manufacturing sites wafer fabrication (fab) is necessary. Large-scale firms have to transfer the manufacturing technology from one country to another in order to save cost. One of key issues for the firms is to make sure the most efficient and practical way for technology transfer. The objective of this research is to propose a systematic analysis methodology for international intra-firm technology transfer in the IC industry. This paper utilizes an international case study on a recent technology transfer in the IC industry. A set of key performance index (KPIs) is defined to measure the grade of success of the project management. This study uses KPI's evaluation of the technology transfer project setup success key factors (SKFs) and process. We combine the literature review and interview expert and project management to construct individual KPIs of technology transfer project. Technology transfer is closely related to knowledge transfer. It is a time limited transaction and is treated as a project. A structured and organized procedure with dedicated teams at the sending and receiving site is necessary. The copy smart methodology is applied in this case study. The findings of this study suggest further improvements for technology transfer projects can be made by locating the project leader at the receiving site in order to have better control.

TD-11.2 [A] Technology Transfer: Solar Power and Distributed Rural Electrification

Stephen W Jordan; Bonneville Power Administration, United States

Tugrul U Daim; Portland State University, United States

The objective of this paper is to assess and transfer a high efficiency multi-junction photovoltaic technology developed at the National Renewable Energy Lab to a startup venture.

The multi-junction cell will be located at the focal point of a parabolic reflector integrated into a small solar tracking system. This technology is a rooftop satellite-dish-sized reflector that will track the sun, focusing many suns of intensity onto a small high efficiency photovoltaic multi-junction cell target. Society has benefited greatly from electrification as it moved from cities to rural communities, and finally to the dispersed few at the end of the line. There are still some rural communities in the world where there are no medium to large electrical energy transmission systems. The state of electrical transmission systems in different countries depends heavily on whether the economy is developing or industrialized. The total world electrical energy usage today is 18 TW-hr (1 TW-hr = 10¹² W-hr). Total electrical loads are forecasted to rise to over 30 TW-hr by 2030, but this estimate could be low. Solar resources are great enough, and high-efficiency multi-junction PV concentrating solar power tracking systems could convert enough sunlight into electrical energy to meet forecasted world electrical load growth.

TD-11.3 [R] Can the Conscious of Technical Characteristics Overcome with Harvesting Local Capability? International Technology Transfer of Clean Technologies Focusing on Technical Characteristics

Kanako Nakayama; Tokyo Institute of Technology, Japan

Yoshitoshi Tanaka; Tokyo Institute of Technology, Japan

International technology transfer of clean technologies is becoming an important issue due to the rising international concern over climate change. By transferring clean technologies from developed countries to developing countries, developing nations need not go through the process of adopting dirty technologies, but can leapfrog over them to install clean technologies, which are already available in other countries and reduce the amount of greenhouse gases. Past field studies reveal that wind turbine technology proceeded with a successful technology transfer to China and India, where it is manufactured and also installed actively within the country. However, as for photovoltaic technology, those two countries quickly became the most active producers of solar panels, but most of the products are exported in foreign countries rather than installed domestically. This research aims to examine the differences of technical characteristics of two technical fields based on patent data, namely patent classification and characteristics of applicants. In order to enhance not only the manufacturing capacity but also the possibility of domestic adoption of clean products, the findings of this research will help the developing nations to absorb particular technologies with harvesting local capability of technology and market.

TD-12 Manufacturing Management-3

Tuesday, 8/2/2011, 14:00 - 15:30

Room: Parlor-B

Chair(s) Jasper L Steyn ; University of Pretoria

TD-12.1 [R] Evaluation of Diverse Inventory Policies Using Simulation and Design of Experiment

Siri-on Setamanit; Chulalongkorn University, Thailand

The importance of inventory management has been evident for a long time since inventories are not only necessary for operations, but they also contribute to customer satisfaction. However, holding inventory comes with costs such as inventory carrying cost and opportunity cost. Therefore, it is vital for a firm to find ways to manage its inventory to maximize customer service, minimize total investment, and maintain operation efficiency. Unfortunately, these three objectives are frequently in conflict with each other. In this paper, the author presents a simulation-based approach to evaluate the impact of continuous and periodic review policies on supply chain performance measures, including cost and service level. This simulation model serves as an experimental platform for managers to evaluate diverse inventory policies for different products under different circumstances. For the case study company, continuous and periodic review policies provide relatively the same costs given the same service level. Furthermore, this paper also applies design of experiment (DOE) to an inventory simulation model. DOE is used to investigate factors that affect performance including variation in demand, lead time, and review interval, and to analyze the interaction

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of these factors. All three factors affect total costs but in different magnitude. Interaction between lead time and review interval is also significant. The results of the experimentation enable managers to gain better understanding of different inventory policies and to select the configuration that best suits the company's objective.

TD-12.2 [A] Utilisation of Wireless versus Wired Access Technologies in the South African Food-Related Manufacturing Industry

Manfred H Rauch; University of Pretoria, South Africa

Richard V Weeks; University of Pretoria, South Africa

The primary aim of this research paper is to assess the degree to which wired and wireless technologies are being utilized within the South African food-related manufacturing industry. Literature suggests that companies in industry are faced with the great challenge of selecting an appropriate access technology that is tailored to their specific requirements. As a result, often the incorrect selection is made and difficulty is experienced. This can be due to the ill-consideration of all aspects in access technology that need to be considered. Thus, a qualitative approach was undertaken in an attempt to gain insight into companies' access technology implementations. This was achieved by means of open-ended, semi-structured questions as part of a narrative interview structure. The objective was to identify the utilization of both wired and wireless access technology and the context in which a specific technology is being employed. The results suggest that while both wired and wireless access technologies are used extensively, limitations are still experienced. It is thus recommended that companies employ failover systems to mitigate costly access technology failures as well as introduce informative procedures to inform companies of appropriate access technologies.

TD-12.3 [R] The Strategies of the Manufacturing Service Industry: The Perspective of Value-added Chain Model

Phil Y Yang; National Taichung University of Education, Taiwan

Yuan-Chieh Chang; National Tsing Hua University, Taiwan

Yi-Chang Yang; Shih Chien University, Taiwan

Jian-Hang Wang; National Taichung University of Education, Taiwan

Many manufacturers are transforming into manufacturing service industries to enhance their value creation. By adopting the value-added chain model, this study conducted four case studies, Acer, Giant, TSMC and Eternal, to verify the high-valued strategies and the common characteristics of service provisions. Specifically, these companies are selected from different industries and value chain positions to enhance the robustness of the research findings. This study concluded that the manufacturing firms strengthen their position as system integrator. The provision of high-valued services is orientated toward the integration of the value chain stages according to the industry and business model. The companies are going to upstream or downstream, outsource non-core manufacturing activities, and sell some manufacturing assets. The high-valued service strategies provide the manufacturing firms with new approaches to compete in a rapidly changing economy. The findings also provide the direction for the emerging economies in confronting industrial structure transformation.

TE-01 Innovation Management-5

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Pavilion East

Chair(s) Jasper L Steyn; University of Pretoria

TE-01.1 [A] New Innovation Patterns? Lessons Learned from Digital Technology Industries

Yi-Yu Chen; New Jersey City University, United States

The emergence of digital technology has disrupted the roles played by entrepreneurial startups and large firms. In addition, new architectures and tools for mass collaboration and user involvement through open innovation merit studies for the setup of industry standards and dominant designs. This study addressed issues related to innovation patterns by analyzing

the linkages between digital processes and the openness of innovation.

TE-01.2 [R] Exploring the Interactions among Incubators: A Case Study on Incubators in the Hsinchu Region

Will Chan; Tohoku University, Japan

Yuko Harayama; Tohoku University, Japan

This paper explores the interactions among incubators within a particular region, a concept that is rarely mentioned and analyzed in the previous literature. Three hypotheses regarding the causes of the competition and cooperation among the incubators were proposed as a result of the review of the previous literatures. The hypotheses were then tested through a case study discussed in this article that includes the three incubators, all of which specialize in technology, within the Hsinchu region. The case was investigated using data collection and interviews. As a result of the investigation, it was concluded that the interactions among the incubators have facilitated the development and complicated the management model of each incubator. The cooperation and competition that exist among the incubators have improved them significantly since their establishments. It is suggested that the policy makers should consider this type of interaction when developing incubators and utilizing the research results from this paper to manage incubators.

TE-01.3 [A] Cluster-Based Regional Innovation System: Theoretical Extension and Case Study of Shaoxing

Yisha Zhou; Zhejiang University, China

Jin Chen; Zhejiang University, China

Yaqi Si; Zhejiang University, China

Innovation is not an isolated activity for enterprises. On the contrary, a mass of information exchange with the external world is required. That is why an enterprise and the environment it is involved in should be considered as a system. Due to inherent characters, an industrial cluster creates good conditions for innovation and can be a special innovation system. In China, most industrial clusters lie in the middle section of the value chain, while sections of high margin are in the hands of others, i.e., R&D and marketing. Therefore, improving the industrial added value has been put on the agenda. Based on the case of a Chinese city, Shaoxing, this paper discusses its textile industrial cluster, which has become one of the key driving forces supporting the rising economy. Our study shows that building the regional innovation system based on industrial clusters in Shaoxing is a great choice to improve innovation competitiveness. As the industry is one pillar of China's economy, it is important to study this trend for further growth of the industry.

TE-02 Technology Management in Energy Industry-5

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Pavilion West

Chair(s) William E Hefley; University of Pittsburgh

TE-02.1 [R] Solar Energy - What Are the prospects?

Timothy A Calderwood; PLEXSYS Interface Products Inc., United States

Bennett Barnwell; Portland State University, United States

Arvind Kumar; Portland State University, United States

Justin Thompson; Indian Health Service, United States

Sath Vang; Daimler Trucks North America, LLC., United States

The price of solar energy has dropped significantly over the years, but many still believe that it is too expensive over the use of fossil fuels and other energy sources. On the other hand, it can be argued that it is one of the cleanest sources of renewable energy. However, since the first mass production of photovoltaic solar cells, they have generated more publicity than energy. So, to the prospects of solar energy are not obvious at this point. This paper further discusses the success and failures of past photovoltaic solar cells projects and evaluates today's photovoltaic use of solar cells from the environmental, societal and governmental perspectives to see its progression from previous lessons learned in the past. The paper also presents a review what the United States Military is doing in solar energy

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as a yardstick of where and how photovoltaic solar cells are likely to be used in the future.

TE-02.2 [R] A Comparison of Energy Efficiency Metrics for School Buildings

Napong Tanatammatorn; Portland State University, United States

Timothy R Anderson; Portland State University, United States

A set of 49 elementary, middle, and high schools from a single school district are examined using five existing metrics and compared with the data envelopment analysis (DEA) benchmarking tool. The DEA results are then decomposed to examine the impact of scale efficiency, and the results are compared to another study of buildings in Taiwan.

TE-02.3 [R] Use of Multiple Perspectives and Decision Modeling for PV Technology Assessment

Nasir Sheikh; Portland State University, United States

Tugrul U Daim; Portland State University, United States

Dundar F Kocaoglu; Portland State University, United States

Renewable energy generation technologies are complex systems that have wide-ranging implications in their production and deployment. Using multiple perspectives such as social, technological, economic, environmental, and political (STEEP) and their decomposition into multiple criteria or indicators provide a broader yet explicit assessment of the technology under consideration. An effective method of determining the relative importance of a criterion with respect to others is by hierarchical decision modeling and expert judgment quantification instruments. These combined approaches can improve decision making for technology assessment and selection. This paper describes the approach and presents an example for photovoltaic solar technologies.

TE-02.4 [R] Technology Commercialization in Energy-Smart Industries

Shiu-Wan Hung; National Central University, Taiwan

Chia-Chin Chang; National Central University, Taiwan

Ping-Chuan Chen; National Central University, Taiwan

Mankind is living in the technology era and is seeing the influence of technology in every aspect of life, and in communities and societies. The technology commercialization (TC) marketplace for energy-smart industries plays a crucial role in increasing technology-related developments and the demand for energy. As part of a new focus on sustainability, this study examined the effects of technological attributes, market potential and environmental factors on the technology commercialization of energy-smart industries. A survey was conducted on two of Taiwan's promising high-tech industries: solar photovoltaic (PV) and light emitting diodes (LEDs). It was found that if the technologies possess the specific attributes required by the potential adopters, namely, innovativeness, generics, simplicity and compatibility, the level of market potential will be more favorable and the TC probability will be higher. Furthermore, the results of the regression analysis indicated that environmental requirements play a moderating role in affecting the relationships between market potential and TC probability. The empirical findings highlighted the role of market potential as a mediator between technological attributes and the likelihood of commercialization. Furthermore, environmental factors were found to moderate the influence of market potential on technology commercialization in energy-smart industries.

TE-03 Technology Management in Government

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Broadway-1

Chair(s) Chun-Shuo Chen; National Taiwan University

TE-03.1 [R] The Experience of Taiwan in Managing Risks and Crises Concerning Public Disease Prevention and Control

Chun-Shuo Chen; National Taiwan University, Taiwan

The current study seeks to explore, describe, and interpret the particular aspects on managing public health, related risks and/or crises. It takes an in-depth view in the involvement of strategic initiatives related to leadership and authority in establishing information flow,

exchange, integration, cooperation across command (management) levels and organizational boundaries in response to the necessity of managing risks or mitigating crises concerning public disease prevention and control. Semi-structured interviews are used to collect the data. The professionals involved in managing risks or mitigating crises concerning public disease prevention and control at national and local levels in different regions of Taiwan were included. The present study seeks to extend the avenue of scholarly inquiry into the confluence of information and knowledge flow, social processes, authority structures, and leadership approaches, as they help to shape, and are in turn reshaped by, the phenomenon being studied. It is also expected that practitioners at different levels in different regions will be able to gain insights into alternatives in innovative strategic cooperation in managing risks or mitigating crises concerning public disease prevention and control.

TE-03.2 [A] Modernization of the e-Government in Estonia

Ahto Kalja; Tallinn University of Technology, Estonia

Janari Põld; Tallinn University of Technology, Estonia

Tarmo Robal; Tallinn University of Technology, Estonia

Uno Vallner; Ministry of Economic Affairs and Communications, Estonia

Participation in the knowledge-based society presumes access to the internet and ICT-based services. As a result of the early liberalization of the telecommunications market and intense competition, Estonia has a well-developed communications network: all central and local government agencies, public libraries as well as educational and health institutions have an internet connection, as do 90 percent of Estonian enterprises. Approximately 90 percent of the Estonian population lives in areas with immediate availability of broadband internet. This paper discusses modernization of the e-Government in Estonia which includes: large penetration on broadband internet in Estonia, developing environments for implementation of e-Government services, and developing e-solutions for very different public sector activities such as e-Notary, e-Procurement, and e-Invoicing.

TE-03.3 [R] MMPE-SI/TI (Gov) - Model to Assess the Maturity Level of the IS/IT Strategic Planning of Brazilian Governmental Organizations

José Gilson de Almeida Teixeira Filho; University of Pernambuco (UPE), Brazil

Hermano Perrelli de Moura; Federal University of Pernambuco (UFPE), Brazil

The number of public and private organizations of all sizes that have developed an Information Systems/Information Technology (IS/IT) strategic planning process is gradually increasing in Brazil. As the demand for new methodologies grows, models and processes that help these organizations understand the benefits of using these mechanisms to improve their businesses become necessary to evaluate the maturity level of their organizational processes, especially those related to IS/IT. This paper presents a model to assess the maturity level of the IS/IT strategic planning of Brazilian governmental organizations, named MMPE-SI/TI (Gov). It was designed in accordance with the main models and standards used for national and international definition and assessment of processes and consists of a reference model (RM), an assessment method (AM) and a database of best practices (DBP) set to assist in the development of the organizations improvement plan. The definition of the model involved several steps, including: systematic review, conducting exploratory case studies, organizing a set of best practices, validation with experts from the IS/IT area, analyzing and interpreting data and improvements recommendation. The MMPE-SI/TI (Gov) model has five maturity levels, six capacity levels, 16 processes and 124 best practices for IS/IT strategic planning directed to Brazilian governmental organizations.

TE-04 Strategic Management of Technology-1

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Broadway-2

Chair(s) Ron Khormaei; Lensbaby, LLC; PSU-ETM

TE-04.1 [A] Understanding and Communicating the Value of Technology: A Process Perspective

David Probert; University of Cambridge, United Kingdom

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Marcel Dissel; University of Cambridge, United Kingdom
Clare Farrukh; University of Cambridge, United Kingdom
Letizia Mortara; University of Cambridge, Great Britain and Northern Ireland
Val Thorn; University of Cambridge, Great Britain and Northern Ireland
Robert Phaal; University of Cambridge, United Kingdom

Technological investment is an important driver of innovation, and the evaluation of technology potential is becoming increasingly important in this context. Although there is a range of possible approaches and tools for understanding and communicating the value of technology to potential customers, not all are useful or accessible in practice, where the situation is often complex and constantly evolving. Although many companies have their own customized processes in place for securing approval for technology development, often combining several techniques, very few empirical studies have been performed to learn from these practices and provide an overall view of the process of selling technologies internally or externally. In this paper, the current literature and practice related to technology valuation is reviewed and summarized in a five-step process for building a business case for technology investment that gives guidance on where and when to use specific valuation tools. The seller or proposers perspective is taken and consultative sales techniques incorporated. This provides a flexible reference for R&D managers and adds to the body of literature on the selection and use of valuation tools. A user friendly guide has been published detailing the five-step approach.

TE-04.2 [A] How are Defensive Patents Defined and Utilized as Business Strategic Tools?: Questionnaire Survey to Japanese Enterprises Having Many Defensive Patents

Yoshifumi Okuda; Tokyo Institute of Technology, Japan
Yoshitoshi Tanaka; Tokyo Institute of Technology, Japan

Japanese enterprises have tremendous numbers of patents, but the half numbers of patents are not used. In addition, 60 percent of unused patents are considered as defensive patents. However, the enterprises do not have a clear understanding of how the defensive patents are defined and managed. The defensive patent has not yet been clearly defined by prior researchers. Japanese enterprises have various opinions on its definition and utilization. Therefore, in this study we performed a questionnaire survey for the top 200 Japanese enterprises which have high numbers of patents. According to our survey, about 90 percent of enterprises think that defensive patents are necessary; and the way of thinking that the a defensive patent can be utilized with its role as defending tools against competitors has been well penetrated to most of the enterprises which made responses to our survey. So, we clarified the features of defensive patents from two aspects, which are the evaluation of the patent and the relation to the environment and the strategy. Furthermore, we recommend that the enterprises continue managing patents according to the features. The purposes of defensive patents have been also clarified with our survey. There are mainly four reasons why Japanese enterprises have defensive patents.

TE-04.3 [R] Servitization: Developing a Business Model to Translate Corporate Strategy into Strategic Projects

Richard V Weeks; University of Pretoria, South Africa
Kobus du Plessis; University of Pretoria, South Africa

The primary aim of this research study was to develop a business model, appropriate for a servitization environment that will facilitate the translation of corporate strategies into strategic projects. An additional aim of the research study is to determine the influence of organizational culture and employees skills on the successful implementation of a servitization process. Economic pressures and turbulent environmental conditions over the last few years have forced manufacturing companies to revisit their strategies to ensure some form of stability and long-term survival. Notably, the emergence of services as being the fastest growing sector of the global economy has given impetus to the need for manufacturing institutions to conduct a strategic reassessment of their operations. The challenge that companies were confronted with was based on how to successfully execute the well-intended strategies. Manufacturing companies realized that the manufacturing of products and the

optimization of manufacturing processes alone were not enough to provide them with a competitive advantage and maximize their economic growth. The strategic realignment in many instances not only focused on issues relating to the manufacturing of products per se, but also on providing a bundle of services to clients, resulting in a so-called servitization strategy. This, however, confronted the executive team with a strategic management challenge, namely, the need to develop business models that would be both appropriate for a manufacturing and a service operational setting. Business models, such as the model developed by [10], provide a transformation platform for the servitization strategy. Elements that influence the successful implementation of the business models, that are not always considered or managed by executives, are organizational culture and the new skills required. In terms of the skills required, the so-called T-shape skills profile in particular, assumes relevance in implementing a servitization strategy. The focus in this research study is therefore to gain an understanding of the concept servitization, from a strategic management perspective. Three very specific aspects are addressed in this regard, namely, the need for a new business model deemed appropriate for implementing a servitization strategy, the organizational culture implications involved and the skills-related issues that need to be taken into consideration for the successful implementation of the strategy.

TE-05 Technology Management in Telecommunication Industry

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Broadway-3

Chair(s) Robert Harmon; Portland State University

TE-05.1 [R] The Trend among Television Stations toward Development of Citizen News Platforms: PeoPo vs. WEnews Platforms in Taiwan as an Example

Mavis Tsai; Shih Hsin University, Taiwan
LiangJun Liu; Shih Hsin University, Taiwan

Based on the development of internet, digital media and Web 2.0 technologies, the use of various new media has become a popular trend for both editors and their audiences. The rise of citizen journalism is an outgrowth of this trend, and now more news media are developing their citizen news platforms to ensure they can get more local audience involvement. Even television stations in Taiwan are beginning to develop citizen news platforms online. However, the models for developing and running these news platforms differ significantly between public television stations and commercial ones. This paper discusses the different strategies and content displayed by PeoPo and WEnews platforms with support from public TV versus commercial TV in Taiwan. The research was launched in 2009 and continued through 2010 with researchers collecting news content from PeoPo and WEnews platforms for several months, then comparing the two platforms' news values, main topics and approaches used by the editors to interact with their audiences. The purpose of the research is to compare public versus commercial TV stations so as to enumerate their different purposes, primary strategies, values and topics, as well as differences in audience reactions. Based on this investigation, the researchers also expect the results of the study will provide some suggestions for other news media interested in developing citizen news platforms or websites.

TE-05.2 [R] An Innovation Process as Leapfrogging Strategies in Digital Wireless Communications Industry in Korea: Catch-up and Lead in Digital Wireless Communications Technologies

Seok Ji Park; ETRI, Korea, South

This paper examines the leapfrogging strategies with the case of catch-up and lead-in digital wireless communications by the Korean public institutes. Despite the disadvantages implied by the technological regime of wireless communications and the risks facing early entrants in the trajectory choice and initial market formation, the Korean Public Institute had achieved a "path-creating catch-up and lead" in the sense that it chose a different path from the worlds forerunner firms in behalf of the Korean government. Despite the lack of sufficient capability and a core technical knowledge base, the Korean Public Institute was

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able to develop the digital wireless communications systems. Towards the global digital communications market, the Korea targeted the national market from the beginning, and their sources for competitive advantages were the speedy catching up of the digital communications for complex systems like switching system at the initial stage. From the mid 1990s, Korea was the first country in the world to develop the Code Division Multiple Access (CDMA) based digital mobile telecommunications system. Korea became the first to commercialize Wibro, LTE (Long Term Evolution), and LTE advanced system for providing wireless broadband communications services in 2005 and 2010 respectively. As a result, Korea enjoyed the number one technologies in the world since the early 2000s in evolutionary wireless communications services.

TE-05.3 [R] Stating Mobile Phone Upgrading Behavior

Fang-Mei Tseng; Yuan Ze University, Taiwan
Hsin-Yen Chiang; Yuan Ze University, Taiwan
Huiyi Lo; Yuan Ze University, Taiwan

The fourth-generation mobile phone soon will be launched. Marketers are concerned about customer acceptance, and, in particular, about the main factors that determine whether customers will upgrade their mobile phones, which will affect the diffusion of 3G, 4G, and Worldwide Interoperability for Microwave Access phones. We integrated post- and pre-adoption theories, upgrading and value-based theory and chose 2G and 3G users to examine customers' plans to upgrade their current phones, and found that value assessments can affect mobile users' plans to upgrade to next-generation versions. When 2G mobile users were satisfied with their current model, they were not willing to upgrade to 3G mobile phones. They tend to upgrade by leapfrogging the next generation product as an indirect result of their positive satisfaction with their current model. These results suggest that 2G mobile users consider the 3G mobile phone to be a transitional product, and will wait for future options that are expected to perform better than those presently available.

TE-05.4 [R] An Integrated Model for Analyzing the Development of the 4G Telecommunications Market in Taiwan

Fang-Mei Tseng; Yuan Ze University, Taiwan
Shenq-Yuan Wang; Yuan Ze University, Taiwan
Ching-Ying Yu; Yuan Ze University, Taiwan

Obviously, higher speed and wider coverage of mobile broadband data transfer service have become the trend of the next generation of telecommunications technology, even though mobile broadband data transfer is not currently widespread in Taiwan. In actual fact, there are some previous studies that focus on the development trends or market potential forecasts of the telecommunications industry. However, most of the previous research conducted to estimate mobile internet market potential neither considered customer preferences nor environmental factors. Moreover, some also considered customer preferences in analyzing the development of mobile broadband without considering the environmental factors. In order to fully estimate future demand and provide implications for businesses and policy-makers, considering the consumers' preferences is very important in order to cope with the development of the telecommunications industry. Therefore, the objectives of this research are to analyze the development of the next generation of mobile telecommunications technology, and especially the diffusion situation for each different generational technology, i.e., 2G, 3G, Worldwide Interoperability for Microwave Access (WiMAX) and long-term evolution (LTE) in Taiwan. In order to make our research more conscientious and complete, we perform conjoint analysis to analyze the customers' preferences and scenario analysis to address the possible scenarios of the mobile telecommunications industry. Furthermore, we combine the results of customers' preferences and the elaborate specified scenarios, and then use the innovation diffusion model to forecast the market shares of 2G, 3G, WiMAX and LTE in Taiwan over the next 10 years.

TE-06 Decision Making in Technology Management-2

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Broadway-4

Chair(s) Peerasit Patanakul; Stevens Institute of Technology

TE-06.1 [A] Selecting an Engineering Manager Using a Hierarchical Decision Model

Larry Ball; Portland State University, United States
Judith Estep; Portland State University, United States
Dong-Joon Lim; Portland State University, United States

Selection of an engineering manager can be a complex undertaking with financial and organizational risk associated with a poor selection. The subjective nature of selecting engineering managers is characterized by stress and uncertainty. To mitigate these effects, a hierarchical decision model (HDM) was utilized for this study to rank engineering manager candidates. The HDM utilized pairwise comparison surveys, expert data from three different industry groups, desirability curves, candidate profiles and constant sum method for data processing. Data was processed for each industry expert group separately and as a combined expert group. The ranking results reflected the influence of industry expert groups and identified inconsistencies in the data created by the expert data.

TE-06.2 [R] Using Hierarchical Decision Models in Voting

Bing Wang; Beijing University of Posts & Telecommunications, China
Jiting Yang; Portland State University, United States

This paper discusses the application of hierarchical decision models (HDMs) in voting. Hierarchical decision model voting (HDMV) method can improve the features of the voting method in group maintenance, problem abstraction, structuring, analysis, fairness, applicability, validity and truthfulness. HDMV also enables voting prediction and election analysis. HDMV uses HDMs to guide the thoughts of the voters and further employs the voting method to synthesize the different voters' judgments. This paper outlines the steps to conduct HDMV and shows the advantages of this method. This paper gives an example of using HDMV to elect one student among three candidates and discusses the different decision results from using different methods to synthesize the group judgments. Voting data obtained has been analyzed by using the intuitionistic mathematics method. According to the analysis, the paper gives the reasons for the decision results through analysis of voting behavior and therefore illuminates the policies in electioneering when candidates are given a second chance. This paper also gives an overview of the methodology problems and application research concerning HDMV.

TE-06.3 [R] An Evaluation of Energy Alternatives for Turkey via Fuzzy Multicriteria Approach

Hasan H Turan; University of Yalova, Turkey
Alperen Bal; University of Yalova, Turkey
Omer F Yilmaz; University of Yalova, Turkey
Cengiz Güngör; University of Yalova, Turkey
Hikmet Erbiyik; University of Yalova, Turkey

Economical development of countries is greatly affected by the right energy strategies. However, strategic energy investment decisions are often complex and multifaceted and involve many different stakeholders with different priorities or objectives. Thus, a systematic approach is needed to find the best energy investment option for countries' future. In this research, a fuzzy multicriteria decision making methodology is suggested for the selection among energy policies. The methodology is based on fuzzy set theory because of its ability to cope with vague and incomplete information. As a case study suggested method is tested to rank several energy alternatives, namely hydro-power, solar, wind, coal, biomass, oil, natural gas and nuclear energy for Turkey. The numerical results reveal insights for feasibility and effectiveness of the proposed method. Finally, sensitivity analysis is performed to test the stability of the rankings for each alternative.

TE-07 Social Networks-2

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Forum Suite

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Chair(s) Alisa Kongthon; National Electronics & Computer Technology Center

TE-07.1 [A] Designing Virtual Social Networks for For-Profit Open Innovation

Nitin Mayande; Portland State University, United States

Charles M Weber; Portland State University, United States

A major supplier of computer products would like the users of its software platforms to enhance the value of its software platforms by engaging in peer production and open innovation. The company is designing a social network that is based on Web 2.0 technologies and acts as a virtual user group. This paper discusses the most important issues pertaining to that endeavor including the need to develop new metrics for network structure and performance. The relative merits of various performance metrics is tested against empirical data. The paper also discusses an approach for forecasting revolutions in network performance in an open innovation system through simulation.

TE-07.2 [A] Using Focus Group to Investigate Why People Use Facebook: The Case of Taiwan

Shih-Chi Chang; National Changhua University of Education, Taiwan

Pei-Hsi Liu; National Changhua University of Education, Taiwan

Facebook is a very popular virtual community in the world. When the Chinese version released in Taiwan in 2008, something interesting happened. People are not only interested in its powerful function for social network connectivity but also its online games such as Happy Farm. Due to its rapid growth in Taiwan, many enterprises also tried to cooperate with Facebook to market their products or services. However, few studies conducted understand the users motivation to enjoy this virtual community. To propose a framework to explain why people use Facebook, four focus groups were conducted, each with six participants. We found that effort expectancy, performance expectancy, perceived playfulness, social influence, perceived critical mass, human-message interaction, human-human interaction, information sharing, right of privacy protection, search function, free to use, and habit are factors influencing the behavioral intention to use Facebook.

