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Dear PICMET Guests:

It is a great pleasure for us to welcome you to PICMET ’06.

Rapidly developing technologies in the second half of the 20th century have enabled the world to be a large global enterprise in a short time. Supply chains are covering the entire world; services for local customers are being originated everywhere around the globe; competitors are entering the field regardless of where they are located. Globalization has become a reality rather than a buzz word. If we want to characterize the future of the world as it is seen in the first half of the 21st century, it is hard to find a term more fitting than the “globalized future.”

What started as off-shore manufacturing has been expanded to the outsourcing of complete operations including R&D, engineering, services and maintenance. As a result, the commercialization of technologies is getting faster; and cost efficiency, by itself, is losing its competitive value. Low wages are attracting capital to flow into countries with low standards of living, but as the wealth generated by that flow starts to improve the living conditions, wages are rising, and another part of the world is emerging as a more cost competitive region in the global economy.

In this pattern of continuous shifts of the world’s wealth, the only way to develop competitive advantage is to be innovative and to stay ahead of the curve. The global economy is making it imperative that nations, industries and companies must be creative and innovative if they are to maintain a competitive edge and continue to survive. That is what is ahead of us in the global future. That future is being shaped by technology, and the only way to manage that future is to have effective technology management capability.

We see innovation as the key to success in the global future, and we see an opportunity for technology management to make a significant impact on the world economy by shaping that future. That is a big challenge for the leaders and emerging leaders in the technology management field. Recognizing this emerging challenge, the PICMET ’06 Conference has taken a bold step and examined the role of technology management for the global future.

Immediately after the PICMET ’04 Conference in Korea, countries in Europe, the Middle East, Asia and South America started submitting proposals to invite PICMET ’06. The proposal from Prof. Dr. Nuket Yetis, the Acting President of TUBITAK, the Turkish Scientific Council, was selected by the PICMET Executive Committee, and Turkey was chosen as the location for the 2006 Conference. The growth of the Turkish economy in the recent past, the ambitious decision to increase the national R&D expenditures nearly 10 times over the next seven years, the dynamism of the developing technology-based industries in Turkey, and the critical location of Turkey between Asia and Europe as a key to the globalized economy played important roles in that decision.

PICMET, celebrating its 15th Anniversary in 2006, is the largest, and arguably the most influential, conference on technology management in the world. The Department of Engineering and Technology management at Portland State University organized the PICMET ’06 Conference with the assistance of the Local Arrangements Committee (LAC) in Istanbul. In addition, hundreds of people participated in planning and organizing PICMET ’06. The International Advisory Council helped to define the critical issues to be addressed by the conference. The Board of Directors provided strategic directions. The Country Representatives provided linkages between PICMET and the regions they represent. The Program Committee conducted the double-blind reviews of the submissions. We acknowledge all the individuals and organizations which supported PICMET ’06, and extend our deep gratitude and thanks to every one of them. We also hope that the ever-increasing enthusiasm of all these people has resulted in a conference that will be a truly rewarding experience for our guests.

(continued on next page)
329 papers were submitted to this year’s conference from authors representing about 200 universities and 100 industrial corporations, research institutes and government agencies in more than 40 countries. After being subjected to a double-blind refereeing process, 256 were accepted for inclusion in the conference. About 80 percent of them are research papers indicated with an [R] preceding their title in this Bulletin, and 20 percent are industry applications indicated with an [A]. Keynotes are indicated with a [K].

Altogether, there are 108 sessions with more than 300 presentations, including keynote speeches, tutorials, panel discussions and special sessions, in this year’s conference.

The papers scheduled for presentation at PICMET ’06 are clustered into 35 major tracks, listed alphabetically below.

Collaborations
Cultural Issues
Decision Making
E-Business
Emerging Technologies
Entrepreneurship and Intrapreneurship
Environmental Issues
Globalization
Information/Knowledge Management
Innovation Management
Intellectual Capital
Manufacturing Management
New Product Development Management
New Venture Management
Outsourcing
Project/Program Management
R&D Management
Resource Management
Science and Technology Policy
Software Process Management
Strategic Management of Technology
Supply Chain Management
Technical Workforce
Technology Adoption
Technology Assessment and Evaluation
Technology Diffusion
Technology Forecasting
Technology Management Education
Technology Management in Biotechnology
Technology Management in Services
Technology Management in Telecommunication
Technology Marketing
Technology Planning
Technology Roadmapping
Technology Transfer

PICMET ’06 has two publications: This Bulletin gives a synopsis of the conference with an up to 200-word abstract of each presentation. The Proceedings is a CD-ROM 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.

We believe the PICMET ’06 Bulletin and Proceedings contain some of the best knowledge available on technology management for addressing the challenges and opportunities of the globalized future. We hope they will contribute to the success of technology managers and emerging technology managers throughout the world.

We are pleased and proud to hear from the participants that every PICMET Conference is better than the previous one in terms of its content, quality, and the impact it is making on the technology management field. We believe the PICMET ’06 Conference will have a major impact on the growth of the field and will contribute significantly to research, education and implementation of technology management. We hope you will find it beneficial and enjoyable.

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

Sincerely,

Dundar F. Kocaoglu
President and CEO
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Portland State University

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

Dr. Bulent Atalay, Prof., Univ. of Mary Washington and the Univ. of Virginia – USA
Dr. Daniel Berg, Professor and Former President, RPI – USA
Dr. Frederick Betz, Adjunct Professor, Portland State University – USA
Dr. Joseph Bordogna, Deputy Director, NSF – USA
Mr. Jim Coonan, Chairman and CEO, Kentrox, Inc. – USA
Dr. Youngrak Choi, Chairman, Korea Research Council of Public Science & Technology, Korea

Dr. Joseph W. Cox, Oregon University System Distinguished Service Professor – USA
Dr. Robert D. Dryden, Dean, Maseeh College of Engineering & Computer Science, Portland State University – USA
Dr. Gunnar Hambraeus, Royal Swedish Academy of Engineering Sciences – Sweden
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Mr. Donald VanLuvanee, Former Chairman and CEO, ESI Corp. – USA
Dr. Nejat Veziroglu, Professor, University of Miami – USA
Dr. Eric von Hippel, Professor, MIT – USA
Dr. Seiichi Watanabe, Executive General Manager, Terumo Corporation – Japan
Dr. Rosalie Zobel, The European Commission – Belgium
PROGRAM COMMITTEE
The Program Committee consisted of 74 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.

LOCAL ARRANGEMENTS COMMITTEE (LAC)
Ersin Uygur, TUSSIDE (LAC President)
Deniz Kasap, TUSSIDE (LAC Coordinator)

LAC MEMBERS
Ulas Alper, Oyak Turizm
Ahmet Aydede, Global Tanitim
Elif Baktir, TEKIM
Nuri Basoglu, Bogazici University
Ferhan Cebi, Istanbul Technical University
Dilek Cetindamar, Sabanci University
Sirin Elci, focus:innovation
Zeynep Gumsyazici, Roche Pharmaceuticals
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ACKNOWLEDGMENTS

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Sabanci University
Technopolis Group
Yeditepe University
STUDENT PAPER AWARD

The number of students doing significant research in the area of Engineering and Technology Management was demonstrated by the 25 nominations received. The selection of the award winners was difficult because of the excellent quality of all the submissions, but one paper stood out for its contribution to the field of Engineering and Technology Management.

AUTHOR
Karim R. Lakhani

ADVISOR & CO-AUTHOR
Eric von Hippel

UNIVERSITY
Massachusetts Institute of Technology, Cambridge, Massachusetts, USA

PAPER TITLE
“Broadcast Search in Problem Solving: Attracting Solutions from the Periphery”

ABSTRACT
The purpose of this study is to explore an alternative mechanism of problem solving that focuses on broadcasting problems to diverse and peripheral problem solvers, what I call broadcast search. Broadcasting problems is a radical departure from traditional problem solving as it involves problem holders engaging in as little problem-solving as possible - instead they attempt to interest a heterogeneous set of external actors in creating solutions to internal problems. Analysis of 166 previously unsolved science problems, originating from the R &D labs of 26 firms, revealed a 29.5% resolution rate via broadcast search. The probability of a problem being solved was significantly correlated with the heterogeneity in the scientific interests of the solvers submitting solutions and their relative specialization. Broadcast search also appears to be an economically efficient problem solving mechanism. It involves low costs for solution seekers relative to the costs of internal R&D. Most of the solvers based their submissions, partially or fully, on previously developed solutions from their own and/or someone else’s work, implying an efficient re-use and transformation of existing knowledge and solutions.

Dr. Karim R. Lakhani joined the Technology and Operations Management Unit at Harvard Business School as an assistant professor in July 2006. He specializes in the management of technological innovation and product development in firms and communities. His research is on distributed innovation systems and the movement of innovative activity to the edges of organizations and into communities. He has extensively studied the emergence of open source software communities and their unique innovation and product development strategies. He has also investigated how critical knowledge from outside of the organization can be found and put to use inside for innovation in the biotechnology, life sciences and industrial chemicals industries. He is co-editor of “Perspectives on Free and Open Source Software” (MIT Press, 2005).

Dr. Lakhani was awarded his PhD in management from the Massachusetts Institute of Technology (MIT) in 2006. He also holds a M.S. degree in Technology and Policy from MIT (1999), and a B.S. degree in Electrical Engineering and Management from McMaster University in Canada (1993). He was a recipient of the Aga Khan Foundation International Scholarship and a four-year doctoral fellowship from Canada’s Social Science and Humanities Research Council.
MEDAL OF EXCELLENCE

Initiated at PICMET ’04 in Seoul, Korea, the Medal of Excellence award is given for extraordinary achievements of individuals in any discipline for their outstanding contributions to science, engineering and technology management. The 2004 recipients were Dr. Daeje Chin, Minister of Information and Communications, Seoul, Korea; Dr. Kiyoshi Niwa, Professor in the Department of General Systems Studies at the University of Tokyo, Japan; and Rosalie A. Zobel, Director of “Components and Systems” in the Information Society and Media Directorate-General of the European Commission. The 2005 recipient was Bob Colwell, President, R & E Colwell and Associates, and former Fellow, Intel Corporation.

PICMET ’06 Awardees in Alphabetical Order

Dr. Frederick Betz, Former Program Officer, NSF

Dr. Frederick Betz recently retired from the Graduate School of Management and Technology at the University of Maryland University College. Previously, he was a program officer in engineering at the National Science Foundation. He received his Ph.D. in physics from the University of California at Berkeley, after which he changed fields to management science and taught in business schools. His research has been in management science and in the management of engineering and technology. His recent books include Managing Technology, Strategic Technology Management, Managing Technological Innovation, and Executive Strategy: Strategic Management and Information Technology.

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

Dr. Fariborz Maseeh is a worldwide expert in micro-electro-mechanical systems (MEMS). After earning a doctorate in engineering from MIT, Maseeh founded IntelliSense in 1991. It was the first company of its kind for the custom design, development and manufacturing of next generation MEMS devices – tiny, computer-controlled chips used in products ranging from cardiac pacemakers to aircraft landing gear. Under Maseeh’s leadership, IntelliSense became the world’s fastest-growing MEMS corporation, twice named to both The New England Technology Fast 50 and The Forbes Fast 50. Maseeh has published numerous scientific articles on topics such as business strategy, fabrication technologies and design and software for MEMS, in addition to securing a number of patents and trademarks. He currently serves on the boards of several technology firms, engineering schools—including the University of California at Irvine (UCI) and the University of Southern California—and non-profit organizations such as the Boys & Girls Club of Boston and the Children’s Hospital of Orange County Foundation for Children. Maseeh considers himself a “venture philanthropist,” applying business concepts to his philanthropy. He considers his gifts as investments and looks for causes with clear objectives and broad markets. Maseeh serves as a UCI Foundation trustee and sits on engineering advisory boards at UCI’s Henry Samueli School of Engineering, the University of Southern California, and Portland State University (PSU). He has endowed several chairs in engineering disciplines at MIT and PSU. He is chairman of the Children’s Hospital of Orange County Foundation and serves on a number of community boards, including the Boys and Girls Club of Boston. As the recipient of the prestigious 2006 Ellis Island Medal of Honor for his outstanding contributions to America, he joins a remarkable group of awardees, including six Presidents, several Senators and Congressman and Nobel Prize Winners.

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

Dr. Veziroglu graduated from the City and Guilds College, the Imperial College of Science and Technology, University of London, with degrees in Mechanical Engineering (A.C.G.I., B.Sc.), Advanced Studies in Engineering (D.I.C.) and Heat Transfer (Ph.D.). After serving in some Turkish government agencies as a Technical Consultant and Deputy Director of Steel Silos, and then heading a private company, he joined the University of Miami Engineering Faculty and served as the Director of Graduate Studies, Chairman of the Department of Mechanical Engineering, Associate Dean for Research and Director of the Clean Energy Research Institute. Since May 2004 he is on leave from the University of Miami and is establishing UNIDO-ICHET (United Nations Industrial Development Organization – International Center for Hydrogen Energy Technologies) in Istanbul, Turkey, as its director. He has published some 350 scientific reports and papers, edited 200
PICMET's Leadership in Technology Management award recognizes and honors individuals who have provided leadership in managing technology by establishing a vision, providing a strategic direction, and facilitating the implementation strategies for that vision. Past recipients include Dr. Andrew S. Grove, CEO of Intel; Norman Augustine, Chairman of Lockheed Martin; Jack Welch, CEO of General Electric; Dr. Modesto A. Maidique, President of Florida International University; Carleton S. Fiorina, Chairman and CEO of Hewlett-Packard Co.; Donna Shirley, Manager of the Mars Exploration Program; Kwan Rim, Chairman of Samsung Advanced Institute of Technology (SAIT); Morris Chang, Founding Chairman, Taiwan Semiconductor Manufacturing Company Ltd. (TSMC); Prof. Dr.-Ing. Dr. Sc. h.c. Bacharuddin Jusuf Habibie, former President, Indonesia, and founder and chairman, The Habibie Center; Dr. Gunnar Hambraeus, member of the Swedish Royal Academy of Science and former President and Chairman, Royal Swedish Academy of Engineering Sciences; Dr. Pairash Thajchayapong, Permanent Secretary, Ministry of Science and Technology—Thailand; and Dr. Eric von Hippel, Professor and Head of the Technological Innovation and Entrepreneurship Group, Sloan School of Management, Massachusetts Institute of Technology.

Veziroglu has been the recipient of several international awards, including the Turkish Presidential Science Award, 1975; Honorary Professorship, Xian Jiaotong University, Xian, China, 1981; I. V. Kurchatov Medal, Kurchatov Institute of Atomic Energy, Moscow, U.S.S.R., 1982; Energy for Mankind Award, 1986, Twenty-Five Years' Service Award, American Nuclear Society, 1987; Turkish Superior Service to Mankind Award, 1991; Honorary Doctorate, Anadolu University, Eskisehir, Turkey, 1998; Honorary Member, Argentinean Academy of Sciences, 2000; and Honorary Doctorate, Donetsk State Technical University, Donetsk, Ukraine, 2001. In 2000, he was nominated for the Nobel Prize in Economics for both envisioning the Hydrogen Economy and striving towards its realization.

PICMET '06 Awardees in Alphabetical Order:

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

Dr. Youngrak Choi is Chairman of the Korea Research Council of Public Science & Technology (KROP). From 2002-2005 he was the president of STEPI (Science & Technology Policy Institute) in South Korea. He was the president of the Korean Society for Technology Management and Economics (KOSTME) from 2002-2003, and from 1999-200 he was the Vice President of STEPI. From 1997-1998 he was the head of the Dept. of Policy and Planning at the Korea Institute of Science and Technology (KIST). Dr. Choi received a B.S. in Forestry from Seoul National University; an M.A. in Public Administration from Seoul National University; and a Ph.D. in Public Administration from Roskilde University in Denmark. He is the President of the Korean Society for Technology Management & Economics and a member of the Presidential Advisory Council for Science & Technology.
Dr. Tsuneo Nakahara, Adviser to CEO (past Vice Chairman) of Sumitomo Electric Industries, Ltd.

Since joining Sumitomo Electric Industries, Ltd., in 1953, Dr. Tsuneo Nakahara has been a major force in the conception, design and manufacturing of optical fiber and cables. Under his guidance, the company developed the vapor phase axial deposition optical fiber manufacturing technology, which has become the standard in Japan and is one of the top three fiber manufacturing processes worldwide. His team also designed extremely low-loss optical fiber with pure silica as the core and fluorine in the clad. This technology was widely used for undersea long-distance cables. He also has been a leader of important research into multi-count optical fiber, leaky coaxial cable, milliwave and beam waveguide, and more. An executive advisor to the CEO of Sumitomo Electric Industries, Ltd., Dr. Nakahara holds nearly 300 patents in the United States and Japan combined, and has published over 100 papers. He has received numerous awards, including an IEEE Third Millennium Medal, the Okabe Memorial Award from the Institute of Electronics and Communications Engineers of Japan, and the Blue Ribbon Medal from the Emperor of Japan. Dr. Nakahara won the 2002 IEEE Alexander Graham Bell Medal “for pioneering work on the design and development of manufacturing systems for optical fibers.” In recognition of his contribution to relations between the United Kingdom and Japan, Dr. Nakahara was appointed an Honorary Commander of the Most Excellent Order of the British Empire, by her majesty Queen Elizabeth II. He has been the CEO of the Nakahara Research Institute, Ltd. since 2006.

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

Prof. Dr. Ozdas served as the Founding Director of the Computer Centre in 1961; Founding Secretary General of the Turkish Scientific Council (TUBITAK) from 1964-1966; Science Board Member of TUBITAK from 1968-1972; Founding Director of Marmara Scientific and Industrial Research; President of the NATO Science Committee from 1973-1979; Board Member of Von Karman Institute and steering Committee Member of AGARD in 1973; Minister of State for Science and Technology from 1980-1983; and Professor at Istanbul Technical University, Department of Mechanical and Control Engineering, since then. He graduated from the Mechanical Engineering Faculty, Technical University, in 1946, with a Diploma in Engineering, then obtained the Diploma of the Imperial College, 1950; and Ph.D. from London University in 1951. He conducted a project at the Massachusetts Institute of Technology (MIT) in 1953 and served as an MIT Research Fellow from 1955-1956; then as a visiting Professor at Case Western Reserve University from 1953-1959; and became a professor at Istanbul Technical University in 1961. Prof. Ozdas is a member of Sigma Xi; President of the Turkish Organization for Automatic Control; and the author of several articles and books in various languages.

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

Edward B. Roberts is the David Sarnoff Professor of the Management of Technology at the Massachusetts Institute of Technology, where he long chaired the Sloan School’s Management of Technological Innovation & Entrepreneurship research and education programs. He was co-founder and co-chair of the MIT Management of Technology Program, a twelve-months mid-career Master’s Degree program for aspiring technology-based leaders. Professor Roberts founded and continues to chair the MIT Entrepreneurship Center, and has also co-directed the Sloan School’s International Center for Research on the Management of Technology. Over the past 40 years Dr. Roberts has become internationally known for his studies and active involvement in many aspects of technology management, including technology strategy, corporate venturing, product innovation management, and technology-based entrepreneurship. Roberts has also been a co-founder and/or director of numerous emerging technology companies (including Pugh-Roberts Associates, Medical Information Technology and Sohu.com) and venture capital funds (including the Zero Stage Capital group and CommonAngels). He has authored over 160 articles and eleven books, his favorite being Entrepreneurs in High Technology (Oxford University Press, 1991). Professor Roberts has four degrees from MIT in electrical engineering (B.S. and M.S.), management (M.S.), and economics (Ph.D.).
GENERAL INFORMATION

CONFERENCE FOCUS
As technology continues to be a dominant force in society, innovation is gaining increasing importance in developing and maintaining competitive advantage. Those who are able to create new ideas, develop new technologies and harness the capabilities generated by technologies are setting the standards and leading the way for the rest of the world. Global leadership in every field is shifting toward innovative use and effective management of technology. The key to leadership is resting in the management of the process of nurturing creative ideas, creating new technologies, developing new products and commercializing them in existing and new markets. In short, the technology-driven world is being defined by the way innovation is managed. Innovation management will be the critical challenge in the years to come. Those who succeed in it will be the emerging leaders in the technology-driven world; those who fail will cease to exist. Recognizing this enormous challenge, PICMET ’06 takes a bold step and examines innovation management in the technology-driven world.

WHO SHOULD ATTEND
Following the PICMET tradition, this high-impact conference 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 ’06 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 ’06 program consists of

- Workshops by experts on critical issues
- Plenary sessions by global leaders from industrial corporations, academic institutions and government agencies
- Research papers by cutting-edge researchers
- Applications papers by researchers and practitioners working on industry applications
- Panel discussions with interactions between panelists and the audience
- Tutorials on select topics by authorities in the field

PUBLICATIONS
There will be two publications at PICMET ’06:

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

The publications will be available to PICMET ’06 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
GENERAL INFORMATION

registration fee allows admittance to all technical sessions and Sunday, Monday and Tuesday evening social events.*

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

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

SESSION AND PAPER DESIGNATIONS

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

First digit shows the day
S: Sunday
M: Monday
T: Tuesday
W: Wednesday
H: Thursday

Second digit shows the time
A: 08:30–10:00
B: 10:30–12:00
C: 12:00–13:00
D: 13:00–14:30
E: 15:00–16:30
F: 17:00–18:30

Third and fourth digits show the room
01: Regency-1
02: Regency-2
03: Smyrna
04: Troy
05: Ephesus
06: Bizans
07: Tyana-1
08: Tyana-2

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 13:00 – 14:30 in Ephesus.

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 most current errata sheet for program changes that may affect your session and make sure it is noted on the outside of your room.
• 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 a computer, LCD projector, and screen. The Tyana Boardroom on the Mezzanine floor is designated as the Authors Room.

E-MAIL

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

PICMET VOLUNTEERS

PICMET Volunteers wearing white polo shirts with the PICMET logo will assist participants throughout the conference. If you need help in locating the room where your session will be held or finding a replacement bulb for the projector, 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.
TRANSPORTATION FROM ISTANBUL ATATURK AIRPORT

OYAK Turizm will provide meet-and-greet service for PICMET visitors coming to Turkey. The service includes a professional representative of the OYAK Turizm agency who will meet you holding a signboard with your name written on it and who will accompany you to the hotel. For cost information and further details, please visit:


Taxis are available at the airport.

There are shuttle busses between the airport and the city center. It is approximately a 5-minute walk from Taxim Square to the Hyatt Regency and Divan Hotels. Shuttles run every half-hour between 06.00—23.00, it takes approximately 40 minutes, and the cost is about $8 per person.

GENERAL INFORMATION ON TURKEY

AREA
779,452 sq km (300,948 sq miles)

POPULATION
69,757,000 (official estimate 2002)

POPULATION DENSITY
89.5 per sq km.

CAPITAL
Ankara. Population: 3,208,000 (official estimate 2002)

GOVERNMENT
A Republic since 1923. Head of State: President Ahmet Necdet Sezer since 2000. Head of Government: Prime Minister Recep Tayyip Erdogan since 2003.

LANGUAGE
Turkish is the language spoken in Turkey. However, English, French and German are also widely spoken in major cities and tourist areas.

RELIGION
99 percent of the Turkish population is Moslem. The remaining is composed of Orthodox Christians, Gregorian Christians, Catholic, Suryani and Protestant Christians, and Jews. Although most of the population is Moslem, Turkey is a secular country and everyone has freedom of religion and beliefs. No one can be forced to participate in religious ceremonies or rites against their will and no blame can be attached to anyone because of their beliefs.

here that the ancient Tigris and Euphrates rivers rise.
TIME
GMT + 2 (GMT + 3 from the last Sunday in March to the Saturday before the last Sunday in October)

USEFUL INFORMATION ABOUT TURKEY

BANKS
Open Monday—Friday, 09:00 to 17:00. You can also find banks in the arrival hall of Istanbul Ataturk Airport. You can easily find change offices in all of the cities and towns.

CLIMATE IN ISTANBUL
The climate in Istanbul is predominately mild with temperatures, even in winter, rarely sinking below freezing. Lightweight clothes are advisable in summer as it can become quite hot.

CREDIT CARDS
Major credit cards such as Visa and MasterCard are accepted everywhere. American Express and Diners Card are also acceptable at hotels and some restaurants and shops.

CURRENCY
The most convenient way to get money in Turkey is by using your home bank ATM/cash card or a credit card in a Turkish ATM/bancomat/cash machine.

If you want to exchange cash, many places will do it for you. Currency Exchange Offices (Doviz Burosu) are found in market areas. They offer better exchange rates than most banks and may or may not charge a commission (komisyon). Shop around for the best rate and the lowest (or no) commission.

The Turkish new lira is the current currency of Turkey and de facto state Turkish Republic of Northern Cyprus. Introduced on January 1, 2005, it is equivalent to 1,000,000 Turkish old lira (which remained valid until the end of 2005) and divided into 100 new kurush.
Symbol: YTL (Yeni Turk Lirasi)
The ISO 4217 code of Turkish new lira is “TRY.”
Banknotes: 100, 50, 20, 10, 5 and 1 YTL
Coins: 1 YTL and 50, 25, 10, 5, and 1 new kurush.

MOBILE TELEPHONE

PLACES TO WORSHIP
Istanbul has numerous places of worship belonging to three major world religions. Most Turks are Moslems. There are 450 Mosques in the city. The Christian and Jewish communities in Turkey have been recognized since the conquest of Istanbul. There are at least 32 Armenian Orthodox, 16 Roman Catholic, 80 Greek Orthodox, 2 Bulgarian Orthodox, and 4 Protestant churches. In addition, there are 15 synagogues and several active monasteries in the city.
POST & TELEPHONE

All post offices in Turkey bear the yellow “PTT” or “Telekom” sign. Larger and central offices are open from 08:00-17:00.

IDD is available. Country code: 90. Outgoing international code: 00. There is an extensive internal telephone network, but often an interpreter will be needed for more remote areas. To phone from PTT telephone booths, which are found in all areas, telephone cards and tokens are used. Local, intercity and international calls can be made from all PTT offices.

Public telephones have two different systems: Phonecards and Tokens. They are both sold at Turkish Telecom offices. Tokens are called “jeton” in Turkish. Phone cards are in 3 different amounts. All over Turkey, phone numbers consist of two sections: area code (3 digits) and the number itself (7 digits). During weekdays from 18:00 to 06:00 and on weekends calls are less expensive.

PRESS

The English-language daily newspaper is The Turkish Daily News.

SHOPPING

In Turkey you can buy special handicrafts which vary from one region to another. Authentic bazaars, rug (carpet) and kilim workshops besides other traditional handicraft centers offer pleasant shopping. The most well-known shopping center is Kapalicarsi, The Grand Covered Bazaar of Istanbul. The Spice Bazaar is also in the neighborhood.

World famous Turkish rugs and kilims are incomparable with respect to quality and beauty. You will certainly have great pleasure in selecting and buying different rugs woven with various styles in different parts of Turkey. Turkish leather and textile products reflecting the latest fashion attract mall visitors with their reasonable prices. The origins of jewelry go back to the Neolithic age in Anatolia. Several designs have been created combining ancient styles with those of the future. Silver and gold jewelry with precious stones are the most popular items to shop for in Turkey.

Numerous art and antique galleries are located in the neighborhood of the Grand Bazaar that sell rare pieces of Ottoman engravings, silverware, needlework, illuminations, ceramics and tiles, paintings and contemporary art. Other popular items are hand-painted ceramics and porcelain originating from Iznik, Istanbul & Kutahya.

A number of souvenir shops offer a wide range of popular gift items at attractive rates, such as laces, kanavice (canvas embroidery), yemeni (color print cotton scarves), copperware and gifts made of brass and marble.

Shops and fashion boutiques are located at different malls in several cities: Galleria Atakoy, Akmerkez, and Capitol in Istanbul; Karum and Atakule in Ankara; and Oasis in Bodrum. In these malls you can easily find modern shopping items at very attractive rates besides well-known brands from fashion centers of the world.

Shopping is very easy since you can use all major credit cards if you do not wish to pay cash. Many shopkeepers and other staff in retail shops speak English and they are attentive and willing to show and introduce their goods. Shopping in Turkey is part of a great vacation.
TAP WATER
Tap water is safe to drink in Istanbul, but we recommend drinking bottled water.

TAXI
Taxis are yellow. They all have taximeters and it is compulsory to use these. The rates per km are fixed and there is a surcharge of 50 percent from midnight to 06:00 am. You can distinguish the difference by the lights on the counter: one red light means day rate; two red lights mean night rate.

TIPPING POLICY
Waiters, hotel personnel, and bellboys are usually tipped. It is customary to leave an extra 5-10 percent for waiters in restaurants. Baggage handlers expect a tip of $1 per bag. Taxi drivers do not expect a tip.

VOLTAGE
Turkey operates on 220 volts, 50 Hz, with round-prong European-style plugs that fit into recessed wall sockets/points. Four- and five-star hotels often provide North American style 120 volts, 60 Hz flush-mounted sockets (points) for North American flat-prong plugs.
Check your appliances before leaving home to see what you will need to plug in when you travel in Turkey. Many appliances with their own power adapters (such as laptop computers and digital cameras) can be plugged into either 120-volt or 220-volt sockets/points and will adapt to the voltage automatically (but you will need a plug adaptor that can fit into the recessed wall socket/point).
If you would like to attend any or all of the daily tours, please print and fill out the tour reservation form by visiting [http://www.picmet06.com/pages/daily_tours.aspx](http://www.picmet06.com/pages/daily_tours.aspx), and send it by fax to Mr. Ulas Alper (fax: +90 212 245 06 16).

**DAILY TOUR 1**

**SUNDAY, 09 JULY;**

10:00 – 18:45*

**COST PER PERSON:** $100.00

Guests will meet in the Hyatt Regency lobby at 10:00 and leave the hotel for an entertaining excursion. At 10:40 a.m. we will visit Dolmabahce Palace, which was the residence of the Ottoman Sultans in the 18th and 19th centuries. It was also the home of Ataturk, founder of modern Turkey, in his last days.

At 12:00 we will leave the palace for lunch at Sabirtasi Restaurant, where fabulous traditional Turkish meals are served.

After lunch, we will go on a walking tour of Beyoglu, a lively section of modern Istanbul, where we will see the St. Antoine Church, Pera Palace, French Street, and the nostalgic tramway.

At 16:30 we will go to the Whirling Dervish Hall for an unforgettable show of the Mevlevis. At 17:00, The Mevlevi show group will present its amazing sem’a (whirling ritual) performance. After the show we will return to the hotel, arriving there at 18:45.

**DAILY TOUR 2**

**MONDAY, 10 JULY;**

10:00 – 18:00*

**COST PER PERSON:** $70.00

At 10:00 we will meet in the Hyatt Regency lobby and depart for Chora Museum (Church of St. Savior), where amazing Byzantine mosaics dating back to the 14th Century can be admired. We will leave the museum for lunch at Lale Restaurant in Haskoy, which is located next to the Rahmi Koc Museum. At Lale Restaurant guests can taste a variety of traditional Turkish casseroles. Lunch will be served at 13:00 and will be followed by a visit to Miniaturk, a mini Turkey park, where you can see mini models of old Ottoman architectural works. A professional guide will accompany the group until 17:00. Guests will return to the hotel at 18:00.

**DAILY TOUR 3**

**TUESDAY, 11 JULY;**

09:30—18:00*

**COST PER PERSON:** $100.00

We will gather in the Hyatt Regency lobby at 09:30 and leave the hotel to visit the Sakip Sabanci Museum.
At 12:30, we will depart from the museum and have a tea break at Emirgan Cay Bahcesi. After the break we will arrive at Arnavutkoy Meat Restaurant, and at 14:00 we will have a lunch of traditional Turkish cuisine until 15:30.