TE-07.3 [R] Security and Privacy Issues in Social Networking Sites from User's Viewpoint

Chalee Vorakulpipat; National Electronics & Computer Technology Center, Thailand

Adam Marks; Embry-Riddle Aeronautical University, United States

Yacine Rezgui; Cardiff University, United Kingdom

Siwaruk Siwamogsatham; NECTEC, Thailand

Although the use of social networking web sites and applications is increasingly on the rise, many users are not properly informed of the risks associated with using these sites and application. Understanding these risks and challenges should be addressed to avoid potential loss of private and personal information. While some studies concerning this issue have been conducted within the context of developed countries, very few studies have been conducted within the context of developing countries. This paper examines the issues of security, privacy, and trust in social networking sites from the users viewpoint, and within the context of two developing countries, namely Thailand and the UAE. Both countries have witnessed a significant increase in the use of social networking tools in the last few years.

TE-08 Technology Management Framework-1

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Council Suite

Chair(s) Leon Pretorius; University of Pretoria

TE-08.1 [R] Study on Popularization of Science and Technology Infrastructure Development in China

Ren Fujun; China Research Inst. for Science Popularization, China

Li Zhaohui; China Research Inst. for Science Popularization, China

Zhen Nian; China Research Inst. for Science Popularization, China

In 2009, a project of monitoring and evaluation of China's Popularization of Science and Technology Infrastructures (PSTI) development was conducted. The index system for China's PSTI development was studied and established. By using these evaluation indexes, monitoring and evaluation of China's PSTI was carried out and abundant detailed data were collected. Through the analysis of the monitoring data, a comprehensive understanding of China's PSTI development status was obtained, the reason was analyzed, and the trend of China's PSTI development was forecasted. These results can not only lay a solid foundation for annual monitoring and evaluation project of China's PSTI in the future, but also provide a policy-making support for accelerating China's PSTI construction. The authors believe this research will be a precious reference for other countries and regions on PSTI development.

TE-08.2 [R] Evaluative Thinking in Science Popularization

Nian Zheng; China Research Inst. for Science Popularization, China

Limei Zhang; China Research Inst. for Science Popularization, China

This paper debates that science popularization has its own important responsibility for society and the global community. Science communicators or science popularizers should deliberately choose the content and approach for disseminating science and technology knowledge based on the evaluation and value judgment. As for that purpose, the authors further argue that communicators or popularizers should have an evaluative thinking in the process of science dissemination or science popularization. The authors hold that the evaluative thinking parallels with critical thinking is one of the most useful ways to guarantee a better play of the role of science and technology dissemination in serving our society while we confront many global problems.

TE-08.3 [A] Probing 'Public Understanding of Science' in China: An Application and Empirical Study of 'Culture Distance' Model in China

Qi Liang; China Research Inst for Science Popularization, China

Chao Zhang; China Research Institute for Science Popularization, China

Fujun Ren; China Research Institute for Science Popularization, China

The present paper in the first section localized and modified the culture distance model with Chinese education level being the control variable, by considering the Chinese civic scientific literacy survey index system and analyzing the latest data result of the 8th Chinese civic scientific literacy survey conducted in 2010. The culture distance model of China Public Understanding of Science was attained. The following sections, in detail, dealt with the application of the modified model on data sets collected in 2003, 2005, 2007 and 2010 in China. A comparative analysis was given between different groups and regions on public understanding of scientific knowledge, scientific methods and scientific concepts among Chinese citizens. The divergence and variation trends of public understanding of science were discussed among citizens with different factors such as: gender, education level and location. Suggestions on effectively communicating science in target populations in China were given at the end.

TE-09 Entrepreneurship / Intrapreneurship

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Directors Suite

Chair(s) W. Austin Spivey; University of Texas at San Antonio

TE-09.1 [R] Spin-out Multiplier: Implications for a New Economic Development Metric -Why Do Some Firms Create More Spin-off Enterprises Than Others?

Steven T Walsh; University of New Mexico, United States

Kelly R Cowan; Portland State University, United States

Traditional economic development can be divided into three broad categories: 1) attracting new firms from outside of a region, also known as hunting and gathering; 2) development of existing firms, also known as growing your own; and 3) entrepreneurship, also known as building your own. Further, traditional economic development has focused overwhelmingly on the first strategy because it often offers the quickest results, micro-economically and

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politically. However, despite the popularity of hunting and gathering, primarily in terms of quick importation of outside jobs, it does not lead to maximum wealth creation; and complete economic development should include both jobs and wealth creation. Finally, no matter which of the three vehicles is used, existing metrics do not further the true understanding of these efforts in making a sustainable economic system, particularly in the case of technology-based economic development. If the current economic development metric systems do not provide policy makers this information, then there is cause for concern.

TE-09.2 [R] The Promise of a Global Patent: Insights from System Archetypes

W. Austin Spivey; University of Texas at San Antonio, United States
Marton Gergely; University of Texas at San Antonio, United States
J. Michael Munson; University of Santa Clara, United States
Amber Schreck; University of Texas at San Antonio, United States

Intellectual property laws explicitly cement the contract between entrepreneur and society. New ideas, goods, and services protected by patent regulation offer inventors an opportunity for wealth, while simultaneously offering society the promise of an improved standard of living. Unfortunately, global flattening threatens both partners in this agreement. Growing populations and economies around the world force entrepreneurs to plan for multiple markets. These forces drive an attendant increase in patent submissions that lead to greater pendency periods and escalating backlogs, in multiple countries. In turn, this leads to increased costs. Thus, the fragmented, multiple patent systems around the world offer ever less protection, while escalating costs and delaying the promise of a better life. Consequently, a key question arises: if a Global Patent System (GPS) were to be implemented, what can stakeholders in the future contracts between entrepreneurs and society learn from a Systems Archetypes perspective? In particular, the Tragedy of the Commons archetype is investigated and highlights not only the promise of a global system, but also the dangers inherent in implementing such a complex change. Implications for a successful global system are discussed. Overall, the ideal GPS will stress the importance of early and continual investment of resources.

TE-09.3 [R] Perspective Research Entrepreneurship Output Performance in 1992-2009

James K Chen; Asia University, Taiwan
Yuh-Shan Ho; Asia University, Taiwan
Ming-Huang Wang; Peking University, Taiwan
Yun-Ru Wu; Asia University, Taiwan

This paper examines research entrepreneurship output performance from 1992 to 2009. Data are based on the online version of ISI Web of Science from 1992 to 2009 focusing on SSCI publishing paper that topic is to respect on entrepreneurship. This study synthetically uses the bibliometric method, study entrepreneurship institute and country analysis, source title, author keyword, and keyword plus analysis, to map global research entrepreneurship during the period of 1992-2009. The data shows research entrepreneurship performance top 50 countries ranking is USA, UK, Canada, Germany, Netherlands, Spain, Sweden, Australia, France, Italy, Finland, Israel, Singapore, Denmark and Switzerland. The top ten publication institutes are University of Nottingham, UK; Indiana University, USA; Max Planck Institute for Economics, Germany; University of Minnesota, USA; Babson College, USA; Harvard University, USA; Rensselaer Polytechnic Institute, USA; University of Illinois, USA; Erasmus University, Netherlands; and Case Western Reserve University, USA. The results find that four issues of innovation, entrepreneurship capital, corporate culture, and economic growth will be the most popular issues in the research entrepreneurship field in the future. This investigation will help researchers realize the panorama of global research entrepreneurship trends and establish further research directions.

TE-10 Technology Roadmapping-1

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Studio Suite

Chair(s) Nathasit Gedsri; Mahidol University

TE-10.1 [R] The Major Determinants for the Adoption of the Strategic Technology Roadmap (STRM) as an Infrastructure for Technological Innovation

Won Il Lee; Gyeonggi Institute of S&T Promotion, Korea, South
Sangbum Park; Gyeonggi Institute of S&T Promotion, Korea, South

This study is about the major determinants for the adoption of the strategic technology roadmap as an infrastructure for technological innovation in an R&D organization. For this study, the concept of the strategic technology roadmap and its characteristics are defined. The key processes of the strategic technology roadmap and the major success factors for the adoption of it are also examined. The study was performed based on the theoretical study and related qualitative study approaches. The major determinants for the adoption of the strategic technology roadmap can be summarized as follows; the top managements' support for the adoption of the strategic technology roadmap, the relevancethe goodness of the fitof the strategic technology roadmap, and the organizational capability for the utilization of strategic technology roadmap. This study can be the good reference for the technology R&D organization which is willing to adopt and utilize the strategic technology roadmap in the future.

TE-10.2 [R] Utilizing Risk Analysis and Scenario Planning for Technology Roadmapping: A Case in Energy Technologies

Yuya Kajikawa; University of Tokyo, Japan
Yasunori Kikuchi; The University of Tokyo, Japan
Yasuhiro Fukushima; National Cheng Kung University, Taiwan
Michihisa Koyama; Kyushu University, Japan

Technology roadmap is emerging as an indispensable management tool in the modern society because it can be used to direct future paths of advancing technologies and to foster understanding among stakeholders including scientists, engineers, R&D managers, and policy makers. Current technology roadmaps are limited in their functions because uncertainties embedded in the presented pathways and major consequences in the future realized by following the roadmap are often not well presented. In this paper, a new approach in technology roadmapping is proposed. The new approach includes identification of technological, economic, environmental and social risks and constraints and applies the scenario planning concept. A case study in the Japanese energy sector was conducted. Inputs from more than 40 experts in the energy sector were collected and assessed to synthesize an integrated perspective on energy technologies, consistently describe inherent risks, and quantify expected outcomes. Findings obtained in the execution of this case study are organized as useful guidelines to construct a useful, reliable, and informative technology roadmap.

TE-10.3 [R] Strategic Road Mapping of Embedded Software Production Technology

Tomoki Kono; Omron software Co.,Ltd, Japan
Shotaro Kohtsuki; Ritsumeikan University, Japan
Atsushi Aoyama; Ritsumeikan University, Japan

Along with rapid increase of diversification in customer demand and digitalization of products, the percentage of embedded software technology among electronic devices has been increasing. In addition, the demand for embedded software technology is increasing due to its multi-functionality, such as shorter lead time and lower cost. As a result, there is an unprecedented need for productivity improvement in embedded software development. This research paper proposes a process model for the acquisition of technology production that will improve the embedded software development's productivity. By using this model, a method for acquiring software technology can be applied to practical situations. Based on frameworks suggested in preceding studies on roadmapping using the T-plan and MAFFINT method, this model has been developed into a practical process capable of a consistent execution that ranges from the selection of the target production technology

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to the development of human resources that will acquire the technology. The application of this model to real-world businesses has verified that significant implications have been provided to the development of new technology.

TE-10.4 [R] An Analytical Approach to Assess the Current State of a Roadmap

*Ronald S Vatananan; Mahidol University, Thailand
Nathasit Gerdssi; Mahidol University, Thailand*

Technology Roadmapping (TRM) has become the method of choice for practitioners to develop a strategic plan linking business strategy, product development, technology, and R&D activities. Keeping a roadmapping operation alive is considered a major challenge. One element of sustaining a roadmapping process is to be aware of when the process needs to be reviewed. A review entails maintaining a roadmap by including up-to-date information, as well as updating or revising its strategic targets. To assist this decision making an analytical approach along with an evaluation model is proposed that can analyze the impact from changes in key drivers and their collective effect on a roadmap. The proposed analytical approach and evaluation model are used to operationalize the maintenance process of a roadmap and serve as a mechanism to sustain a roadmap implementation. The evaluation model produces a TRM status signal to indicate the current state of an organization's roadmap. Management can then use the TRM status signal to recommend appropriate responses for reviewing their roadmap (i.e. maintaining, updating or revising).

TE-12 Supply Chain Management

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Parlor-B

Chair(s) Ahm Shamsuzzoha; University of Vaasa

TE-12.1 [R] Exploring the Factors Affecting the Identification Standards Adoption Process in the US Healthcare Supply Chain

*Angelica Burbano; University of Arkansas, United States
Ronald Rardin; University of Arkansas, United States
Ed Pohl; University of Arkansas, United States*

The adoption of identification standards and its associated technology in the healthcare supply chain has been slow over the past 25 years despite the evidence of the benefits that can be achieved. The widespread use of identification standards in the form of barcode labeled medical supplies and medical devices can contribute to the reduction of point of care errors and can increase the efficiency of healthcare supply chain related processes. This paper reports on the findings related to the exploration of the factors affecting the adoption of product and location identification standards. The identification standards adoption process is compared with the adoption of electronic health records (EHR) and electronic data interchange (EDI). The main conclusions from the identification standard's literature are presented, and a conceptual model to explain the identification standards adoption process is proposed. The limitations and implications of current findings are explained, followed by a discussion on the integration of these findings with subsequent modeling efforts.

TE-12.2 [R] Assessing Supply Chain Risk and Energy Efficiency Simultaneously via Network DEA

*Ford G Zeng; University of Texas at Arlington, United States
Jamie Rogers; University of Texas at Arlington, United States*

For years, researchers and practitioners have investigated the various technologies and strategies to improve supply chain performance and mitigate risks. Recently, there has been increasing attention placed on sustainable energy management. Achieving sustainable differentiated advantage in today's competitive environment demands supply chain executives to have a clear understanding of appropriate approaches to managing the key risks involved. The purpose of this paper is to examine the constructs of energy efficiency and risk matched together, and to evaluate the supply chain potential outcomes in terms of benefits, costs, and risks. The paper explains the interaction between risk and energy

efficiency in a supply chain context, explores the real-world application of network data envelopment analysis (DEA) joint efficiency, and develops an approach of quantitatively assessing supply chain risk management and energy efficiency simultaneously.

TE-12.3 [R] Risk Management in Supply Chains: Information Exchange, Systemic Motives and Cognitive Barriers

*Jyri Vilko; Lappeenranta University of Technology, Finland
Anna Rumpu; Lappeenranta University of Technology, Finland
Jouni Koivuniemi; Lappeenranta University of Technology, Finland*

Supply chain disruptions are a critical issue for many companies. Supply chain complexity and disintegration are emerging as major challenges to supply chain risk management. The ability to identify risks has decreased as the control of supply chain operations have fallen to the hands of outside service providers. For risk management to work properly, supply chain actors need to cooperate and share information. In this paper we assess information exchange and its risks in a supply chain between the Baltic States and Finland. This is done by presenting information exchange methods and the risks involved as seen by the practitioners in the field. The case is then analyzed from the viewpoint of cognitive barriers and systemic motives which affect information exchange in the supply chain. The study is based on state-of-the-art literature as well as empirical findings from interviews conducted. The paper defines supply chain as a systemic construct, which incorporates actors whose visibility and control over the supply chain is constrained by internal organizational factors and cognitive barriers. Further, risk management practices are dependent upon contingent factors that drive changes in supply chains.

TE-12.4 [A] Dynamic Inventory Management Parameters Adjusting Scheme as a Logistics Service

*Ari Happonen; Lappeenranta University of Technology, Finland
Erno Salmela; Lappeenranta University of Technology, Finland*

This study examined the knowledge enhancement model, in which a logistics service provider (LSP) provides dynamic inventory parameter management and update service for its customers in the future. This type of a case-based research data about 4PL model cases was one of the research gaps revealed by the literature review done by Selviaridis and Spring (2007). The research data has been collected through interviews of company owners, logistics managers, project leaders and logistics consultants and also from case study, based on real inventory data. The researched concept allows providing of strategic services, such as temporary funding of inventory components, continuous development of the supply chain and new exception management capabilities. The case is considered a good example how demanding and information analytical LSP services are not limited to large size companies and service providers and how it is possible for a small company to grow with the LSP and subcontractors in case of carefully designed supply chain and inventory buffers. Through applying this model, the LSP can be identified as an enabler of growth and as such LSP can have a tactical supply chain manager role. For a large company, the model may save a huge amount of assets and energy as the inventories are fitted to projected demand. Dynamic warehouse management model allows demand synchronized inventory parameter update process using fast re-parametrization process based on real inventory demand data. The model is based on an idea of using both long and short time period history data to anticipate the future demand and its variations.

TE-13 Technology Assessment and Evaluation-1

Tuesday, 8/2/2011, 16:00 - 17:30

Room: Parlor-A

Chair(s) Jisun Kim; Portland State University

TE-13.1 [R] Early Phase Technology Management Valuation Practices by University Licensing Offices in the United States: Empirical Data from a Survey of the Top 100 Organizations

Cory Hallam; University of Texas at San Antonio, United States

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Anita Leffel; *University of Texas at San Antonio, United States*
Ismael Chinae; *University of Texas at San Antonio, Spain*

Many studies concerning the management of early phase technology revolve around methods for predicting commercial success of the innovation as a critical component to the patenting, licensing, and technology risk reduction investment process. While firms have individualized methodologies for technology development investment strategies, universities typically end their commercialization activities with the licensing of the technology to a firm. Little is written about what financial valuation techniques university technology licensing offices are currently using for determining the financial value of their innovations as part of the licensing process. This paper attempts to add to this field of knowledge via a survey of the top 100 US university-based technology licensing offices to address if they establish a priori financial values for their innovations and what methods they use. Furthermore, data was collected on licensing to identify the licensing ratios of the universities, which indicates that the majority of all licensing revenue is for technology in the health/medical related fields.

TE-13.2 [A] Technology Level Evaluation in Agricultural Science and Technology

Moonjung Choi; *KISTEP, Korea, South*
Byoung Soo Kim; *KISTEP, Korea, South*

It is very important to evaluate technology level to establish a science and technology (S&T) strategic plan. Technology level is generally evaluated by expert opinion surveys because the range of technology level evaluation is broad, and one technology can be divided by several technologies. In this study, a two-round Delphi survey was used to evaluate technology level, and SCI publication and USA patent were analyzed to evaluate research performance. The agriculture field includes seven categories such as agricultural engineering, agricultural biotechnology, etc. Technology level was expressed numerically such as percentage of top-level country. In terms of publication and patent analysis, quantitative and qualitative comparisons were performed by using several indicators, such as the number of publications, citation index, which is the internationally standardized number of citations, scientific strength, etc. The USA was ranked to world top position in all categories of agriculture field in expert Delphi survey and SCI publication and USA patent analysis. But the rank among major countries was different between expert Delphi survey and research performance analysis. Experts graded the higher rank to Korea than research performance analysis. Both evaluation results from expert Delphi survey and research performance analysis should be considered to establish agricultural S&T strategic plan not to distort technology evaluation results.

TE-13.3 [A] The Defense Economic Value Analysis Model of Its R&D Project

Won-Joon Jang; *Korea Institute for Industrial Economics and Trade, Korea, South*
Choon-Joo Lee; *Korea National Defense University, Korea, South*

According to the increasing importance of defense R&D projects, not only the domestic combat readiness but also its international export, the need to get an actual economic value of its defense R&D project is also an important issue today. This paper presents the defense economic value analysis (DEVA) model of its R&D project with the in-depth review of previous studies both domestic and abroad. After analyzing the technical, economical and defense strength effect with proven methods, it should present the concrete economic values of the defense R&D project and contribute to boosting the economic value analysis of the R&D projects in the near future.

TE-13.4 [R] Simple Numeric Model to Compute Technology: Contribution Factor for the Technology Valuation

Daemyeong Cho; *Hanyang University, Korea, South*
Gyunghyun Choi; *Hanyang University, Korea, South*

Understanding the value of technology is very important and necessary to manage a technology-based business effectively, not only in the view of valuation of assets but also R&D

strategy. The value of technology can be expressed as a value of the technology-contribution portion of the total net business profit which is gained by the technology commercialization. In this paper, we show a simple numeric model to compute the technology-contribution factor for the valuation on the basis of an empirical analysis.

WA-01 PLENARY - 4

DATE: WEDNESDAY, 8/3/2011
TIME: 08:00 - 9:30
ROOM: PAVILION
CHAIR: TBA

WA-01.1 [K] Building a Smarter Grid: The Intersection of Policy, Technology, and Economics

Phil Keisling; *Portland State University, United States*

Phil Keisling, an ex journalist and Oregon's former Secretary of State, readily admits he is no smart grid expert. But in the fall of 2009, he was a co-founder of Smart Grid Oregon, one of the nation's first state trade associations focused on promoting smart grid-related businesses and innovations. In his presentation, he will describe the critical importance of linking policy, technology, and economic considerations together as states forge innovative new approaches to energy policy and practice.

WA-01.2 [K] Energy Conservation as a River: Delivering Energy Efficiency in Oregon and the Northwest

Margie Harris; *Energy Trust of Oregon, Inc., United States*

The Northwest has used energy conservation programs and technologies over the last 30 years to meet growing energy demand with the lowest-cost, least-risk resource available while moderating the impacts of energy development on the regions rivers. Nearly 40 years ago, the Northwest was putting the finishing touches on the last of its major hydropower dams, completing the transformation of wild rivers into a power system. This system of dammed rivers spread inexpensive electric energy to the entire region, connected inland areas to the ocean and protected urban centers from devastating floods. But the species that inhabited the wild rivers paid a heavy toll. Today, river flows and fish and wildlife habitats are being restored. Energy conservation has not driven this restoration, but it has helped make it possible. Instead of narrowing energy options as the dams firm generating capacity was reduced, energy conservation has helped meet the regions growing energy demand. After 40 years, the rivers work better for native species and their energy supplies do more work for people. Energy conservation strategies and techniques deliver ongoing benefits without building new, more costly generation sources. In Oregon, Energy Trust of Oregon is a nonprofit organization that provides energy conservation programs for four investor-owned utilities, and works with other organizations, utilities and governments throughout the region to bring technologies and energy solutions to consumers. Energy Trusts programs and lessons learned provide valuable guidance for developing or enhancing energy conservation programs elsewhere in the nation and worldwide.

WB-01 Innovation Management-6

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Pavilion East

Chair(s) Andre J Buys; University of Pretoria

WB-01.1 [R] China: Can It Move from Imitation to Innovation?

Dong-Joon Lim; *Portland State University, United States*
Dundar F. Kocaoglu; *Portland State University, United States*

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This report analyzes both positive and negative aspects of China's prospect of moving from imitation to innovation. The positive aspect is analyzed by Chinese innovation input/output index ratio and case studies of today's innovative companies of Korea and Japan. It is shown that China is on the right track toward innovation by following an Imitator strategy. However, three impediments to be overcome are also identified by analysis of government issues, corporation issues and leadership issues. Finally, a bright future toward innovation is projected for China with examples of successful innovation cases.

WB-01.2 [A] Culture of Innovation in a Brazilian Service Firm

Clarissa Côrtes Pires; Aeronautics Technological Institute – ITA, Brazil
Ligia Maria S. Urbina; Aeronautics Technological Institute – ITA, Brazil
Roberto T Leite; Chemtech - A Siemens Company, Brazil

This paper presents a case study to improve the R&D Center coordination in a Brazilian service-oriented company, whose services and business operations are heavily based on professional knowledge. The focus of the study is an approach for process coordination during the execution of R&D activities, using the concepts of culture of innovation, collaborative partnerships and knowledge management. It also presents the advantages and restrictions in implementing research centers inside KIBS companies.

WB-01.3 [A] Assessing Technological Innovation in SME Footwear Clusters in Nigeria

Willie O Siyanbola; Obafemi Awolowo University, Nigeria
Olumuyiwa O Olamide; Obafemi Awolowo University, Nigeria
Oluseyi O Isola; Obafemi Awolowo University, Nigeria

International competitiveness and economic progress are, among other factors, driven by the process of continuous innovation. Innovation valued by the marketplace is recognized, today, as a creator and sustainer of enterprises. Among the many challenges enterprises face, none seem to be as crucial as the need to change and grow. However, many SMEs seem to fail to innovate in time. They often lack the necessary resources to invest in strategic development operations. This paper draws from the findings of an empirical firm-level study being carried out in Southeastern Nigeria involving two footwear clusters and about 600 entrepreneurs. The paper investigates the general business characteristics and innovation activities of the clusters. The assessment of the two clusters is with a view to addressing specific strategic policy issues designed to sustain the clusters and raise their innovative capability for global competition.

WB-02 Technology Management in Energy Industry-6

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Pavilion West

Chair(s) Svetla T Stoilova; Oregon Institute of Technology

WB-02.1 [R] Externality Valuation in South Africa's Coal Based Electricity Generation Sector

George Alex Thopil; University of Pretoria, South Africa
Anastassios Pouris; University of Pretoria, South Africa

South Africa, like most other developing economies, uses coal as the primary fuel source for its electricity requirements. South Africa also generates a significant amount of its electricity from nuclear energy for its western regions. Coal generated electricity causes pollution and is occupationally hazardous for the miners extracting coal. These occupational hazards and impacts of pollution are not accounted for in the pricing of electricity and are called externalities. The reason behind undertaking a research of this nature is to investigate whether the quantification and then the monetization of externalities in the electricity generation sector will encourage utilities to look into alternative techniques of electricity generation. The research presented here aims to highlight the important externalities encountered while producing electricity from coal. The externality analysis based on the ExternE methodology intends to align South Africa's externality costs along international lines. The external costs are presented and put into context within the local pricing of electricity. This will help in as-

sisting policy makers, regulators and utilities in evaluating the actual impact of externalities and to ascertain to what extent they need to internalize the externalities.

WB-02.2 [A] A Competitive Energy Market Management Model for South Africa

Michael O Kachienga; University of Pretoria, South Africa
Sizwe Dhlamini; Nat'l Society of Black Engineers of South Africa, South Africa

In recent years a competitive management of energy systems technologies has been a major challenge to South African organizations including Eskom, the National Energy Regulator as well as government departments such as the Department of Energy and Department of Transport. Eskom has been a monopoly electricity utility company in South Africa for nearly 100 years. As a result of the Eskom monopoly and regulations which prevented the entry of independent power producers, the energy mix in South Africa has effectively been fossil fuel based central generation technologies, namely coal and nuclear. In the transport sector the predominant suppliers are foreign oil companies such as Shell, Total, BP, Caltex and Mobil, which provide petroleum and diesel. Local transportation fuel suppliers are PetroSA and Sasol. Moving forward the government of South Africa is beginning to open up the power generation space to include renewable energy options. The establishment of an independent power market trading entity will allow customers to benefit from multiple generation sources. The Renewable Energy Feed-In Tariff (REFIT) will be among the tools that the energy market regulator will use in the management and selection of electricity generation technology. However, if an energy solution is to fit into the South African context, it must support the goals of sustainability of society, which means that the price of the commodity cannot be the sole criteria for purchase of generation output. This paper proposes a new energy market management model that takes into account technical, financial and socio-economic measures that can be used by a pool regulator in deciding which power producer from which to procure electricity. The model focuses on a reliable and sustainable electricity market as its key pillar to promote energy security.

WB-02.3 [A] When Can Technology Management Help Firm Accelerate Competitiveness Journey: A Case of Renewable Energy Focal Firm from India

Kiran Momaya; Indian Institute of Technology Bombay, India
Karuna Jain; Indian Institute of Technology Bombay, India
Kailash P Sekhar; Indian Institute of Technology Bombay, India

With growing aspirations, emerging countries such as India will need to scale-up their energy production. Firms that have capabilities to address the issues related to energy have a huge opportunity to contribute. Taking the case of a firm that has achieved phenomenal growth, we try to understand how it has leveraged its innovativeness and technology management. We have used case method and benchmarking to explore the situation. Moser Baer was selected for the case study after considering several criteria. We found that effective technology acquisition and deployment capabilities are major technological critical success factors in the context.

WB-03 Science and Technology Policy-1

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Broadway-1

Chair(s) Deok S Yim; Gyeonggi Research Institute

WB-03.1 [A] The Study on the Strategy of the Innovation Cluster

Won Il Lee; Gyeonggi Institute of S&T Promotion, Korea, South
Jae Keun Hong; Gyeonggi Institute of S&T Promotion, Korea, South

This research focused on the strategy consulting of the 'Gwanggyo & Pankyo Technovalley' for the formation of the innovation clusters. The study was performed based on both theoretical study and related qualitative study approaches. Particularly, scenario planning as a foresight method was used for the strategy formulation of the innovation clusters. The major determinants for the success of the formation of the innovation clusters can be summarized

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as follows: the service of the hosting institution of clusters, the alignment of the national cluster policy and the networks of the clusters. In terms of the needs of times, this study regarding the strategy for the formation of the innovation clusters is anticipated to be a good reference for the R&D organizations and technology cluster participants in coming years.

WB-03.2 [R] Management and Governance Issues in the Development of Science and Technology Based Innovation Cluster

Deok S Yim; Gyeonggi Research Institute, Korea, South
Young C Seong; Gyeonggi Research Institute, Korea, South
Won Il Lee; Gyeonggi Institute of S&T Promotion, Korea, South
Sangbum Park; Gyeonggi Institute of S&T Promotion, Korea, South
Jae Keun Hong; Gyeonggi Institute of S&T Promotion, Korea, South

Science and Technology Parks (STPs) as a kind of innovation cluster have been established to strengthen the national capabilities in science and technology by many governments and universities. However, many of the government initiated STP projects do not succeed, not because of insufficient investment but because of poor management skills and not having the right governance structure. Many governments do not pay proper attention to the management master plan compared to the attention given to hardware infrastructure building. In this paper, relevant literature was reviewed to identify the success factors of STPs. In addition, the cases of Korean innovation clusters were reviewed and evaluated, including Daedeok Innopolis and several technoparks. The experience of Korea shows that the right management practice and right governance structure are critical success factors for STP development.

WB-03.3 [R] Can Research Influence Policy?

Pei-Chun Lee; SPRU, The University of Sussex, United Kingdom
Hsin-Ning Su; Science and Technology Policy Research Center, Taiwan

Science, technology and innovation (STI) policy research comprises heterogeneous set of activities undertaken by a community of diverse actors. The goal of the STI policy community is to conduct research to understand effective policies for STI and then contribute to the public or private sector. In order to understand whether or not STI policy research contributes to the benefit of government, this study selects the UK as the case study and investigates ways of linking STI policy research to government policy practice and proposes a three-step linking mechanism, i.e. 1) knowledge creation, 2) dissemination of research and 3) making contribution to policy practice. The mechanism facilitates linking from STI policy research communities to policy practice. Each of the steps is empirically analyzed by comparing two famous cases, UK Technology Foresight and Technopolis, in order to identify determinants of STI policy research communities making contributions to government policy practice.