The next stop will be Ortakoy. Located next to the Bosphorus, it is where handmade jewelry and artifacts are sold by the artists. One hour of time for shopping will be provided at Ortakoy.

We will arrive back at the hotel at 18:00.

DAILY TOUR 4

WEDNESDAY, 12 JULY;

10:00—18:00*

COST PER PERSON: $90.00

The group will meet in the Hyatt Regency lobby at 10:00. At 10:30 we will leave for the Fener—Balat tour, visiting the most ancient and historical places of Istanbul, including the home of the Greek Orthodox Patriarch, the counterpart of the Pope in the Greek Orthodox religion.

At 13:30 lunch will be served in one of the best fish restaurants in Istanbul, Le Caique, which is full of ancient ambiance. At 15:00 p.m. we will leave the restaurant to go to the historical Cagaloglu Hamam (Turkish Bath), arriving at 16:00. There you will enjoy a traditional bath with Turkish massage along with a few Hamam surprises. At 17:30, we will leave the Hamam, returning to the hotel at 18:00.

DAILY TOUR 5

THURSDAY, 13 JULY;

10:00—18:30*

COST PER PERSON: $110.00

We will gather in the Hyatt Regency lobby at 10:00 a.m. and depart from the hotel at 10:30 for the Old City / Sultanahmet city tour, which will be accompanied by experienced guides. Stops will include the Blue Mosque, St. Sophia Museum, Topkapi Palace, and the Grand Bazaar.

A delicious Turkish lunch will be served at the famous Konyali Restaurant, located on the grounds of Topkapi Palace, which has a stunning view of the Bosphorus.

The program will end at 18:00, and we will be back at the hotel at approximately 18:30.

ISTANBUL BY NIGHT & SHOW

THURSDAY, 13 JULY;

20:30—24:30*

COST PER PERSON (ORIENT SHOW AND DINNER): $80.00

At 20:30 we will meet in the Hyatt Regency lobby and go to ‘Sultanas’ for its Turkish nighttime entertainment program, which runs from 21:00—24:00. Dinner, various entertainments and a belly dancer show are included.

After the program, at 24:00, transfers will be arranged back to the hotel.

*Includes travel time
If you would like to join our post-conference tours, please visit http://www.picmet06.com/pages/pre_post_tours_in_turkey.aspx, print and fill out the tour reservation form, and send it by fax to Mr. Ulas Alper (fax: +90 212 245 06 16).

OYAK TOURISM SERVICES
Phone: + 90 212 245 06 06
Fax: +90 212 245 06 16

CAPPADOCIA
JULY 6 – 9, 2006  •  $560

DAY 1 (JULY 6)
• In the morning depart the hotel for the airport, and from Istanbul airport depart to Kayseri via Turkish Airlines.
• Transfer from Kayseri airport to Cappadocia.
• After check-in, free time until 13:00.
• At 13:30 begin the Cappadocia tour accompanied by an English-speaking guide; we will visit 20 different churches and the Goreme open-air museum, which consists of ancient tombs.

DAY 2 (JULY 7)
• After an open buffet breakfast, depart the hotel for Derinkuyu, an ancient underground city. Detailed information will be given by experienced guides.
• Depart for Ihlara valley, known as Mummies Valley.
• Well-known churches will be visited in the Valley, and the group will experience its natural beauty by visiting such as places as Cavusin and Zelve.
• A break will be given in the Derbent Valley for taking photos.
• Next we will visit Avanos, where the group will visit the pots and pans workshop to watch them being produced by masters. Time for shopping will be made available.
• The group will stop on the way back to the hotel to watch the Red Valley sunset.

DAY 3 (JULY 8)
• After breakfast, depart the hotel for Uchisar Castle, where four large and important valleys—Derbent, Avcilar, Uzundere, Kiliclar—can be admired. Detailed information will be provided by the guide followed by a photo break.
• We will continue to the Onyx stone workshops, which belong to the district, and shopping time will be available.
• A presentation and demonstration of how carpets and kilims are weaved will be given.
• Lunch will be provided in the city center of Urgup.
• After lunch, we will visit the world-famous winery, Turasan’s Wine Cellars, where a presentation will be given by the producers. Wine tasting and shopping will be available in the cellar.
• We will depart Urgup to see the Chimney Rocks. Time will be given for taking photos, and then we will return to the hotel.
• After having dinner at the hotel, guests can enjoy a Traditional Turkish Night in the district upon request. To participate in the Traditional Turkish Night, an additional participation fee of $50 per person will be charged on site.

DAY 4 (JULY 9)
• After breakfast, we will check out of the hotel and depart for Gul Sehir.
• At Gul Sehir, the shrine of Hacibektas-i Veli will be visited and a guide will give a presentation.
• We will depart Gul Sehir and go to Kayseri airport. In the afternoon we will depart from Kayseri Airport and arrive at Istanbul Airport via Turkish Airlines.

This tour requires a minimum of 10 participants.

Included services:
• Turkish Airlines scheduled flight round-trip ticket
Three nights, half-board hotel accommodation (half-board includes breakfast, accommodation and dinner)

- Transportation and excursions with luxury, air-conditioned vehicles
- Istanbul (hotel-airport-hotel) transfers
- Guide services
- Honoring during excursions (in the bus)

Excluded services:
- Extra food and drinks in the hotel
- Drinks during meals
- Extra food and drinks during the excursions
- Museum entrances fees
- Lunches and night disco tours

CAPPADOCIA, PAMUKKALE, KUSADASI
JULY 15 – JULY 22, 2006 • $900

DAY 1 (JULY 15)

- Transfer from the hotel to Istanbul Airport.
- Depart Istanbul via Turkish Airlines and arrive in Izmir.
- Transfer from Izmir airport to hotel.
- After checking in at the hotel, we will begin our tour of Selcuk, visiting the Selcuk Museum, Selcuk Castle, Saint Jean Basilica, Ayasuluk Hill, and the Virgin Mary’s House.
- Lunch will be provided in Selcuk.
- After lunch we will depart Selcuk for the ancient city of Ephesus, where we will see the city fortresses, Odeon, Bouleterion, Agora, Door of Heracles, Domitian Temple, Kuretler Street, Traian Fountain, Hadrian’s Temple, hillside houses, the Library of Celsus, Lovehouse, Agora of the Port, Marble Street, ancient theater, and Arcadiane Way.
- Departure from Ephesus to the hotel.

DAY 2 (JULY 16)

- Breakfast in hotel and departure to the Temple of Apollo for a guided tour of one of the most important temples of Anatolia.
- Lunch will be provided in a local restaurant.
- After lunch, we will visit the ancient city of Miletos and the Temple of Athena.
- We will have a break and a short visit at Sirince Village, famous for its wine and its old Greek houses.
- We will visit the Temple of Artemis and Cave of the Seven Sleepers for a guided tour.
- Return to the hotel.

DAY 3 (JULY 17)

- After breakfast at the hotel, we will depart from Kusadasi to Pamukkale, which will take about 2.5 hours.
- The group will check in at the hotel and will have some free time for a rest, and we will then depart the hotel for the red water source, which comes from Karahayit Village.
- We will visit the archaic thermal pools.
- We will travel to the Pammukkale Travertines and walk on the snow white travertines, which are unique in the world. We will have a break for taking photos.
- Depart for the hotel.

DAY 4 (JULY 18)

- Depart the hotel for the ancient city of Hierapolis, another beauty of Pamukkale, where we will visit the following sites: Nekropol, ancient City Door, ancient theater, monuments from the Roman period, temples, and the Antique City Museum.
- The next stop will be the ancient city Aphrodisias, where we will visit the arena, theater, Temple of Aphrodite, site museum, Tetrapilon, Roman Hammam, and Archaic Street. On the way back to the hotel, a break will be given for shopping at the carpet and kilim workshop.
- Arrive at the hotel.
DAY 5 (JULY 19)
• After breakfast at the hotel, depart for Cappadocia, where we will check in and have free time to rest until dinner.
• Dinner will be provided at the hotel.

DAY 6 (JULY 20)
• After breakfast, depart the hotel for Uchisar Castle, where four large and important valleys—Derbent, Avcilar, Uzundere, Kiliçlar—can be admired. Detailed information will be provided by the guide followed by a photo break.
• We will continue to the Onyx stone workshops, which belong to the district, and shopping time will be available.
• A presentation and demonstration of how carpets and kilims are weaved will be given.
• Lunch will be provided in the city center of Urgup.
• After lunch, we will visit the world-famous winery, Turasan’s Wine Cellars, where a presentation will be given by the producers. Wine tasting and shopping will be available in the cellar.
• We will depart Urgup to see the Chimney Rocks. Time will be given for taking photos, and then we will return to the hotel.
• After having dinner at the hotel, guests can enjoy a Traditional Turkish Night in the district upon request.
To participate in the Traditional Turkish Night, an additional participation fee of $50 per person will be charged on site.

DAY 7 (JULY 21)
• After an open buffet breakfast, depart the hotel for Derinkuyu, an ancient underground city. Detailed information will be given by experienced guides.
• Depart for Ilhara valley, known as Mummies Valley.
• Well-known churches will be visited in the Valley, and the group will experience its natural beauty by visiting such as places as Cavusin and Zelve.
• A break will be given in the Derbent Valley for taking photos.
• Next we will visit Avanos, where the group will visit the pots and pans workshop to watch them being produced by masters. Time for shopping will be made available.
• The group will stop on the way back to the hotel to watch the Red Valley sunset.

DAY 8 (JULY 22)
• After we have breakfast at the hotel and check out, transfer to Kayseri airport.
• Departure from Kayseri to Istanbul airport.
• Transfer from the airport to the hotel.

This tour requires a minimum of 10 participants.

Included services:
• Turkish Airlines scheduled flight round-trip ticket
• Seven nights, half-board hotel accommodation (half-board includes breakfast, accommodation and dinner)
• Transportations and excursions with luxury, air-conditioned vehicles
• Istanbul (hotel-airport-hotel) transfers
• Guide services
• Honoring during excursions (in the bus)

Excluded services:
• Extra food and drinks in the hotel
• Drinks during meals
• Turkish Night (50 USD) unlimited local drinks included
• Extra food and drinks during the excursions
• Museum entrances fees
• Lunches and night disco tours
POST-CONFERENCE TOURS

SELCUK, DIDIM, SIRINCE VILLAGE
JULY 17—20, 2006  •  $450

DAY 1 (JULY 17)
• Transfer from the hotel to Istanbul airport.
• Depart from Istanbul airport for Izmir airport via Turkish Airlines.
• Transfer from Izmir airport to hotel.
• After we check in at the hotel, we will meet in the lobby at a time determined by our guide.
• Depart from the hotel for the Kusadasi and Izmir panoramic city tour.
• After the city tour we will return to the hotel.

DAY 2 (JULY 18)
• After breakfast at the hotel, we will depart for Selcuk, where before lunch we will visit the Selcuk Museum, Selcuk Castle, Saint Jean Basilica, Ayasuluk Hill, and the Virgin Mary’s House
• We will have lunch in Selcuk.
• After lunch we will depart Selcuk for the ancient city of Ephesus, where we will see the city fortresses, Odeon, Bouleterion, Agora, Door of Heracles, Domitian Temple, Kuretler Street, Traian Fountain, Hadrian’s Temple, hillside houses, the Library of Celsus, Lovehouse, Agora of the Port, Marble Street, ancient theater, and Arcadiane Way.
• Departure from Ephesus to hotel.

DAY 3 (JULY 19)
• Breakfast in hotel and departure to the Temple of Apollo for a guided tour of one of the most important temples of Anatolia.
• Lunch will be provided in a local restaurant.
• After lunch, we will visit the ancient city of Miletos and the Temple of Athena.
• We will have a break and a short visit at Sirince Village, famous for its wine and its old Greek houses.
• We will visit the Temple of Artemis and Cave of the Seven Sleepers for a guided tour.
• Return to the hotel.

DAY 4 (JULY 20)
• After breakfast, check out of the hotel and transfer to Izmir airport.
• Arrival at Istanbul airport.
• Transfer from airport to the hotel.

This tour requires a minimum of 10 participants.
Included services:
• Turkish Airlines scheduled flight round-trip ticket
• Three nights, half-board hotel accommodation (half-board includes breakfast, accommodation and dinner)
• Transportations and excursions with luxury, air-conditioned vehicles
• Istanbul (hotel-airport-hotel) transfers
• Guide services
• Honoring during excursions (in the bus)

Excluded services:
• Extra food and drinks in the hotel
• Drinks during meals
• Extra food and drinks during the excursions
• Museum entrances fees
• Lunches and night disco tours
Robert D. Dryden, Dean
Maseeh College of Engineering and Computer Science
Portland State University
and
Dundar F. Kocaoglu, Chair
Department of Engineering and Technology Management
Maseeh College
invite you to attend the

Portland State University
Alumni and Friends Reception

Hyatt Regency Istanbul—Gossip Bar
Taskisla Caddesi, Taksim
Istanbul, Turkey 80090
Thursday, July 13, 2006
15:30 – 18:00
Please join us for beverages, hors d’oeuvres, and good conversation.
We are pleased to announce that Dean Emeritus Dr. Erzurumlu
will also be in attendance.

For further information and to confirm attendance, please contact
Pamela Gesme Miller, Director of External Relations, Maseeh College, PSU
503-725-8135, millerpg@cecs.pdx.edu
SOCIAL EVENTS

To facilitate the informal interaction of the participants, several social events have been scheduled during PICMET '06

RECEPTION/BUFFET
DATE: SUNDAY, JULY 9
TIME: 20:00—23:00
LOCATION: HYATT REGENCY POOLSIDE
DRESS: INFORMAL

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

DINNER AT BOGAZICI UNIVERSITY (BOSPHORUS UNIVERSITY)
DATE: MONDAY, JULY 10
TIME: 20:00—23:00
LOCATION: BOGAZICI UNIVERSITY
DRESS: CASUAL

Enjoy traditional Turkish and international dishes as well as a stunning view of the Bosphorus Strait while you mingle and network with colleagues. Busses will leave the hotel at 19:30 to transfer guests to the university and will bring them back to the hotel when the event is over. Included in registration fee.*

AWARDS BANQUET
DATE: TUESDAY, JULY 11
TIME: 20:00—23:00
LOCATION: REGENCY BALLROOM
DRESS: BUSINESS ATTIRE

This is the premier social event of the conference. The PICMET '06 “Leadership in Technology Management,” “Medal of Excellence” and “Outstanding Student Paper” awards will be presented at the banquet. Included in registration fee.*

DINNER CRUISE ON THE BOSPHORUS
DAY: WEDNESDAY, JULY 12
TIME: 20:00 – 23:00

This optional dinner cruise will take PICMET guests on a leisurely boat ride on the Bosphorus, the strait separating Europe from Asia. While enjoying specially prepared Turkish food and unlimited drinks, guests will have a magnificent view of the city spread on two continents.

Busses will leave the hotel at 19:30 to transfer the guests to the boat, and will bring them back to the hotel after the cruise ends. Tickets are $85 and can be purchased on-line when registering for the conference or on-site at the registration desk.

*The student and one-day registration fees do not cover evening events. Tickets for these events may be purchased on-line when registering for the conference or on-site at the registration desk.
Site visits to the following companies will be offered during PICMET ’06. Seating is limited, so sign up early ($50). The times below include travel time. Buses will begin boarding by the Hyatt at 08:15.

**KALE ALTINAY ROBOT**

**TUESDAY, JULY 11, 08:30 - 13:30**
Kale Altinay Robot is a robot design and advanced production technology company. The company has the capability of designing and optimizing modern production systems. It also has modern CAD technologies (software for electrical and mechanical design) as well as simulation software that enables real-time simulations in a computer environment.

Kale Altinay Robot began operations in 1991, after the founders developed Turkey’s first six-axis robot. In 1997, the company was awarded the “High Technology Entrepreneur Award,” and in 1998 it received the “SME of the year” award.

**ARÇELIK A.S.**

**WEDNESDAY, JULY 12, 08:30 - 13:30**
During this site visit to Arçelik, visitors will learn about the company’s R&D efforts and the integration of these efforts with the company’s business plan. The Central R&D labs are where the washing machine plant and the dryer production are located. After a brief company overview and an introduction to Arçelik’s R&D activities from a technology management perspective, a short lab and plant tour will be held. With this plant, which attained 87% capacity utilization in 2004, Arçelik became one of the leading manufacturers of front-end loading washing machines under a single roof in Europe.
PROGRAM OVERVIEW

The PICMET ’06 technical program consists of 108 sessions including 9 plenary sessions, 4 tutorials, 5 panel discussions, 3 special sessions and 87 paper sessions.

The plenaries are scheduled from 08:30 to 10:00 every morning, Sunday, July 9, through Thursday, July 13; and also from 13:00-14:30 Sunday, July 9, through Wednesday, July 12, in the Regency Ballroom.

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

THE PAPERS

Research papers and applications-oriented papers are explicitly identified in this conference. Separate evaluation criteria were used, and different referees were selected for each category to make sure that appropriate papers were included in the conference for the “Research” and “Application” categories. We emphasized research methodology, the use of the research literature, the theory behind the paper, the sample size, and the impact on the research community of the “Research Papers.” The important evaluation criteria for “Industry Applications” were the usefulness of the application, the importance of the case being discussed, the generalizability of the concepts presented, and the impact of the paper on the users of technology management. The “Research Papers” included in PICMET ’06 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 72 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 and 13:00-14:30 time slots (with the exception of Thursday afternoon when there will not be an afternoon plenary session). Otherwise there are up to 8 break-out sessions in each of the morning and afternoon time slots Sunday through Thursday.

In order to make the sessions easy to see, we have prepared the schedule listings in three 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.

The third set contains the same information as the second set, but the sessions are ordered by room number. This set is intended to give you a good picture of all the tracks in which the sessions are scheduled. The sessions in a track are kept in the same room as much as possible. By looking at the sessions in each room, you should easily be able to select the tracks which you would like to follow.

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 ’06.
SHARE THE PICMET EXPERIENCE

We define “PICMET Experience” as

“Joining the world’s leading technology management experts from academic institutions, industrial corporations and government agencies for discussions on cutting-edge topics.”
# Daily Schedule

## Sunday July 9th, 2006

<table>
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<tr>
<th>Time</th>
<th>01 Regency-1</th>
<th>02 Regency-2</th>
<th>03 Smyrna</th>
<th>04 Troy</th>
<th>05 Ephesus</th>
<th>06 Bizans</th>
<th>07 Tyana-1</th>
<th>08 Tyana-2</th>
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<td>Innovation Management-1</td>
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<td>R&amp;D Management-1</td>
<td>Technology Management in Services-1</td>
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<td>TUTORIAL: Shift to Platforms</td>
<td>Manufacturing Management-1</td>
<td>Technology Management in Services-2</td>
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## Daily Schedule

### MONDAY JULY 10TH, 2006

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<th>06: Bizans</th>
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# Daily Schedule

**Tuesday July 11th, 2006**

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<td>Technology Marketing-1</td>
<td>Supply Chain Management-1</td>
<td>Decision Making-3</td>
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**THURSDAY JULY 13TH, 2006**

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# Schedule of Sessions

## Schedule of Sessions by Date

### Sunday, July 9, 2006

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<tr>
<th>Session</th>
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### Monday, July 10, 2006

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<td>MB</td>
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# Schedule of Sessions

## ME 01 Monday 15:00 - 16:30 Regency-1
- Technology Transfer-2

## ME 02 Monday 15:00 - 16:30 Regency-2
- Resource Management-1

## ME 03 Monday 15:00 - 16:30 Smyrna
- Innovation Management-2

## ME 04 Monday 15:00 - 16:30 Troy
- Technology Management Education-1

## ME 05 Monday 15:00 - 16:30 Ephesus
- Project/Program Management-1

## ME 06 Monday 15:00 - 16:30 Bizans
- Technology Management in Telecommunication-2

## ME 07 Monday 15:00 - 16:30 Tyana-1
- Decision Making-2

## MF 01 Monday 17:00 - 18:30 Regency-1
- Technology Transfer-3

## MF 02 Monday 17:00 - 18:30 Regency-2
- Resource Management-2

## MF 05 Monday 17:00 - 18:30 Ephesus
- Project/Program Management-2

## MF 06 Monday 17:00 - 18:30 Bizans
- Technology Management in Telecommunication-3

## MF 07 Monday 17:00 - 18:30 Tyana-1
- E-Business-1

## MF 08 Monday 17:00 - 18:30 Tyana-2
- PANEL: CTO and CIO Practices in Turkey

## Tuesday, July 11, 2006

### TA 01 Tuesday 08:30 - 10:00 Regency-1
- PLENARY-5

### TB 01 Tuesday 10:30 - 12:00 Regency-1
- Collaborations-2

### TB 02 Tuesday 10:30 - 12:00 Regency-2
- Outsourcing-1

### TB 03 Tuesday 10:30 - 12:00 Smyrna
- Innovation Management-3

### TB 04 Tuesday 10:30 - 12:00 Troy
- Technology Management Education-2

### TB 05 Tuesday 10:30 - 12:00 Ephesus
- Project/Program Management-3

### TB 06 Tuesday 10:30 - 12:00 Bizans
- Technology Management in Telecommunication-4

### TB 07 Tuesday 10:30 - 12:00 Tyana-1
- Technology Assessment and Evaluation-4

### TB 08 Tuesday 10:30 - 12:00 Tyana-2
- Software Process Management-1

### TD 01 Tuesday 13:00 - 14:30 Regency-1
- PLENARY-6

### TE 01 Tuesday 15:00 - 16:30 Regency-1
- Strategic Management of Technology-3

### TE 02 Tuesday 15:00 - 16:30 Regency-2
- Technology Adoption-1

### TE 03 Tuesday 15:00 - 16:30 Smyrna
- Innovation Management-4

### TE 04 Tuesday 15:00 - 16:30 Troy
- Environmental Issues-1

### TE 05 Tuesday 15:00 - 16:30 Ephesus
- Cultural Issues-1

### TE 06 Tuesday 15:00 - 16:30 Bizans
- Technology Management in Telecommunication-5

### TE 07 Tuesday 15:00 - 16:30 Tyana-1
- Globalization-1

### TE 08 Tuesday 15:00 - 16:30 Tyana-2
- PANEL: Meet the Journal Editors

### TF 03 Tuesday 17:00 - 18:30 Smyrna
- Innovation Management-5

### TF 04 Tuesday 17:00 - 18:30 Troy
- New Venture Management-1

### TF 05 Tuesday 17:00 - 18:30 Ephesus
- Project/Program Management-4

### TF 06 Tuesday 17:00 - 18:30 Bizans
- Technology Planning-1

### TF 07 Tuesday 17:00 - 18:30 Tyana-1
- Globalization-2

## Wednesday, July 12, 2006

### WA 01 Wednesday 08:30 - 10:00 Regency-1
- PLENARY-7

### WB 01 Wednesday 10:30 - 12:00 Regency-1
- Collaborations-3
### SCHEDULE OF SESSIONS

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<td>TUTORIAL: “Project Ekin: Triggering a Cultural Change for Innovation”</td>
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36
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<td>“Supply Chain Management-2”</td>
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<td>“Supply Chain Management-3”</td>
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<td>“Technology Roadmapping-1”</td>
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<td>“Entrepreneurship and Intrapreneurship-1”</td>
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<td>“Technology Assessment and Evaluation-1”</td>
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<td>“Technology Assessment and Evaluation-3”</td>
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<td>“Decision Making-1”</td>
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<td>“E-Business-1”</td>
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<td>“Decision Making-3”</td>
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<td>“Intellectual Capital-1”</td>
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<td>“Intellectual Capital-2”</td>
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<td>07 Thursday 10:30 - 12:00 Tyana-1</td>
<td>TUTORIAL: “IT Governance and Audit”</td>
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<td>07 Thursday 15:00 - 16:30 Tyana-1</td>
<td>TUTORIAL: “eGovernment - process improvement”</td>
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<td>“Technology Forecasting-1”</td>
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<td>PANEL: “ICT and Development: Exploring Possibilities and Challenges”</td>
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<td>08 Monday 10:30 - 12:00 Tyana-2</td>
<td>SPECIAL SESSION: “ETMERC Panel Discussion”</td>
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<td>08 Monday 17:00 - 18:30 Tyana-2</td>
<td>PANEL: “CTO and CIO Practices in Turkey”</td>
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<td>“Software Process Management-1”</td>
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<td>PANEL: “Meet the Journal Editors”</td>
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<td>“Manufacturing Management-2”</td>
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<td>08 Wednesday 15:00 - 16:30 Tyana-2</td>
<td>PANEL: “Strategic Technology Networks”</td>
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<td>WF</td>
<td>08 Wednesday 17:00 - 18:30 Tyana-2</td>
<td>PANEL: “Emerging Foresight Studies in Turkey: National, Sectoral and Corporate Experience”</td>
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## PERSONAL SCHEDULE

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<tr>
<td>08:00 – 08:30</td>
<td>Bright Start</td>
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<td>Coffee Break</td>
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<tr>
<td>10:30 – 12:00</td>
<td>Plenary (Regency)</td>
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<td>12:00 – 13:00</td>
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<td>13:00 – 14:30</td>
<td>Plenary (Regency)</td>
<td>Plenary (Regency)</td>
<td>Plenary (Regency)</td>
<td>Plenary (Regency)</td>
<td>PICMET '07 and PICMET '08 Planning Session (Regency)</td>
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<td>14:30 – 15:00</td>
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<tr>
<td>15:00 – 16:30</td>
<td>Plenary (Regency)</td>
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<td>16:30 – 17:00</td>
<td>Coffee Break</td>
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<tr>
<td>17:00 – 18:30</td>
<td>Welcome Reception (Pool Side)</td>
<td>Dinner at Bogazici University</td>
<td>Awards Banquet (Regency)</td>
<td>Dinner Cruise on the Bosphorus (optional)</td>
<td>Night Club (Optional)</td>
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<td>20:00 – 23:00</td>
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PLENARIES

PLENARY SESSION — 1

DATE: SUNDAY, JULY 9, 2006

TIME: 08:30—10:00

ROOM: REGENCY BALLROOM

SESSION CHAIR: PROF. DR. NUKET YETIS, PRESIDENT, SCIENTIFIC AND TECHNOLOGICAL RESEARCH COUNCIL OF TURKEY (TUBITAK), TURKEY

KEYNOTE-1

Ali Coskun, Minister of Industry and Trade, Turkey

“TBA”

Ali Coskun is the Minister of Industry and Trade for Turkey. He has been a Congressman from Istanbul since 1995, serving as the Chairman of the National Defense Commission from 1995 to 1998; member of the Plan and Budget Committee from 1999 to 2002; member of the Industry, Trade, Energy and Natural Resources and Information and Technology Commission from 1999 to 2002; Vice President of Justice and Development Party (AK Parti) since 2001; and President of the Economy Board, Justice and Development Party since 2001.

Mr. Coskun has been the general manager, or board member, or the chairman of the board of directors of 17 companies. He received his B.S. in Electrical Engineering from Yildiz University and an MBA from Istanbul University.

PLENARY SESSION—2

DATE: SUNDAY, JULY 9, 2006

TIME: 13:00—14:30

ROOM: REGENCY BALLROOM

SESSION CHAIR: DR. TIM ANDERSON, DEPARTMENT OF ENGINEERING AND TECHNOLOGY MANAGEMENT, MASEEH COLLEGE OF ENGINEERING AND COMPUTER SCIENCE, PORTLAND STATE UNIVERSITY, USA

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

(TUBITAK), Turkey

“The Impact of Science and Technology Investments to the Future Prosperity of Turkey”

The power of any entity is principally dependent upon how that entity creates, manages and utilizes the knowledge. In today’s world, all the developed nations use science, technology, and innovation (STI) in a very robust way. Porter points out four pillars for national advantage. These are land, labor, capital and infrastructure. Turkey has some advantages as well as challenges concerning the pillars of having national competitiveness. After an in-depth analysis was carried out on possible causes of challenges in the Turkish science, technology and innovation system, Turkey has set its science and technology strategy, priorities and targets for the period of 2005-2010 through a participatory and transparent process relying on a technology foresight study. In order to achieve these targets, it was decided by the Supreme Council for Science and Technology to establish the Turkish Research Area in 2004. Public funding for STI has increased substantially starting in 2005. As a part of that initiative, new programs and work-flow mechanisms were established, project evaluation and the selection system was restructured, a performance monitoring and assessment system was developed, administrative and legal infrastructure was enhanced, and more importance is placed on national and international collaborations. It is expected that these efforts will make a contribution to the future prosperity of Turkey.

Prof. Dr. Nüket Yetis became the Acting President of the Scientific and Technological Research Council of Turkey (TÜBITAK) in 2004. She was the Director of the Turkish Institute for Industrial Management from 2000 to 2003.

She is the former dean of Marmara University Faculty of Engineering (MUME) (1994-2000), where she established Master and Doctoral Programs of Engineering Management. She led Continuous Quality Improvement activities at MUFEE, which is the first Turkish public organization that became a finalist at the European Quality Award in 2000. She also led MUFEE to be the first applicant and finalist of the European Quality Award in higher education.

Her major interests are engineering and technology management, quality management and reengineering, production and resources management. She has several
national and international academic publications.

She led several projects for institutions and companies both in the public and private sector on continuous quality improvement and reengineering at the Turkish Institute for Industrial Management.

Prof. Dr. Yetis was educated at Bosphorus University. She received her MBA in Operations Management at the same university and Ph.D. in Industrial Engineering at Istanbul Technical University. She is a member of several professional societies including the Turkish Quality Association (KalDer), EFQM Education Community of Practice, and EFQM HealthCare Working Group.

PLENARY SESSION — 3

DATE: MONDAY, JULY 10, 2006

TIME: 08:30—10:00

ROOM: REGENCY BALLROOM

SESSION CHAIR: DR. DUNDAR F. KOCAOGLU, DEPARTMENT OF ENGINEERING AND TECHNOLOGY MANAGEMENT, MASEEH COLLEGE OF ENGINEERING AND COMPUTER SCIENCE, PORTLAND STATE UNIVERSITY, USA

Dr. Bacharuddin Jusuf Habibie, former President, Indonesia; Founder and Chairman, The Habibie Center, Indonesia

“Overall-Productivity, Democratization and Human Security”

“TBA”

Prof. Dr.-Ing. Dr. Sc. h.c. Bacharuddin Jusuf Habibie was born in 1936 in Pare-pare (South Sulawesi) Indonesia. On March 11, 1998, the People’s Consultative Assembly (MPR) elected and installed B. J. Habibie as the seventh Vice President of the Republic of Indonesia. On May 21, 1998, he took the oath of office as the third President of The Republic of Indonesia. Under his leadership, Indonesia succeeded not only in conducting the first free and fair general elections in 1999 but also succeeded in bringing about significant changes towards democratizing and reforming Indonesia.

In 1955 Dr. Habibie studied at the Technische Hochscole, Aachen, Germany. In 1960 he earned his Diplom-Ingenieur with cum laude at the Department of Aircraft Design and Construction, and earned his Doctor Ingenieur with summa cum laude at the same institution in 1965. He started his career in Germany by becoming the Head of Research and Development of Structure Analysis in the Hamburger Flugzeugbau GmbH, Hamburg, Germany (1965 - 1969); Vice President and Technology Director MBB GmbH, Hamburg and Munchen (1973 - 1978), and Technology Senior Advisor to the MBB Board of Directors (1978).