WB-05 Emerging Technologies-1

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Broadway-3

Chair(s) Kumiko Miyazaki; Tokyo Institute of Technology

WB-05.1 [R] Conceptualization and Operationalization of Emerging Technologies: A Complementing Approach

Alfonso Avila-Robinson; Tokyo Institute of Technology, Japan
Kumiko Miyazaki; Tokyo Institute of Technology, Japan

In view of the ever-increasing recurrence and severity of renewal waves coupled with the need to understand the processes of (socio) technological gestation, over the years, the construct emerging technologies are slowly filling in an important theoretical niche within the technology and innovation management (TIM) field, namely that of the very early stages of (socio) technological evolution. In particular, this paper attempts to contribute to the extant literature on the conceptualization and operationalization of emerging technologies along three dimensions: a) an approach to discern the differences and similarities of emerging technologies vis-a-vis other conceptual constructs through the analysis of the network

of co-citations of cited references, b) an extended characterization of the construct emerging technologies, and c) the operationalization of such conceptualization focused on the knowledge base of emerging technologies for the particular case of MEMS/NEMS (Micro-/Nano ElectroMechanical Systems). With that purpose in mind, a heavy use of a series of bibliometric approaches and network analyses based on publications was made.

WB-05.2 [R] A Technology Audit: The State of Human Language Technologies (HLT) R&D in South Africa

Aditi Sharma Grover; CSIR & University of Pretoria, South Africa
Gerhard B van Huyssteen; North-West University, South Africa
Marthinus W Pretorius; University of Pretoria, South Africa

South Africa (SA) epitomizes diversity, with the nation boasting 11 official languages. The field of human language technology (HLT) can play a vital role in bridging the digital divide and thus has been recognized as a priority area by the South African government. The current HLT landscape in South Africa consists mostly of a relatively young R&D community, the government and a handful of private sector companies. A key challenge is the perceived fragmentation of the R&D activities in this domain; there is insufficient codified knowledge about the currently available South African HLT language resources (LRs) and applications. In this paper we describe a national technology audit we undertook for the South African HLT landscape. The objective of our study was to codify and present a profile of HLT components in the South African HLT R&D environment. We present the technology audit process employed, which involved various data collection methods such as expert consultations, workshops and questionnaires. We also describe the complementary approaches used to analyze the status of the landscape, such as the detailed inventories of HLTs available across South Africa's 11 languages and a series of indexes developed to provide a landscape overview. We found that a number of HLT LRs are available in South Africa but are of a very basic and exploratory nature, and there are many areas that lie fallow in terms of the variety, number, technology maturity and accessibility of HLT items.

WB-05.3 [A] Knowledge Mapping Method for Emerging Technology Detection and Examination on Interdisciplinary Research Fields

Heyoung Yang; Korea Institute of S&T Evaluation and Planning, Korea, South

The search for emerging technologies is important for science and technology policy. Early detection of emerging technologies makes R&D strategy setting possible. In this study, we suggest the methodology to search emerging technologies by the knowledge mapping method. We examine the highly cited papers in SCOPUS publication DB from 2005 to 2009. We also examine the characteristics of some interdisciplinary research fields by knowledge mapping. Knowledge mapping is conducted based on social network analysis method using keywords in publications. We expect this knowledge mapping will be a helpful methodology for emerging technology detection and examination of interdisciplinary research fields.

WB-06 Technology Marketing-1

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Broadway-4

Chair(s) Robert Harmon; Portland State University

WB-06.1 [A] Communicating the Potential of New Technologies: Technology Marketing by Target-Group Adapted Physical Technology Demonstrators

Michael Schmitz; Fraunhofer IAO, Germany
Antonino Ardilio; Fraunhofer IAO, Germany

The development of new technologies is generally a time-consuming and cost-intensive task. Therefore, the future exploitation of a new technology has to be considered in the early stages of the development of said technology with the aim of managing the development path in relation to market potential. In particular technology-driven /-developing companies and applied research institutes aspire to a commercialization of potential new technologies which have been identified also sometimes within future fields outside of their core businesses. Unfortunately, new technologies come with an increased complexity and

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thus also with an increasing need for explanation of their functionality and capabilities. The way to communicate technological advantages to a potential target group is today primarily focused on single applications by the use of specific prototypes or other concepts of demonstration related to an explicit product. But even the development of application-specific prototypes in each future field is very cost-intensive and not practicable in all industries. This paper introduces an approach to convey the functional profile of the new technology into potential target groups across different application fields by the focus on customer delight. The aim is to draw attention to a particular function of the technology by highlighting of a set of relevant attributes which lead to customer satisfaction. Using a case study, the development of a target group specific, function orientated and physically perceptible technology demonstrator will be discussed, and the approach on how to communicate technological advantages without any industry specific pre-product focus will be demonstrated.

WB-06.2 [R] Agent Based Simulation of Carbon Emissions Trading Market

*Fatma Mutlu; TOBB University of Economics and Technology, Turkey
Nilgun Fescioglu-Unver; TOBB University of Economics and Technology, Turkey*

In this research we examine the supply and demand relationship in a carbon emissions trading market by using agent based system simulation. An agent based system is a computational system that simulates the behaviors of autonomous agents. We model different nations which take place in the carbon trading market as autonomous agents, and these agents act as buyers or sellers in the same trading market. A market-director agent directs the trading between the buyer and seller agents and enables a market mechanism with dynamic auction. This study analyzes the changes in carbon price and the total carbon reduction amount under several different demand scenarios. We used JADE (Java Based Agent Development Environment) as the simulation environment.

WB-06.3 [R] A Comparative Analysis of Digital Innovation Ecosystems

*Bharat Rao; NYU Poly, United States
Bertha Jimenez; NYU Poly, United States*

In this paper, we examine how Apple and Google have used third-party led innovation to create viable digital innovation ecosystems, through the App Store and the Android platform respectively. In many ways, this is similar to the strategy adopted in an earlier decade by NTT DoCoMo in the mobile communications space, through the iMode platform. We compare and contrast alternative approaches to accelerating innovation through such an ecosystem oriented approach, and outline some key lessons for content providers, developers, and other stakeholders. We analyze these developments through the theories of network externalities, social network communication theory, and related frameworks in strategic management.

WB-07 Technology Management in Biotechnology Industry-2

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Forum Suite

Chair(s) Takao Fujiwara; Toyohashi University of Technology

WB-07.1 [R] Internationalization Practices of High-Tech Firms: The Case of Turkish Biotech Companies

*Dilek Cetindamar; Sabanci University, Turkey
Berna Beyhan; Middle East Technical University, Turkey
Hayri Kozanoglu; Marmara University, Turkey*

As one of the generic technologies, biotechnology (BT) has generated a highly internationalized set of industries across the globe. Even though BT firms are small in advanced countries, they are part of a highly international innovation system through the complex networks they generate. But how is the case for BT firms in developing countries? Are they becoming a part of global value chains similar to their counterparts in advanced countries? Are they introducing innovations that connect them into global markets? This paper is an attempt to find out a plausible set of answers to these questions for BT firms operating in an emerging economy, Turkey. This attempt might highlight some important policy issues regarding the

creation and development of new technologies in developing countries.

WB-07.2 [R] Using Balanced Scorecard and System Dynamics in Exploring the Performance of Taiwan's Pharmaceutical Industry

*Ting-Lin Lee; National University of Kaohsiung, Taiwan
Shu-Chuan Yang; National University of Kaohsiung, Taiwan*

Balanced scorecard (BSC) is one of the popular performance measure methods which can translate the strategy into a set of clear performance indicators and manage the status of implementing the strategy. However, BSC is unable to simulate the complicated environment, to be short of the strategy's simulation, and is usually used on the business unit level; only a few studies have ever tried to use it on other levels. Therefore, this study tries to combine BSC with SD to explore Taiwan's pharmaceutical industry that had formulated the relevant strategy of development since 1982, but its contribution is still limited at present. Based on four perspectives of BSC, the related indicators will be conducted. Mainly, the purpose of this study is to investigate and build the complex system of Taiwan's pharmaceutical industry, and amend the policy direction to enhance its performance. This paper not only integrates the research tools and gives suggestions to improve the performance of this industry, but also assists Taiwan in becoming a R&D, manufacturing and operations center in the Asia-Pacific region in the future.

WB-08 Technology Planning

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Council Suite

Chair(s) Cory Hallam; University of Texas at San Antonio

WB-08.1 [R] Smart Transition Management to Smarten Energy Systems in a Deeply Uncertain World

Erik Pruyt; Delft University of Technology, Netherlands

Enormous future energy technology/system investments are needed to replace old technologies, and expand/prepare systems for future needs. Moreover, smarter technologies/systems are needed, but in this ever more complex, interconnected, and uncertain world, smarter energy policy/decision-making is certainly needed too. After all, current energy policy/decision-making still mainly ignores complexity and uncertainty. This paper illustrates two model-based approaches for supporting policy/decision-making for complex and uncertain issues. First, Serious Model-Based Gaming and Bounce-Casting allows policy/decision-makers to experience dynamic complexity and deep uncertainty, and helps them feel the need for embracing them in policy/decision-making. Before having experienced different plausible futures, almost all high-level energy grid managers and highly-educated students that played our energy network investment or energy technology investment games applied inappropriate strategies, and failed, which prepared them for thinking outside their old/reactive/predictive modes while bounce-casting. Second, Exploratory System Dynamics Modeling and Analysis allows exploring and analyzing millions of plausible (uncertain) dynamic system behaviors and testing the robustness of policies/strategies/decisions. This second approach is illustrated using corresponding energy network and energy technology investment models. Using both approaches may be even more useful: most subjects only acknowledged the need to take uncertainty and dynamic complexity seriously into account after having participated in an experience-oriented session.

WB-08.2 [A] Technology Strategic Planning for an R&D Institute: The Case of Taiwan Textile Research Institute

*Gwo-Tsuen Jou; Taiwan Textile Research Institute, Taiwan
Benjamin J. C. Yuan; National Chiao Tung University, Taiwan*

Taiwan Textile Research Institute (TTRI), a government-sponsored R&D institute in Taiwan, has conducted a technology strategic planning in September, 2009, to find its future R&D directions from 2011 to 2015. The Cross-SWOT methodology, which is analogous to TOWS, developed by IBM was adopted to arrange a series of educational seminars and brainstorming workshops for the TTRI managing team. The information of global op-

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portunities and threats (O/T) was collected from five aspects, i.e. social, technological, economic, ecological, and political (STEEP), whereas, the strengths and weaknesses (S/W) were identified by comparing TTRI with its three benchmarking organizations based on organizational capabilities. Twenty four people from TTRIs managing team were divided into 4 groups. Each group consisted of three functional departmental heads and three project leaders. Through rational discussions and debates by providing proven data or reasons, five strategic areas (SA) and strategies were pinpointed: two attack strategies by maximizing TTRI strengths and external opportunities; two market creation strategies by utilizing TTRI strengths to avoid the threats; one transformation strategy by improving TTRI weaknesses to grab external opportunities.

WB-08.3 [R] Prioritizing Factors of Organizational Innovation: The Application of Grey Relational Analysis

Chien-Chiang Lin; Shih Hsin University, Taiwan
Wen-Wei Hung; Shih Hsin University, Taiwan

In the past, corporations could remain competent as long as they possessed valuable resources such as land, capital, or labor forces; however, facing globalization, technological advancement, and the pressure of being environmentally friendly, corporations need to cultivate innovative capabilities to stay competitive in the fast-changing business arena. It is well recognized that successful innovation could improve operational performance; however, most companies cannot successfully enjoy the fruit of innovation and obtain premium returns. Investing in innovative activities is always a risky decision; therefore, it is of great importance for corporations to figure out possible factors that might jeopardize the process of being innovative. The current study reviewed previous articles concerning factors that might affect the result of innovative activities; questionnaires were then formulated and distributed to practitioners in the financial industry in Taiwan to understand their opinions about the priority of those factors. Grey relational analysis was utilized to analyze the data provided by those practitioners to uncover the relative importance of different factors. A comparison of the priority of these factors among practitioners at different organizational levels was conducted to figure out similarities as well as differences among those practitioners. The results of the current study could be a reference and a starting point for practitioners to invest precious resources for pursuing excellence.

WB-09 New Product Development-1

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Directors Suite

Chair(s) O. P. Sharma, G. B. Pant Govt. Engineering College

WB-09.1 [R] Importance of Industrial Design and Its Collaboration Process with Engineering Design

Kazuhide Sugiyama; Canon Electronics, Japan
Hiroshi Osada; Tokyo Institute of Technology, Japan

While there are industrial design (ID) centric living commodities like home electric appliances on one hand and engineering design (ED) centric industrial goods like automotive parts on the other, engineering designer (EDer) and industrial designer (IDer) collaborate in the development process of office equipment such as copier and facsimile that is positioned in between two types of products. Meanwhile, management strategy that put ID in its core is recognized as being more important lately, as technology and price alone cannot differentiate office products. However, the extent of contribution of ID to its increased importance in the office equipment is not clarified. The needs to shorten the time to develop a product are increasing, so in order to perform the proper management in the collaboration process between ED and ID, the past process and present statuses are to be analyzed. This research verifies how ID has increased its importance on creating customer values of office equipment by interviews of the designers of ID and ED, respectively. And this research also clarifies the extent of contribution of EDer and IDer on creating value of office equipment such as copier, printer and document scanner that requires the collaboration between ID and ED.

WB-09.2 [R] The Effects of Customer Orientation on the Product Performance of Technological Innovations: A Comparison between SMEs and Large Companies

Kai-Ingo Voigt; University of Erlangen-Nürnberg, Germany
Christian V Baccarella; University of Erlangen-Nürnberg, Germany
Andreas Wassmus; University of Erlangen-Nürnberg, Germany
Oliver Meißner; University of Erlangen-Nürnberg, Germany

In a high-technology marketplace, consumers and producers simultaneously face a high uncertainty concerning these technological advanced products. Companies have to anticipate customer demands way in advance to satisfy the market adequately. Among other things, this is the reason why there are failure rates among technological innovations as high as 65 percent when these high-tech products are launched into the market. One way to counteract this fatal development is to integrate customers as early as possible in the product development process in order to achieve an optimal fit between market needs and technological possibilities. This study analyzes customer orientation as part of market-orientation within the biggest German industrial markets. In this context, 108 managers were asked to answer a survey in order to find out about their companies' customer-integration methods, which are used to let the users be part of the product development process. In addition, this paper analyzes the relationship between customer orientation, new product performance and company size. Surprisingly, correlation analysis shows that there is no significant relationship between customer orientation and new product performance in the group of small- and medium-sized enterprises (SMEs), whereas this correlation is highly significant in the group of big companies. This fact leads to the conclusion that customer orientation is not as important for SMEs as it is for larger companies. SMEs are by definition closer to the market. They have fewer customers and have to work side by side with them. In contrast, large companies have to compensate for their lack of closeness by using customer-orientation methods to boost product performance and, therefore, business performance. On the other side, SMEs have to concentrate on other ways to enhance their firm performance.

WB-09.3 [R] Abstract Model of LPD: A Critical Review of the Lean Product Development Concept

Liv Marcks von Würtemberg; Royal Institute of Technology, Sweden
Joakim Lilliesköld; Royal Institute of Technology, Sweden
Evelina Ericsson; Royal Institute of Technology, Sweden

Many companies that have been working successfully with Lean for some years are now implementing lean product development (LPD). Even though much has been written about the LPD concept, a main body of the LPD literature is promoting the concept without objections. Accordingly, criticism towards LPD tends to be undividedly negative to the concept. The contribution of the present study is twofold. First, it summarizes previous research about the LPD concept in a model in accordance with enterprise architecture terminology. This section also includes a structured breakdown of tools mentioned in LPD literature. Second, the paper discusses both advantages and disadvantages with the concept, aiming to present an unfeigned picture of LPD, using examples from Swedish industries. Thereby, the study clarifies which expectations that a company starting to implement LPD reasonably can have on the concept.

WB-09.4 [A] Capability Life Cycle Tool to Integrate External Innovation

Ron Khormaei; Lensbaby, LLC; PSU-ETM, United States

With increased globalization of all businesses, the reliance on external partners has become a key factor in all aspect of the business. The increased reliance on external alliances for continuous innovation is the new frontier for growing business in a hyper-competitive environment. Lessons learned from decades of logistics and production outsourcing could effectively be combined with the separate line of research into business lifecycles to provide business managers practical tools to more fully leverage internal and external resources available to them. In this work, an alliance-based product development lifecycle (A-PDL) model is proposed, combining the existing internal models for product development with

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tools in building effective alliances. Understanding rewards and benefits for all parties and aligning longer term development directions with the external strategic partners are key foundations for a successful development partnership. Areas like IP protection, pricing, and schedule can be turned from negative pitfalls into glues that tie partners even closer. A clear comprehensive set of metrics established early can align expectations between technical staff and business managers to avoid unnecessary frictions through the life of the collaboration. This proposed overall framework is evaluated based on real industry examples, and a set of future work is outlined.

WB-10 Technology Forecasting-1

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Studio Suite

Chair(s) Scott W Cunningham; Delft University of Technology

WB-10.1 [R] Exploring the Impacts of the Interactions between Lifecycles and Other Dynamics that Influence the Development of Technology-Based Industries

Michele Routley; University of Cambridge, United Kingdom

Robert Phaal; University of Cambridge, United Kingdom

David Probert; University of Cambridge, United Kingdom

To address future uncertainty within strategy and innovation, managers extrapolate past patterns and trends into the future. Several disciplines make use of lifecycles, often with a linear sequence of identified phases, to make predictions and address likely uncertainties. Often the aggregation of several cycles is then interpreted as a new cycle, such as product lifecycles into an industry lifecycle. However, frequently different lifecycle term technology, product, industry are used interchangeably and without clear definition. Within the interdisciplinary context of technology management, this juxtaposition of dynamics can create confusion, rather than clarification. This paper explores some typical dynamics associated with technology-based industries, using illustrative examples from the automotive industry. A wide range of dimensions are seen to influence the path of a technology-based industry, and stakeholders need to consider the likely causality and synchronicity of these. Some curves can simply present the aggregation of components; other dynamics incur time lags, rather than being superimposed, but still have a significant impact. To optimize alignment of the important dimensions within any development, and for future strategy decisions, understanding these interactions will be critical.

WB-10.2 [R] On the Technology Forecasting Using Data Envelopment Analysis (TFDEA)

Alptekin Durmusoglu; University of Gaziantep, Turkey

Türkey Dereli; University of Gaziantep, Turkey

There have been numerous technology forecasting methods which are competing in terms of the quality of forecasts that has been produced. Technology forecasting using data envelopment analysis (TFDEA) has also been a competing technique with its introductions in PICMET '01. After its introduction, TFDEA has been a favorable approach to obtain technological predictions. Positive results have been provided through a number of applications ranging from the first flights of aircrafts/jets to wireless technologies. A dogfight between TFDEA and some other forecasting methods has ended with the victory of TFDEA so far. The fundamental handicap of original TFDEA has been the employment of a constant rate of change which is obtained from historical data. However, accepting a constant change rate is somehow contrasting with the nature of technological change and may fail to forecast properly in the long-run. In this respect, this paper focuses on milestone articles employing TFDEA and proposes better forecasts through some modifications on the existing handicap of the TFDEA approach. The current works on the wireless technology forecast of CDMA technology has yielded promising results.

WB-10.3 [R] Resolving the Issue of Multiple Optima in Technology Forecasting using Data Envelopment Analysis

Timothy R Anderson; PICMET, United States

Lane Inman; Aisle Five, Inc., United States

Technology forecasting with data envelopment analysis (TFDEA) offers an effective means to determine technological capability over time without the burden of fixed a-priori weighting schemas. However, a commonly used extension of TFDEA can create situations where there are multiple feasible solutions. This can introduce challenges in reproducing results for practitioners. This paper resolves this issue by extending TFDEA in a manner consistent with common data envelopment methodologies to ensure consistent and reproducible results. The extension is then demonstrated numerically using a well-known data set of fighter jet technology forecasting in which this issue of multiple optima was first observed.

WB-11 Environmental Issues-2

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Parlor-C

Chair(s) Kelly R Cowan; Portland State University

WB-11.1 [R] A Systems Approach to Analysing Environmental Decisions in the Automotive Industry

Breno Nunes; Aston Business School, United Kingdom

Frederick Betz; Portland State University, United States

David Bennett; University of South Australia, Australia

Duncan Shaw; Aston Business School, United Kingdom

This paper uses systems thinking to analyze environmental decisions and their interactions in the automotive industry. The motivation comes from the findings of an environmental decision making investigation undertaken from 2006 to 2010. Using data from 10 case companies, five principles of systems thinking theory were identified in a visual pattern analysis to undertake the assessment by considering the soft systems around the automotive industry and some other manufacturing companies (e.g. roots definition, interdependence, feedback loops, hierarchy, etc). The results show the implications of environmental policies and decisions relating to production processes and automobile design. For example, incremental choices for better fuel economy can lead to more intensive use of cars resulting in very little overall pollution reduction. Likewise, the introduction of disruptive technologies for zero emissions vehicles (e.g. electric cars and fuel cell initiatives) requires wider systems adjustment in order to accept the radical innovations involved, which comprises a feedback loop of no infrastructure, no zero-emissions cars, no infrastructure. Finally, the analysis of systems also suggests that within the automotive industry, the wider environment will ultimately have a significant impact on the drivers, the selection of options, and even the performance of environmental decisions.

WB-11.2 [R] A New Environmental Index for Evaluating Degree of Development of Low-Carbon Society

Yasuyuki Suzuki; Japan Techno-Economics Society/Ritsumeikan Univ., Japan

Environmental indexes such as carbon footprint, ecological footprint or eco-efficiency have been seriously considered in several global organizations such as the World Business Council for Sustainable Development and the World Commission on Environment and Development. In addition, environmental evaluation methods such as Life Cycle Assessment or Leadership in Energy and Environmental Design Green Building Rating System have also been considered. However, it is hard to say if the standards for evaluating the progress of a given action towards the realization of a low carbon society have been precisely established. In this paper, a standard index for evaluating actions is suggested for the realization of a low carbon society and a concrete evaluation method.

WB-12 New Venture Management

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Parlor-B

Chair(s) Thorsten T Teichert; University of Hamburg

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WB-12.1 [R] Economic Impact Assessment of the Government-led Venture Firm Certification Policy

Chae Yoon Lim; Science and Technology Policy Institute, Korea, South
Youngkyu Kim; Seoul National University, Korea, South
Jeong-Dong Lee; Seoul National University, Korea, South

In this paper, we evaluate the additional effect of the government-led venture firm certification policy. Starting from 2000, more than 10,000 technology-intensive small- and medium-sized companies and new venture firms were created through the development and implementation of policies focused on supporting venture firms. The core of this policy is the certification of qualified firms by the government, who is a credible third party. By gaining the public recognition of these certified venture firms in the economy and in the society, the government wants to resolve the issue of information mismatch in the market. By reviewing the impact of venture policies of the past 10 years on the dynamic performance such as the survival and the growth of venture firms, this study attempts to define the new direction of venture policies. Methodologically, to deal with the selectivity issue, we adopt a propensity score matching estimator. According to the results of the analysis, certification of venture firms tends to affect the growth of venture firms, especially during the early years of venture firms. As small- and medium-sized companies accumulate their experience and generate various information that can draw market credibility, the impact of venture firm certification on the growth of venture firms tends to reduce.

WB-12.2 [A] Persuasion Methods of Fund Raising for New Ventures

Wen-Chun Tsai; Chung Yuan Christian University, Taiwan
Yu-Ching Lai; Lughwa University of Science and Technology, Taiwan

In the research on entrepreneurship theory, acquiring resources is a critical issue that affects the survival of a new venture. The typical resource a new venture has is the professional capabilities of the entrepreneur, but other resources are very limited, especially the shortage of entrepreneurial funds. Venture capital is one of the important sources for new ventures to obtain funding. Existing literature has explored the evaluation criteria used by venture capitalist (VCs). However, in terms of practical operations, new ventures still need to carefully narrate and organize presentation content to earn VCs favorable impression during direct interaction between them and VCs. This study adopts the qualitative research approach and analyzes the oral presentation content of a new venture, Company A, in the setting of a pitch meeting. Through detailed content analysis, we conclude with several important persuasion methods and develop a framework of persuasion content for new ventures. The main contribution of this study is to provide an initial persuasion guide for fundraising from a practical perspective.

WB-12.3 [R] Structure and Agency in Academic Spin-off Creation: A Retrospective Roadmapping Approach to Characterize Entrepreneurs' Mental Models

Jonathan S Freitas; Federal University of Minas Gerais, Brazil
Carlos A Gonçalves; Federal University of Minas Gerais, Brazil
Lin C Cheng; Federal University of Minas Gerais, Brazil
Reynaldo M Muniz; Federal University of Minas Gerais, Brazil

Strategic management research (SMR) has provided some of the main theoretical foundations to the study of academic spin-offs (ASO). The influence of SMR's rooted conception of firm performance as resulting from the structure-and-agency duality is clear on this nascent field's specialized literature. Nevertheless, specific characteristics of agency, of structure and of their interplay during ASO creation are still under-researched though potentially relevant to understand and explain spin-offs' heterogeneity. Thus, this paper presents a cognitive approach used to characterize this duality in the spin-off process, as perceived by entrepreneurs. Reported findings are the first results of the initial case study of an ongoing multiple-case comparative research. This initial investigation is being conducted in an embryonic Brazilian high-technology academic spin-off focused on developing products from carbon nanotubes to various industrial applications, such as fuel cells, supercapacitors and batteries. A hybrid version of cognitive mapping and retrospective roadmapping

was used as a data collection and modeling technique. Envisaging theory development, evidence-based propositions were derived from results in order to be further investigated by future works. Though partial, these initial findings and the way they were obtained may already represent a theoretical and methodological contribution to the advancement of this technology management research strand.

WB-13 Technical Organizations and Workforce-1

Wednesday, 8/3/2011, 10:30 - 12:00

Room: Parlor-A

Chair(s) Nathasit Gerdri; Mahidol University

WB-13.1 [R] The Expanded Public Works Infrastructure Programme: Lessons Learned in Transferring Technical Skills to Unskilled Workers within the South African Construction Industry

Etienne van der Linde; University of Pretoria, South Africa
Marie-Louise Barry; University of Pretoria, South Africa

Unemployment in South Africa has increased to an alarming 24.3 percent of the job seeking population. As a result, the socio-economic well-being of South Africa is severely threatened due to activities such as social exclusion and crime. Consequently, the fight against unemployment has rarely been more pressing and the Expanded Public Works Programme (EPWP) was established as a skills transfer program to support employment creation. The success and continuous improvement of skills transfer programs are of the utmost importance, and this study sets out to determine failure factors and recommendations from similar past projects to update outdated literature. The relationships between the EPWP stakeholders are investigated within this study. The investigation focuses on the success of the program, recurring failure factors and possible remedies from the perspective of the contractors, consultants and project managers involved. The investigation commences with a literature survey followed by a focus group. Results obtained are then validated through a survey. The investigation suggests that the EPWP achieves most of its stated program objectives, but fails to support employment creation. The investigation indicates that there are indeed recurring failure factors. A list of these failure factors and possible remedies are suggested for future skills transfer projects.

WB-13.2 [R] Key Factors Influencing the Development of Innovative Organizations: An Exploratory Study

Norawat Chutivongse; Mahidol University, Thailand
Nathasit Gerdri; Mahidol University, Thailand

This paper investigates the key factors influencing the development of innovative organization in Thailand. The multi-industry survey is conducted for the management level of the firms registered in the Stock Exchange of Thailand (SET). The survey is used to explore the organizational characteristics and measure the level of innovativeness in each organization. The result of factor analysis concludes five factors pertaining to the development of an innovative organization in Thailand. Those factors are: 1) organizational culture 2) human resource development 3) support on physical aspects, 4) commitment from management team and 5) vision and goal sharing. From the regression analysis, it indicates that among the five factors, commitment from management team is the most influential factor.

WB-13.3 [R] Modeling Counterparts for the Three Artifacts of Software Process Assessment

Timo Mäkinen; Tampere University of Technology, Finland
Timo K Varkoi; Tampere University of Technology, Finland

Process assessment is a means to characterize a software process for improvements. The main result of an assessment is a set process profiles, which describes the gap between the assessed processes and reference processes. Based on assessment results and an organization's business goals, target process profiles are proposed, often with supplementary suggestions, regarding how the target profiles can be implemented in practice. We discuss an approach to enhance the three steps of an assessment with process models. In the

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approach the actual process profiles are illustrated by a descriptive process model, which is constructed by mapping the elements of the reference processes to the organization's process elements. The modeling counterpart for the target process profile is a generic target process model, where elements from the reference processes are added to the descriptive process model to fill the gap between the target and actual process profiles. To demonstrate the suggestions for improvements, the reference process elements in the generic target process model are replaced by elements from practical software engineering and management methods. A process library consisting of both the reference processes and a set of practical methods supports the construction of the process models.

WD-01 Innovation Management-7

Wednesday, 8/3/2011, 14:00 - 15:30

Room: Pavilion East

Chair(s) Christopher J Rowe; Vanderbilt University

WD-01.1 [R] Automotive Component Manufacturing Innovation in Developing Countries' Association with Education

Jasper L Steyn; University of Pretoria, South Africa

Gideon A Liebenberg; University of Pretoria, South Africa

Kai-Ying Chan; University of Pretoria, South Africa

The associations between employee qualification levels and innovation and between innovation and training as innovation activity were investigated for automotive component manufacturers in a developing country context, using a survey conducted in South Africa, India and China. Automotive component manufacturers in developing countries have to innovate to remain competitive amidst intense global competition in the sector. It was proposed that employee qualification levels and training were factors contributing to innovation in such companies. The survey questionnaire was developed as part of an international study on innovation-based strategies for globalization in automotive component manufacturing in developing countries. The respondent companies were profiled in terms of their levels of employee qualifications and training and their innovation. Statistical analysis of the South Africa data yielded associations between some categories of education and some types of innovation and between some levels of training as innovation activity and some types of innovation. The associations were consistent with dependency characteristics in the supply chain relationships. Comparison with education and innovation data from China and India showed marked lower education levels in South Africa despite similar levels of innovation activity. This is ascribed to structural differences between the national sectors and the nature of the innovation activity reported.