In 1978 he was appointed Minister of State for Research and Technology and, concurrently, head of the Agency for the Assessment and Application of Technology (BPPT). He maintained this job for five terms of office during Development Cabinet, until 1998. He was appointed as Chairman of the Indonesian Moslem Intellectuals Association (ICMI) in 1990. He is president of the Islamic International Forum for Science, Technology and Human Resources Development (IIFTIHAR) since 1997; founder and Chairman of the Board of Trustees of The Habibie Center (THC) since 1999. In 2001, he became a member of the Board of Founders of the Muslim World League (Rabithah ‘Alam Islami) and in 2000 he became a member of InterAction Council (IAC). B.J Habibie has 17 National and 16 International medals and decorations.

PLENARY SESSION — 4

DATE: MONDAY, JULY 10, 2006

TIME: 13:00—14:30

ROOM: REGENCY BALLROOM

SESSION CHAIR: DR. TUGRUL U. DAIM, DEPARTMENT OF ENGINEERING AND TECHNOLOGY MANAGEMENT, MASEEH COLLEGE OF ENGINEERING AND COMPUTER SCIENCE, PORTLAND STATE UNIVERSITY, USA

KEYNOTE-1

Cengiz Ultav, Member of the Executive Committee – Vestel Electronics, Turkey

“Competitive Positioning and Innovation Power of Turkey”

Based on recent studies carried out by World Economic Forum, OECD and the EU, competitive positioning and the innovation capabilities of Turkey will be discussed. Macroeconomic, public institutions and business perspectives defining the above factors
will be analyzed. Recent developments and observations will be shared complementary to the above studies. Real cases representing competitive and innovative power of Turkey that have resulted in global market share will be presented and relevant success factors will be discussed.

Cengiz Ultav holds a BSc and MSc in Electronics Engineering from Middle East Technical University. He held technical and management positions at Bimsa A.S. and Info A.S. in Turkey, and Philips and Dornier System GmbH in Europe between 1973 and 1981. He worked as a consultant to major groups in Turkey (Koç, Sabancı and Eczacıbaşı) between 1981 and 1988.

Mr. Ultav became Assistant GM at NCR Turkey and GM at Sun Mikrosistemler Turkey between 1988 and 1992. He established own company, Multima, in 1992, as a Microsoft Certified Solution Provider (top winner two years in a row), personally became a Microsoft Solution Development Discipline – SDD consultant, serviced major holding groups (Koç, Sabancı and Eczacıbaşı) and Vestel. He joined Vestel in 1995 as a VP participating from day one as Zorlu Group acquired Vestel and embarked upon a major growth challenge that by 2005 achieved more than 25 percent market share in the EU in consumer electronics. He is currently Senior VP at Vestel, responsible for Strategic Planning, Investor Relations and New Business Development. Multima continues as a software company with ERP sales.

Mr. Ultav worked as a UNDP Consultant studying electronics and IT industry feasibility in Vietnam. He is a founding member of UNIX User’s Group in Turkey and a founding member of the Turkish Informatics Society, where he is currently a board member. He received the ‘Lifetime Achievement Award’ from the ICT Business Association (TUBISAD) of Turkey in 2005.

KEYNOTE-2

Dr. Hee-Yol Yu, President, Korea Institute of Science and Technology Evaluation and Planning (KISTEP), South Korea

“Dynamics of National R&D Program Evaluation in Korea”

Given the increasing significance of government-funded R&D programs in Korea, the importance of an efficient implementation of those programs based on the objective evaluation seems certain to increase. As part of the efforts for enhancing the efficiency of the public R&D, the Korean government has recently reformed the administrative system of S&T, establishing the Office of Science and Technology Innovation (OSTI) within the Ministry of Science and Technology and reorganizing the Korea Institute of Science and Technology Evaluation and Planning (KISTEP) for specialized support for OSTI. In line with this reform, the country is undergoing a paradigm shift in R&D activities; from “PIE” (planning-implementation-evaluation) to “EPI.”

This presentation will introduce how Korea’s national evaluation system has evolved and how government-funded R&D programs are evaluated in Korea, and it will address current issues encountered in the process of evaluation. It will also suggest some reform measures for the improvement of evaluation practice. Finally, some suggestions for promoting international cooperation in evaluation will be made. It is hoped that this informative presentation on the evaluation system of R&D programs in Korea will convey some meaningful insights to policy makers and experts in this area from around the world.

Dr. Hee-Yol Yu currently holds the position of President of the Korea Institute of Science and Technology Evaluation and Planning (KISTEP). Previously, he served as Vice Minister of the Ministry of Science and Technology of the Republic of Korea. Born in Jeonju, Jeonbuk Province in January 1947, he started his career in the Korean government in 1969.

Dr. Yu received a B.A. degree (1969) in Liberal Arts and Sciences and an M.A. (1975) in Public Administration from Seoul National University. He earned his Ph.D. degree (1996) from Korea University in the field of Politics and Science and Technology Policy Making. He was awarded a Diploma of Distinction (1976) from Manchester University and an M.Phil. (1982) in Technology Innovation from the Science Policy Research Unit, Sussex University, in the United Kingdom. Dr. Yu was honored with the Republic of Korea Golden Stripes Order of Service Merit in 1999 for his long and distinguished public service.

Dr. Yu’s career parallels the growth of Korea’s science and technology as he has made sizable contributions to each phase of science and technology in Korea.

• In the 1970s, Dr. Yu played a major role in initiating and implementing policy for expanding technical and engineering education and establishing government-
• In the 1980s, Dr. Yu initiated Korea’s National R&D Program and helped establish Daeduk Science Town to promote science and technology to a higher level. In addition, the Korea Technology Development Corp., the first venture capital initiative in Korea whose name was recently changed to KTB (Korea Technology Banking) network, was established under his careful planning and preparation to support venture projects.

• Dr. Yu led Korea in globalizing its S&T capacities during the 1990s. Vision 2025, the HAN (Highly Advanced National) project, and Dual-use Technology Development (technology that can be utilized both for civilian and military purposes) were major accomplishments in his work. To further facilitate venture projects, he introduced the Technology Development Lottery to Korea.

• Dr. Yu led Korean delegations at many international conferences on such topics as technology transfer, protection of IPRs, and foreign direct investment.

• Dr. Yu contributed to establishing the legal framework for S&T policy in Korea. Some examples of major laws enacted under his leadership are: the Technology Development Promotion Act (No. 2399, 1972), Promotion of Engineering Services Act (No. 2474, 1973), Government–supported Research Institutes Act (No. 2671, 1973), Computer Programs Protection Act (No. 3920, 1986), Korea Technology Banking Corp. Act (No. 4491, 1991), Professional Engineer Act (No. 4500, 1992), and the Science and Technology Framework Act (No. 6353, 2001).

• Dr. Yu laid the foundation for the information industry in Korea. Through his leadership, the eight-bit personal computer for educational use was developed for the first time in Korea and distributed to the primary and secondary schools throughout the country in 1982, which marks the opening of the information society in Korea. He also founded the Federation of Korean Information Industries and the Korean Software Industry Association.
PLENARIES


He received his B.S. (1967) and his M.S. (1968) in Industrial Engineering and Management from Oklahoma State University. His Ph.D. degree was received from Texas Tech University in 1973. Dr. Dryden has experience both in industry and in academia. After working for Conoco Pipe Line Company, he joined the faculty at the University of Texas at Arlington (1968), and also served as associate director of the Construction Research Center. In 1977, he assumed the chairmanship of the Industrial Engineering Department at Wichita State University, where he also directed the Rehabilitation Engineering Center. In 1979, he accepted the position as Department Head of the Industrial Engineering and Operations Research Department at Virginia Tech, where he remained until joining PSU. He is a professional engineer and has consulted and conducted research in the areas of construction productivity, safety, human factors engineering, rehabilitation engineering, and economic evaluation.

Dr. Dryden’s affiliations and awards include: Board Member, Kentrox, 2004-present; Board Member, Oregon Quality Initiative, 1997-1999; Institute of Industrial Engineers (IIIE): 1995-96, Chairman-Council of Fellows; 1990-92, Group Vice President of Technical Operations; 1986-88, Group Vice President of Education, Research, Publications, and Professional Development; 1985-86, Director-Ergonomics Division; 1985-1986, Chairman, Council of Industrial Engineering Academic Departments Heads (CIEADH); 1983-84, Director-Management Division. In Alpha Pi Mu Dr. Dryden is presently National Executive Director. In the past, he has held the following Alpha Pi Mu offices: Regional Vice President, Executive Vice President, and President. He received Alpha Pi Mu’s David F. Baker Memorial Award for “Outstanding Contributions to Industrial Engineering” in 1987.

Dr. Dryden’s other professional societies and activities include: member, Board of Directors, Software Association of Oregon (SAO), member, Human Factors Society, Rehabilitation Engineering Society of North American (RESNA), The American Society for Engineering Education, Tau Beta Pi, Sigma Xi, Phi Kappa Phi, Omega Rho, and Order of the Engineer. He received IIE’s Albert G. Holzman Distinguished Educator Award in 1993; Fellow Award in 1989; Ergonomics Division Award in 1987; Management Division Award in 1985 and Virginia Tech’s Affirmative Action Award in 1985. He is listed in Who’s Who in Engineering and Who’s Who in Technology 5 Edition (Who’s Who in Mechanical Engineering and Materials Science). Dr. Dryden was appointed in April 1988 to the President’s Committee on Employment of People with Disabilities for the period of 1988 through 1995.

Dr. H. Chik M. Erzurumlu is Dean Emeritus, Maseeh College of Engineering and Computer Science, and Professor Emeritus of Civil Engineering, Portland State University. He received the Professional Degree in 1957 from the Technical University of Istanbul; M.S. in 1962; and Ph.D. in 1970 from the University of Texas, Austin.

Dr. Erzurumlu is the author of numerous papers in the area of engineering management, engineering education, and structural engineering. As a licensed professional engineer, he serves as a consultant to various engineering and industrial firms, and governmental agencies. He is a Fellow of the American Society of Civil Engineers (ASCE), and a Fellow of the National Society of Professional Engineers (NSPE). He has held numerous elected leadership positions in ASCE and NSPE. He was honored in 1985 as the Outstanding Engineer of the Year by the ASCE Oregon Section. The Professional Engineers of Oregon (PEO) recognized him as the Engineer of the Year in 1995, and presented him with the President’s Award in 2005.

Dr. Erzurumlu currently serves on the Engineering Accreditation Commission of ABET representing ASCE, and the ASCE Accreditation Committee on Academic Prerequisites for Professional Practice (CAP^3).

KEYNOTE-2

Thomas H. Lipscomb, Senior Fellow, Annenberg Center for the Digital Future (USC), USA

“Major E-Commerce Profits Depend on IP Protection in Developing World”

For some time there has been a basic belief among developing countries that “intellectual property rights” were simply another holdover from Western Imperialism. And new struggling economies did not feel they could carry the additional burden of paying royalties to wealthy nations who should have provided this material to them for free.

One of the worst offenders in this area was the
young United States. American theft of European literary and industrial patents and intellectual property was so flagrant for the first 125 years of its existence that famous authors like Dickens and Thackeray went on speaking tours of the US to try to convince Americans to stop pirating their books. It took more than a century for a reluctant United States to institute its first copyright laws.

But in an age of digital technology, which Stanford economist Paul Rohmer has called “the greatest lever of capital in history,” there are huge advantages in joining in IP treaties earlier rather than later. Since the cost of developing intellectual property is so much lower than other forms of invention and deployment, the profits are far higher, and the time from development to marketplace is much shorter. Small countries can create astonishing levels of wealth by protecting their own and agreeing to protect and license the IP of others.

We will review the experiences of countries like Mexico, Korea, India and others in seeing the pros and cons in action of different policies.

Thomas H. Lipscomb is chairman of The Center for the Digital Future, a New York-based public policy nonprofit foundation. He is the founder and until recently CEO and chairman of Internet Commerce Corporation, Inc. (ICC), a public company which uses proprietary technology to create advantaged systems for the secure distribution, marketing, control and auditing of valuable digital information. He holds five patents in digital technology, and ICC has received three industry awards for its technology. ICC received coverage by Forbes, Fortune, Business Week, Newsweek, Wired Advertising Age, Crain’s, Publishers’ Weekly, Success and other publications.

ICC was named one of Fortune Magazine’s "25 Cool Companies" in technology (along with companies such as Netscape and Cisco Systems) and Newsweek listed Lipscomb as one of the "50 most influential people to watch in cyberspace." He was also a founder and former CEO and President of another e-commerce company, Wave Systems, Inc.

Mr. Lipscomb is one of the few executives with high-level experience in both print publishing and the world of electronic media. He has been both a magazine publisher of consumer magazines such as The Ladies Home Journal and a CEO in book publishing, where he was responsible for top bestsellers by authors as diverse as Agatha Christie, Susan Isaacs, Craig Claiborne, Jack Anderson and William Safire. Books he has published have won literary awards such as the Pulitzer Prize and National Book Awards. His most recent publishing position was as President of Times Books -- The New York Times book division.


He has appeared on public affairs shows such as NBC’s Today Show, The ABC Evening News, BBC Channel 1 News and News Night, Extra (Germany), News Netherlands, and PBS NPR.

Management; Founder and Chair, MIT
Entrepreneurship Center, USA
“Perspectives on Technological Entrepreneurship”

During recent years public recognition has grown rapidly and globally of the vital role played by technological entrepreneurs in economic development and industrial competition. Along with this recognition has finally come a strong increase in academic attention to technological entrepreneurship - who become company founders, how new firms are formed, and what key factors affect their success and failure. Special issues of many journals have now focused upon this area.

The author began his continuing research on technology-based entrepreneurs in 1964, when the directly relevant literature was essentially non-existent and when fewer than a handful of US academics were plowing this field. Now he reviews the perspectives gained over the past 40 years from many contributors and adds new data and findings based on his own recent studies of over 2100 MIT alumni entrepreneurs since the 1930s. The new research documents the dramatic trends in entrepreneurial intensity among university graduates, the significant but still lagging increase in female participation, and the rapid entry of non-US alumni into entrepreneurship both in the USA and in their own countries. The research also highlights how many entrepreneurs essentially adopt new company formation as their careers, forming multiple firms over their lives, learning as they go how to build ever more successful enterprises.

Dr. Edward B. Roberts is the David Sarnoff Professor of the Management of Technology at the Massachusetts Institute of Technology, where he long chaired the Sloan School’s Management of Technological Innovation & Entrepreneurship research and education programs. He was co-founder and co-chair of the MIT Management of Technology Program, a twelve-months mid-career Master’s Degree program for aspiring technology-based leaders. Professor Roberts founded and continues to chair the MIT Entrepreneurship Center, and has also co-directed the Sloan School’s International Center for Research on the Management of Technology. Over the past 40 years Dr. Roberts has become internationally known for his studies and active involvement in many aspects of technology management, including technology strategy, corporate venturing, product innovation management, and technology-based entrepreneurship. Roberts has also been a co-founder and/or director of numerous emerging technology companies (including Pugh-Roberts Associates, Medical Information Technology and Sohu.com) and venture capital funds (including the Zero Stage Capital group and CommonAngels). He has authored over 160 articles and 11 books, his favorite being Entrepreneurs in High Technology (Oxford University Press, 1991). Professor Roberts has four degrees from MIT in electrical engineering (B.S. and M.S.), management (M.S.), and economics (Ph.D.).
IMS initiative has been managed under the European Commission’s Research Framework Programmes 4, 5 and 6. Since the beginning of IMS in 1995, about 40 R&D projects were launched with European participation. These projects involve more than 1000 companies and research institutions world-wide and represent an international commitment level of around 500 million (with 200 million of it being European investment).

The outcomes of a study which has aimed to assess the effectiveness of the European part of IMS will be presented. The presentation will also describe several activities that were conducted in Europe over the last year with the aim to mobilize the researcher community (academic and industrial) and to present its views on future research under IMS at the 2006 IMS Vision Forum in Seoul.

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

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

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

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

KEYNOTE-2

Dr. Caner Oner, Executive Vice President of Investments and Information Services, OYAK, Turkey

“The e-Government Portal in Turkey”

The e-Government Portal is a new endeavor initiated recently in Turkey. It can simply be defined as a single point of contact through which the State will provide public services in a more effective and a more citizen-focused approach.