WD-01.2 [R] Organisational Factors that Enhance Creativity through R&D

Teams: Analysis of Spanish Industrial Firms

Guillermo Pérez-Bustamante; University of Oviedo, Spain

Ricardo Arroyo; University Monterrey, Mexico

The actual competitive environment demands that firm innovate continuously due to the market life of a product becoming shorter. New products or processes arise from knowledge in action. Creativity is becoming a key intangible competitive factor for firms because it is necessarily part of the development of ideas, results, products or solutions, as well as a useful tool to solve problems or tasks. It is a human activity, a capability that becomes an organizational intangible capability through innovation which should be adequately managed. In this paper we analyze the influence of several organizational factors that enhance creativity and, therefore, innovativeness and productivity. The factors taken into consideration are communication, team working, leadership, technologies available, cooperative agreements, motivation and HRM training and development. Through a survey sample of 121 Spanish industrial firms in the creative high-tech and medium-tech sector with a minimum of 50 employees in 2009, we analyze how the interaction of the previously mentioned organizational factors has a positive incidence on business results and innovative activity, measured through both patented and non-patented innovations. This sample represents 8.5 percent of the total population.

WD-01.3 [R] Innovation in Indonesia: The Types, the Necessary Factors, and the National Innovation System

Leo Aldianto; Institute Technology Bandung (ITB), Indonesia

Endang S Agustini; Institute Technology Bandung (ITB), Indonesia

Bayuningrat Hardjakaprabon; Institute Technology Bandung (ITB), Indonesia

Indonesia has recognized the importance of innovation as to strengthen national and regional economic competitiveness in the globalization era. Therefore, Indonesia is actively looking for a National Innovation System, which will be able to promote more innovation. However, Indonesia faces the challenge to build a system that answers the local environment and conditions. Consequently, efforts are needed to put the innovation activities in Indonesia on paper. This literature study is a start to identify the kinds of innovation that are done in companies in Indonesia. In addition, the innovation in universities and other public research institutions will also be collected. The third effort will look for programs, which are initiated by the government in the area of fostering innovation. The results will form a better basis to design a National Innovation System which is suitable for Indonesian characteristics. This paper aims to show the types of innovation that are necessary and important for Indonesian companies and to describe the factors needed to support those innovations. Subsequently, this research will give an important stepping stone to build a working Indonesian National Innovation System.

WD-02 Technology Management in Energy Industry-7

Wednesday, 8/3/2011, 14:00 - 15:30

Room: Pavilion West

Chair(s) Judith Estep; Portland State University

WD-02.1 [R] Giant Oil Companies and Dynamic Capabilities Approach

Yasser Alizadeh Miab; Portland State University, United States

After a century of huge demand for products and inexpensive crude oil supply for the giant oil companies (Royal Dutch Shell, ExxonMobil, BP, Chevron, TOTAL), the environment started becoming more and more challenging for them. The role of some factors will be more and more critical in the future of the oil industry as a whole and in these companies as well. Oil will not be as cheap anymore, and GHG emission has become the biggest question oil companies have to address. Also, the increasing rate of fuel consumption worldwide is a motivation to develop the new technologies deploying alternative sources of energies. If the nightmare of Peak Oil in this decade is added to the problem, the situation will be very challenging for these big companies. So could it be the beginning of an alarming situation for these big companies, after about a century of convenience for them? What strategy and path should they choose? In this paper the strategies of these companies, referred to as the Giants, facing these challenges in the past, present and future will be analyzed using the dynamic capability theory as the framework. Shell and Total seems to be more proactive in reconfiguring new capabilities, and ExxonMobil and Chevron see the environment as less challenging and seem to be more conservative. BP has a position somewhere in the middle. The roots for such a strategic perspective will be briefly described.

WD-02.2 [R] Electric Vehicles: Struggles in Creating a Market

Abraham Sin Oih Yu; Universidade de São Paulo, Brazil

Lydia Correia da Silva; University of São Paulo, Brazil

Cristina L Chu; Universidade de São Paulo, Brazil

Paulo T Nascimento; University of Sao Paulo, Brazil

Alceu Salles Camargo Júnior; University of São Paulo, Brazil

Toyota is the pioneer in the hybrid electric vehicle, and today almost all major car assemblers produce hybrid cars. Now, several auto manufacturers are preparing for the commercial launches of battery powered electric vehicles in 2011. Another battle for dominance in electric car market has started. However, the development of technologies for electric cars has a very long history and presently there is a huge diversity of technological solutions in development. In order to understand the evolution of electric vehicles, we carried out two related case studies. In the first case study, we analyze the experience of General Motors in

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the last 40 years in developing electric vehicles. Our focuses are on the objectives of each development, technologies employed and external factors that stimulated each effort. The results show that in the first 20 years the main objective is to explore different technologies. The intention to launch a commercial electric vehicle only appears in the last 20 years. In the second case study, we analyze propulsion technologies and product architectures electric vehicles announced, in the last few years, by established auto manufacturers and new entrants. The results show that innovations in product architecture can provide a niche market for electric vehicles.

WD-02.3 [A] Oil Corporations Biofuels Technology Strategies: Disregard and Alliances

Paulo T Nascimento; University of Sao Paulo, Brazil
Ana Paula Lopes; Universidade de São Paulo, Brazil
Daniela Santana Marzagão; Universidade de São Paulo, Brazil
Abraham Sin Oih Yu; Universidade de São Paulo, Brazil
Alceu Salles Camargo Jr; Universidade de São Paulo, Brazil
Lydia Lopes Correia Silva; Universidade de São Paulo, Brazil

The high oil prices, the need to reduce greenhouse gas emissions, and the search for energy security have increased the interest in the research, exploration and production of alternatives to fossil fuels. This paper discusses some key aspects of technological strategies of four large oil companies that invested in biofuel from 2005 to 2010. The results show that some of these companies, which for many years worked independently on their R&D projects, looked for strategic alliances in their biofuel projects. These partnerships were targeted at joint research and production, R&D, acquisitions and joint ventures. Part of the investments in R&D was directed towards ethanol and biodiesel, but with different approaches in each company. Petrobras invested to increase the ethanol production capacity, while BP had most of its projects aiming at breakthroughs in biodiesel. Shell focused on R&D of second generation biofuels, and Exxon invested particularly in the production of biodiesel. Except by Petrobras and maybe Shell, oil companies do not seem very concerned with a biofuels threat to their businesses in the short or medium term.

WD-02.4 [R] Aligning Technology Licensing Strategies and Business Competitiveness: A Case of Photovoltaic Technology Firms in India

Kailash Sekhar P.; Indian Institute of Technology Bombay, India
Raj Mohan M; Indian Institute of Technology Bombay, India
Sumit Sharma; Indian Institute of Technology Bombay, India
Udayarajan V; Indian Institute of Technology Bombay, India
Mukundan R.; Indian Institute of Technology Bombay, India
Karuna Jain; Indian Institute of Technology Bombay, India
Kiran Momaya; Indian Institute of Technology Bombay, India

Geographical position has been identified in strategic management literature as a critical asset. The sub-continental geographical position of India provides it with an estimated annual solar insolation (a measure of solar radiation energy received on a given surface area in a given time) of about 5 trillion kWh. Licensing from international technology leaders has been the traditional technology strategy of Indian firms and expand on it through process innovation in alignment with development needs. The business value thus created is dependent on the efficient use of licensed technological capabilities. In this paper, a framework capturing the relationship between the licensor's technological capabilities and licensee's existing position in the industry value chain is proposed. This helps us to understand how a licensee firm leverages the available technological strength towards its value chain expansion. We measure the value chain competencies through industry value chain and financial analysis and technological competencies through the patent proximity method. In this work, we apply this framework to study the efficiency of the Indian photovoltaic technology firms in leveraging their licensing strategy. Such a framework allows firms to identify and align their technology strategies to the potential growth opportunities, be it vertical or horizontal.

WD-03 Science and Technology Policy-2
Wednesday, 8/3/2011, 14:00 - 15:30

Room: Broadway-1

Chair(s) Claudia Brunner; University of Liechtenstein

WD-03.1 [R] An Experimental Policy-Making Project for Promoting Emerging Industries: A Case Study of the 'Vision 2025 Project' in Taiwan

Yi-Wen Chen; Tamkang University, Taiwan
Sheng-Chih Chen; National ChengChi University, Taiwan

As industrial policies play an increasingly critical role in national competitiveness, many nations follow the concept of traditional strategic planning, by external environmental scanning, forecasting and the competitive advantage analysis. After deciding promising industries, with export-led, the government then invests sufficient resources to support related actors to foster the development of several domains. Consider, for example, Taiwan is well positioned to expand in the development of information and communication technologies (ICT) industries as the planning model. However, when faced with a rapidly changing and unpredictable future, this model may result in resource rigidity. For promoting emerging industries, many researchers state that the demand-driven innovation policy is more effective because the new technological structure could be generated by constructing an innovative ecosystem which as a way of setting vision more explicit, has concerned with interactions among different players. As a result, this study introduces the project of Vision 2025, which is the first experimental policy formulation project in Taiwan. We identify four major stages for vision-setting, and further propose that digital storytelling should be adopted at the beginning to provide an interaction schema.

WD-03.2 [R] ESM-based National Innovation Policy Influence Analysis with the Panel Data of Listed Chinese Electronic SMEs

Ling Wang; China University of Political Science and Law, China
Zhan-Hong Zhu; China University of Political Science and Law, China
Jie Wang; Stanford University, United States

This study uses the event study methodology (ESM) to evaluate the influence of national innovation policies on small and medium size enterprises (SMEs) in high-tech industries. Originally, ESM was employed in the field of finance, and gradually it has been applied in many other fields to study the impact of a specific issue or event on organizational behaviors, including impact identification and impact duration for an event. ESM is regarded as an effective empirical research method because of its specific procedures for identifying event consequences and its explicit statistical analysis for investigating relationships among complex factors. Traditionally, most ESM applications are single event applications. However, innovation policies must be treated as a series of multiple relevant events at irregular time intervals. Employing ESM to study the impacts of innovation policies has not been attempted until now. In this paper, we use ESM to investigate the impacts of one specific type of Chinese innovation policy, namely, the tax preference policies for enterprises during the period of 2006-2010. For this study, tax preference policies have been treated as input variables and the market values of electronic companies listed on Shenzhen SMEs Stock Exchange have been selected as output variables. ESM-based empirical analysis shows that these policies have substantial impacts on enterprise performance. More specifically, the upward trends of the average abnormal return and cumulative average abnormal returns are both significant for companies taking advantage of these policies, and as a result, the enactment of the policies demonstrates a positive influence on the market values of the relevant companies. This study indicates that enforcing tax preference policies is an effective approach for the Chinese government to promote the development of high-tech industries by influencing innovation behaviors of individual companies.

WD-03.3 [R] Under Iron Fist Control: The Technology Progress of Chinese Construction Industry

Shisong Jiang; Zhejiang University, China
Limin Gong; Zhejiang University, China

In transition economies, the impact of governments on industrial technology progress is far-reaching. However, most studies merely focus on the government's positive effects,

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while ignoring the potential negative effects. This article aims to fill this gap. By applying an analytical framework of complex systems industry to Chinese construction industry, we develop a cause map to explain why the technology progress of Chinese construction industry is so slow. The map identifies three kinds of roles played by government in hindering the technology progress of the construction industry: governments as clients, as regulators and as administrators of industry associations and professional bodies. We further argue that these roles lead to a series of consequences: the separation between design and construction, lagging behind in the introduction of general contracting, high uncertainty in innovation approval and low motivation of construction firms to innovate, and ultimately, the slow technology progress of the industry.

WD-04 Strategic Management of Technology-2

Wednesday, 8/3/2011, 14:00 - 15:30

Room: Broadway-2

Chair(s) Antonino Ardilio; Fraunhofer Institute for Industrial Engineering

WD-04.1 [A] Strategic Planning for Research Institutions: An Approach towards Identifying the Most Attractive Path for Technology Development

Antonino Ardilio; Fraunhofer Institute for Industrial Engineering, Germany

Joachim Warschat; Fraunhofer Institute for Industrial Engineering, Germany

The transfer of technology knowledge from research institutions into industry is a quite demanding task and often to be condemned to fail. In many cases, the main reason is the inability of research institutions in capturing market needs and market requirements as well as considering them in their future technology development. But how to outfit research institutions with the rules of the free market economy and how to transform the identified actual and future market needs into the strategic planning for the technology? This paper introduces a method for the identification of actual and future market needs and their transformation into the strategic technology planning by using graph theoretical approaches.

WD-04.2 [R] Business Method Patents as a Challenge for Technology Management in the Logistics Industry: The Case of Intelligent Sensor Networks

Helen Niemann; University of Bremen, Germany

Martin G Moehrl; Universitaet Bremen, Germany

Lothar Walter; University of Bremen, Germany

Business method patents represent a new challenge for technology management in the logistics industry. (i) They open up possibilities of patenting to companies which have never before utilized this kind of property right. Hence, the technology management is challenged to implement a patent strategy that stands up to patent-driven changes in the competitive environment. (ii) Patents of this kind usually rely on inventions driven by business-processes rather than technical aspects. And this poses a challenge to the technology management of companies in which patenting is a commonly used instrument for defending primarily technical solutions. To provide some case-related insight into how technology management in the logistics industry deals with the abovementioned challenges, we analyze the utilization of such patents in the context of intelligent sensor networks. We develop several hypotheses and propose a workflow-based approach for patent analysis, comprising (i) the systematic analysis of a business process, and (ii) the use of functions of this business process for the identification of relevant patent documents. One major finding is that only relatively few logistics companies are active in this patent field. Accordingly, and this can be regarded as an alarming signal which might apply to other industries as well as technology management in the analyzed field, a major opportunity is missing to gain advantages and to secure the freedom to operate.

WD-04.3 [R] Towards a Process Framework for Assessing the Potential Value of Technologies

David Probert; University of Cambridge, United Kingdom

Clare Farrukh; University of Cambridge, United Kingdom

Marcel Disse; University of Cambridge, United Kingdom

Robert Phaal; University of Cambridge, United Kingdom

Current technology valuation literature predominantly focuses on explaining the merits and implications of specific tools, but little research is available that takes a contextual process perspective. The aim of this paper is to further develop an integrative process framework that supports the structuring of the valuation process and the more systematic choice of valuation techniques for new technologies. The paper starts by reviewing key concepts and issues that surround the assessment of technology investments and the evidence of what companies use. Many factors need to be brought into the appraisal process, reflecting technological and market conditions. While there is usually a desire to reduce the assessment to a financial value, it is also widely appreciated that there is long term strategic value in securing a technological lead, which is difficult, or even inappropriate, to assess in purely financial terms. The multiple factors involved in the evaluation activity are identified with respect to the changing nature of the appraisal process as the technology matures and the implications for associated tools. The result of the literature review is a process framework which provides a conceptual basis for integrating valuation techniques. This framework is then populated with the results of industrial case studies on technology valuation to allow conclusions on its applicability to be drawn.

WD-04.4 [R] Strategic Innovation Decisions and Innovation Capabilities: Decision and Action Models

José J Aguilar Zambrano; National University of Colombia at Medellin, Colombia

Jorge Robledo Velásquez; National University of Colombia at Medellin, Colombia

In this paper we argue that the innovation strategic decisions cannot be considered firm capabilities. The recurrent character of capabilities would halt the change processes of the firm. Thus, a gap is identified between the strategic decisions of the firm and its strategic capabilities. The firm strategic capabilities are the set of actions that the organization actually carries out in order to implement innovation management as a basis for searching firm's strategic objectives. Moreover, an innovation strategic decision expresses what a company wants to be capable to do. What the firm wants to be capable to do is a programmed sequence of decisions of allocation of internal and conditional coherence of those capabilities which are designed to meet the innovations objectives of an organization. Strategic decisions relate to the existing capabilities of the firm and the results of these decisions are determined by the relationship between different types of capabilities. The model presented in this paper shows the decisions that the firm should consider to drive innovation from a set of innovation capabilities arising from the literature. From this perspective, a set of specific criteria is identified for decision making about building innovation capabilities for the company.

WD-05 Emerging Technologies-2

Wednesday, 8/3/2011, 14:00 - 15:30

Room: Broadway-3

Chair(s) Thomas G Lechler; Stevens Institute of Technology

WD-05.1 [R] Bibliometric Discovery of Innovation and Commercialization Pathways in Nanotechnology

Scott W. Cunningham; Delft University of Technology, Netherlands

Alan Porter; Search Technology / Georgia Tech, United States

Nanotechnology is widely seen as the source of the next industrial revolution. As a result, national governments have made short-term stimulus investments in nanoscience in the hopes of achieving long-lasting economic and societal benefits. Despite the stimulus funding, the scale and timing of new nanotechnology innovations are far from clear. Part of the problem stems from the fact that nanoscience is often far upstream of potential societal application. But the issue is more complex given the evidently complex coupling of science, technology and commercialization. Nanotechnology itself is often presented as an exemplar of a new class of strategic research initiatives. In this paper we characterize nanotechnology commercialization in a well-recognized database of nanotechnology research. Contribu-

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tions are made to the ongoing effort to define, and refine, the relevant knowledge base for nano-science and technology. The effort further requires novel techniques for isolating commercially relevant research in large databases of science.

WD-05.2 [A] Visualization of Patents Belonging to Composite Materials Used in Electronics

Türkyay Dereli; University of Gaziantep, Turkey
Alptekin Durmusoglu; University of Gaziantep, Turkey

There have been numerous methods which are used to identify evolution of technologies. One prestigious of those methods has been analyzing the patent information using the visualization methods. An esteemed visualization method was also presented by Kim et al. in 2008, where some drawbacks of existing methods have been handled rigorously. In their proposed visualization method, collected keywords from the patents of a target technology field are clustered by k-means algorithm. With the clustering results, a semantic network of keywords is formed. Subsequently, a patent map is built up using the patents. Since composite materials have been key materials for microelectronic devices ranging from computers, sensors and micro-electromechanical systems (MEMS), nano-MEMS to bio-MEMS, in this study, patents which belong to the composite materials used in electronics have been analyzed. For this purpose, the European Patent Office's database esp@cenet has been searched for the technologies covering the composite materials that can be used in electronics. Sixty nine granted patents have been retrieved and analyzed using Kim et al.'s (2008) visualization method. The keyword existence matrix defined through the proposed methodology has been formed using the keyword list of Composites Science and Technology which is a well-respected journal in the related domain.

WD-05.3 [A] Technology Platforms Based on Roadmaps in the Field of Nanotechnology

Anatoliy Afanasiev; Russian Corporation of Nanotechnologies, Russia
Yuri Khakhanov; Russian Corporation of Nanotechnologies, Russia

Russian State Corporation of Nanotechnologies (RUSNANO) was established in 2007. Its main activity is selection and co-investing money of the Federal budget in nanotechnology projects that have high potential for commercial or social benefit. RUSNANO develops roadmaps to support the investment process involved in the activities of leading Russian scientific and business institutes. Roadmaps allow defining priorities for investments, R&D, staff training, infrastructure advance, and choosing the most promising technologies. More than 500 experts are actively participating in developing the roadmaps. Six roadmaps are being developed at RUSNANO: nuclear energy, aircraft industry, spacecraft industry, medicine and pharmacy, water cleaning and purification, and energy saving. Four roadmaps have already been developed and approved by RUSNANO Board of Management (2010): light emitting diodes, halocarbon composite fibers, catalysts for petrochemical industry, and effective cutting instruments. Currently, several technology platforms based on technology roadmaps are being developed. Technology platforms will become a communication media and support creation of several product lines based on one common technology. The presentation highlights the RUSNANO strategic planning approach by an example of one of the technology platforms based on technology roadmaps.

WD-06 Cultural Issues-2

Wednesday, 8/3/2011, 14:00 - 15:30

Room: Broadway-4

Chair(s) David Kruger; Tshwane University of Technology

WD-06.1 [A] Building Trust in a Diversified Society: The Essence of Leadership

Kemlall Ramdass; University of Johannesburg, South Africa
David Kruger; Tshwane University of Technology, South Africa

When leaders inspire people, there is a solid self-confidence, but not one that walls others out. Leaders are about whom they are and can open themselves to others. They are in sync

with their inner self through disciplines that keep them honest, knowing, and open. The first and most demanding obligation of a leader is the Socratic injunction to know thyself. The accelerating pace of the commercialization of science, technology and academia, together with the diminishing traditional value system, has led to the abuse of authority and power of leaders in all spheres of life. It is difficult find a leader that portrays the qualities of leadership in society. Trust appears to be a primary attribute associated with leadership. Part of the leader's task has been, and continues to be, working with people to find and solve problems, but whether leaders gain access to the knowledge and creative thinking they need to solve problems depends on how much people trust them. When followers trust a leader, they are willing to be vulnerable to the leader's actions. Honesty consistently ranks at the top of most people's list of characteristics they admire in their leaders. In times of change and instability, people turn to personal relationships for guidance, and the quality of these relationships is largely determined by the level of trust. This paper outlines the challenges facing the leadership of South African academia through quantitative and qualitative survey and outlines the qualities that need to be instilled in a diversified society through the restoration of trust.

WD-06.2 [R] Image Behaviour in International Engineering Projects: A Comparison between South African and Chinese Groups

Dongdong Jiang; University of Pretoria, South Africa
Leon Pretorius; University of Pretoria, South Africa

There are many factors outside the control of management that could determine the success or failure of a project, especially when managing international development projects. For an international project manager, understanding key concepts in cross-cultural management and project management is the basic requirement in the era of globalization. Face/image is a critical cultural issue for achieving project success in the Chinese community because it represents prestige, respect, dignity and social status. In this article, the Face/image behavior of Chinese project managers is assessed in a cultural context and the Face/image behavior effect on five project activities (project communication, negotiation, conflict resolution, contract process and team building) is studied. This is an empirical study using surveys to explore the cultural differences between Chinese and South African engineering project managers on Face/image behavior and the effects on the five project management activities. Although the questionnaire is designed based on Chinese culture, South African project managers have also been asked to participate in order to illustrate the differences where applicable. The results showed that are significant differences between the Chinese and South African project managers in their Face/image behavior on three project activities. However, during the project contract process and project team building, there seems to be no significant difference between their Face/image behaviors.

WD-06.3 [R] The Importance of a Common Language in the Requirements Defining Process

Kari K Lilja; Tampere University of Technology, Finland
Ari Linden; Tampere University of Technology, Finland
Hannu Jaakkola; Tampere University of Technology, Finland

During the requirements defining process, the customer describes the desires, wishes, needs and requirements he has concerning the new data system. These may vary from general good-to-be aspects to lists of detailed functions that the system should be able to do. The supplier in his turn tries to translate the free-form verbal descriptions into the form of exact use cases, terms and clauses. In a survey conducted in 2010, many of the participants mentioned a lack of common language and the misunderstandings caused by this as one of the biggest issues caused by different organization cultures. Not only does each sector have its own jargon, but also inside the sector there may be organizations where words are used in a way that is not common in the sector. Language and the terms used are part of identity. For a company or organization it can be a means to create a sense of solidarity and togetherness. A common jargon inside the organization can also transfer traditions and tacit knowledge from one generation to another. Unless the participants have time to live inside the opposite organization and learn the language, there are only a few

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tools to use to avoid misunderstandings: project glossaries, checklists, audit meetings, and listening to the members of the opposite organization.

WD-06.4 [R] The Differences between the Supplier's and the Customer's Equality Policies and Their Impact on the Result of an IT Project

*Kari K Lilja; Tampere University of Technology, Finland
Hannu Jaakkola; Tampere University of Technology, Finland*

The aim of this study was to find out whether the earlier finding that differences in the customer's and the supplier's equality policies might have an impact on the success of an ERP project could be confirmed simply by comparing answers to three elementary questions with the success of the project. Twenty five different projects over a period of 22 years were analyzed using the information available in notes and protocols. The available results of an earlier survey were used for 14 of the projects, and, finally, further information was collected by an e-mail interview with three elementary questions. Although a masculine business culture seems to influence the success of an ERP project, the official and easy-to-see signs of a company's equality policies, like equal occupations for both men and women, the number of women within management and within the members of board of directors, did not give such reliable signals to be used alone to warn of potential risks in projects. However, when combined with questions concerning the real atmosphere in organizations, these signs might be useful in evaluating the risks.

WD-07 Knowledge Management-2 Wednesday, 8/3/2011, 14:00 - 15:30

Room: Forum Suite

Chair(s) Nazmun Nahar; University of Jyväskylä

WD-07.1 [R] Who is the DFSS Black Belt?: An Investigation of the Competence Profile of the Role in Theory and Practice

*Evelina Ericsson; Royal Institute of Technology, Sweden
Liv Marcks von Würtemberg; Royal Institute of Technology, Sweden
Joakim Lilliesköld; Royal Institute of Technology, Sweden*

Many companies of today use development concepts like Design for Six Sigma (DFSS) to structure and improve their development processes. An important part of the DFSS concept is the role of structure and the role of the Black Belt in particular. That the DFSS Black Belts are given sufficient help to meet the high expectations of the role is therefore of crucial importance for the success of a DFSS initiative. When implementing DFSS in an organization, a training investment related to the role structure is recommended by the literature. Little is said, however, about how this training should be carried out in practice. Interviews on a multinational Swedish organization recognized for its extensive DFSS and Six Sigma program shows that some requirements on DFSS Black Belt competences are not covered by existing literature or by the official descriptions of DFSS Black Belt certification requirements. The purpose of the article is to investigate the gap between what companies wish their DFSS Black Belts to know and what support research and DFSS training companies can offer in this matter. The paper also provides a competence profile for a DFSS Black Belt. The competence profile summarizes recommended knowledge for a DFSS Black Belt derived from literature, DFSS certification companies and practical experience from the case study company.

WD-07.2 [R] Positive or Negative? Patent Institution Impact on the Knowledge Creation of Computer Software

Shann-Bin Chang; Ling Tung University, Taiwan

Knowledge exists in many different types and patterns in our world, intellectual property is one of the carriers of knowledge, and the patent is the most useful document of the intellectual property. From the beginning, the nature of the patent institution is to accelerate the speed of innovation and invention; it should be true for the patents of computer software as well. But another voiced by advocates of open source and free software (OSS) is extremely opposed to patenting computer software. They are concerned that the software patent acts

as a barrier to technology improvement. This study discusses the role of patents in the formulation and creation of computer software knowledge, and in what direction the patent institution affects computer software R&D. This study interviewed three software engineers to discuss the software patents issue and proposes four propositions. Finally, this study concludes with two suggestions and future study recommendations.

WD-07.3 [R] Research on Knowledge Diffusion in Disciplines Based on Actor Network Theory

*Feifei Wu; Beijing University of Technology, China
Xin Li; Beijing University of Technology, China
Lu-Cheng Huang; Beijing University of Technology, China*

This paper analysis the multi-factor mechanism of knowledge diffusion in different disciplines based on Actor Network Theory. The purpose is to promote emerging knowledge diffusion in many different areas.

WD-08 Technology Management in Service Industry-1 Wednesday, 8/3/2011, 14:00 - 15:30

Room: Council Suite

Chair(s) Richard V Weeks; University of Pretoria

WD-08.1 [R] Availability and Sustainability As Value Elements in Assessing Customer Value of an Industrial Service

*Ville Ojanen; Lappeenranta University of Technology, Finland
Toni Ahonen; VTT Technical Research Centre of Finland, Finland
Markku Reunanen; VTT Technical Research Centre of Finland, Finland*

For a customer of industrial maintenance solution providers, purchasing a solution is an asset management option that needs to be justified, preferably in economic terms, e.g. by achieving energy savings or increasing the availability of a production system. Therefore, the value elements of maintenance service solutions should be identified and quantified wherever possible. When assessing customer value, one needs to focus on the assumed benefits on the basis of which the value proposition is made, on the value elements based on the capabilities and know-how of the service provider, and the features of the services provided. Even though research on customer value in product, service and solution management has clearly increased in recent years, a common understanding of comprehensive value assessment in industrial maintenance management is as yet incomplete, and new methods to promote value element identification and value assessment need to be studied. In our paper, we present an integrated methodology for assessing the value of a maintenance services. The approach combines a qualitative Service Quality Function Deployment (SQFD) method with a quantitative Service Business Value Assessment (SBVA). The utilization of the multi-method approach is illustrated by means of a real-world case study of a value-based assessment of the maintenance service portfolio of a provider of industrial solutions.

WD-08.2 [R] Technological Changes Underlying Innovation in Services: The Case of Healthcare and Financial Service Sector in Japan and Korea

*Hyejin Lee; Tokyo Institute of Technology, Japan
Kumiko Miyazaki; Tokyo institute of technology, Japan*

Industry develops new technologies and adopts them to improve products and processes. Since IT has an important effect on products, processes, and organizations, it brought changes to the overall industry. Service sectors improve processes or develop new business models using IT, such as ERP, electronic data processing method. This paper's purpose is to identify which technologies drive innovation in the service sector by focusing on the healthcare services and financial service, by analyzing the interaction between technologies and services. Through analyzing patents, we attempt to figure out which service sector develops technology actively, or adopts passively from suppliers. Korean and Japanese patent data are collected and analyzed by network analysis and quantitative analysis. We try to measure the technological activities by searching keywords of service, and by compari-

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son of IPC subclasses. The results of the analysis give an understanding of technological activities and technology networking in the service sector. Implications and future research directions for sustainable growth in the service industry are discussed at the end.

WD-08.3 [R] A Conceptual Framework for Managing Service Desks: A South African Perspective

Awie C Leonard; University of Pretoria, South Africa
Ian Strydom; University of Pretoria, South Africa

The service desk is a critical part of any organization, as it is in most cases the first point of contact with customers. Therefore, it holds the key to the organization's profitability and survival. A qualitative interpretive research approach was followed in order to get a better understanding of the real problems staff and users of such desks experience. Field studies as well as short case studies are used to analyze the typical service desks in the South African business environment with special emphasis on the role of information technology. Based on previous research in the field of relationship management, the article presents a conceptual framework to improve the current situation. The framework explains the elements to be focused on to ensure that staff manning such desks are effective in their operations. The framework also serves as a tool for managers to support them in their decision making regarding the operations of such desks.

WD-09 New Product Development-2

Wednesday, 8/3/2011, 14:00 - 15:30

Room: Directors Suite

Chair(s) Terry R Schumacher; Rose-Hulman Institute of Technology

WD-09.1 [R] An Investigation on Fast and Frugal Model for New Project Screening

Fatima M Albar; Portland State University, United States
Antonie J Jetter; Portland State University, United States

Research in psychology is increasingly interested in decision-makers' use of heuristics or rules of thumb because they have accuracies close to more complex decision rules and seem particularly useful in difficult decision-making contexts when uncertainty is high and speed is of the essence. One particularly difficult decision setting is the fuzzy front-end of new product development because a large number of product ideas need to be screened to identify the few that should be developed further. This process is currently poorly supported through decision tools and mainly occurs on the basis of managerial gut-feel. This study explores managerial gut-feel by investigating the performance of simple project screening heuristics: two so-called Fast and Frugal (F&F) heuristics, Take-the-Best and Tallying, and three logistic regression models with 3, 5, and 7 decision variables are used to screen a simulated dataset of 52 projects. Each model's ability to recognize successful projects and correctly reject poor projects is compared against the predictions of the other decision models. The results show that the logistic regression models outperform the F&F models in overall prediction quality and in the ability to predict project failure. However, the Tallying model has an overall performance that is close to the logistic regression, and both F&F models are better at predicting success than the logistic regression model. Furthermore, the regression model that only takes three decision variables into consideration performs better than the regression models with five and all seven decision variables. This indicates that a simple "less is more" decision approach, which is the basis of managerial gut-feel, can be a successful strategy for front-end screening.

WD-09.2 [A] An Effective Transition from the 'Fuzzy Front End' to Product

Mark H Tennant; Xerox Corporation, United States
Paul R Newman; Portland State University, United States

New product development (NPD) is traditionally viewed as stages which are joined by a series of transitions. While in many cases the overall process is thought of as seamless, in fact, when actually executed, it becomes a series of throw-it-over-the-wall hand-offs. The result can be catastrophic, often resulting in losing critical tacit data, in turn resulting

in the need to redesign, to cycle back, duplication of effort, schedule slip and needless added expense. This talk discusses the approach taken by the Direct Marketing Group, a division of Xerox Corporation, to address these issues. The key elements in our approach are the holistic involvement of the three key functional elements manufacturing, marketing and engineering throughout the process, along with a dynamic compositional change in the characteristics of the NPD team as the product progresses from a so-called lightweight to a more heavyweight later on. The results are shorter decision paths, more predictable schedules, improved time to market, fewer resets, and reduced NRE: Time = Money, resulting in the capability to do more with less.

WD-09.3 [R] Model of Abstraction Levels for the Early Phases of Product Development

Lena Wagner; GSaME, Germany

Through turbulent environments companies are forced to develop faster, better products, which cannot afford to fail the market. Within these environments every phase of the product development process must be optimized to support the companies' survival. Focusing on the early phases of the product development process, companies can use this special phase to improve their products and time-to-market. Based on a former systematic literature review, where the impact of diversity on the early phases of product development was explored, this study analyzes what impact different abstraction levels have for the development process used in diverse teams. A model with three different abstraction levels is proposed and the impact of the abstraction level on solving strategies is determined. This paper shows what companies can gain, if they use diverse teams and work with the right abstraction level, regarding the developed model. To identify the right opportunity and develop products faster, companies can use the model of abstraction levels and recommendations given in this paper.

WD-09.4 [A] A New Material Product Development Management Tool: A Case Study of High-Purity Ammonia Gas Business Development for White LED Application

Hideki Hayashida; Osaka University, Japan
Hiroshi Katayama-Yoshida; Osaka University, Japan

In this paper, we present a more comprehensive view of technology management tool for new business development (NBD). The object of this tool is a comprehensive set of tools to help the development teams as they drive their NBD projects. This tool covers the full range of NBD tasks, from concept product design through to full market launch for NBD. This tool describes a comprehensive set of six independent aspects dynamics as NBD tasks as a function of time. A key element of this tool is to keep well balanced all the aspects at the same time during ongoing project. With regard to the effectiveness of this tool model, we applied this to high-purity ammonia gas for Blue Light-Emitting Diode (Blue LED) production used for white LED application business as a case study. From this case study, we could follow up new business development dynamics as a function of time by this tool. Regular hexahedron tool model including designed business model consist of proper design of a dynamic relationship of each element: 1) intellectual assets (Internal and external), 2) cost, 3) resource (people/organization), 4) financing, 5) customer as market with customer value. 6) We could extract "Design as a key word of this tool to integrate other aspect. As a result, we find that it is effective to achieve customer values through full range of NDB process as the material product development management tool that regular hexahedron model is sufficient balanced connection to each independent elements.

WD-10 Technology Roadmapping-2

Wednesday, 8/3/2011, 14:00 - 15:30

Room: Studio Suite

Chair(s) Frederick Betz; Portland State University

WD-10.1 [A] Variable Capacity Heat Pump Program Development Roadmap

Ibrahim Iskin; Portland State University, United States

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Jack M Callahan; Bonneville Power Administration, United States
Mira K Vowles; Bonneville Power Administration, United States
Ryan T Fedie; Bonneville Power Administration, United States

This roadmap effort is a continuum of the Northwest Energy Efficiency Technology Roadmap pursued by Bonneville Power Administration with the engagement of 20 collaborating organizations. The purpose of this roadmap is to explore adoption barriers and drivers associated with diffusion of variable capacity heat pump technology, and facilitate a regional consortium towards developing an energy efficiency program in the case of the Northwest, U.S. Adoption barriers are grouped under the names contractor, designer and owner related unfamiliarity; difficulty in measuring development and incentive programs; lack of information in savings and measures of cost effectiveness; and conflicting incentives and codes/standards. Policy tools and necessary action items have been developed to address specified issues by considering relevant regional efforts in an attempt to prevent duplicating the efforts already underway elsewhere.

WD-10.2 [A] Technology Roadmap Process Implementation at Arcelik

Melda Polat; Arcelik A.S., Turkey
Iffet Iyigun Meydanli; Arcelik A.S., Turkey

Long-term planning is vital for creating business plans and forming the strategies of a company. Roadmapping is an indispensable part of a long-term planning process in terms of responding to threats and keeping the competitive advantage. Arcelik is a household appliances manufacturer which develops its products and technologies. At Arcelik, the roadmapping process covers planning for market, product and technology. In roadmaps, market and business drivers, new product platforms and features, emerging and critical current technologies are identified. Roadmaps are prepared for a five-year period with participation from different departments. Besides, technology roadmaps are studied in detail for each defined technology area. After the technology roadmaps are finalized, critical technologies captured from different technology roadmaps are consolidated under the related product roadmap. Market-product-technology roadmaps are approved and reviewed each year. After the approval, project charters and budgets are prepared. We will be discussing both the lessons learned and the strengths and weaknesses of the process, particularly the technology roadmaps.

WD-10.3 [R] A Policy Dimension Required for Technology Roadmapping: Learning from the Development of Emerging Wind Energy Industry in China

Yuan Zhou; Tsinghua University, China
Guannan Xu; Tsinghua University, China
Tim Minshall; University of Cambridge, United Kingdom
Jun Su; Tsinghua University, China
Fang Zhang; Tsinghua University, China
Qiang Zhi; Tsinghua University, China

Innovation policies play an important role throughout the development process of emerging industries. However, existing policy studies view the process as a black box and fail to understand the policy-industry interactions through the process. This paper aims to develop an integrated technology roadmapping tool in order to facilitate the better understanding of policy heterogeneity at the different stages of new energy industries in China. Through the case study of the Chinese wind energy equipment manufacturing industry, this paper elaborates the dynamics between policy and the growth process of the industry. Further, this paper generalizes some Chinese specifics for the policy-industry interactions. As a practical output, this study proposes a policy-technology roadmapping framework that maps policy-market-product-technology interactions in response to the requirement for analyzing and planning the development of new industries in emerging economies (e.g. China). This paper will be of interest to policy makers, strategists, investors, and industrial experts.

WD-11 Technology Management in Education-2

Wednesday, 8/3/2011, 14:00 - 15:30

Room: Parlor-C

Chair(s) William T Flannery; University of Texas at San Antonio

WD-11.1 [R] The Current State and Problems of Educational Management in the Science-Based Technology School (SBTS) of Thailand

Pattanan Nownaisin; King Mongkut's University of Technology Thonburi, Thailand
Nate Hongkraitert; ASEAN Institute for Health Development (AIHD), Thailand
Kuntida Chanchaoren; Kasetsart University, Thailand
Komkrit Chomsuwan; King Mongkut's University of Technology Thonburi, Thailand

Science-Based Technology School (SBTS) is a pilot project which was established under a co-operative agreement between the National Science and Technology Development (NSTDA) and The Vocational Education Commission (VEC) in 2008. The main purpose of the project is to provide information to new inventors or new technologists in order to support the growth of the domestic economy and industries. Project based learning (PBL) and teaching is an approach for classroom activity and is integrated within the basic science curriculum and vocational training for the students in the school. The aim of this paper is to study the current state and existing problems in educational management of the Science-Based Technology School project and provide possible improvements. The teaching and learning process were examined and efficient mechanisms to support and improve academic knowledge for new inventors were considered. Results from this study will be applied to future designs and used to develop the educational management model for the Science-Based Technology School.

WD-11.2 [R] When Academy Meets Industry: A Case Study of Team Teaching between Academic and Industrial Teachers

Wan-Yu Chen; TransWorld University, Taiwan

Due to the rapid change in the world technology and the growth of national economy, it is difficult for the traditional curriculum design in technological and vocational education to meet the industrial demands. There is a growing awareness that the traditional teaching technique cannot meet students' academic needs or their future employment requirements. To enhance the quality of education, the Ministry of Education of the R.O.C. builds a bridge between industry and Technological and Vocational Education institutions for the establishment of partnerships and collaboration projects. Through the industry-academy cooperation, academic and industrial teachers operate common course, students experience more than one teacher in the same classroom. Team teaching can be an effective alternative to the traditional solitary teacher's self-reflection upon what he/she is doing in the classroom. It can enhance both teachers' professional knowledge and students' learning efficiency. The purpose of this study was to investigate the case school teachers and students recognition effects of the operational process of team teaching. A self-developed questionnaire was used to explore the perspective of teachers and students randomly selected from case school in Taiwan. Completed questionnaires from 764 students and 21 teachers formed the basis of our empirical analysis. Based on the findings of this study, recommendations about team teaching were made to the educational authorities and teachers.

WD-11.3 [R] What Factors Affect Academic Performance in an Online Technology Management Bachelor's Program?

Guy H Downs; Eastern Michigan University, United States
Pamela R Becker; Eastern Michigan University, United States

This paper explores the factors that correlate to the length of time it takes an undergraduate student to complete a Technology Management bachelor's program. Three independent variables are identified in this paper: the age of the student, the gender of the student, and the total number of credit hours that the student transferred into the program from other higher education institutions. The dependent variable is binary and reflects whether a student was able to complete their degree within three years of entering the program. A logit model is used to analyze the data. We find that gender had no statistically significant relationship with the odds that a student will graduate within three years, while the age of the student is negatively correlated with the dependent variable, and the total number of transfer credits is positively correlated with the dependent variable. The former is significant

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at the 10 percent level, while the latter is significant at the 5 percent level.

WD-12 PANEL: Meet the Editors

Wednesday, 8/3/2011, 14:00 - 15:30

Room: Parlor-B

Panelist(s) Timothy R Anderson; PICMET

Tugrul U Daim; Portland State University

Toni L Doolen; Oregon State University

Fred Y Phillips; Alliant International University

Meet the editors of the Technology Management related journals. The editors will be discussing the philosophies, criteria, and submission processes of their journals and answer questions from prospective authors.

WD-13 Technology Adoption-2

Wednesday, 8/3/2011, 14:00 - 15:30

Room: Parlor-A

Chair(s) Nathasit Gerd Sri; Mahidol University

WD-13.1 [R] Lessons Learned from IT Adoption in Healthcare Organizations: A Comparative Study

Chonyacha Suebsin; Mahidol University, Thailand

Nathasit Gerd Sri; Mahidol University, Thailand

This paper explores the factors affecting the process of technology adoption in healthcare organizations. To derive the factors and to examine the situation of organizational adoption, we conduct case studies of new technologies' implementation in private hospitals in Thailand through a series of in-depth interviews. The result from this study can be used as a guide for management in organizations planning to adopt new technologies to foresee and handle such issues pertaining to the phenomena effectively.

WD-13.2 [R] Learning Styles and Adopting Facebook Technology

Yu-ching Chen; Chinese Culture University, Taiwan

With the development of technologies, Web 2.0 has become an important issue in learning. With the growing of Web 2.0 technology, online social networking such as Facebook has emerged and become popular. Facebook is considered to be an educational tool since enabling peer feedback, interaction, and learning in a social context. Moreover, preparing appropriate environments for learners with different needs is essential in the academic process. Creating such learning environment will not be possible without understanding students' differences. Kolbs Learning Style Model is one of the commonly used models when investigating students' learning preferences. The study investigates the differences of students' learning outcome and satisfaction in a class using an online social networking tool, Facebook, among different learning styles. Results show that participants in the Converger group performed better than participants with other learning styles. Moreover, the Converger group had a more positive attitude toward Facebook because in their perception, Facebook facilitates their interaction with others and improves content understanding in the class. Suggestions of integrating Facebook into class as well as recommendations for future research are provided.

WE-01 Innovation Management-8

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Pavilion East

Chair(s) Thomas G Lechler; Stevens Institute of Technology

WE-01.1 [R] The Measurement of Innovation Capability and Competence of Game Software Companies through Patent Indicators

Yun Ken; National Yunlin Univ. of Science and Technology, Taiwan

Nai-Yuan Pai; National Yunlin Univ. of Science and Technology, Taiwan

Ta-Sheng Hung; National Yunlin Univ. of Science and Technology, Taiwan

Chih-Hung Wu; National Taichung University of Education, Taiwan

In recent years, innovation has become the pursuing goal of enterprises. Gradually, firms encounter the situation of no innovation, no survival; therefore, innovation is an essential consideration for high-tech industry and RD departments. Innovation is not restricted only to the development of tangible products; however, for game software industry innovation also includes the development and the design of game software products, the introduction of game production management. Innovation has brought a uniqueness for enterprises and this uniqueness could be a significant factor of creating competitive advantage. For game software producers nowadays, maintaining competence by simply developing new game does no longer exist. Firms found out that simply producing new games and enhancing high quality screens are no longer key factors to maintain competence. Only by constant innovation can enterprises increase advantages and raise profits. The patent represents the technology capability type and advantages of an enterprise. Though patent analysis, a firm is able to understand the technical expertise of each company and investigate the technical development track and enterprise arrangement of a specific industry. The more patents firms hold, the greater positive of competence they own. This study is based on a general approved patent indicator, and we take patent application, the location of publication and gain into consideration. With the six patent indicators, including numbered patents, patent growth rate per quarter, cites per patent, current impact index, technology strength and technology life cycle, we evaluate the innovation orientation and competence of each firm.

WE-01.2 [R] An Innovative Model of Blue Ocean Strategy and Niche Marketing in Green Industry: A Case Study of the Smart LED Industry

Kuei-Kuei Lai; National Yunlin Univ. of Science and Technology, Taiwan

Ta-Sheng Hung; National Yunlin Univ. of Science and Technology, Taiwan

Nai-Yuan Pai; National Yunlin Univ. of Science and Technology, Taiwan

Wei-Ting Lin; National Taichung University of Education, Taiwan

Using a developer in the LED corporate market as a research target, this study utilized case study methods to investigate the innovation model and sales strategy of this company. This study found that the subject company used long tail strategy and blue ocean strategy, in combination with niche marketing strategy, to satisfy market demands with the customized smart LED green lighting products. Based on the results of this study, our conclusions are as follows: When a company's brand awareness and economic scale cannot match those of well-known front-line companies in the mainstream market, such a company can use leading technology, R&D, and innovation to produce products that are differentiated from those of large manufacturers. Based on the long tail strategy, small and medium enterprises (SMEs) can utilize the blue ocean strategy to select a niche market according to their unique advantages and develop high-margin products through product customization strategies.

WE-01.3 [R] Identifying the Core/Periphery Technological Positions from Affiliation Networks: The Network Analysis of 2-Mode

Calvin S Weng; Takming University of Science and Technology, Taiwan

The purpose of this paper is to examine the interactions between the focus of R&D and technological areas, and to inquire into the technological network in shaping the technological position from innovative dynamics environment. 2-mode network analysis is employed to explore the question of how R&D activities interact. Our empirical data is from USPTO. We conducted both of network analysis and statistic analysis. We identified some key patents from the network analysis. From the regression analysis, we also found that the impact of centralities is mixed.

WE-01.4 [R] Methodological Tool for Measurement and Assessment of Technological Innovation Capabilities

Jorge Robledo Velásquez; National University of Colombia at Medellín, Colombia

José J Aguilar Zambrano; National University of Colombia at Medellín, Colombia

Juan D Pérez Vélez; Corporación CIDET, Colombia

From the resource-based view of the firm, central importance is given to the resources

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and organizational capabilities required to implement successful competitive strategies. In particular, recent literature points to the technological innovation capabilities as critical for international competitiveness, especially for technology-based companies. However, the concept of innovation capability and, particularly, its measurement, assessment and relationship with business performance, are issues still under discussion. This paper seeks to contribute to this discussion by presenting a methodological tool to identify and classify the variables required to measure and assess the technological innovation capabilities. Conceptually, the proposal rests on three pillars: i) the resource-based view of the firm; ii) the concept of technological innovation capability and its specific constituent capabilities; and iii) a systemic congruence model for organizational assessment of the company. The methodological tool is verified in order to reach conceptual and theoretical consistency, resorting to proposals and results reported in the literature on innovation capabilities. The functional requirements of the tool are studied for its implementation, and its use is illustrated for the case of a web application developed as an assessment tool for technological innovation capabilities in SMEs of the Colombian electricity sector.

WE-02 Technology Management in Energy Industry-8

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Pavilion West

Chair(s) Kai-Ying Chan; University of Pretoria

WE-02.1 [R] Understanding Adoption of Energy Efficiency Technologies: Applying Behavioral Theories of Technology Acceptance & Use to Understand the Case of LED Lighting for Commercial, Residential, and Industr

Kelly R Cowan; Portland State University, United States

Tugrul U Daim; Portland State University, United States

What factors are most significant in understanding adoption behavior for energy efficiency technologies by commercial, residential, and industrial customers? The case of energy efficient lighting technologies is specifically examined. Several types of lighting technologies are compared to indoor LED lighting to determine how the technology meets the needs the various user types. What factors are most significant in motivating technology adoption for such technologies, and preventing subsequent technology disadoption? This is particularly important for energy efficient lighting technologies, as both technology adoption and technology disadoption can be extremely rapid, and ongoing user involvement is often required to recognize full benefits from these technologies. The Unified Theory of Acceptance and Use of Technology (UTAUT) is useful in explaining adoption behavior related to stakeholder expectation and buy-in for the new technologies. UTAUT contains four elements that can be adapted to fit this research: (1) performance expectancy; (2) effort expectancy; (3) social influences; and (4) facilitating conditions. In the case of energy efficient lighting adoption, and LED adoption in particular, performance expectancy and effort expectancy can be related to factors such as future energy price expectancies, actual savings results, and ease of energy savings. Factors involving social influences include perceptions of environmental friendliness among different user groups, and facilitating conditions include policies, incentives, and educational programs to encourage adoption. Some conclusions are then drawn regarding adoption factors for emerging energy efficient lighting technologies.

WE-02.2 [R] A Comprehensive Assessment of Solar Photovoltaic Technologies: Literature Review

Nasir Sheikh; Portland State University, United States

Dundar F Kocaoglu; Portland State University, United States

In the modern era renewable energy generation technologies have broad societal impact and need to be assessed considering multiple perspectives including: social, technological, economic, environmental, and political (STEEP). Assessment of energy technologies is a complex process because it is based on multiple criteria and multiple decision makers, and usually requires analytical models. The purpose of this paper is to review the literature to determine the assessment methods used and the perspectives covered. As a result of the literature analysis a list of perspectives addressed by each research study is compiled

and the gaps in the research are identified. The focus of this paper is solar photovoltaic technologies.

WE-02.3 [R] Multi-criteria Applications in Renewable Energy Analysis: A Literature Review

Rimal Abu Taha; Portland State University, United States

Renewable energies are rising as solutions for sustainable, environmentally friendly and long-term cost-effective sources of energy for the future. Renewable energy decision making can be viewed as a multiple-criteria decision-making problem with correlating criteria and alternatives. Multi-criteria decision analysis (MCDM) offers a flexible tool that is able to handle and bring together a wide range of variables and thus offer useful assistance to the decision maker in mapping out the situation. MCDM methods can be divided into two categories, multi-objective decision making (MODM) and multi-attribute decision making (MADM). A review of 90+ published papers of MCDM analysis in the renewable energy field is presented in this paper. Classifications of application areas as well as methodologies used are summarized. Analysis reveals that AHP is the most used of all MCDM methodologies.

WE-03 Science and Technology Policy-3

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Broadway-1

Chair(s) Won Il Lee; Gyeonggi Institute of S&T Promotion

WE-03.1 [R] Corporate Strategies for a Mature Society

Hiroaki Itakura; Kagawa University, Japan

Japan has become one of the world's most advanced mature societies, and the degree of this maturity is more advanced in local regions than in cities. This paper will present a superindustrialization strategy as an effective model to generate local power by a new combination of internal force and external force.

WE-03.2 [R] What Roles Do STI Policy Research Communities Play in Policy Practice?

Pei-Chun Lee; SPRU, The University of Sussex, United Kingdom

Hsin-Ning Su; Science and Technology Policy Research Center, Taiwan

Policy research on science, technology and innovation (STI) significantly brings not only impact on government policies but also benefits to business and society. The UK, where rigorous STI policy research has been conducted, is selected as the case investigated in this study. This study first attempts to problematize what current STI policy research communities are by evaluating knowledge structure and collaboration structure of the UK STI policy research communities, and then expand on the roles STI policy research communities play in policy practice. Therefore, the relationship between STI policy research communities and policy practice is characterized by several elements that exist between STI policy research communities and government, i.e. institution, interface and interaction. Also, the knowledge created by STI policy research communities is analyzed in order to uncover fundamental bases of communities' contributions to policy practice.

WE-03.3 [R] The Swiss Innovation System: Past - Present - Future

Christian Marx; University of Liechtenstein, Liechtenstein

Claudia Brunner; University of Liechtenstein, Liechtenstein

According to the European Innovation Survey, Switzerland is the innovation leader in Europe. The country thereby surpasses countries such as Germany, Finland or Sweden in most of the relevant indicator areas. In addition to that, Switzerland is also rated as one of the most competitive countries in the world, according to the World Economic Forum and other sources. The paper addresses the question how Switzerland managed to become an innovation leader, what the current situation looks like and how these advantages can be sustained. Method wise, it is the result of an analysis of secondary data from multiple sources combined with a series of interviews and workshops with major stakeholders in

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the innovation field in Switzerland. The results are presented within an adapted national innovation system framework. The most interesting question focuses on the future of the system and how the advantages created can be kept compared to emerging countries such as China or India.

WE-04 Strategic Management of Technology-3

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Broadway-2

Chair(s) Jeffrey Busch; Jeffrey S. Busch PMP Portland State University

WE-04.1 [R] A Philosophical Stance on Developing Industrially Relevant Strategic Technology Management Toolkits

Clive Kerr; University of Cambridge, United Kingdom

Clare Farrukh; University of Cambridge, United Kingdom

Robert Phaal; University of Cambridge, United Kingdom

David Probert; University of Cambridge, United Kingdom

When considering the potential uptake and utilization of technology management tools by industry, it must be recognized that companies face the difficult challenges of selecting, adopting and integrating individual tools into a toolkit that must be implemented within their current organizational processes and systems. This situation is compounded by the lack of sound advice on integrating well-founded individual tools into a robust toolkit that has the necessary degree of flexibility such that they can be tailored for application to specific problems faced by individual organizations. As an initial stepping stone to offering a toolkit with empirically proven utility, this paper provides a conceptual foundation to the development of toolkits by outlining an underlying philosophical position based on observations from multiple research and commercial collaborations with industry. This stance is underpinned by a set of operationalized principles that can offer guidance to organizations when deciding upon the appropriate form, functions and features that should be embodied by any potential tool/toolkit. For example, a key objective of any tool is to aid decision-making, and a core set of powerful, flexible, scalable and modular tools should be sufficient to allow users to generate, explore, shape and implement possible solutions across a wide array of strategic issues. From our philosophical stance, the preferred mode of engagement is facilitated workshops with a participatory process that enables multiple perspectives and structures the conversation through visual representations in order to manage the cognitive load in the collaborative environment. The generic form of the tools should be configurable for the given context and utilized in a lightweight manner based on the premise of start small and iterate fast.

WE-04.2 [R] Scientific and Technological Knowledge Flow and Technological Innovation: Quantitative Approach Using Patent Citation

Hyun-Woo Park; Korea Institute of Sci. and Tech. Information, Korea, South

Sang-Hyuk Suh; Hoseo University, Korea, South

Jong-Taek Lee; Korea Institute of Sci. and Tech. Information, Korea, South

The relationships among science, technology, and industry are very complicated and vary according to time. Thus, it would be almost impossible to combine the three categories in a single model. However, the linking of science, technology, and industry, which are divided according to their respective classification standards, is a starting point from which to understand how science and technology, technology and industry, and further science, technology, and industry are related to each other. This paper examines the methodology for linking science, technology, and industry, and more concretely proposes a model for analyzing science, technology, and industry in an integrated manner. This paper makes an empirical study of trend analysis of technological innovation through a linkage structure of knowledge flow between science, technology, and industry based on the classification linkage and analytic framework using scientific papers and patents. This paper uses citation analysis to analyze knowledge flow such as absorption and utilization of given knowledge, looks at the provision of knowledge to create new knowledge, and examines the use of network analysis to analyze the complicated phenomenon of knowledge flow.

WE-04.3 [R] 3-Level Modeling of Organizations' Technological Capability

Peter Štrukelj; University of Primorska, Slovenia

Slavko Dolinšek; University of Primorska, Slovenia

Based on our research of the largest companies in various production sectors (manufacturing and services) in today's world, we propose a slightly different conceptualization of what technology is and what are the main differences of this conceptualization in relation to other relevant conceptualizations. Then we propose a quite simple conceptualization of an organization's technological capability as a central concept of management of technology. Based upon the above two concepts, we then propose a way for how an organization's technological capability can be modeled at three different levels (purely theoretical, technology sector specific and organization specific). At the first, purely theoretical level of modeling, we explain all the particular models that are included at the first level. Regarding the other two levels, we present only their principle. At the end, we explain in what relation technological capability modeling and technological capability auditing are. Thereupon, we present our idea on what the principle of effective technological capability assessment should be.

WE-04.4 [R] Building Core Technological Competence: Patent Portfolio Perspective

Fang-Pei Su; Shu-Te University, Taiwan

Hui-Chuan Shih; Central Taiwan University of Science and Technology, Taiwan

Patents are generally regarded as important indicators of a firm's technical capabilities. We can interpret a firm's technological development path by analyzing its patent portfolio, and the development path can explore the core technological competence (CTC) of the firm. The topic of building technological competence has attracted considerable attention in recent research by management scholars, but has not sparked much empirical analysis. Time and effort invested in the R&D of building CTC is huge, so we can analyze a patent portfolio to explore the strategic intentions of a firm. Based on the premise of strategic controllability, rather than patent citation data, this study relied on patent family members and claiming of priority patents to examine the patent portfolio of a firm, empirically validating the development of its CTCs. A company may develop a core patent portfolio of its technological competencies by filing patent applications and claiming priority. In addition, our results facilitate the prediction of a firm's future R&D direction from its patent portfolio.

WE-05 Project/Program Management-4

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Broadway-3

Chair(s) Joseph S Nadan; Polytechnic Institute of NYU

WE-05.1 [R] IT Project Success Factors: An Experience Report

Liv Marcks von Würtemberg; Royal Institute of Technology, Sweden

Ulrik Franke; Royal Institute of Technology, Sweden

Robert Lagerström; Royal Institute of Technology, Sweden

Evelina Ericsson; Royal Institute of Technology, Sweden

Joakim Lilliesköld; Royal Institute of Technology, Sweden

Large investments are made annually for development and maintenance of IT systems, systems that support the core business of all types of companies and organizations. Successful outcome of IT projects is therefore a crucial issue for the economy at large, yet a majority of the IT projects carried out today fail when it comes to finishing on time, within budget and with the desired quality. The contribution of this paper is the experience from 28 IT projects. The influence of IT project success factors, derived from previous research, was assessed by the project managers and compared with the projects outcome in terms of time, budget and quality. Though the dataset is too small to allow generalization, the success factors' risk analysis, user involvement and top management support turned out to be of particular importance for the reviewed projects.