The State shall have the capability to offer secure services to the citizens (G2C) and institutions (G2B) on a 7 days / 24 hours basis through the web and on all mobile devices. In order to facilitate this, a closer and well defined inter-administration (governmental agency) (G2G) relationship and coordination has to be established, as well.

The above-mentioned characteristics clearly suggest that this project should not be regarded as an IT solution to eliminate bureaucracy and paperwork, but more so as a challenging re-organization and a re-engineering effort; a re-organization of the internal and inter-administration procedures, and a re-engineering of public service processes.

The e-Government portal project should definitely be viewed as one of the primary driving forces for a big cultural change and a new way of life for Turkey.

Dr. Oner is an Executive Vice President of Investments and Information Services in OYAK, the largest private pension fund and third largest conglomerate in Turkey. He also holds various board positions in several OYAK subsidiary companies.

Before joining OYAK, he served as President and Chairman at NCR (AT&T) Turkey, as EVP at T.C. Ziraat bank, as EVP at Tunotbank and as Assistant Coordinator of Planning and Budget at Yasar Holding. He has also served as a board member in several Turkish and foreign banks.

Dr. Oner holds a Ph.D. degree in Public and International Affairs and a M. Sc. Degree in Industrial Engineering / Management, both from the University of Pittsburgh, PA, USA; MA and BA degrees in Urban Planning from the Middle East Technical University, Turkey.
PLENARY SESSION — 8

DATE: WEDNESDAY, JULY 12, 2006

TIME: 13:00—14:30

ROOM: REGENCY BALLROOM

SESSION CHAIR: DR. ANTONIE JETTER, DEPARTMENT OF ENGINEERING AND TECHNOLOGY MANAGEMENT, MASEEH COLLEGE OF ENGINEERING AND COMPUTER SCIENCE, PORTLAND STATE UNIVERSITY, USA

KEYNOTE-1

Prof. Dr. Naim H. Afgan, Instituto Superior Tecnico
Lisbon, Portugal

“Sustainability: The Management System Property”

Sustainable development is a strategic goal of modern society, reflecting contemporary demand for economic, social, political and environmental development. Access to affordable and reliable economic growth, drawn from environmentally acceptable sources of supply, is an important feature of sustainable development. This keynote speech presents a review of the sustainability concept by addressing sustainability; appraising a range of sustainability policies and identifying ways to overcome the shortcomings in their implementation.

Sustainability is one of the buzz words recently introduced to our vocabulary to explain the present state of life support systems. In this respect, there are several definitions, each one describing a specific aspect of sustainability. For example, the management system is a complex system that requires adequate tools to measure sustainability as an element of that complexity. The sustainability notion is characterized by a multi-dimensional structure including indicators with different scales.

This presentation will highlight the historical background of sustainability development and emphasize its importance in the validation of the management system. The complexity of the management system is defined as a structure of elements which comprise individual functionality within the management system. Each element is described with a number of indicators. A “Sustainability Index” is derived as the quality measure of the management system with agglomeration of the indicators. The methodology is based on a multi-criteria evaluation of the system.

The quality of the management system is an important property which requires specific measurement procedures and methodologies. The evaluation method that will be presented in this keynote is based on a list of priorities among the various alternatives under consideration. An essential feature of the method is to assess the effects of different constraints on the priorities.

In summary, this presentation is aimed to demonstrate the sustainability assessment of management systems using aggregated economic, environmental, social and technological indicators. In this framework, the sustainability assessment is seen as the quality measurement of the management systems. “Sustainability Index” is introduced for the quantification of the appropriate indicators to evaluate the management systems and to determine their quality.

Prof. Naim Hamdia Afgan is the UNESCO Chair Holder for the Energy Sustainable Management at the Instituto Superior Tecnico, Lisbon. He is also a Fellow of the Islamic Academy of Sciences and a Member of the Academy of Sciences and Art of Bosnia and Herzegovina. He organized three EURO Courses in the year 2000. The courses were on “Sustainability Assessment of Clean Air Technologies,” “Sustainability Assessment of New and Renewable Energy Systems” and “Sustainability Assessment of Water Desalination Technologies.”

Prof. Afgan has been a scholar, a scientist and an engineer. He was the chairman of Energy Engineering in the Mechanical Engineering Faculty at the University of Zagreb until he joined the VINCA Institute of Nuclear Sciences in Belgrade in 1957, where he spent most of his academic carrier. He has served as a member of the Configuration Control Board of the Encyclopedia of Life Support Systems, and published more than 200 papers and two books. His books are titled Sustainability Assessment of Energy Systems by Kluwer Academic Publishers (2002) and Quality, Sustainability and Indicators of Energy Systems by Begell House, New York (2005.)

Prof. Dr. Afgan received his undergraduate degree at the University of Zagreb, and the Doctor of Technical Sciences degree at the University of Belgrade. He was one of the founders of the International Center for Heat and Mass Transfer, and served as scientific and general secretary of ICHMT for a number of years. He has also served as the UNESCO expert for development of distance learning methodologies.
KEYNOTE-2

Dr. T. Nejat Veziroglu, Director, Clean Energy Research Institute, University of Miami, USA; President, International Association for Hydrogen Energy


One efficient way to promote a new technology is to implement high-profile pilot projects that demonstrate the benefits the new technology can bring to audiences worldwide. Since this strategy can focus attention and bring public acceptance of the hydrogen energy technologies much more effectively than other methods, the United Nations Industrial Development Organization – International Centre for Hydrogen Energy Technologies (UNIDO-ICHET) is supporting and promoting a variety of pilot projects worldwide which utilize hydrogen energy technologies in either a new application or as a replacement for fossil fuels; are both relevant and visible to the local community; and create an awareness of hydrogen energy based solutions within the local community. UNIDO-ICHET’s activities are focused on promoting the development, acceptance and use of hydrogen technologies in the world at large. An important facet of this program is being achieved by demonstrating the viability and applicability of the technologies through selected pilot projects at various world-wide locations in partnership with local organizations. The chosen pilot projects are intended to show that adoption of hydrogen-based technologies need not be confined to only the industrially advanced economies but can be modified to meet the needs of a much wider target group.

Dr. Veziroglu graduated from the City and Guilds College, the Imperial College of Science and Technology, University of London, with degrees in Mechanical Engineering (A.C.G.I., B.Sc.), Advanced Studies in Engineering (D.I.C.) and Heat Transfer (Ph.D.). After serving in some Turkish government agencies as a Technical Consultant and Deputy Director of Steel Silos, and then heading a private company, he joined the University of Miami Engineering Faculty and served as the Director of Graduate Studies, Chairman of the Department of Mechanical Engineering, Associate Dean for Research and Director of the Clean Energy Research Institute. Since May 2004 he is on leave from the University of Miami and is establishing UNIDO-ICHET (United Nations Industrial Development Organization – International Center for Hydrogen Energy Technologies) in Istanbul, Turkey, as its director. He has published some 350 scientific reports and papers, edited 200 volumes of proceedings, and is the Editor-in-Chief of the monthly scientific journal International Journal of Hydrogen Energy. He has been an invited lecturer and/or consultant on energy research and education to many countries and to several universities and research organizations in the United States. Dr. Veziroglu has organized several conferences and symposia on Alternative Energy Sources, Environment, Hydrogen Energy, Heat and Mass Transfer, and Remote Sensing, including the first major conference on Hydrogen Energy. He is a member of some 20 scientific organizations and is a Fellow of the British Institution of Mechanical Engineers, the American Society of Mechanical Engineers and the American Association for the Advancement of Science. He is also the Founding President of the International Association for Hydrogen Energy. Dr. Veziroglu has been the recipient of several international awards, including the Turkish Presidential Science Award, 1975; Honorary Professorship, Xian Jiaotong University, Xian, China, 1981; I. V. Kurchatov Medal, Kurchatov Institute of Atomic Energy, Moscow, U.S.S.R, 1982; Energy for Mankind Award, 1986, Twenty-Five Years’ Service Award, American Nuclear Society, 1987; Turkish Superior Service to Mankind Award, 1991; Honorary Doctorate, Anadolu University, Eskisehir, Turkey, 1998; Honorary Member, Argentinean Academy of Sciences, 2000; and Honorary Doctorate, Donetsk State Technical University, Donetsk, Ukraine, 2001. In 2000, he was nominated for the Nobel Prize in Economics for both envisioning the Hydrogen Economy and striving towards its realization.
Property Strategies, RIKEN, Japan

“RIKEN and Its New Technology Transfer Scheme”

RIKEN is one of the oldest private research institutes in Japan. Established in 1917, it had a brilliant history of social contribution in producing venture businesses for more than 60 companies in the 1930s. After World War II, RIKEN became a government-supported research institute that was similar to national ones. In 2003, however, RIKEN became one of the Independent Administrative Institutes like other National Research Institutes, and in 2004 it initiated a unique technology transfer program, referred to as “Integrated Collaborative Research Programs,” in which industrial sectors play leading roles through exchange of leadership in technology transfer between public domains and industrial sectors. It is working quite successfully so far, and this keynote will discuss the program in detail.

Dr. Eiichi Maruyama is currently the Director of the Center for Intellectual Property Strategies at RIKEN in Japan and Professor at the National Graduate Institute for Policy Studies. From 1999 until 2005 he held various positions at RIKEN including Director of the Frontier Research System and Director of the Nanoscience Research Program. From 1993-1999 he was the Executive Director of Angstrom Technology Partnership. He was a Visiting Professor at Waseda University from 1992-1993, and from 1989-1993 he was Director of Hitachi, Ltd. Dr. Maruyama was General Manager of Hitachi’s Advanced Research Laboratory from 1985-1991, and prior to that he worked for many years at Hitachi’s Central Research Laboratory. He received a Dr. Eng. from Osaka University in 1976 and his undergraduate degrees from the University of Tokyo.

KEYNOTE-2

Se Ho Cheong, Vice President, R&D Innovation, Samsung Advanced Institute of Technology (SAIT), South Korea

“MOT by Using Scientific Methodology in Samsung R&D”

Only those who can create or develop dominant designs will survive. The followers will not. Therefore, we must be a front-runner. In order to succeed in this competitive environment, we are developing dominant designs by using scientific methodology in Samsung R&D. Samsung uses several approaches to gain competitive advantage through MOT. We use scientific methodologies in linking technology strategies to business units under the “R&D innovation” motto.

In the past, Samsung’s technical success depended on the CEO’s leadership and guidance, but as the developer of many of the world’s best products, Samsung needed a systematic approach to MOT and developed and adapted the methodologies required for that approach.

When we initiate projects, we pursue “Doing the right thing.” With technology roadmap, we plan Samsung’s technology strategy by working together with the customers. With technology trees, we bring out Samsung’s core technologies and plan for the appropriate projects. With TRIZ, we explore and identify creative ideas.

When we execute projects, we pursue “Doing it the right way.” With QFD, we decide on parameters that are managed by scorecard. At the R&D process gate, we determine whether it can be achieved by checking this scorecard. We characterize and optimize parameters through DOE.

This keynote speech will present the use of such methodologies in Samsung’s scientific approach to Management of Technology.

Se Ho Cheong is Vice President of R&D Innovation at SAIT (Samsung Advanced Institute of Technology). Prior to his current position, he served at various management positions in Samsung since 1984, including six years at Samsung Electro-Mechanics Company, four years at the Samsung Group Headquarters, four years at Samsung Medical Center, and seven years at SAIT. Mr. Cheong was educated at the Seong-Gyun-Gwan University in Seoul, Korea, and received his degree in Management and Industrial Psychology in 1984.
ETMERC PANEL DISCUSSION

DATE: MONDAY, JULY 10, 2006
TIME: 10:30—12:00
ROOM: TYANA-2

Panelists: Antonie de Klerk, University of Pretoria
William Flannery, University of Texas – San Antonio
Marthinus Pretorius, University of Pretoria

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

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

All educators and academic researchers are invited to attend this panel to meet ETMERC’s Executive Committee, to participate in ETMERC’s strategy development for future activities, and to share ideas and experiences with colleagues from around the world.

PICMET COUNTRY REPRESENTATIVES MEETING

DATE: WEDNESDAY, JULY 12, 2006
TIME: 10:30 – 12:00
ROOM: REGENCY – 2
Chair: Kiyoshi Niwa, University of Tokyo, Japan, PICMET Director in International Activities

PICMET has more than 80 Country Representatives from 52 countries. They provide news items for the PICMET Newsletter, TMN (Technology Management News), about developments in technology management; disseminate PICMET information; identify authors and session chairs; recommend nominees for PICMET awards; submit proposals for the location of future PICMET conferences; and represent PICMET in their countries.

All current country representatives and those who want to join the Country Representatives organization are invited to attend this special session to discuss the roles of the country representatives and the future strategies that are being developed for making PICMET information and activities readily available throughout the globe.

PICMET ’07 AND ’08 PLANNING SESSION

DATE: THURSDAY, JULY 13, 2006
TIME: 13:00—14:30
ROOM: REGENCY – 1

Please join us in providing feedback on PICMET ’06 and developing plans for upcoming PICMETs. All PICMET attendees are invited to participate in helping make future PICMET meetings as productive as possible.
A GRADUATE COURSE ON UNIVERSITY-TO-INDUSTRY TECHNOLOGY TRANSFER
SUNDAY, JULY 09; 10:30 – 12:00, TROY
Speaker: Elliot A. Fishman, Stevens Institute of Technology, USA

The author was tasked to design a course dealing with the topics of technology commercialization and university-to-industry technology transfer. Through lectures, readings and critical class discussion, we explored technology transfer from an interdisciplinary approach. The following topics were considered: economics of property rights and negotiation of intellectual assets; evolution of patent policies of universities and states; marketability of patents and factors affecting quality of IP; economics of technology transfers and appropriation of IP; serendipitous Discovery and Accidental Invention; university-industry nexus on spin-offs, start-ups and patent licenses.

The course assumed a decidedly conceptual approach, with the intent to instill students with economic theories, not train them with practical lessons. It was believed a theoretical approach would serve students throughout their career, even if IP laws, cultural settings or business practices change. Because the focus of this course was on underlying theory, not practice, we concentrated on readings from academic journals and texts, rather than industry case studies or trade publications.

The purpose of this tutorial is to review the literature covered in the course and the pedagogical conclusions from the first semester it was taught at our School of Technology Management. A bibliography will be handed out at the conference as findings on the suitability of various readings are discussed.

Dr. Elliot A. Fishman is Industry Associate Professor at Stevens Institute of Technology, Howe School of Technology Management, in Hoboken, New Jersey. He teaches technology licensing, commercialization, and finance. His research focuses on economics of commercializing early-stage technology and the valuation and management of intellectual property. In addition to his academic role, he is founding member of Astrina Capital, LLC, a consulting firm that provides financial advisory and valuation services for public and private equity transactions.

Previously, he managed the New York office of Advantage Capital Partners, a venture capital partnership managing over $440 million in assets. Prior thereto, he served as part of the pre-IPO management team of Doubleclick, Inc. and from the ground floor helped build the company to its spectacular growth. At earlier stages in his career, he worked as a technology transfer manager (for the University of Pennsylvania), as an executive for a technology transfer incubator (Technology Management & Funding, LP), and as an electrical engineer (for Amdahl Inc. and National Semiconductor Corporation). Dr. Fishman holds a Ph.D. from the University of Pennsylvania, an MBA from the Wharton School and a BSEE from Duke University.