WE-05.2 [A] Use of a Production Function to Estimate the Impact of Work Fragmentation on Labor Productivity

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Gerald H Williams, Jr.; Construction Research, Inc., United States

Labor makes up the largest variable cost in building construction and numerous other industrial applications. Fragmentation of labor operations, frequent starts and stops, ramping up and ramping down of a workforce are recognized as having a negative impact on labor productivity. Several methods have been developed to estimate the impact of work fragmentation; however, these methods generally do not work well in projects where severe systemic fragmentation occurs. This paper proposes a theoretical method based on a production function model and tests this model using data from a highly fragmented office building project. The analyses found that the use of a production function can provide evidence of the impact to labor productivity resulting from work fragmentation; however, some statistical methods still appear to provide a more accurate estimate of the actual impact to labor productivity and its cost.

WE-05.3 [R] Critical Success Factors for Instrumentation and Control Engineering Projects in the South African Petrochemical Industry

Francis Busi; University of Pretoria, South Africa

Marie-Louise Barry; University of Pretoria, South Africa

Alice Chan; University of Pretoria, South Africa

Organizations are increasingly delivering their products and services in project specific environments with emphasis placed on the success of the various projects. The instrumentation and control engineering (ICE) department at Sasol Secunda executes a lot of projects for a number of business units at Sasol Synfuels in Secunda. The projects are characterized by maintenance, as well as introduction of new technology where renewals and improvements on existing systems are performed. The research study explores the subject of project success by attempting to identify the critical success factors for ICE projects at Sasol Secunda. It becomes apparent that some characteristics of ICE projects contribute to their perception of success. The research strategy and methodology involved evaluation of literature, informal interviews with some ICE personnel, and a survey through a questionnaire distributed to a population of 110. Various critical success factors were identified, with the following factors considered most critical for ICE project success: appropriately skilled people and trained personnel, understanding of the technology to be implemented by all those involved, proper documentation of decisions including design decisions throughout the project life cycle, and adherence to the change management procedure. The study, however, revealed that currently factors not directly related to the projects (external factors) contribute to success. Various recommendations are made for improvement of ICE project execution, and a focus group study is suggested as necessary for further research.

WE-05.4 [R] Intellectual Productivity Management in Research Projects: Theoretical and Observational Approaches

Ryoichi Kusama; Kyoto University, Japan

Takao Shime; NEC C&C Innovation Research Laboratories, Japan

Shintaro Sengoku; Kyoto University, Japan

Hideki Kawai; NEC C&C Innovation Research Laboratories, Japan

Kazuo Kunieda; NEC C&C Innovation Research Laboratories, Japan

Keiji Yamada; NEC C&C Innovation Research Laboratories, Japan

Chihiro Suematsu; Kyoto University, Japan

Transaction costs are believed to cue an improvement in organizational productivity, but it has not yet been investigated exhaustively. In this study we aim to propose an approach for integrated R&D project management by optimizing transactions, in particular, designing and managing intellectual interactions in off-line meetings. First, an enabling managerial framework was designed from three aspects, i.e., modes of transactions, points of discussion, and transactors. Secondly, a deduction in key activity and performance indicators was demonstrated through ethnographic observations on a series of sampled meetings. Furthermore, a method of transaction diagramming was developed. The collected data was subjected to regression analyses to evaluate the effect of these activity indicators against their performance. It was found that the explicitness in the agreements made during the meetings had a significant positive effect on the overall productivity. Furthermore, we also

found that pre-meeting activities, such as proper agenda setting, appropriate selection of transactors, and the elaborate preparation of meetings, are preferred activities to increase productivity of meetings. These findings show a good correspondence to practical experiences; therefore, we concluded that the proposed approach is well functioning. These trials are oriented to foster an institutional approach for intellectual productivity management, and expected to improve the existing guidelines (e.g. PMBOK) towards open and interdisciplinary value creation project management.

WE-06 Technology Marketing-2

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Broadway-4

Chair(s) Fred Y Phillips; Alliant International University

WE-06.1 [R] Establishing a Quality Culture in Higher Education: A South African Perspective

David Kruger; Tshwane University of Technology, South Africa

Kemlall Ramdass; University of Johannesburg, South Africa

The merger of higher education institutions (HEIs) has created monolithic organizations of inefficiency and ineffectiveness in administrative and academic processes. It was the result of mismatched and outdated processes inherited from merged institutions. The student or customer is deprived of a quality service by the unwieldy processes. The end users of the product from the HEIs are uncertain of the quality of the finished product that would be employable. Employers measure qualified students to certain quality standards. In the past two decades industry realized that to remain competitive, continuous improvement was imperative for success. HEIs are not excluded from competitive pressures. The debate currently raging is whether total quality management (TQM) principles could be applied in HEIs. The methodology of TQM has been utilized in industry over an extended period of time with impressive results. A major obstacle in applying TQM in HEIs is the argument that there are environmental differences between industry and HEIs. The aim of the article is to find common ground between industry and HEIs. The above could be achieved by tailoring the major features and potentialities of basic TQM principles and guidelines to fit HEIs.

WE-06.2 [A] Technology-Based Strategic Marketing Planning for Pi-Pe

Sineenat Tienkouw; National Electronics and Computer Technology, Thailand

Nutvadee Wongtosrad; Chalmers University of Technology, Sweden

Paramet Tanwanont; National Electronics and Computer Technology Center, Thailand

Rattapoom Niraswan; National Electronics and Computer Technology Center, Thailand

Chaimongkon Khlayprapha; National Electronics and Computer Technology Center, Thailand

Pisan Taesuwan; National Electronics and Computer Technology Center, Thailand

Thanate Muangthong; National Electronics and Computer Technology Center, Thailand

Sapa Chanyachatchawan; National Electronics and Computer Technology Center, Thailand

Rattapoom Tuchinda; National Electronics and Computer Technology Center, Thailand

Thatsanee Charoenporn; National Electronics and Computer Technology Center, Thailand

Virach Sornlertlamvanich; National Electronics and Computer Technology, Thailand

In this paper, we present a strategic marketing plan combined with technology-based marketing approach (TBM) and competitive strategy approach for an intelligent travel planning system named Pi-Pe, which uses artificial intelligence to help users easily create their one-day trip schedule with three simple steps: 1) Select the date and time, 2) state the starting location, and 3) pick the destinations. The purpose of the paper is to develop a set of technology-based marketing plans for Pi-Pe in the pursuit of competitive advantage to drive up product value and create sustained commercial advantage.

WE-06.3 [R] Market Segmentation Strategies for Future Telecommunications Services

Naeyang Jeong; ETRI, Korea, South

Youngsang Yoo; ETRI, Korea, South

Tae-Young Heo; Korea Maritime University, Korea, South

SESSIONS

The recent popularity of market segmentation reflects the growing importance of considering a broader set of factors, including consumers' psychology and lifestyles. It has been increasingly regarded as a better alternative for estimating the long-term potential demand, especially for new technology products and services. In this study, we perform a segmentation of the future telecommunication service market using consumers' acceptance toward technology and their general value and lifestyles, as segmentation variables, to reveal characteristics that distinguish different segments. A survey was conducted in June 2006 on 800 consumers aged 15 to 69, residing in Seoul and five other major South Korean cities, through one-on-one interviews. Using the data collected through this survey, we performed a two-phase segmentation analysis. The samples were divided into two sub-groups according to their level of acceptance of new technology. These two sub-groups were further divided each into 5 smaller sub-groups through two rounds of segmentation. The ten sub-groups were then analyzed in their detailed characteristics, including general demographic characteristics, usage patterns in existing telecom services such as mobile service, broadband internet and the status of ownership of a computing or information device and the desire to purchase one. Through these steps, we were able to show that each of these 10 sub-groups responded to telecom services as independent markets. Further, as we grade the willingness of each segment to use future telecom services, we suggest a main target segment of each future telecom service.

WE-07 Knowledge Management-3

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Forum Suite

Chair(s) Kiyoshi Niwa; The University of Tokyo

WE-07.1 [R] The Role of Knowledge Management in Technology Assimilation Processes

Dilek Ozdemir; Istanbul Technical University, Turkey

Seda Tacer; Istanbul Technical University, Turkey

Sitki Gozlu; Istanbul Technical University, Turkey

Technology is one of the most important determining factors for achieving competitiveness. Since companies cannot produce all technologies internally, they need to acquire them from outside providers. Thus, they face some challenges, which are caused due to the gap between provider and receiver. The gap between the parties can originate from technology itself, organizational context, or environmental attributes. Performance of firms in integrating imported technologies into their existing organization is influenced by several factors. One of these factors is knowledge, which is a key asset for all organizations and obtained through technology transfer. The aim of this study is to identify the role of knowledge management in the technology assimilation process by analyzing the data gathered from a survey conducted in 47 Turkish firms. It was discovered that knowledge management activities constitute one of the most important factors in technology assimilation process. Knowledge management factors do not show significant differences in regard to their impact on particular technology assimilation activities. However, when compared, they may play relatively different roles due to the objectives and needs of the case.

WE-07.3 [R] Knowledge Integration in a Product Development Organization Accompanied by M&A: A Case Study of a Precision Device Manufacturer

Nobuhiro Horie; Japan Advanced Institute of Science and Technology, Japan

Yasuo Ikawa; Japan Advanced Institute of Science and Technology, Japan

This case study of a precision device manufacturer discusses knowledge integration in a product development organization after M&A. The goal is to contribute to establishment of a methodology that helps to accomplish the purpose of M&A. The special feature is to analyze establishment of a new product development organization, and its entry into a new market from the standpoint of knowledge management. This study proposes the ARC Model to explain knowledge integration in product development organizations after M&A. Knowledge integration is conducted in three phases, i.e., Assessment, Reorganization and Cooperation. In the first phase, knowledge of the acquiring company and the acquired company is

assessed. In the second phase, product development organizations are reorganized based on assessment in the first phase. Strategic transfer and far transfer of existing knowledge are conducted. In the third phase, knowledge is created in the process of product development in the new organization. Near transfer and serial transfer of the newly created knowledge are conducted. This study indicates that one of the adverse factors against knowledge integration in product development organizations is difference of corporate cultures and another is persistence of knowledge not necessary for the new market.

WE-07.4 [R] Learning by Using and the Link between Conceptual and Operational Knowledge

Milton F Chagas Jr.; UNINOVE, Brazil

Milton A Campanário; UNINOVE, Brazil

Marcello M Silva; UNINOVE, Brazil

The objective of this article is to assess the implications of iterative learning in organizations that establish and lead modular networks of innovation that create complex systems. This article focuses on the analysis of the dynamic phenomena that occur when a system performs its functions through subsystem interactions in its operational environment. Herein, it is argued that learning by using is a distinct epistemological class, which is practice-oriented, to the extent that it requires the reflective confrontation of previous stock of knowledge and that derived from praxis, which is concrete, dynamic and relational. In these cases, subsystems design and interfaces refinement cannot be deterministically understood as a set of problem resolutions that will naturally occur. Instead, these dynamic phenomena emergent properties can generate causal ambiguity situation, which arises from functionalities coupling. By taking a resource-based view of the firm, this article discusses the importance of learning by using in the systems integration capabilities building. It proposes a model that considers the domains of knowledge, organization, and product within a project-based organization framework.

WE-08 Technology Management in Service Industry-2

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Council Suite

Chair(s) Kumiko Miyazaki; Tokyo Institute of Technology

WE-08.1 [R] R&D and Innovation in Services Companies: The Air Traffic and Navigation Services Case Study

Andre J Buys; University of Pretoria, South Africa

Selaelo T Mathane; University of Pretoria, South Africa

The South African government has introduced a R&D Tax Incentive Scheme to encourage organizations to develop technology. This study investigated whether it is viable for a service company to develop technological solutions and advancements that are eligible for the R&D Tax Incentive. This is a case study of Air Traffic and Navigation Services Company Limited (ATNS). In this case study, qualitative and quantitative research approaches were combined. Data gathering were combinations of the focus group method, questionnaires, interviews and record analysis. The core business of ATNS is to provide Air Traffic and Navigation Services in South Africa's continental and adjacent oceanic airspace. The study found that although ATNS is committed to "remaining at the forefront of product, service and technology development and leading the way for our stakeholders" (2010 Annual Report), it is ATNS policy to purchase from global equipment manufacturers rather than developing products or solutions in-house. The organizational culture negatively affects technological activities as entrepreneurship is not encouraged. Although ATNS personnel have substantial technical capabilities, they are not employed for technology development. This study found that ATNS could develop technological solutions and advancements that are eligible for the R&D tax incentive.

WE-08.2 [R] A Causal Model of Quality Management Practices and Stakeholder Interests in Higher Education Institutions: Comparison of Public and Private Universities

SESSIONS

Faik Tunc Bozbura; Bahcesehir University, Turkey
Erkan Bayraktar; Bahcesehir University, Turkey
Ekrem Tatoglu; Bahcesehir University, Turkey

The purpose of this study is to provide the empirical analysis of differences between the Turkish public and private universities with regard to the effects of quality management (QM) practices on meeting the expectations of various stakeholder groups. Drawing on extant literature, a set of nine QM practices that are applicable to higher education were identified and used as independent variables, while a total of three stakeholder groups including students, businesses and employees were identified as dependent variables. Relying on a survey questionnaire, primary data was collected from a sample of 144 academicians serving at 22 universities located within the greater metro-region of Istanbul, Turkey. Based on structural equation modeling, the test results indicated that the link between QM practices and stakeholder interests is much stronger for private universities than for public universities in terms of the effects of QM practices on fulfilling the expectations of stakeholder groups.

WE-08.3 [R] Redefining Market Opportunities through Technology-Oriented Service Innovation

Robert R Harmon; Portland State University, United States
Haluk Demirkan; Arizona State University, United States
Ellen Chan; Portland State University, United States

Given the dominance of services in most advanced economies, organizations seeking to grow must rely on service innovation for continued business success. Manufacturers, in particular, are becoming increasingly dependent on services as extensions of their product models or remaking themselves into service companies. However, most improvements to services are incremental and often me too in nature. It is relatively rare and difficult for a company to develop a service that creates an entirely new market space or reshapes an existing market. Those companies that can create or redefine markets have the potential to make the competition irrelevant and gain significant competitive advantage. Market creating factors include core benefits vs. delivery benefits, separable vs. inseparable service dimensions, and marketing strategy approaches that can leverage disruptive value to create uncontested market space. To illustrate these concepts, this paper explores the service innovation approaches of six technology companies as they relate to redefining market opportunities to create uncontested market space.

WE-09 Productivity Management

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Directors Suite

Chair(s) Cornelis C van Waveren; University of Pretoria

WE-09.1 [R] A Case Study on Lab Failure Analysis: Establishing True Capacity through Optimization - Post Upper Management Setting the Goals

Wendy L Peterman; Wendy L. Peterman Consulting, LLC, United States
Ann-Marie J Lamb; Portland State University, United States
Patricia Myers; Intel Corporation, United States

This paper showcases a case study of how optimization models were used to establish true capacity capabilities for a lab facing a situation in which upper management had set a goal, without validation of actual lab capabilities. This paper highlights the first step for this failure analysis laboratory: determining current baseline capacity. The models show the 400 units goal could not be reached: the maximum appears to be on the order of 200 units and is in line with historically assumed throughput. Research implications include an example of product-mix problem analysis and associated integer linear programming (ILP) model for a type of business which is not often under study, laboratory testing. This case study provides value for researchers sifting through a large quantity of product-mix learning/models but finding it difficult to find examples without cost as a primary constraint or decision variable to be minimized. Value is also provided for practitioners who are often faced with a similar problem, goals set by higher levels of management without solid knowledge of true capac-

ity; this case study shows how an industry group set about facing this problem and a path toward results rather than becoming deterred by seemingly impossible goals.

WE-09.2 [R] A Two-Phase Decision Support System for Optimizing the Steel Roll Cutting Problem

Chyuan Perng; Tunghai University, Taiwan
Shao-Jen Weng; Tunghai University, Taiwan
Jen-Teng Tsai; Tunghai University, Taiwan
Bin-Chen Jheng; Tunghai University, Taiwan

Cutting a large steel roll material into a small piece of sheet is an optimization problem for a steel sheet supply industry because of minimization of surplus materials. Due to having too much stock of leftover bits and pieces of steel which come from the orders decreased, therefore the production schedule becomes very important for the industry. This study aims at how to optimize steel roll cutting problem by using the database decision support system to track the steel oxidized condition and find a flexible cutting schedule for production of steel sheet. The goals of this study are 1) optimizing cutting plane of steel sheet materials, 2) tracking and checking the steel oxidized problem using database technology, and 3) establishing a decision support system (DSS). In addition, a heuristic method in the DSS helps in minimizing the waste of cutting a steel roll into pieces of steel sheet. At the same time, DSS helps in tracking the roll condition and optimizing the production schedule of the steel sheet cutting problem in the case study.

WE-10 TUTORIAL: Technology Forecasting using DEA

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Studio Suite

Speaker(s) Timothy R Anderson; Portland State University
Yonghee Cho; Portland State University
Tugrul U Daim; Portland State University
Alptekin Durmusoglu; University of Gaziantep
Oliver L Inman; Aisle Five Consulting, Inc.
Jisun Kim; Portland State University
Dong-Joon Lim; Portland State University

A new approach for technology forecasting was first reported on in PICMET 2001. This approach uses a popular management science technique, data envelopment analysis, to provide a tool incorporating multiple trade-offs in technologies. This session will describe the applications conducted, use of this approach, new developments, challenges, and future research directions.

WE-11 Technology Transfer-2

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Parlor-C

Chair(s) Antonino Ardilio; Fraunhofer IAO

WE-11.1 [R] An Agency Explanation for Technology Transfer through Royalty Payments

Peter J Sher; National Chi Nan University, Taiwan
Chien-Hsin Lin; Yu Da University, Taiwan
Beryl L Kuo; National Chi Nan University, Taiwan

Joint ventures and technology licensing involve contracting and royalty payments. This study explores the effects of informal governance, knowledge tacitness, and organizational receptivity on the preference of variable-royalties scheme. Drawing on agency theory, this study assumes that the variable-royalties scheme is a process-based compensation where the licensee is the principal and the licensor is the agent. This study tests hypotheses using information from a survey of 104 firms and partial least square analysis to examine the compensation scheme measured as a continuum from a fixed-fee to variable-royalties. The results show that prior link and relational satisfaction facilitating goal alignment are positively associated with the variable-royalties scheme. Organizational receptivity promotes the

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legitimacy to imposing routines, evaluating the technology, and forming expectation, and then is positively associated with the variable-royalties scheme. This study shows knowledge tacitness is negatively associated with the royalty payment, which implies less transfer programmability moves compensation from variable royalties to a fixed fee. Our arguments are significantly different from conventional agency relationship that does not involve the dimension of licensee transfer and monitoring capacity.

WE-11.2 [R] Sculpting an Organisational Field

*Okan Pala; Sabanci University, Turkey
Dilek Cetindamar; Sabanci University, Turkey*

Organizational fields in the aggregate constitute a recognized area of institutional life. In Turkey, Sabanci University (SU) has shaped the emerging organizational field of technology-based academic entrepreneurship significantly. SU founded the second technology transfer office, Research and Graduate Policy Directorate (RGP), in Turkey. In essence, RGP acts as an interface between the academic and business world according the demands of the business world with the research of the academic world. However, RGP went further and founded the first technology commercialization company, Inovent, providing a business view to researchers and helping them get patents, found companies, and transfer their knowledge to the business world. Furthermore, Golden Horn Ventures was the second venture capital firm to spin out from Inovent. Subsequently, other universities started founding technology transfer offices and companies like Inovent. Overall, this paper is an explorative research, which will provide the detailed case of the shaping of an organizational field in a developing country by a dominant actor, in other words, the role of SU in creating technology-based academic entrepreneurship in Turkey.

WE-11.3 [A] Measuring Efficiency and Identifying Dynamic Efficiency Changing Patterns of Technology Licensing of U.S. Research Institutions Using Time-Lag Factored Data

Jisun Kim; Portland State University, United States

This study evaluates efficiencies and their changes of technology licensing practices of 46 U.S. research institutions using licensing data of the association of university technology manager (AUTM) survey from 1991 to 2007. Data envelopment analysis and Malmquist Index are well-known methods evaluating relative performance of service organizations where widely recognized standard evaluation structures do not exist. However, while Malmquist Index provides insight efficiency changes from one period to the following period, it has limitations of non-circularity and infeasibility. Therefore, this study reviews and compares the current approaches addressing these issues and adopts them to evaluate efficiency changes of licensing practices. Also, time-lag effects of the licensing variables are examined based on the findings from authors previous study and applies time-lag incorporated licensing data to the evaluation. The result presents dynamic changes and changing patterns of licensing performance.

WE-12 Manufacturing Management-4

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Parlor-B

Chair(s) Kathryn E Stecke; The University of Texas at Dallas

WE-12.1 [R] The Impact of Lean Enterprise Transformation on Production Learning Curves Used by Technology Managers in Aerospace Companies: A Decomposition-Based Model of Unit-Derived Learning Curve Data

*Cory Hallam; University of Texas at San Antonio, United States
William T Flannery; University of Texas at San Antonio, United States*

Lean Enterprise Transformation is aimed at addressing the operational processes that comprise a firm in a manner that maximizes value creation and waste minimization via a tool-set of operational behaviors, equipment, measures, and incentives that enables continual improvement akin to the methods originally established in the Toyota Production System (TPS). Work on learning curves related to large scale aerospace programs indicates that the

unit-derived learning curve can be used as a rough predictive tool, but that other factors such as initial estimate errors, program delays and temporal workforce non-homogeneity can impact the value of these learning curves to technology development managers. A decomposition-based model of unit-derived learning curves is presented in this paper with some programmatic data from the aerospace and defense industry to identify potential improvements to learning curve estimating and a predication of the impact these changes could have on program performance is tested with simulations.

WE-12.2 [R] Lean Manufacturing Practices: Issues Created When Two Companies are Integrated and Quality Management Standards are Imposed

*Geoffrey J Peter; Oregon Institute of Technology - Portland Center, United States
Kenneth Shinn; Oregon Institute of Technology - Portland Center, United States
Fred Fleener; Pacific Scientific OECO, United States*

Lean manufacturing (LM) lowers operating costs by cutting waste (Muda) from manufacturing processes. Practicing LM principles, conducting Kaizen events, and removing unnecessary activities and variations through continuous improvement keep businesses competitive. However, these practices may create issues when integrating two unique companies and when externally imposed quality management standards conflict. This paper discusses the transfer of a manufacturing facility, Electro-Kinetic Devices (EKD), Inc., from Santa Barbara, California, to the Pacific Scientific (OECO) facility in Portland, Oregon, and the eventual integration of these companies. OECO had many challenges in relocating and transferring the EKD manufacturing process, even though both companies had many lean practices and manufactured similar products. Three primary issues related to LM were: loss of tribal knowledge or personnel with manufacturing process experience and knowledge, standardization of common tooling and subcomponents with value stream mapping, and the aerospace industry's requirements for process validation in the event of manufacturing relocation. The paper further discusses the rigidity in quality management standards within aerospace and defense industries that are counter to many lean principles. This paper then discusses the adoption of International Organization for Standards (ISO) 9100-Aerospace Standard (AS) 9100 and the integration of lean manufacturing to all defense and aerospace contractors while striving to maintain the highest quality standards.

WE-12.3 [R] Concurrent Engineering Supporting in Energetic Cables Manufacturability

*Dragoslav P Nikolic; Faculty of Management Novi Sad, Serbia-Montenegro
Dusan M Ristic; Faculty of Management Novi Sad, Serbia-Montenegro
Darko D Nikolic; University of Connecticut, United States*

The transformation process within any business adds value and cost to the goods or service output from the system. Taking important steps to become agile is necessary to be a manufacturing contender and in the next decade, organizations must focus on moving information based on design vs. operations costs through the entire supply chain, assembly manufacture and final products distribution. Clearly, the objectives established for the operating system will have fairly substantial cost implications. Getting the design correct at the start of the development process will reduce downstream difficulties in the workflow. Concurrent engineering aims to reduce the number of redesigns, especially those resulting from post-design input from support groups. By involving these groups in the initial design, less iteration will be needed and the major items that do occur will occur before the design becomes final. The overall time taken to design and manufacture a new product can be substantially reduced if the two activities are carried out together rather than in series. The reductions in design cycle time that result from concurrent engineering invariably reduce total product cost. Therefore, companies use concurrent engineering to produce better quality products, developed in less time, at lower cost, that meets the customers' needs. Concurrent engineering provides benefits such as reduced product development time, reduced design work, reduced product development cost and improved communications. This work is intended to cause developers to consider all elements of product life cycle, from conception through final disposal, regarding how concurrent engineering does affect cost schedule through total life-cycle assessment.

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WE-12.4 [A] Development of a Conceptual TQM Model for Implementation in Small and Medium Sized Manufacturing Enterprises (SMMEs)

S B Mallur; STJ Institute of Technology, India

Nagraj L Hiregoudar; K.C College of Engineering & IT, India

This paper presents a development of a conceptual total quality management (TQM) model for introduction and implementation of TQM in small and medium sized manufacturing enterprises (SMMEs) in the north Karnataka region. The development of this model is based on the TQM literature review, the structured interviews, and general characteristics of 295 SMMEs in the northern Karnataka firms. This model provides the users with a number of practices, drawn mainly from the northern Karnataka firms' experiences in general and their failures and problems in particular. The present study attempts to fill the gap by identifying the critical factors of managing the SMMEs' quality, and proposes a holistic conceptual framework for the implementation of TQM in the SMMEs industry. The benefits of this proposed model is that it helps its users in evaluating the strengths and weaknesses of their TQM implementation, targeting their improvement areas, setting up an action plan for improvements, and tailoring a special part to the needs of their firms.

WE-13 Technology Assessment and Evaluation-2

Wednesday, 8/3/2011, 16:00 - 17:30

Room: Parlor-A

Chair(s) Kenny Phan; Portland State University

WE-13.1 [R] The Effects of Using Information Technology on Knowledge Management Systems: An Empirical Analysis on Turkish Textile Sector

Muammer Zerenler; Selcuk University, Turkey

Emel Celep; Selcuk University, Turkey

Business environments have become much more complex, through the rapid development of information technology (IT) and knowledge. In order to overcome ensuing complications, enterprises ought to make changes about products, services and processes. Consequently, many enterprises have applied IT in order to cut production costs, introduce innovations in products and services, promote growth, develop alliances, lock in customers and suppliers, and create switching costs and raise barriers to entry. In other words, IT can help a firm aiming to gain a sustainable competitive advantage. In addition, many studies have argued that intangible assets such as knowledge can create business value. And therefore, knowledge workers will be able to replace clerical workers as the new mainstream of manpower resources, a field in which the development of IT is the main force for change in knowledge management system (KMS). Therefore, this study explores the role and effect of IT in the application of KMS on firms; moreover, relationships between KMS and IT are analyzed and demonstrated by means of the expert interviews, literature reviews, and questionnaire analyses. Also, how to enhance the effectiveness and efficiency of implementing KMS through appropriate IT is discussed by this study.

WE-13.2 [A] An Empirical Study of Provincial Economic Growth Efficiency in China: Based on Provincial Standard Coal Consumption

Jian Zhang; Tongji University, China

Song Chen; Tongji University, China

Qiang He; Tongji University, China

Sizhuo Gong; Tongji University, China

Rapid economic growth is the main objective of policy makers to pursue, but it is often accompanied with higher energy consumption. Traditionally, using per capita GDP to measure economic growth does not reflect the impact on the environment. In this paper, we use the GDP revised by standard coal to study the efficiency of provincial economic growth in China, and provide references for governor to change the model of economic growth in order to save energy and reduce emission to achieve the Kyoto Protocol. The results showed that the efficiency of provincial economic growth increased dramatically during the last two decades, and the provinces had a higher per capita GDP always accompanying higher energy consumption. It is worth noticing that some developed provinces have low energy efficiency,

which means their economic growth lacks efficiency.

WE-13.3 [A] Environmentally Smart Technology Selection Model for Coal Fired Power Generation: A Case Study of Thar Coal, Pakistan

Muhammad A Choudhary; University of Engineering and Technology, Pakistan

Aamir A Kundi; National University of Science & Technology, Pakistan

Pakistan, despite having the sixth largest coal reserves in the world equivalent to 185.5 billion tons, has less than one percent share in Pakistan's power generation, compared with a world average of 40 percent. Thar coal can provide the cheapest power tariff in Pakistan after hydel, making it a preferred fuel source. An acceptable balance between the utilization of Thar lignite to its maximum while mitigating the environmental degradation is warranted. An environmentally smart technology selection model was developed which compares significant environmental, economic, technological and operational parameters and yields their impact on power tariff for four alternate plant configurations. Sub-critical, super-critical, ACFB, PFBC and IGCC combustion technologies, sorbent injection, spray dry scrubbers and wet scrubber technologies for SO₂ removal, low NO_x, selective non-catalytic and selective catalytic reduction technologies for NO_x removal and electrostatic precipitators, and baghouse filters for particulate emission were contrasted. The parameters, which included efficiency, load range, load change rate, startup time, availability, technology maturity, suitability and complexity, available plant sizes, power consumption, emissions, waste production and disposal, capital and O&M cost were applied to alternate plant configurations to Thar coal mine mouth power generation plant at pre-combustion, combustion and post combustion stages, and their consequent impact on power tariff was calculated. The configurations that complied with World Bank and Pakistan EPA guidelines are recommended.

HA-01 PLENARY - 5

DATE: THURSDAY, 8/4/2011

TIME: 08:30 - 10:00

ROOM: PAVILION

CHAIR: TBA

HA-01.1 [K] University and Industry Interactions

James C Spohrer; IBM University Programs World Wide, United States

How are university and industry interactions evolving? This talk describes IBMs University Programs, and the five Rs of university-industry interactions: research, readiness, recruiting, revenue, and responsibilities. University-industry interactions are evolving as universities become more and more important to nations and regions competing in a global knowledge economy. For example, the percentage of world-wide gross domestic product (GDP) of a nation is highly correlated with the percentage of top-ranked universities from that nation.