SHIFT TO PLATFORMS
SUNDAY, JULY 09; 15:00 – 16:30, TROY
Speaker: Mary Doyle, Intel Corporation, USA

Disruptive technologies, changing global socioeconomic conditions, increasingly sophisticated customers—these things are driving a new approach to innovation and design at Intel and throughout the industry. The new world is a world where emerging markets outpace the growth of other markets, where the rate of innovation makes possible uses of computing that have never before been imagined, and where solutions delivered to customers are increasingly complex. Addressing these trends demands:

- A user-centered platform-oriented approach where platforms are designed from the outside in and that comprehend everything from microprocessors to communications infrastructure to the application software needed to deliver a complete end user experience.
- A focus on user experiences that haven’t even been imagined by understanding early on what people value and what experiences are possible through new emerging technologies, and working with end users and the ecosystem to create a joint vision of these unprecedented new uses.
- Expansive ecosystem collaboration initiatives to enable the best ideas and technologies to emerge and to be brought to market as cohesive solutions.
• This presentation will describe Intel’s approach to innovation and how a user-driven, collaborative approach will drive the future of computing.

Mary Doyle is director of the Corporate Platform Office at Intel Corporation. She is responsible for driving the transformation of Intel to a platform-oriented company, with specific focus on organizational change, platform management processes and metrics. She is also responsible for driving an end user value-based approach to Intel’s platform design and development.

Doyle first joined Intel in 1999 as manager of strategic solution alliances with Original Equipment Manufacturers (OEMs). Specifically, she owned the strategic solution alliances with Compaq and HP. She then managed the Retail and Healthcare market segment groups and owned the operational implementation of the vertical market strategy across all market segments. Her next position was in Intel Corporation’s Enterprise group as director of Intel’s Itanium solutions initiative, chartered to ensure the delivery of Itanium-based solutions and software through strategic alliances with original equipment manufacturers (OEMs) and independent software vendors (ISVs).

Prior to joining Intel, Doyle was the director of Vertical Market Business Operations and Strategy for Compaq Corporation. She also held the positions of director of Corporate & Brand Strategy and Product Line Manager for the Alpha mid-range and low-end servers for Digital Equipment Corporation.

PROJECT EKIN: TRIGGERING A CULTURAL CHANGE FOR INNOVATION

SUNDAY, JULY 09; 17:00 – 18:30, EPHESUS

Speaker: Sirin Elci, Technology Management Association, Turkey; Ihsan Karatayli, Technology Management Association, Turkey; Lale Tomruk Gumusluoglu, Bilkent University, Turkey

In Turkey, the importance of innovation and innovation-based entrepreneurship is not well understood by related actors including firms, academia, policy-makers and implementers, and society in general. There are limited efforts for raising awareness on and increasing investments in innovation. This leads to weak economic performance which, in turn, negatively affects the society in many respects.

As an important consequence of this problem, the unemployment rates are very high among educated young people (38.5 percent of university graduates between 20-24 years of age are unemployed).

Changing this situation requires a change of culture. The most important target groups for such a cultural change are children, university students, teachers and enterprises. For this reason, the Technology Management Association started a project in partnership with the Turkish Informatics Foundation, METUTECH, Referans, the Technopolis-Group and the International Society for Professional Innovation Management. The project is an award winner of the World Bank’s Turkey 2005 Development Marketplace Competition.

Project Ekin, whose pilot phase has been implemented since July 2005, has been a success, and the main goal of “integrating innovation and innovative entrepreneurship in the national education curricula” has been achieved as a result of the cooperation of the project team with the Ministry of National Education.

Sirin Elci is the President of Technology Management Association and the project manager of Project Ekin. She works as a consultant in the field of research, technology development and innovation (RTDI), where she has more than 10 years of experience. Prior to working as a consultant, she worked as a manager for the Technology Development Foundation of Turkey, where she mainly dealt with the design, implementation, and monitoring and evaluation of the programs for supporting industrial RTDI. She holds the M.S. degree in Science and Technology Policy Studies from the Middle East Technical University and Associate of Science in Management and Business Administration from the American Management and Business Administration Institute.

Currently, Ms. Elci works as a consultant in local and international projects of various institutions, including the World Bank and European Commission, and is an Associate of the Technopolis-Group. She also actively takes part in a number of international and national networks and task forces on RTDI and is a member of the International Association for Management of Technology (IAMOT) and the International Society for Professional Innovation Management (ISPIM). She is a registered expert of the International Network of SMEs (INSME) and runs a web site she initiated for raising awareness on innovation in Turkey (www.focusinnovation.net). She also acts as the country...
correspondent in two major RTDI initiatives of the European Union, European Trend Chart on Innovation and ERAWATCH.

Ihsan Karatayli is a member of the Technology Management Association and is the coordinator of Project Ekin, where he is mainly responsible for the implementation of the project in a less developed region of Turkey. He started his professional life at the Technology Development Foundation of Turkey in 1998 as a technical expert in the Technology Development Projects Group. His primary duties were providing necessary assistance to Turkish industrial companies, mainly SMEs, in the design and management of their technology development and innovation projects which are supported by TTGV, and the proactive promotion of technology development and innovation in the industry.

Mr. Karatayli currently works as a project engineer in TEMSA, a leading bus and coach producer in Turkey, in the product development department. Among his duties are coordination of integrated projects between the company, universities and R&D centers; preparation of R&D support applications of technology development and innovation projects; cost/feasibility analysis of projects; and management of IPR and technology roadmapping. He holds a B.S. in Mechanical Engineering from the Middle East Technical University.

Dr. Lale Tomruk Gumusluoglu is a board member of the Technology Management Association and the coordinator of university relations in Project Ekin. She is a member of the Faculty of Business Administration at Bilkent University, where she lectures on Innovation Management, International Business and Business Strategy courses to fourth-year students. She worked as a coordinator of the “e-mail debate project” between Bilkent University and the University of Rhode Island. She graduated from Middle East Technical University’s Management Department and holds an MBA degree from Bilkent University. She recently received her Ph.D. from the Organization and Management Department of Hacettepe University and wrote “The Effectiveness of Transformational Leadership on Followers’ Creativity and Organizational Innovation: An Empirical Study in Turkish Software Development Sector” as her dissertation.

As a board member of the Anatolian Strategic Research Foundation (ASRF), she participated in and edited many international conferences such as “Local Administrations and Privatization,” “Development of Political Code of Ethics” and “Intra-Party Democracy.” She worked in a World Bank project on “Women’s Entrepreneurship in Turkey” and then studied entrepreneurship in Turkey and Europe. Currently, her academic interests are entrepreneurship, technological innovation and leadership.

**IT GOVERNANCE AND AUDIT**

THURSDAY, JULY 13; 10:30 – 12:00, TYANA-1

**Speakers: Erol Lengerli, Audit and Risk Advisory Services, Turkey**

IT governance is the basic approach to create a manageable IT environment to be managed by the IT managers. In short, IT governance is creating the environment so that within this environment IT managers will be able to manage their departments. Since governance is mainly the strategic approach to the enterprise’s objectives, how should we set the role of IT to be in line with business objectives and get its own role within companies’ broad strategic approach? To be able to dedicate a reasonable role to IT, the IT governance should exist and IT management should follow the strategy and objectives set by IT governance.

In addition, “Auditing IT,” or “IT Audit” in other words, is tightly coupled to IT governance. Any governance should be auditable, and any IT governance should also be in line with business strategy and objectives defined/set by business governance as well. That is why IT governance and IT Audit plays crucial roles within the company’s strategy and objectives.

Erol Lengerli is an Information Risk Management Partner (IRM) for KPMG Turkey. Prior to his current position, he was an IT consultant and instructor of Host and Networking Technologies Scenarios courses at Sabanci University and Bahcesehir University. He also worked for 17 years at IBM as a systems engineer and as a specialist for networking and systems integration at IBM International Technical Support Organization. Mr. Lengerli holds a B.S. degree in Industrial Engineering from Bogazici University, Istanbul, Turkey.
ICT AND DEVELOPMENT: EXPLORING POSSIBILITIES AND CHALLENGES

DATE: SUNDAY, JULY 9
TIME: 17:00-18:30
ROOM: TYANA-2

Panelists: Sherif Camel, American University in Cairo; G. Harindranath, University of London; Jonathan Liebenau, London School of Economics; Maung Sein, Agder University College

This panel will bring together a range of experts from around the world to explore the potential role of information and communications technologies (ICT) in socio-economic development.

J. Liebenau will argue that private enterprises have been more successful in disseminating ICT widely than development projects initiated by multilateral bodies or governments. Although not specifically aimed at poverty reduction, enterprises such as cybercafés have had the effect of bringing ICT directly to far-flung regions throughout the developing world.

S. Kamel will examine Egypt's electronic government initiative, a strategic plan formulated by the government to transform its operations through a public-private partnership. He will address the specific challenges faced while operating in a developing country context.

G. Harindranath and M. Sein will argue that the ambiguous findings and diverse opinions on the role of ICT in development can be attributed to the fact that ICT has mostly been conceptualized as a monolithic, homogeneous entity. They will draw on recent concepts from the ICT literature to propose an integrative framework to study the possible role of ICT in development.

MEET THE JOURNAL EDITORS

DATE: TUESDAY, JULY 11
TIME: 15:00-16:30
ROOM: TYANA-2

Moderator: Timothy Anderson, Portland State University
Panelists: Jeff Butler, University of Manchester; Tugrul Daim, Portland State University; Anthony Di Benedetto, Temple University; Joseph Martino, Yorktown University

Editors of the leading journals in Engineering and Technology Management will discuss the philosophies and strategies of each journal and answer questions from the audience.

CTO AND CIO PRACTICES IN TURKEY

DATE: MONDAY, JULY 10
TIME: 17:00-18:30
ROOM: TYANA-2

Panelists: Orhan Alankus, Tofas; Dilek Cetindamar, Sabanci University; Nuri Duzgoren, Kordsa

Although there is extensive literature on the CEO, CTOs are a highly neglected topic in management. Whatever name is adopted, either CTO or CIO, companies need high-level managers to coordinate their technology investments. In increased technological complexity, companies should manage technologies developed inside or outside the company in order to gain competitive advantage. Hearing about the practices of CTOs might provide insight about what is missing in the theoretical realm.

STRATEGIC TECHNOLOGY NETWORKS

DATE: WEDNESDAY, JULY 12
TIME: 15:00-16:30
ROOM: TYANA-2

Panelists: Dilek Cetindamar, Sabanci University; Mahmut Kiper, TUBITAK; Alphan Manas, Brightwell Holding; Gunduz Ulusoy, Sabanci University
The number of inter-firm relations within these networks has increased significantly, leading to exponential growth in the degree of complexity perceived by those involved in this new type of organization. Additionally, collaborations move away from being bound to one another long-term to more loosely connected entities with a more short-term orientation to capture emerging market opportunities, which calls for continuous decision-making. Hence, cooperation for innovation requires management of highly complex networks and more continuous decision-making, a true challenge for both industrial practitioners and academics.

EMERGING FORESIGHT STUDIES IN TURKEY: NATIONAL, SECTORAL AND CORPORATE EXPERIENCE

DATE: WEDNESDAY, JULY 12
TIME: 17:00-18:30
ROOM: TYANA-2

Panelists: Alper Alsan, Siemens; Nuri Basoglu, Bogazici University; Tugrul Daim, Portland State University; Ozcan Saritas, Istanbul Technical University

Foresight studies are mushrooming across countries. The national foresight studies are increasingly being adopted by sectorial associations and companies. The diffusion and use of the results of foresight studies are not automatic and require intensive efforts.
Through guest lectures and a workshop, the colloquium gives PhD students an excellent opportunity to meet colleagues, network and learn about the following topics:

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

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

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

Three workshops will be presented at PICMET ’06 on Saturday, July 8, 2006. The cost of each workshop is $225, or you can sign up for two workshops—one in the morning and one in the afternoon—for $395. Workshops are not included in the conference registration fee.

Workshop - 1
Saturday, July 8, 2006, 08:30 - 12:30

TECHNOLOGY OF INNOVATION
Speaker: Mark H. Polczynski, Ph.D., Marquette University, USA

Typically, technology is viewed as the product of innovation. This workshop examines the role that technology plays in driving innovation. The workshop provides a brief overview of how the following seven technologies drive innovation:

• Data mining,
• TRIZ (Theory of Inventive Problem Solving),
• Computational research,
• Evolutionary computing (genetic algorithms and genetic programming),
• Fuzzy logic,
• Neural networks.

As these technologies are reduced to practice in innovation-related applications, they have the potential to dramatically “democratize” innovation by:

• Significantly increasing the productivity of the innovation process and the quality of process outputs,
• Broadening the base of people involved in innovation.

By the end of the workshop, attendees will have obtained an insight into some innovation-driving technologies worth paying attention to. It is obviously not the objective of this workshop to prepare experienced practitioners capable of applying the technologies covered to complex problems and processes. Rather, the workshop is structured to allow students to:

• Assess the potential of each technology for impacting innovation and general decision making processes,
• Stimulate the application of these technologies in their work to create and enhance competitive advantage.

Dr. Mark Polczynski received his B.S. and Ph.D. degrees in engineering from Marquette University. He has spent 27 years in industry working at Allen-Bradley, Cutler-Hammer, Square D, A.O. Smith, and Eaton Corporation. He has done electronic hardware and software design and product quality assurance, and has supervised electronic manufacturing. He has managed research and development departments, and has led new product and technology development teams. Mark is currently Engineering Director of Marquette University’s Masters of Science in Engineering Management Program. Mark is developing Entrepreneurial Engineering Specialty and Certificate Programs within the Masters Program, and is initiating an International Engineering Cooperative Research and Student/Faculty Exchange initiative in the College of Engineering.

Workshop - 2
Saturday, July 8, 2006, 08:30 - 12:30

AN OVERVIEW OF TECHNOLOGICAL FORECASTING
Speaker: Joseph P. Martino, Ph.D., author and consultant, USA

This workshop will provide an overview of Technological Forecasting. Topics to be covered include Delphi, Extrapolation (both growth curves and trends), Leading Indicators, Probabilistic Models, and Measures of Technology. Applications of Technological Forecasting in research and development planning will also be covered. Professional forecasters and managers of engineering, technology, and R&D will find the seminar to be very beneficial and immediately applicable to their work.

Dr. Martino is a private consultant in the field of technology management. His clients include domestic and foreign firms and government agencies involved in Research & Development and technology advancement. From 1975 through 1993 Dr. Martino was employed by...
the University of Dayton Research Institute as a Senior Research Scientist. While with the University, he prepared technological forecasts and conducted research on technological forecasting for a variety of sponsors. These have included the Army Missile Command, Air Force Foreign Technology Division, Advanced Research Projects Agency, Martin Marietta Corporation, American Telephone and Telegraph Company, International Telephone and Telegraph Company, and the Institute for Interconnection and Packaging of Electronic Circuits, and the Hobart Corporation.

While with the University of Dayton, Dr. Martino taught courses in the Engineering Management Department of the School of Engineering. He created and taught a course in Technological Forecasting, and a course in Technology Assessment. These were graduate-level courses, offered to practicing engineers who were preparing for management responsibilities. The Forecasting course covered methods of technological forecasting, and applications to R&D planning, business, and government. The Assessment course covered methods of anticipating the social, economic and environmental consequences of deploying new technology.

Prior to joining the University of Dayton, Dr. Martino served for 22 years in the U.S. Air Force, retiring in the grade of Colonel. His assignments included the following:

- Plans Staff, Air Force Avionics Laboratory, where he prepared forecasts of electronics technology;
- Chief, Environmental Analysis Division, Air Force Office of Research Analyses, where he prepared forecasts of critical technologies for future weapon systems, and conducted research on methods of technological forecasting;
- Plans Staff, Air Force Office of Scientific Research, where he prepared forecasts of critical technologies for future weapon systems and planned a basic research program to reduce uncertainties about these technologies.

Dr. Martino is the author of the widely used textbook, *Technological Forecasting for Social Change*. The third edition of this work was published in 1992 by McGraw-Hill. He has published numerous reports and journal articles on methods of technological forecasting.