HA-01.2 [K] The Nexus of Academic Research & Corporate Entrepreneurship: How Leadership Selection Drives Innovation & Performance

Keith D Kulper; KULPER & COMPANY, LLC, United States

The intersection of academic research and corporate entrepreneurship drives the discovery of new knowledge, globally; this is why we have chosen to specialize on this area in our professional executive search consulting practice at KULPER & COMPANY, LLC. The selection of the right leaders is vital to stimulating successful implementation of strategic imperatives for the higher education institution or company. Our efforts in this area have consistently yielded leaders with average tenure of five years or longer, accompanied by a record of promotion and significant added responsibilities; two very key metrics of success for our profession. My remarks will touch on how we are able to achieve specific outcomes

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in our area of specialization and will present supporting data to show how an efficient executive search process leads to the achievement of long-term developmental goals for the organization or institution as a whole.

HB-01 Innovation Management-9

Thursday, 8/4/2011, 10:30 - 12:00

Room: Pavilion East

Chair(s) Saku J Makinen; Tampere University of Technology

HB-01.1 [R] Coopetition: Its Successful Management in the Nexus of Dependency and Trust

Ricarda B Bouncken; University of Bayreuth, Germany

Viktor Fredrich; University of Bayreuth, Germany

Management practice developed the concept of coopetition, the collaboration with the competitor, which has been largely ignored in the literature. Research has so far concentrated on explorative case studies. This study will make an attempt towards the better understanding of coopetition and its effect on performance. We further analyze different antecedents of coopetition and consider different configurations of coopetition. First, we research the performance and management relationships of coopetition. Second, to furnish the different configurations of coopetition, we research different mixtures of trust and dependency as relational factors. Our results indicate that a) coopetition requires different facets of an alliance-management system depending on the mix of trust and dependency and, b) most surprisingly, a high trust/high dependency environment fosters the relationship of coopetition and performance outcomes the most. Our results enriches theory and management practice on coopetition. We contribute to the understanding of coopetition as a strategy associated with different mixes of trust and dependency. The large-scale study shows that there is neither a single general performance effect by coopetition nor a single management system leading to coopetition. Management antecedents and performance effects strongly rely on the specific setting of trust and dependency elements. We encourage further research on the condition of success and management system of coopetition.

HB-01.2 [R] Evaluating Exploitation Strategy for Technological Innovation: Cost or Compatibility?

Daral Piruncharoen; Chulalongkorn University, Thailand

Chaiapat Lawsirirat; Chulalongkorn University, Thailand

Toryos Pandejpong; King Mongkut's University of Technology, Thailand

Achara Chandrachai; Chulalongkorn University, Thailand

Innovation becomes an important asset for firms to compete in today's business environments. It is essential for firms to choose methods of exploitation wisely in order to exercise proprietary invention to its utmost potential. Some of the past literature suggests cost perspective to evaluate exploitation strategy while its validity has been questioned by scholars who believe in contradictory theories. This research is dedicated to explore determinants of exploitation strategy. It takes a qualitative approach by in-depth interviewing for five case studies of innovative products from multiple industries. The finding revealed that firms may not factor in cost perspective even though the main objective is to gain big profit. In contrary the results indicated that firms indeed pay attention to factors which lead to evaluation of compatibility between the invention and commercialization environment. Additionally, the finding suggests that exploitation strategy is a dynamic process and shall be re-evaluated throughout life cycle of invention especially when the commercialization environment has changed.

HB-01.3 [R] Disruptive Innovation in China's BoP Market

Jianghua Zhou; Tsinghua University, China

Yunhuan Tong; Tsinghua University, China

Jizhen Li; Tsinghua University, China

Disruptive innovation is considered appropriate for firms to serve the low-income groups, known as the base of the pyramid (BOP). By applying disruptive innovation into BOP mar-

kets, poor people can benefit from the new technology, and the firms can get a huge market with potential to disrupt the whole industry. By studying the cases of Chinese local mobile phone manufacturers, this paper explores the pattern of the disruption process in BOP markets. This paper adopted an exploratory research strategy. The study shows that the partnership between the core technology provider (an integrated chip provider) and the local BOP-oriented product servers (many small- and medium-scaled mobile phone manufacturers) is a successful model in the context of China. Many local mobile firms grew up and disrupted the mobile industry from the ground up. As a result, the price of mobile phones decreased significantly, and many low-income people could afford a phone with which they enhanced their livelihood. The study suggests that a disruptive technology provider can leverage the existing local BOP models to scale up the business.

HB-02 Technology Management in Energy Industry-9

Thursday, 8/4/2011, 10:30 - 12:00

Room: Pavilion West

Chair(s) Erik Pruyt; Delft University of Technology

HB-02.1 [R] Smartly Saving Energy with a Zero Power Consumption Standby System

Siwaruk Siwamogsatham; NECTEC, Thailand

Patharakorn Rattanawan; NECTEC, Thailand

Matanee Kitjaroen; NECTEC, Thailand

Phattharat Songtung; NECTEC, Thailand

Pornanong Pongpaibool; NECTEC, Thailand

Kullaprapa Navanugraha; NECTEC, Thailand

In this modern era, saving energy ought to become a major concern and responsibility of everyone on this global warming world. All should consume energy as wisely as possible. Nonetheless, an enormous deal of energy (around 5-10 percent of total household energy consumption) is still being wasted nearly everywhere with and without consumers' awareness over the standby power drawn by various appliances when they appear to be switched off via remote control units and yet stay in the sleep/standby mode possibly almost 24 hours a day. In this work, we redesign the system such that the appliances do not consume energy at all when switched onto the sleep mode. Unlike the existing system in which some amount of energy is still consumed by the sleeping appliance while waiting for a weak wake-up signal command from the remote control unit, instead the proposed system has the remote control unit emit strong energy to wake up the system from a completely shut down state. Essentially, this system reflects the more efficient standby energy management strategy since users typically utilize the remote unit to emit the strong energy in order to wake up appliances only a few times a day while the zero power consumption saving advantage during the prolonged standby period is apparently more dominant. When widely adopted, this innovation can smartly help reduce household energy consumption throughout the world.

HB-02.2 [A] Improving Access to Public Building Energy Use to Promote Better Energy Policy

Jason Durfee; Eastern Washington University, United States

Martin Weiser; Eastern Washington University, United States

We recently used money from a National Science Foundation grant to install additional monitoring and sensing equipment in the engineering building at our educational institution. This allows students access to various types of data used in the operation of the building. They now use the actual building as a Living Laboratory for thermodynamics, fluid mechanics, and Heating, Ventilation, & Air-Conditioning (HVAC) classes. The data is accessed through an internet interface and is therefore accessible anywhere there is an internet connection. We have also used this data in visits with middle school children to illustrate the concepts of building energy use. Placing this data on a public website will enable the public at large to increase their understanding of the amount of energy it takes to run a building and where that energy is used. Better citizen education regarding how energy is used for building heat-

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ing, cooling, and ventilation should result in better decisions in the development of public energy policy. This paper will discuss how we went about gaining access to that data, and the potential we see for taking this information to the public.

HB-02.3 [R] How to Fight against the Energy Crisis at the Basic Level? Multicriterial Analysis for the Night Lights Regulation: The Case of the Urban Commune of Antananarivo

Haja Ralaihova; University of Antananarivo, Madagascar
Elisé A Raveloson; University of Antananarivo, Madagascar
Etienne Rakotomaria; University of Antananarivo, Madagascar

The night lights are the main source of squandering for the developing countries cities, such as the African cities and in the circumstances the capital city of Madagascar, the urban commune of Antananarivo. In spite of that, the accessibility difficulty to the specific software and to the sufficient database constitutes a major handicap for the elaboration of an annual regulation program. A more simplified method is possible for the night lights study by the decision-making multicriterial tool. The invoices data and those of the few technical recordings on each station are necessary. This method result is a hierarchical table based on the priority order to the regulation of each station taking into account the selected strategy and the budget effectively available of the commune. This study is based on the general network management principle by the information crossing among other things on the night lights infrastructures' safety. This principle is orientated so that it could be applied to the cities of Madagascar with less sophisticated data.

HB-02.4 [A] Is Technology Compatible with Sectorial Good Governance Principles? Case of Energy Projects

Franck Razafindrabe; University of Antananarivo, Madagascar
Elisé A Raveloson; University of Antananarivo, Madagascar
Etienne Rakotomaria; University of Antananarivo, Madagascar

The concerns over sustainable development are increasing and good governance is in the center of sectorial priorities. For a better objectivity of decisions, technology is considered as a necessity which must, however, take into account requirements related to the good governance principles. By considering the social, economic and environmental aspects, it is convenient to analyze if technology is compatible with these requirements. This communication proposes to give some reflection approach on this subject, particularly in the field of energy. The proposed approach has been applied to the drinking water access in urban area and the mining project management.

HB-04 Global Issues

Thursday, 8/4/2011, 10:30 - 12:00

Room: Broadway-2

Chair(s) Deok S Yim; Gyeonggi Research Institute

HB-04.1 [R] An Analysis into the Impact of Globalization on the Clothing Industry in Conjunction with the Clothing Industry in South Africa

Kemlall Ramdass; University of Johannesburg, South Africa
David Kruger; Tshwane University of Technology, South Africa

The clothing industry in South Africa is seen as a conventional industry with characteristics such as labor intensive with low levels of qualification; low salaries; low potential for investment in R&D and innovation; flexible labor legislation and powerful labor unions. However, it continues to be an important sector in terms of the South African labor market with regards to job creation. The strong impact of globalization and delocalization in the organization of work is pressurizing the industry in terms of its competitiveness. Global competitiveness in terms of quality, price and supply chain management are reducing the viability of the industry. Few organizations are able to keep their positions in the marketplace without changes in the organization of work and workers. Organizations that respond to the challenges have positioned themselves for economic stability. Organizations have found different methodologies in dealing with the reality of the situation. Two distinctive paths can be

identified: outsourcing production with dismissal of workers and relocation of facilities; and skilling the workforce through continual improvement. The aim of the paper is to highlight the predicament faced by the clothing industry and what could be done to change the levels of productivity in the industry. This paper presents results through qualitative research analysis from the case study conducted in Kwa-Zulu Natal on several clothing organizations in comparison to international experiences.

HB-04.2 [R] Managing Competence Transfer in Global Software Companies

Ville Wesslin; Tampere University of Technology, Finland
Petri Linna; Tampere University of Technology, Finland
Hannu Jaakkola; Tampere University of Technology, Finland

Globalization is strongly affecting the software industry. One of the trends has been offshoring more and more work to be done on different sites in the form of global software development (GSD). Modern information and communication technology (ICT) allows information sharing globally immediately with no delays. Software development tools are global and configuration management can be arranged in a way that allows working on different sites. The software development work is often done wherever it is most cost-effective. Development work frequently takes place in countries that are located far from the place where the contract has been made with the customer. As a result of this trend, competence transfer (CT) between software development sites has become an important issue. The subject of CT has not yet been studied extensively. The aim of this work is to introduce a model for companies as they distribute work globally between sites to manage CT. As a result, a competence transfer grid is introduced. This research has been conducted at the Tampere University of Technology.

HB-04.3 [R] Effects of Cross-Cultural Factors in Global Services Production

Elina Karttunen; Tampere University of Technology, Finland
Hannu Jaakkola; Tampere University of Technology, Finland
Petri Linna; Tampere University of Technology, Finland

Globalization is one of the main trends of our time. Simultaneously, the status of services in the software industry is becoming more significant. Service production is spreading all over the world in the global environment, creating international working teams where different cultures' working methods meet. In these situations, the cultural differences related to ways of communication and making business might be experienced. Cross-cultural factors also affect the strategic division of the production processes in different countries. The cultural characteristics of a country might be more ideal for some production processes than for others. The focus of this paper is on the globalization of software services. The purpose is to verify the hypothesis of the importance of cross-cultural factors in global service production by studying four Finnish software service companies. The findings suggest that cultural factors have a considerable effect on the global service production due to the people-oriented nature of the service business. The found critical cross-cultural factors are presented with suggestions to provide businesses with a way to avoid the pitfalls of cultural differences. The paper is a part of an ongoing research project STEP, jointly run by Tampere University of Technology Pori unit and the University of Jyväskylä.

HB-05 Project/Program Management-5

Thursday, 8/4/2011, 10:30 - 12:00

Room: Broadway-3

Chair(s) Sabin Srivannaboon; Chulalongkorn University

HB-05.1 [A] Autonomic Project Management

Joseph S Nadan; Polytechnic Institute of NYU, United States

This paper introduces a new class of project management system that may be used to overcome many of the shortcomings of current project management systems and enable new functionalities that will significantly improve project outcomes. Current project management methods are not good enough because (i) they exacerbate our tendency to prefer the illusion of certainty to the reality of doubt, (ii) all tasks are modeled as being equally

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important, resulting in the project manager misguidedly focusing on pre-defined critical path tasks, (iii) data is entered by project managers, who often, unintentionally or otherwise, create a biased estimate of the project outcome, and (iv) errors in specifying tasks remain undetected until they manifest themselves in project problems. The business benefits of Autonomic Project Management include (i) reduced effort to define projects and manage a project portfolio, (ii) properly focusing project managers on critical tasks rather than the critical path, (iii) using auditing to decrease estimation bias, thereby reducing operational risk, (iv) early identification of potential problems in not-yet-started tasks, and (v) automatically measuring and benchmarking performance against company and industry best practices, thereby identifying opportunities for companies to improve their ability to perform tasks in selected areas.

HB-05.2 [A] A Management Framework for Interdisciplinary Research Projects: Empirical Study on the Collaboration Process and the Research Outcome

Tomohiro Anzai; University of Tokyo, Japan
Shintaro Sengoku; Kyoto University, Japan

In order to improve the productivity of applied research, governments have generated large-scale research funds for establishing new centers to promote collaboration between internal/external organizations and researchers with different specialties. However, it is challenging for universities and public institutes to develop the strategy, operational process and organizational structure for maximizing the effect of collaboration. Due to the lack of standardized methods for measuring the performance of research projects with integrative approaches, it is still difficult for the governments to evaluate the outcome of each project and effectiveness of the research funding. In this research, we have conducted the comparative research between two of the largest research programs in Japan with a strong focus on integration of interdisciplinary fields, Center for Nanobio Integration (CNBI) of The University of Tokyo and Institute for Integrated Cell-Material Sciences (iCeMS) of Kyoto University by database analysis and questionnaire survey of researchers, aiming at identifying key success factors of management of interdisciplinary projects and requirements of individual researchers who could promote collaboration and integration. Through these empirical approaches, we have obtained several implications for the effective institutional management and developed a managerial framework for measuring and evaluating the outcome of the interdisciplinary research projects.

HB-06 Technical Organizations and Workforce-2

Thursday, 8/4/2011, 10:30 - 12:00

Room: Broadway-4

Chair(s) Marie-Louise Barry; University of Pretoria

HB-06.1 [R] Towards a Career Management Framework for Civil Engineers in the South African Public Sector

Arvin Sarjoo; University of Pretoria, South Africa
Marie-Louise Barry; University of Pretoria, South Africa

Public sector organizations consist of complex systems and its people the lifeblood and links which chain together organizational performance. The Delphi research methodology bases a South African local government organization, the City of Tshwane Metropolitan Municipality (CTMM), as its context, yet also highlights factors typical to many public sector organizations. Career management success factors of civil engineers, technologists and technicians are explored from employee and organizational perspectives. The demographic results describe the 42 Delphi participants at primarily senior managerial level, with 24 years average work experience and with post-graduate qualifications. The three rounds of qualitative and quantitative questionnaires focused on the desired, current and feasible states of career management with results revealing significant gaps in factors of public service motivation (PSM), technical skills, organizational structure and organizational policy. The Likert-based data was statistically analyzed via Spearman's rho coefficients, means and medians. The results revealed the respondents' positive attitude regarding the feasibility

of closing gaps to reach career management goals. The recommendations describe the importance of converting on paper career management policies into tangible outcomes. Therefore, the buy-in of CTMM leadership into the importance of career management to the municipality as a whole is crucial for its continual success.

HB-06.2 [R] Towards a Framework for Human Resource Management Processes in the Mature Project Orientated Organisation: The Case for an ICT Organisation in South Africa

Jacob Duif; University of Pretoria, South Africa
Marie-Louise Barry; University of Pretoria, South Africa

Projects are executed by people. Human resource management (HRM) processes are required to make the most effective use of the people in a project environment in order for organizations to be competitive. Project orientated organizations (POO) have specific characteristics which have special requirements in terms of an organization's HRM processes as opposed to those processes employed by classically managed organizations. In this study, the focus group technique was used to explore and understand the HRM processes employed by the mature POO with a specific focus on their requirements and dependencies. The study was conducted within one of the leading information and communications technology (ICT) companies in South Africa. The organizational strategy is the driver of the HRM processes in the mature POO. POOs spend a significant amount of time and resources to hire new employees. It is therefore important that the right resources are appointed. The research results identified that the HR planning and recruiting processes are the key processes in the mature POO. The research further identified the differences in sources of information required by the human resource (HR) planning processes of organizations executing internal projects as opposed to external projects.

HB-07 Management in Information Technology-1

Thursday, 8/4/2011, 10:30 - 12:00

Room: Forum Suite

Chair(s) Lane Inman; Aisle Five, Inc.

HB-07.1 [A] Costing: Non Traditional Data Stores versus Traditional DBMS Database Technologies

Tim R Coulter; Aisle Five Consulting, United States

Storage in large-scale data centers is changing dramatically. The move from high-cost enterprise class storage systems to storage nodes that are part application, part storage and part service is pervasive. These nodes make up new technology plays, like hadoop, hbase, mongodb, and cloud storage. This paper talks about real-world use cases for building out these environments, the business drivers, the successes and failures. It provides details on the cost models, the changes of the paradigm and when and why this new paradigm should be used.

HB-07.2 [R] Maturity and Innovation in Software Production: Convergence or Conflict

Antonio Carlos Tonini; Engineering and Management College, Brazil
Mauro M Spinola; University of São Paulo, Brazil
Jose Manuel C Medina; University of São Paulo, Brazil
Vagner L Gava; University of São Paulo, Brazil
Andre L Fleury; University of São Paulo, Brazil
Rodrigo Franco Gonçalves; University of São Paulo, Brazil

Currently, much of human activity depends on information systems. The number of software companies has grown considerably, aiming for high demand and high financial returns. Competition standards have changed, from differentiation strategies to low-cost and high-quality strategies. Paradoxically, the need for a mature process based on control and governance started to coexist with the creative ability to innovate continuously in a high dynamic market. To supply software, companies have to incorporate more service components, requiring the definition of a strategic position between innovation and maturity

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process. Currently, software companies aim to establish long-term partnerships to provide software-based services in which the software product is just one part of the contracted services. This paper investigates the relationship between innovation and maturity, analyzing the results of case studies conducted with two Brazilian software organizations. The first company operates in a specific segment and prioritizes process stability, while the second company aims for general market demands. The study shows that innovation and maturity are necessary and complementary strategies for the software companies operating in turbulent and highly dynamic environments. Collected evidence also suggests that for both companies, internet-based services are promoting a shift in strategy orientation, from efficiency to differentiation.

HB-08 R&D Management-4

Thursday, 8/4/2011, 10:30 - 12:00

Room: Council Suite

Chair(s) Stephan Buse; Hamburg University of Technology

HB-08.1 [A] Metrics Evolution in an Energy Research & Development Program

Brent Dixon; Idaho National Laboratory, United States

All technology programs progress through three phases: discovery, definition, and deployment. The form and application of program metrics need to evolve with each phase. During the discovery phase, the program determines what is achievable. A set of tools is needed to define program goals, to analyze credible technical options, and to ensure that the options are compatible and meet the program objectives. A metrics system that scores the potential performance of technical options is part of this system of tools, supporting screening of concepts and aiding in the overall definition of objectives. During the definition phase, the program defines what specifically is wanted. What is achievable is translated into specific systems, and specific technical options are selected and optimized. A metrics system can help with the identification of options for optimization and the selection of the option for deployment. During the deployment phase, the program shows that the selected system works. Demonstration projects are established and classical systems engineering is employed. During this phase, the metrics communicate system performance. This paper discusses an approach to metrics evolution within the Department of Energy's Nuclear Fuel Cycle Research and Development Program, which is working to improve the sustainability of nuclear energy.

HB-08.2 [R] R&D Benchmarking Using Data Envelopment Analysis: The Case of Thailand Research Fund

Songphon Munkongsujarit; Portland State University, United States

Timothy R Anderson; Portland State University, United States

Due to the limitation in the availability of resources (time, money and researchers) for research projects, it is always a policy and decision maker's challenge to decide on appropriate research projects or programs to support as well as how much money should be spent and how the funding should be managed in order to achieve the research goals. Thus, it would be helpful to provide the information on efficiencies of different research projects or programs to assist the decision-making process. This paper provides the measurement and comparison of the efficiencies of the research projects or programs by utilizing the data envelopment analysis (DEA) method applied to a case study of Thailand Research Fund (TRF). The DEA technique is used because it does not require the impossible-to-define explicit input-output relationship of the research projects. Based upon the analysis result and the policy implication, it would enable the decision maker to identify the projects or programs with high efficiency which should be supported continuously as well as the projects or programs with lower efficiency which should be terminated or required to improve their operation.

HB-08.3 [R] Research Productivity in Selected Higher Education Institutions in Nigeria

Oluseyi O Isola; Obafemi Awolowo University, Nigeria

Willie O Siyanbola; Obafemi Awolowo University, Nigeria

M. O Ilori; Obafemi Awolowo University, Nigeria

This paper discusses critical input and output factors of R&D in higher education institutions in Nigeria. It also shows quantitative analyses of researchers' productivity using partial productivity approach and an assessment of factors influencing research productivity. Based on a recent research effort, researchers were sampled from 12 leading universities. They were randomly selected from the fields of agriculture, science and technology/engineering. Findings from the results reveal that productivity of the researchers is of medium category. Also, input factors such as qualifications of researchers, years of experience, research collaborations and time spent on research significantly contribute to research productivity.

HB-09 New Product Development-3

Thursday, 8/4/2011, 10:30 - 12:00

Room: Directors Suite

Chair(s) Antonie J Jetter; Portland State University

HB-09.1 [A] Reducing Risk in Moving from 'R' to 'D' - Adaptation of NASA's 'TRL' Metrics to a Product Development Environment

Donald Titterton; Xerox Corporation, United States

Michael Meinhardt; Xerox Corporation, United States

Chad Slenes; Xerox Corporation, United States

Today's new product development (NPD) processes are under increasing pressure to reduce the cycle time to bring products to market. This is reflected in the need to rapidly assess the technology in terms of its maturation and staging in order to implement it in new products. Premature productization of a new technology, by contrast, can cause serious collateral damage to overall project schedules and project spends if risks are not clearly understood. Time, money, and engineering effort may be wasted on building product prototypes that end up not fully working or meeting critical specs. There may be insufficient time for problem solving because of the need to feed the beast (meet prototype build commitments). Potential recognition of show stopping issues may occur late in the process resulting in the need to reset or recycle steps in the design. As a result the costs and schedule become unpredictable. At Xerox Direct Marketing Group, we have implemented a readiness assessment tool first developed by NASA in 1974 called the Technology Readiness Level. Our implantation, which uses only the first four levels of the process, has had significant benefits for us. Throughout 2010 we piloted this idea in two major product development projects which used this methodology to manage technology risk. Both projects were staffed at lower levels than historical norms, and both projects met their technology demonstration milestones (as an integrated system) with no surprises and very little or no schedule slip. In this talk we present an overview of the process, our specific implementation and the benefits of implementing such a process.

HB-09.2 [A] Ontology-based Technology Model for the Use in the Early Stage of Product Development

Dieter Spath; Fraunhofer Institute for Industrial Engineering, Germany

Stefanie Bunzel; Fraunhofer Institute for Industrial Engineering, Germany

One of the key factors for a successful product development is the early integration of technologies in the innovation process. Especially emerging technologies, such as nanotechnologies, pose a wide range of new functionalities and therefore high potentials for a future product. To combine the technological knowledge with the identified product requirements in the early stages of the development, it is necessary to create a logical connection between those two domains. This connection provides a systematic access to technological solutions especially tailored for the particular needs of the product developer. By using an ontology-based model for the technology domain, it is possible to interrelate all the relevant aspects (functionalities, material, structures, sizes, etc. as well as corresponding experts and research institutions) and therefore provide a comprehensive and logically connected data pool. The underlying IT support allows for a fast and extensive search and extraction

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of the adequate solutions for the product development within this data pool. The detailed model of this ontology-based approach will be presented in this paper. The implementation and combination with specific product requirements will be shown using the example of nanotechnology.

HB-10 Technology Forecasting-2 **Thursday, 8/4/2011, 10:30 - 12:00**

Room: Studio Suite

Chair(s) Michèle Routley; University of Cambridge

HB-10.1 [A] Forecasting of Advanced Electronic Packaging Technologies Using Bibliometric Analysis and Fisher-Pry Diffusion Model

Nasir Sheikh; Portland State University, United States

Fredy A Gomez; Portland State University, United States

Yonghee Cho; Portland State University, United States

Jayanth Siddappa; Portland State University, United States

Forecasting advanced or emerging technologies by determining their technology diffusion rates is a science and an art because of lack of experiential data. One method to assist in forecasting is data mining and analysis of bibliometric data from a variety of sources such as patents, journal citations, and science awards. This information can then be used in well-known technology diffusion models such as Fisher-Pry, where emerging technologies substitute older ones. This paper uses global bibliometric analysis to forecast the growth of advanced or next-generation electronic packaging technologies relying on analogous technology growths.

HB-10.2 [R] Investigation of a Lead Indicator of Technological Innovations

Takeshi Maeno; New Energy and Industrial Technology Development, Japan

Naoki Shibata; The University of Tokyo, Japan

Yuya Kajikawa; The University of Tokyo, Japan

ichiro Sakata; The University of Tokyo, Japan

Innovation is fundamental to economic growth. To innovate, it is necessary to identify at an early stage technologies that can become the seeds of innovation and to ensure sufficient resources are allocated to such technologies. However, it is very hard to identify technology seeds. Many people in the public and private sectors desire such a forecasting tool. In this research, trends in the number of papers, patents, and newspaper articles were investigated. The research suggested that the number of patents is a more appropriate way to gauge trends than is the number of papers or newspaper articles as trends become evident more quickly in patents. Through further analysis, implications for patent forecasting were derived. These could be a useful guideline for decision makers in the public and private sectors.

HB-10.3 [A] Measuring the Reverse Salience of CPU Utilization in Video Game Consoles: The Performance Gap Ratio as a Forecasting Tool

Liliya Hogaboam; Nascentia Corp., United States

Jay Justice; Portland State University, United States

Marwan Lingga; Portland State University, United States

This study applies and adds to the concepts of recent research revolving around reverse salience as a technology-forecasting methodology. A recent proposal for using performance gap and time gap measurements to determine the magnitude of reverse salience is applied to the disparity between hardware utilization in video game consoles and available hardware (in the form of the x86 central processing unit). Due to the exponential evolution of the principal comparison specification, clock frequency, we propose using a performance gap ratio in addition to the performance and time gap measurements for more detailed characterization of the technology gap between the two subjects. Determining the performance gap ratio equation leads to a technology-forecasting device to assist analysts in determining the optimal time to launch a future platform and the specifications that should be included based on presently available hardware.

HD-02 Technology Management in Energy Industry-10

Thursday, 8/4/2011, 14:00 - 15:30

Room: Pavilion West

Chair(s) Rimal Abu Taha; Portland State University

HD-02.1 [R] Strategic Management of Transmission Access to the Electricity Grid

Sertac Oruc; Delft University of Technology, Netherlands

Scott W Cunningham; Delft University of Technology, Netherlands

The electric power industry has fully entered a new era. The industry has been consistently moving away from vertical integration and monopoly, and towards a competitively organized industry. There remain unfulfilled requirements for institutional reform. In this paper we confront existing strategic hypotheses about the nature of networked competition. The approaches adopted across countries vary in terms of market and system operation, property rights and investment incentives. A number of key concepts emerged as central to the organization of the grid, including nodal pricing, transmission capacity rights, and compensation for wire ownership. Traditionally, grid management was conducted cooperatively, and through committee agreement by network operators. Where possible, network stability was ensured through the provision of excess transmission capacity. Economic pressures have resulted in a more competitive market, with attendant concerns about efficiency, decentralization and the profitability of participants. Nonetheless, a set of core, generalizable problems in congestion management with regards to congestion pricing remain which are not easily resolved through simple solutions as the interrelated systems increase in size spatially. We demonstrate the current situation, where we are heading in congestion management and creation of a pan European power grid. The challenges ahead are discussed. The study serves as a basis for a wider research project in which we examine the action of strategic behavior on small, analytic models of the electricity grid. As a result, we intend to confront existing strategic hypotheses about the nature of networked competition, comparing and contrasting the relative efficiency of these network management proposals using formal theories derived from cooperative game theory.

HD-02.2 [A] ISEE Energy Technology Management

Dietmar H Winzker; University of Pretoria, South Africa

Leon Pretorius; University of Pretoria, South Africa

An appropriate focus on the parameters of innovation, sustainability, economics and ethics (ISEE) is considered critical for managing any new technology, and this is especially useful in the case of alternative energy technology, energy generation and energy utilization in a local and global socio-economic context. An attempt is made to determine the significance attached to the degree of ISEE parameters by surveying available literature on a broad basis and to compare it to a group of expert opinion. The large variety of aspects to be considered, the diverse alternative energy resources and their specific challenges, and the complex global environment in which energy resources have to be managed require an effective technology management model. A holistic management model that has been utilized in other complex multi-disciplinary high technology environments is suggested. A qualitative as well as an initial attempt at quantitative analysis is presented which elucidates the applicability of the critical ISEE parameters for a number of alternative energy resources and their respective technologies by assessing the amount of research papers that have been published. The study reflects on the relative desirability of the respective energy technologies, and it also briefly considers using a systems thinking management which will enable the judicious and effective use of energy technology in a responsible, socio-economically sound manner.

HD-02.3 [A] Energy Management and Engineering Realities

Svetla T Stoilova; Oregon Institute of Technology, United States

Michael Berry; Oregon Institute of Technology, United States

Nowadays, there is a big concern about the energy resources all over the world. Energy is a very popular word, but it is a very abstract concept. It is a well-known fact that energy

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cannot be created nor destroyed. It can readily be converted from one form into another. We should not be concerned about running out of energy. Energy is a property of matter and is everywhere around us. For example, one pound of air as ideal gas at standard temperature of 77°F and pressure of 1 atm. contains a tremendous amount of energy (91.51 Btu/lb). The real question here should be: How much useful work could be obtained from this energy? Surprisingly, the work potential of this huge energy reservoir, the atmosphere, is near zero. We want to bring to the table a discussion about the engineering and economic realities in the context of constantly increasing demands for energy. Several examples and sample calculations will demonstrate that we must be concerned not only with the quantity, but also with the quality of the energy.

HD-02.4 [A] How to Reduce Energy Consumption by Energy Audits and Energy Management: The Case of Province Jilin in China

Jian Zhang; Tongji University, China
Yuchen Zhang; Tongji University, China
Song Chen; Tongji University, China
Sizhuo Gong; Tongji University, China

The aim of this paper is to conduct an in-depth study on how to reduce energy consumption in China. The main objective of this case study includes finding out problems of energy audit and energy management in Jilin province, which caused excessive energy consumption. The case study reveals that the enterprises are unwilling to cooperate actively with the energy audit, the reported statistics data are always faked, the energy management systems of the enterprises are not perfect, the efficiency of energy conversion and energy consumption are low, and the enterprises often exist with the phenomenon of wasting energy. Considering the problems which affect the reduction of energy consumption, we provide five solutions to strengthen the supervision and management of energy consumption, and to reduce the unnecessary energy waste.

HD-03 Science and Technology Policy-4

Thursday, 8/4/2011, 14:00 - 15:30

Room: Broadway-1

Chair(s) Deok S Yim; Gyeonggi Research Institute

HD-03.1 [R] Foreign Direct Investment: Diagnosis and Proposals for a Public Policy Agenda for Brazil

Milton A Campanário; UNINOVE, Brazil
Marcello M Silva; UNINOVE, Brazil
Milton F Chagas Jr.; UNINOVE, Brazil
Leonel C Pessoa; UNINOVE, Brazil

The research analyzes the viability to adopt policies to enhance Brazilian foreign direct investment (FDI). Based on statistical data and on literature review, the policy agenda frames the underlying questions surrounding FDI. There is not yet a theoretical framework to deal with emergent countries economic outward FDI. There exists strong evidence that capital flows through FDI to generate externalities in the following domains: macroeconomic, international trade, and microeconomic (in themes closely related to industrial organization and innovation). The theoretical proposition has its grounds in the conception that international capital flows are absolutely compatible in the following contexts: monetary, commercial, industrial organization and innovation policies. A better positioning of national enterprises internationally may result in growing partnership within the foreign environment. Brazil has not yet a set of policies to deal with inward and outward Brazilian FDI flows, without necessarily jeopardizing macroeconomic policy and the related monetary and currency stabilization goals. Summing up, it is contended that FDI stimulus by means of public policies may contribute not just to a better competitiveness and innovation of Brazilian enterprises but also to assure balanced growing and economic structural change.

HD-03.2 [R] Impact of Reformation of IPR System on Patent-based Innovation in China: Empirical Studies over Chinese Patent System Change

During 1993 and 2007 Episodes

Xiangdong Chen; Beihang University, China
Gu-Peng Zhang; Beihang University, China
Ni-li Ha; Beihang University, China

Although there have been important changes or revisions to the patent system in China three times since 1985, empirical studies on the impact of the changes have not been fully conducted. This study investigates important patent system reform in 2000, with a research window covering the time period between 1993 and 2007, in the following aspects: 1) descriptive study on the differences in the patenting movement, before and after the revision of the Patent Act in 2000 in China; 2) empirical studies on regionally clarified patenting data in terms of the two contrasted groups, namely, R&D intensive and patenting advantage regions vs. non-intensive regions, with particular focus on provincial and regional data, to reveal level of impact of reform of the Patent Act; 3) empirical investigation over the impact of patent system reform in terms of influence from FDI. Major findings include that there is a significant positive impact by the 2000 version of the reform in Patent Act in China on local innovation in terms of R&D input and patenting output. Also, a stronger impact upon those R&D intensive and patenting advantage regions can be found against other non-intensive regions, which further implies that patent system reform can raise R&D efficiency over those innovation intensive regions in China. On the other hand, less innovation intensive regions may need more focused policy assistance to encourage local innovation performance.

HD-03.3 [A] Successful Technology and Innovation Policy for Namibia: A Review of Issues and Lessons for a Developing Country

Kenneth K Matengu; University of Namibia, Namibia

As a result of the rise of the global knowledge society, increasing demands of labor markets, and the recognition that technology and innovation policies play significant roles in the competitiveness of a country, in 1999 the Government of Namibia developed and released a National Research, Science and Technology Policy. The policy was seen as a key instrument that would help drive the transformation of Namibia towards a knowledge-based economy, where the production and usage of technology and innovation would lead to economic benefits. Further policies and strategies were developed with emphasis on the necessity of shifting the proportion of national income derived from natural resources to innovative activities, increasing the percentage of workforce employed in the knowledge-based jobs and the ratio of firms applying technology and innovation. Over a decade now, these policies have not been implemented. This article reviews evidence from official publications, fieldwork interviews conducted between 2008 and 2010, relating to the quest for economic transformation and the promotion of innovation and technology in Namibia. The article analyzes factors that have hindered the implementation of the said policies and presents lessons for other developing countries.

HD-04 Strategic Management of Technology-4

Thursday, 8/4/2011, 14:00 - 15:30

Room: Broadway-2

Chair(s) Daphney H Mayindi; University of Pretoria

HD-04.1 [A] Technological Competence and Capacity Building for Rural Infrastructure Development: Lessons from South Africa's Civil Aircraft Industry

Daphney H Mayindi; University of Pretoria, South Africa
Michael O Kachienga; University of Pretoria, South Africa

The objective of the paper is to provide an overview on how lessons learned from South Africa's (SA) civil aircraft industry could be applied to build appropriate technological capabilities needed to improve rural development. Factors found to have impacted on the technology capability building process of the SA civil aircraft industry are discussed. The paper outlines the diverse nature of rural communities, socio-economic challenges, the need for technology advancement and sustainable development geared towards improved rural development. It discusses how technology transfer could improve rural infrastructure devel-

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opment whilst also looking at R&D investment and its impact on growth performance in the global technology trade. It emphasizes the importance of technology adoption, adaptation and innovation networks as strategies for dealing with lack of technological capacity and technological competence in underdeveloped rural communities. It also emphasizes the role of government in building and shaping national technological capabilities and competencies through various support mechanisms that could facilitate infrastructure development, the use of indigenous knowledge, productivity at rural community-level geared towards rural development and sustainable growth. It proposes interventions for successful building of technological capabilities and national technological competencies that could lead to rural development characterized by vibrant, equitable and sustainable rural communities.

HD-04.2 [R] Does One Size Fit All? Explaining the Governance Mode and Strategic Position of Cluster Innovation Platform: A Comparative Case Study of Zhili Childrens Garment Cluster and Shaoxing Textile Cluster

Limin Gong; Zhejiang University, China
Shisong Jiang; Zhejiang University, China

Despite its significant role, the government encounters a policy dilemma about how to intervene to promote industrial cluster upgrading. This paper focuses on government-supported innovation platforms within clusters. Through a comparative case study in China, we find a general pattern among cluster characteristics, governance mode and strategic position of the innovation platform. The contributions are: 1) proposing a typology for innovation platform; 2) enriching the knowledge-based theory of clusters by innovation practices in developing countries; and 3) pointing out that embedding in global value chain is not always appropriate for clusters in developing countries. Managerial implications and future research directions are also discussed.

HD-04.3 [R] Managing Change in M&A Projects

Yildiz Y Guzey; Izmir University, Turkey
Murat Kudret Yurtseven; Izmir University, Turkey

Merger and acquisition (M&A) project is a process when two or more companies are re-structured as a whole with common goals. There is a restructuring aspect in M&A projects' goals. Current structures need to reorganize as a new single structure after the project decision is taken. A major challenge facing M&A projects is to manage the change process effectively. Employees identify themselves with the organization which they spend their life for and believe that their efforts and their personal characteristics contribute to the organizations personality. They need to know that their salary is going to be paid regularly, and they also need to know their role, their responsibilities and their possible future position in the organization. When M&A possibility occurs, the employees' expectations could be destroyed. They feel like they have been betrayed. In this paper, we investigate the organizational change and its effects on employees in merger and acquisition projects, considering personal characteristics of the employees and characteristics.

HD-06 Decision Making in Technology Management-3

Thursday, 8/4/2011, 14:00 - 15:30

Room: Broadway-4

Chair(s) Charles M Weber; Portland State University

HD-06.1 [R] Exploring the Uncertainty of Energy Transitions: The Case of World Wind Power

Caner Hamarat; Delft University of Technology, Netherlands
Erik Pruyt; Delft University of Technology, Netherlands

Models are frequently used for decision support in modern-day decision making. This approach is referred to as model-based decision support and it is mostly at least implicitly used for predictive purposes. However, predictions are almost always wrong and can be dramatically misleading for policy making. Another shortcoming related to predictive model use is the lack of proper consideration of deep uncertainty. Deep uncertainty refers to the lack of knowledge or agreement related to the correct representation of a system and the

evaluation of (model-based) outcomes. This paper proposes to embrace deep uncertainty by using models in an exploratory way in order to improve model-based decision support under deep uncertainty. For this purpose, a new research methodology for analyzing complex and deeply uncertain systems, Exploratory Modeling and Analysis, is combined with System Dynamics modeling to capture deep uncertainties and dynamic complexities related to energy transitions. In this paper, we illustrate this methodological approach by using three different versions of a world wind power model (to introduce structural uncertainties) and by introducing some parametric uncertainties. This case clearly illustrates the need to consider both structural and parametric uncertainties for technology management under deep uncertainty.

HD-06.2 [A] Cognitive Mapping: A Decision Support Tool for a New Business Unit Location Choice

Alexandro S Lima; Instituto Tecnológico de Aeronautica, Brazil
José Henrique S Damiani; Instituto Tecnológico de Aeronáutica, Brazil
Arnoldo S Cabral; Instituto Tecnológico de Aeronáutica, Brazil

The search for the best way to allocate resources is a common problem in organizations. The difficulty lies, generally, in trying to bring together conflicting goals, usually condensed to minimize costs and maximize benefits, all in accordance with a risk level considered acceptable. The identification of promising locations for the installation of new business units addresses this kind of problem, where a decision has to be made in order to optimize the organization's resources. This paper aims to discuss the use of cognitive maps as a support tool in a locational decision problem. To this end, we present concepts treated in literature, necessary to understand the issue at hand. Then, explanations are taken on the use of cognitive maps for the identification and hierarchical structuring of fundamental points of view of a decision maker. Finally, a case study is presented, aiming to demonstrate the applicability of cognitive maps in developing an analytical framework to support the decision making process of choosing the location for a new medical laboratory unit.

HD-07 Management in Information Technology-2

Thursday, 8/4/2011, 14:00 - 15:30

Room: Forum Suite

Chair(s) Tim R Coulter; Aisle Five Consulting

HD-07.1 [R] Promoting Research and Development: A Case Study of Thai ICT Industry

Supachart lamratanakul; Kasetsart University/Asian Institute of Technology, Thailand
Maliene Anantarattanachai; Kasetsart Business School, Thailand
Paitoon Chetthamrongchai; Kasetsart Business School, Thailand

Information and communication technology (ICT) plays a critical role in various developments in government policy. The study focuses on Thailand as a case to analyze an implementation of the government policy. The case shows that the Thai government creates the ICT plan for ten years to leverage the strength of R&D. The plan supports and encourages five sectors of development: 1) government, 2) commerce, 3) industry, 4) education, and 5) society. Each sector is often known as electronics development or e-government, e-commerce, e-industry, e-education, and e-society. The study, thus, is initiated to analyze and make recommendations for improving the ICT plan that the Thai government can promote and leverage the potential of researchers to the point that innovative creation in ICT is flourishing. The results of the study show that the ICT industry can be more reinforced by a) setting the research and economic development agency for ICT industry, b) promoting research potential in ICT at the country level, c) developing a national research database for ICT, d) evaluating and following up the ICT research in every segment in the country, and e) creating research funding for ICT projects.

HD-07.2 [A] Google's Retreat from China: Two Competing Theories

Jonathan C Ho; Yuan Ze University, Taiwan
Qing Zhang; Wuhan University, China

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Chung-Shing Lee; Pacific Lutheran University, United States

After a four-year operation in China, the Internet search engine giant left the world's most potential cyber market. The retreat has commonly been attributed to clashes between Google's belief in Internet liberty and the Chinese government's policy on Internet censoring. Two theories held by Google and China are competing with each other to explain the departure. Evidence of "highly sophisticated" cyber-attacks intended to gain access to the company's software code and the e-mail accounts of dozens of human rights activists, and the further limitation of free speech on the web in China, including the persistent blocking of law-breaking content and websites such as Facebook, Twitter, YouTube, Google Docs and Blogger, all violated Google's core corporate value, the Don't be Evil motto. On the other hand, the Chinese government argued that Internet censorship is practiced around the globe, and Google should have been aware of the policy before entering China's market. The retreat, therefore, should be attributed to some other economic and technical factors. This study compares these two competing theories and analyzes the logic behind them from various perspectives. Systematic integration of the two theories as well as their underlying perspectives would provide insight for Western Internet companies who wish to operate in China's market.

HD-07.3 [R] Strategic e-Commerce Model Driven-Architecture for e-Learning: TQM & e-ERP Perspective

Asif M Rashid; NUST, Pakistan

Zainab Riaz; NBS,NUST, Pakistan

Erol Sayin; Middle East Technical University, Turkey

Hammad A Qureshi; SEecs, National University of Science & Technology, Pakistan

Gokcan Yilmaz; Middle East Technical University, Turkey

Muiz ud Din Shami; National University of S&T (NUST), Pakistan

Hu Ping Ping; Peking University, China

Innovation and value proposition in distance-learning programs (e-learning programs) is a multifaceted-activity with enormous dimensionality. The implementation of information communication technology (ICT) and enhanced enterprise-resource planning (eERP) for smart-campus has emerged as inevitability for industrial competitiveness in smart-factories as per the dictates of total quality management (TQM). The philosophy of productivity management and concurrent engineering stipulates a competitive framework for e-learning for dissemination and absorption of knowledge by the intelligentsia, technologists and students. Conversely, competitiveness in today's global village demands an innovative and systems approach for improving the learning curves in a virtual environment. The e-learning-programs have numerous inherent perplexities since in every virtual classroom there is a much higher probability to interact with orthogonal cultures that too with multiple-intelligences. This paper proposes a conceptual strategic-planning framework for diffusion of innovative in a distance-learning program (Course-Technovation). The framework is based on literature review and field visits encompassing integrated E-commerce model-driven architecture embedded with business intelligence and coupled with eERP-design functionalities.

HD-08 R&D Management-5

Thursday, 8/4/2011, 14:00 - 15:30

Room: Council Suite

Chair(s) Frederick Betz; Portland State University

HD-08.1 [R] Outsourcing of R&D: Chances and Risks

Stephan Buse; Hamburg University of Technology, Germany

Paulius Armonaitis; Hamburg University of Technology, Germany

Since the 1970s, the function of internal R&D has been changing. Organizations have increasingly recognized that specialized R&D service providers can not only provide short-term benefits, but also supplement the existing in-house functions and provide learning opportunities. Thus, an increasing number of firms have been contracting out parts of their R&D. In Japan, for example, industrial R&D outsourcing expenditures have more than doubled between 1986 and 1998. Similar trends were observed in Germany and the USA.

Yet the changes, at least to the extent of R&D outsourcing, have not been uniform across industries. Different surveys show a tendency to bipolarization. While in some industries R&D outsourcing has become widely accepted among established companies, other industries have only begun to think about this issue. Based on five international case studies, this paper aims to contribute to a rather scarce pool of research into this topic by providing some insights about how the outsourcing of R&D has been implemented in practice, and by exposing some of its chances and risks through the analysis of critical success factors. Because further case analyses will be integrated during the following months, it is still work in progress.

HD-08.2 [A] R&D Portfolio Management: The Case Study of a Big Energy Company in Brazil

Mariana Pfitzner; State University of Campinas, Brazil

Ruy Quadros; State University of Campinas, Brazil

Portfolio management is a process that belongs to innovation management, whose objective is to translate the company's technology strategy. Portfolio management entails the systematic evaluation, selection and prioritization of R&D projects in the organizational context. The aim of this article is to discuss the use of tools for managing the R&D portfolio in the Brazilian electrical sector, using the case study of an energy distribution company as an analytical support. The Brazilian electrical sector was chosen due to the significant resources invested in R&D over the last 10 years, which surpassed US \$1 billion. In this sector, investment in research projects and guidelines for their completion are enforced by law. Otherwise, energy companies would not invest in R&D; they would rather buy equipment and systems from international suppliers. For this reason, the government agency ANEEL (Agencia Nacional de Energia Eltrica) enforces Brazilian energy companies to invest in R&D, aiming at the creation of a national innovation system. Through this, companies are obliged to invest around 0.5 percent of their EBTs (earning before taxes) in R&D projects. The execution of these projects is also strongly supervised by ANEEL, which guarantees that their results will turn into new products, patents, job creation, tariff reduction and operational efficiency for the company. Then, R&D projects do not only pursue technology risk but also the so-called regulatory risk. If projects are not accomplished with the government criteria, energy companies may be strongly penalized. In order to avoid such regulatory risk, companies shall implement portfolio management tools to guide their technology strategies. Regulatory risk should be prioritized in the evaluation and selection of research projects. Hence, the company's R&D portfolio must be balanced in such a way that the expectations of all stakeholders, namely, society, government and the company's board, are attended. Therefore, the use of portfolio management tools like technology roadmaps and strategic baskets communicate a company's strategy to its external R&D partners and help it manage regulatory risks much better. In the end, this article shows methods of selection and prioritization of R&D projects, which were developed by a big energy company. The methodology used in this article includes a literature review and interviews carried out with the innovation management area of the selected company. The results help the authors make practical suggestions to support the R&D portfolio management of all energy companies whose research activities are also regulated.

HD-08.3 [R] The Position of Brazil on the Run for Cellulosic Ethanol: Mensuration by S&T and R&D Programs

Iraci Joao; University of São Paulo, Brazil

Geciane Porto; University of São Paulo, Brazil

Simone Galina; University of São Paulo, Brazil

Although Brazil masters the technology of producing cutting edge ethanol, its position is jeopardized by the possibility of the production of cellulosic ethanol in commercial scale competitively. Therefore, the present research is intended for (i) verifying the results of scientific and technological efforts made by countries which develop cellulosic ethanol, (ii) focusing innovation networks, comparing BIOEN and CTBE, the two main Brazilian R&D programs to Biomass Program, to the United States, the reference country. It was listed science and technology indexes on Web of Science and Esp@cenet bases, and out of a

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total of 95 patent applications and 403 papers published. It is noticed a considerable backwardness in what concerns Brazil, with regional state operations and low involvement by the private sector on the networks studied, that is, two Brazilian companies and 117 American ones, which reduces the chances of Brazil to master this new technology path. As study limitation, it is important to highlight its exploratory characteristic.

HD-09 Technology Transfer-3

Thursday, 8/4/2011, 14:00 - 15:30

Room: Directors Suite

Chair(s) Dilek Cetindamar; Sabanci University

HD-09.1 [A] Developing A Process of Detecting Time-Lag Coefficients of Technology Licensing Data of U.S. Research Institutions

Jisun Kim; Portland State University, United States

Tugrul U Daim; Portland State University, United States

Timothy R Anderson; Portland State University, United States

This study examines the issue of how to model the time lags in university technology licensing. For example, research expenditures in one year are unlikely to result in patents or startups in the same year but instead may take several years to come to fruition. Simulated data is used to compare different econometric approaches rarely applied in the field of engineering management. The results provide an approach detecting and modeling time-lag coefficients of the input and output variables of the university technology licensing process.

HD-09.2 [A] Total Time-Lag Factor of Technology Licensing Data of U.S. Research Institutions Incorporating Multiple Paths in the Licensing Process

Jisun Kim; Portland State University, United States

Tugrul U Daim; Portland State University, United States

Timothy R Anderson; Portland State University, United States

Performance evolution of universities' licensing practices has been a favorable interest in literature. However, the existing studies implicitly or explicitly state their limitation of ignoring time-lag effects of the licensing variables such as expenditure, patents, and start-up licensing income. A statistics process detecting time-lag coefficients of licensing variables of U.S. research institutions was developed by the authors of a previous study which provided insights of the time-lags of all the licensing variables. This study follows up the previous study and suggests an approach incorporating multiple paths in the licensing process with the time-lag coefficients. The time-lags identified from the previous study include both direct and indirect relationships presenting time duration among licensing activities. As a result, multiple time-lag relations are involved in multiple paths from a licensing activity to another activity. In order to use the identified time-lag effect for the evaluation of the entire licensing process, an approach to connect the lag effects of all other licensing variables to the output variable at the final licensing process is required. For this purpose, this study defines a time-lag transform function which is applied for all possible licensing paths, and generates total time-lag factored licensing data.

HD-09.3 [R] Innovation Service Platform: Collaboration Based on Contest and Strategy Resources

Shu Wang; Zhejiang University, China

Jin Chen; Zhejiang University, China

Fang Xie; Zhejiang University, China

With providing a practical view of the current position of intellectual property, this paper notes the differing problems that need addressing in R&D and technology transfer in China. For analyzing how to bridge public and private, and science and business, this study presents several cases that incorporate the main mechanisms and processes necessary for stimulating innovation and creation of technology. Specifically, the paper points to the increasing value of R&D crowdsourcing based on innovation contest through accessible innovation platform service. For how these services achieve the performance, this study presents such a tool in the form of a function model that helps in understanding what types

of innovations can potentially choose and which innovative activities and collaborations are most clearly associated with improved performance systematically and strategically. Then we close by suggesting applications to technology transfer and IP services for future innovation in developing countries.

HD-10 Technology Diffusion

Thursday, 8/4/2011, 14:00 - 15:30

Room: Studio Suite

Chair(s) Jacques G Bourque; Portland State University

HD-10.1 [R] Adoption Dynamics of Increasing-Return Technologies in Systemic Contexts

Saku J Makinen; Tampere University of Technology, Finland

Juho Kannianen; Tampere University of Technology, Finland

Ozgur Dedehayir; Tampere University of Technology, Finland

This paper examines the adoption dynamics of increasing-return technologies in a systemic business ecosystem context. Many systemic, complex technologies have shown to exhibit increasing returns to adoption in that the initial increase in adoption leads to increasing experience with the technology and improvements in technology and its utilization, which further lead to increasing adoption. In systemic context our empirical study examines the adoption dynamics of technology utilization provisioned by another sub-system industry's actors. We hypothesize that the more a technology is utilized initially, the faster the adoption would be due to experience gained in utilizing technology. Simultaneously, we hypothesize that as the technologies become more complex as they build on existing knowledge, the dynamics of adoption would slow down since the experience accumulation becomes more difficult and resource consuming. Our original empirical setting considers some 2,890 products utilizing 54 different technologies and platforms in the computer industry. Our modeling results show that technological improvements between successive technologies influence the companies' adoption of the successive technology in a way that the more there is improvement performance-wise, the less the firms adopt the technology. However, we also find some anomalies contrary to our initial expectations and discuss the managerial and research implications.

HD-10.2 [R] A Fuzzy DEMATEL based Lead User Method for Deriving Factors Influencing the Acceptance of an Innovative Technology

Chi-Yo Huang; National Taiwan Normal University, Taiwan

Yi-Fan Lin; National Taiwan Normal University, Taiwan

Gwo-Hshiung Tzeng; Kainan University, Taiwan

The Smart Phone emerged recently as one of the most popular consumer electronics devices. Consequently, analyzing and predicting the consumer's purchasing behaviors of Smart Phone for fulfilling customer's needs has become an indispensable task for marketing managers of the mobile phone vendors. However, the predictions are not easy. The consumer electronics technology evolved rapidly. Market leaders are also competing in the same segmentation by providing similar products which further complicated the competitive situation. How the consumers' acceptance of future Smart Phones can be analyzed and predicted had become an important but difficult task. In order to accurately analyze the factors influencing consumers' acceptance of Smart Phone and predict the consumer behavior, the technology acceptance model (TAM) and the lead user method (LUM) will be introduced. Further, the differences in the factors being recognized by both lead users as well as mass customers will be compared. The possible customers' needs will first be collected and summarized by reviewing literature on the TAM. Then, the causal relationship between the factors influencing the consumer behaviors being recognized by both the lead users as well as the mass customers will be derived by the fuzzy DEMATEL (FDEMATEL), analytic network process (ANP) and the structural equation modeling (SEM), respectively. An empirical study based on the Taiwanese Smart Phone users will be leveraged for comparing the results being derived by the FDEMATEL, the ANP and the SEM. According to the analytic results being derived by using the FDEMATEL and ANP-based LUM, the perceived

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usefulness, perceived ease of use, attitude and behavioral intention were recognized as the most important factors for influencing the user's acceptance of Smart Phone. The research results can serve as a basis for the marketing manager's strategy definitions. The proposed methodology can be used for analyzing and predicting customers' preferences and acceptance of high technology products in the future.

HD-10.3 [R] Status and Prospects of Technology Diffusion Research Based on Patent Information

Lu-Cheng Huang; Beijing University of Technology, China

Ning Wang; Beijing University of Technology, China

A comprehensive literature review of technology diffusion is provided. The current research and achievements of technology diffusion using patent data and patent analysis methods are described. Then the deficiencies in current analysis methods, as well as the improvements, that should be made in the further work are illustrated. Finally, a preliminary research frame of technology diffusion based on patent information is presented.

HE-02 PICMET 2012 Planning Session

Thursday, 8/4/2011, 16:00 - 17:30

Room: Pavilion West

Chair(s) Timothy R Anderson; Portland State University

Dilek Cetindamar; Sabanci University

Tugrul U Daim; Portland State University

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

This panel session will provide an opportunity to give feedback on PICMET '11 and to get involved in the planning for PICMET '12 and '13 conferences. PICMET '12 will be held July 29-August 2, 2012, in Vancouver, British Columbia, Canada.



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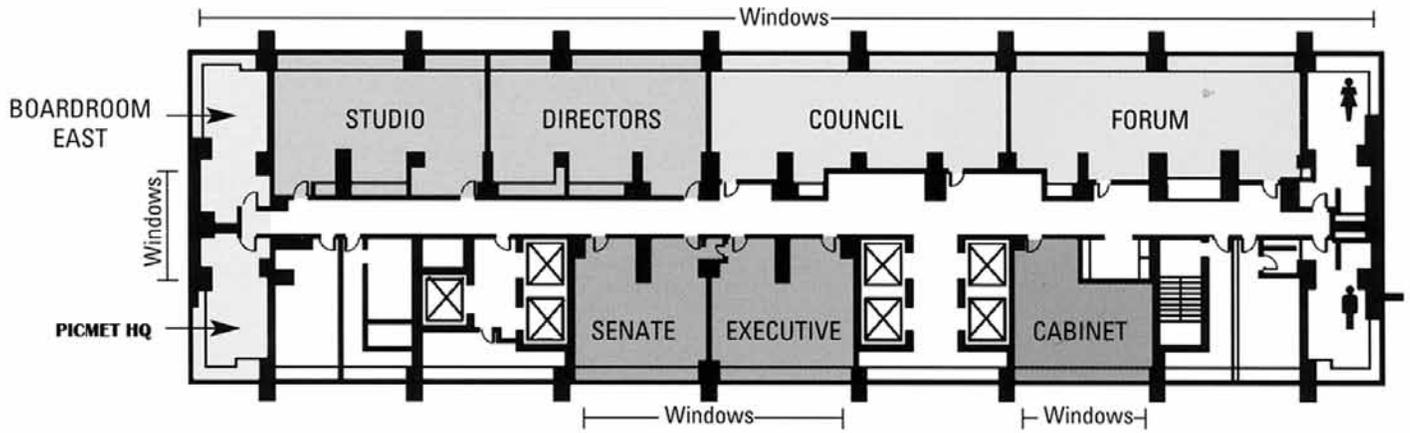
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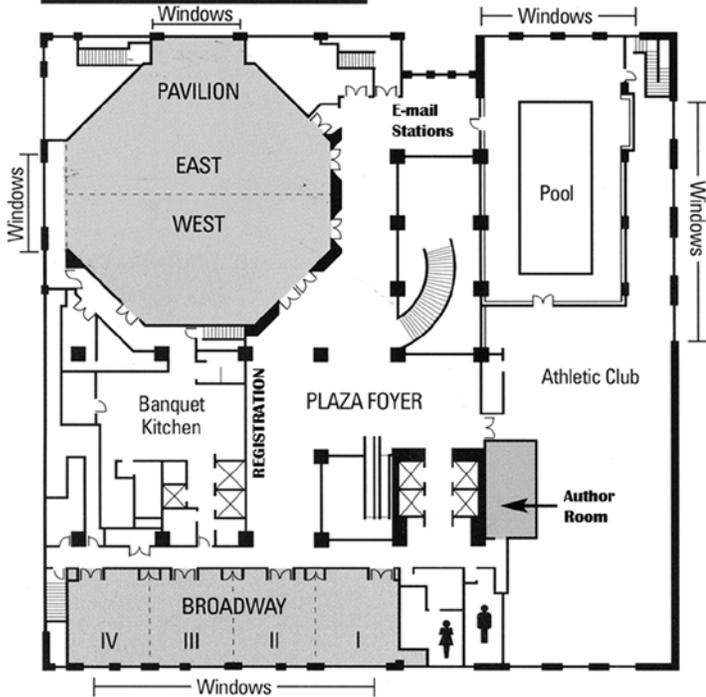
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