Workshop - 3
Saturday, July 8, 2006; 13:30 - 17:30

**INFLUENCING WITHOUT AUTHORITY**

**Speaker: Vijay K. Verma (PMP, MBA, P.Eng.), TRIUMF, Canada**

CANCELED

Workshop - 4
Saturday, July 8, 2006; 13:30 - 17:30

**FAST-START TECHNOLOGY ROADMAPPING**

**Speakers: David Probert, Ph.D., and Charles Romito, Ph.D., University of Cambridge, England**

Technology roadmapping is widely used in industry to link market and business drivers and goals to product and technology development. This workshop focuses on a practical approach for initiating roadmapping (‘T-Plan’), the result of applied research at the University of Cambridge, based on more than 80 applications in a wide range of sectors and organization types. The workshop will provide participants with an overview of the technology roadmapping approach, including theory and practice. A group-based activity will give participants a taste of how a roadmap is developed, and discussion will focus on the practical challenges of implementing the technique.

**Dr. David Probert** pursued an industrial career with Marks and Spencer and Philips for some 18 years before returning to the Engineering Department in Cambridge in 1991. His experience covers a wide range of industrial engineering and management disciplines in the UK and overseas. He joined the Manufacturing Engineering Group as Royal Academy of Engineering/Lucas Industries Research Fellow, to develop a practical approach to the issues of make or buy and vertical integration in the manufacturing industry, which has been widely applied and disseminated. Now Reader in Technology Management, he is a founding member and Head of the
Centre for Technology Management within the Institute for Manufacturing. This is a team of around 30 research and academic staff, with an active consortium of collaborating companies. Current research interests of the Centre include technology and innovation strategy, technology management processes, industry and technology evolution, new product design and development, software sourcing and industrial sustainability.

Books published include Developing a Make or Buy Strategy for Manufacturing Business, Technology Management Assessment Procedure, and most recently T-Plan: The Fast Start to Technology Roadmapping. The T-Plan process is currently being widely applied at international and national levels (EU Framework 6 project and DTI Foresight Vehicle Technology Roadmap), industry sector level (Faraday Partnerships) and within individual companies and other organizations.

Charles Romito is a doctoral researcher at the Centre for Technology Management. His research is focused on the decision making involved in technology investments. He holds an MSci degree in Physics from the University of Bristol, where his research investigated practical applications of piezoelectric digital to analogue conversion. Immediately prior to Cambridge, Charles was employed by Telespazio (Rome, Italy), a satellite communications subsidiary of the Finmeccanica group. Whilst there, his roles included R&D project management, business planning and telecoms regulation. He has also worked on behalf of CEPT (the European telecoms regulator) and has participated in fora of the ITU (International Telecommunications Union).
SESSIONS

SA-01: PLENARY-1

DATE: SUNDAY, 7/9/2006
TIME: 08:30 - 10:00
ROOM: REGENCY-1

SA-01.1 [K]
Ali Coskun, Minister of Industry and Trade, Turkey

TBA

SB-01 Collaborations-1

Sunday, 7/9/2006, 10:00 - 12:30
Room: Regency-1
Chair(s): David W Birchall; Henley Management College

SB-01.1 [R] A Strategic Alliance Approach for the Industry of Radio Frequency Identification in Taiwan
Chia-Nan Wang; Newfancy Technology Inc., Taiwan
Kun-Chung Li; Kainan University, Taiwan
Wen-Po Tseng; Kainan University, Taiwan
Ke-Yi Li; Kainan University, Taiwan
Ming-Yen Kao; Kainan University, Taiwan
Kun-Tsung Tsai; Kainan University, Taiwan
Pan-Hsin Tsai; Kainan University, Taiwan

It becomes more and more difficult for enterprises to retain a successful operational model in the highly competitive environment. In fact, how a company chooses alliance partners in the uncertain future to increase its own competitive advantages has become an important topic nowadays. Based on Data Envelopment Analysis (DEA) and heuristic technique, this study proposes a new systematic approach to resolve the issues of strategic alliance. The objective of this research is to provide an effective search to find the right strategic partner when a corporation implements a strategic alliance, as well as the analysis of efficiency and resources distribution for the formed corporation after the alliance. Realistic data are collected from Taiwan’s published stock market. A total of 16 companies of Radio Frequency Identification (RFID) are collected. This paper tries to help target company G to find the right alliance partners. By our proposed approach, the results show that the predicted benefits of 8 enterprises will be increased, and 3 will be decreased. The results are sound for enterprises to find future candidates for strategic alliances by many industry people.

SB-01.2 [R] Small and Medium-Sized Enterprises’ Performance: Network and Absorptive Capacity Perspectives
Chien-Hsin Lin; Yu Da University of Business, Taiwan
Peter J Shen; National Chiao Tung University, Taiwan

Small and medium-sized enterprises (SMEs) in Taiwan, seemingly weak, are in fact competitive within the global environment. Network synergy seems a critical source of Taiwanese SMEs’ competitiveness. This paper adopts a meso perspective and develops a multilevel framework to explain Taiwanese SMEs’ competitiveness in network settings. In specific, in the network level, network size is proposed to be a determinant of network competitiveness, in the firm level firms’ positions in a network and respective absorptive capacity are proposed to be determinants of SMEs’ competitiveness, while network competitiveness also influences SMEs’ competitiveness. Research implications and directions for future research are discussed.

SB-01.3 [R] A Win-Win Cooperation Strategy for Big and Small Businesses: 10 Policy Proposals
Seo-Kyun Kim; ETRI, Korea, South
Kyoung-Seok Oh; ETRI, Korea, South

The Korean government's policies on small businesses concentrated only on their protection and promotion, partly impeding their creation of new jobs and growing into larger businesses through further investment. Their growth and domestic sales continue to deteriorate, whereas the larger businesses continue to grow with increasing export sales. Therefore, this study reviews small business support policies and their implications in key foreign countries, as well as the status of Korean small businesses and problem areas in their cooperation with large businesses based on the past theoretical research of win-win cooperation. In so doing, we present 10 policy ideas that may be steadily implemented to provide practical assistance to win-win cooperation between small and large businesses.

Note: [R] = Research paper; [A] = Industry Application; [K] = Keynote
SESSIONS

One effective way of accelerating the commercialization of research results output by a university is to adopt an “innovation ecosystem” in which participants take on different roles in the innovation process from new discoveries to commercialization. An increase here in the number of participants, however, may mean more people without a deep understanding of science and technology such as graduates with an MBA background, venture capitalists, entrepreneurs, etc. This can make communication difficult in the innovation ecosystem, and even more so in cutting-edge technologies like nanotechnology and biotechnology, thereby hindering the commercialization process. To help eliminate this difficulty, a concept-creation model (or tool) is proposed based on existing theories and three case studies. The model recommends that (1) university output be translated into social value using easy-to-understand language, and that (2) significant and promising university discoveries be pre-selected by experienced persons to simplify their combination and transformation into a product concept by business-oriented people not specialized in science and technology. Considering that concept creators of this type may have better insight into market trends and social needs, this model will enable more non-specialists to participate in the innovation ecosystem and contribute to the commercialization of university output.

SB-03.2 [R] Turkey’s Patent Market Position in Europe

Ozgur Kulak; Marmara University, Turkey
Eray Kulak; Bilgi University, Turkey

Patents are monopoly rights given to “new,” “inventive,” and “industrially applicable” engineering ideas. Internationally recognized patent productivity is one of the strongest indicators of the technological development of a country. In this study, we explore the key performance characteristics of Turkey in European innovation market. Turkey became a member of European Patent Organization in 2000. During the ongoing integration process into the European Union, competition with other European countries is important, especially in cutting-edge technologies. The research reported on here partly involved gathering, analyzing, and synthesizing innovation-related macro data of Turkey and definition of the country’s position in the European patent market. In this paper, we discuss the following: a) competencies and difficulties of Turkish innovators; b) country performance compared with other European countries; and c) a roadmap for the development of innovation strategies of Turkey based on numerous suggestions. To make these statistical conclusions, we utilized raw data of annual reports of OECD, UNESCO, UN, World Bank, EU, WIPO, EPO, and TPE.

SB-03.3 [R] Policy Implications for Government and Higher Education in Pursuing Innovation

Khaliq Ahmad; Department of Business Administration, KENMS, IUM, Malaysia
Arif Hassan; International Islamic University Malaysia, Malaysia

Innovation management and research must be a core element of the mission of higher education and is a policy directive set by the government which is often a major source of funding for educational needs in our countries. The extent to which higher education institutions are engaged in research and development activities has a key role in determining the status and the quality of these institutions and the contribution which they make to economic and social development. Otherwise, higher education institutions would find it difficult to finance their activities, including research and innovation. In the modern and globalizing era, a real international world of learning, highly competitive, is emerging. Anyone representing higher academic institutions cannot rely on politics or anything else. If they want to get into that orbit, there is no choice but to go on the basis of merit. In response to the challenges ahead the Higher Education Institutions in Malaysia are likely to have charted out their directions based on the following two scenarios: 1) A very few research universities concentrate all world-class research across all disciplines; the rest concentrate on undergraduate or professional teaching with limited locally relevant applied research; 2) The spread of teaching and research excellence with universities as the “main proximity knowledge providers” driven to specialize in areas of their excellence because of relevance and competences. Thus, this paper will attempt to answer the concerns and challenges faced by higher education institutions in Malaysia today.

SB-03 TUTORIAL: Graduate Course on University-to-Industry Technology

Note: [R] = Research paper; [A] = Industry Application; [K] = Keynote
The Chinese firm’s R&D investment is lower than that in other countries. In this paper we analyzed determinants of firm R&D investment from a resource-based view. We generalized seven kinds of firm internal resources that may influence a firm’s R&D investment decision-making on the basis of literature review. We collected the financial data of 1136 individual firms from the China Private Science and Technology Firms Database. We extracted three factors that cumulatively explained about 73% variance by using principal component analysis of factor analyses. Three factors are physical resource factor, R&D manpower resource factor, and financial resource factor. We investigated the empirical relationship between the three factors and firm R&D investment by using a regression model. The results show that both physical resource and R&D manpower resource are statistically significant in explaining a firm’s R&D investment. The financial resource factor is statistically insignificant in explaining firm’s R&D investment. This suggests financial constraints may not be a critical determinant of the firm’s R&D investment in data. Based on these results, we provide some policy implications and potential fields of further study.

SB-06 Technology Management in Services-1
Sunday, 7/9/2006, 10:30 - 12:00
Chair(s) Dennis Ridley; Floriday A&M University

SB-06.1 [A] ‘Services Science’ and Service Layer Added Strategic Technology Roadmapping
Akio Kameoka; Japan Advanced Institute of Science and Technology, Japan
Kotaro Nakamura; NTT Data Web Co. Ltd., JAIST, Japan
Tetsuro Fujiwara; Autodesk Ltd. Japan, JAIST, Japan
Nobuhisa Kamada; Mode 2, co, ltd, JAIST, Japan

Next generation MOT moves its focus to the higher value added services innovations by integrating more sophisticated service functions to the conventional products and systems. This paper provides a scheme for the newly emerging “service science” expected to support services innovations and derives a practical methodology to integrate new services to the strategic technology roadmap and roadmapping by introducing a new independent layer of services between the market and products layers. Here, the concept of “service” is widely defined as “a supporting activity to help an individual or organization to achieve its objective”. Accordingly, it includes physical supporting functions, psychological supporting functions, intellectual supporting functions, spiritual supporting functions, as well as technological supporting functions provided through products. Valuating products and systems with their added services improves customer satisfaction and the total customer value should be considered as the summation of the products/system value, added service value, and individual user added value. As for a new methodology for managing the service integrated technology/products innovation, this paper proposes a service-integrated technology roadmap/roadmapping, which involves a new concept of functions, “requiring functions” and “supplying functions,” to fill the gaps between the market and service layers, as well as the service and products layers.

SB-06.2 [R] “Beyond the Balance Sheet” and the Global Economic Sectors
Daniel Berg; Rensselaer Polytechnic Institute, United States
Norman G Einspruch; University of Miami, United States

In a series of articles entitled “Beyond the Balance Sheet,” FORBES has examined certain corporate characteristics that are not always quantified on the balance sheet, but, nevertheless, contribute to shareholder value. Using a technique called “Data Surface Mining” (DSM), the previously published data were further analyzed to characterize the similarities and differences between the Goods and Service Sectors; the results of these analyses are presented herein. In addition, the issues of technology management especially relevant to the Service Sector are presented. These issues are of critical importance in light of the fact that the Service Sector represents 80% (GDP and/or employment) of the United States economy and is of increasing importance in the global economy. Furthermore, technology management in the Service Sector has not has not been given great attention in the academic literature.

SB-06.3 [R] Service Business Enhancement Achieved by a Team of Engineers through a Service Sciences Framework
Kotaro Nakamura; Japan Advanced Institute of Science and Technology, Japan
Tetsuro Fujiwara; Japan Advanced Institute of Science and Technology, Japan
Nobuhisa Kamada; Japan Advanced Institute of Science and Technology, Japan
Akio Kameoka; Japan Advanced Institute of Science and Technology, Japan

In order to enhance the service sector of the Japanese manufacturing industry and to increase its profitability, a new service-designing scheme is required. This new scheme involves designating products as outlets for service flow and designating knowledge concerning goods and services, customers, and service process. This paper proposes a new service-designing scheme based on a “service-sciences” oriented framework, which is suitable for the service sector of the Japanese manufacturing industry. Within this framework, services are classified according to A. H. Maslow’s hierarchy of needs theory and categorized into 15 service types. These 15 service types consist of 5 types that satisfy individual needs; 5 types that achieve organization goals; and 5 types that perform the functions of infrastructure. Using this classification of the 15 service types along with various methodological techniques, including a technology road-mapping system, it may be possible for Japanese industrial organizations of engineering to enhance their services and to become more profitable. Currently, engineers, from various companies in the engineering field, are collaborating on these activities to develop a common approach for new service business. Lastly, the possibility for the enhancement of the Japanese service sector is described based on recent case studies.

SB-07 Technology Assessment and Evaluation-1
Sunday, 7/9/2006, 10:30 - 12:00
Chair(s) Seda Turan; Istanbul Technical University

SB-07.1 [R] Valuation of R&D and Patent: An Economic Value Added Perspective
Chun-Yao Tseng; Tunghai University, Taiwan
Cheng-Hwa Liu; National Tai-Chang Institute of Technology, Taiwan

R&D and patent are viewed as two major proxies of intellectual capital in the literature of industrial economics. Since 80 percent of a company’s value is intangible, conventional accounting measures are insufficient for determining the effect of intellectual capital. Whereas Economic Value Added (EVA) can provide a framework for valuation of intellectual capital, this study applied EVA to evaluate the effect of R&D and patent. The main objective of this study is the valuation of R&D and patent, and clarifying the relative importance of them. Additionally, this study determined whether EVA reflects economic reality of R&D and patent more accurately than conventional measures do. The theoretical basis for this study is a knowledge production function explaining the effects of traditional production factors (including physical capital and labor) and intellectual capital factors (including R&D, international granted patents and national granted patents) on a firm’s sales and EVA. Time-series cross-section panel data from 219 Taiwanese electronic manufacturers between 1990-2003 were employed for the fixed effect analysis in the model. Major empirical results show obvious differences among the effects of R&D and patent, and EVA method is proved to be an appropriate proxy of economy reality to capture the value of R&D and patent.

Seyed H Tabatabaeian; Allameh University, Iran
Mahdi Pakzad; Allameh University, Iran

This article deals with the importance of the survey of research and scientific activities and the existing mechanisms in this regard. The first part of the article is a review of the literature of technological change measurement. In this part, theoretical principles of technological changes are discussed. Also, we will deal with measurement of research and
The power of any entity is principally dependent upon how that entity creates, manages and utilizes the knowledge. In today’s world, all the developed nations use science, technology, and innovation (STI) in a very robust way. Porter points out four pillars for national advantage. These are land, labor, capital and infrastructure. Turkey has some advantages as well as challenges concerning the pillars of having national competitiveness. After an in-depth analysis was carried out on possible causes of challenges in the Turkish science, technology and innovation system, Turkey has set its science and technology strategy, priorities and targets for the period of 2005-2010 through a participatory and transparent process relying on a technology foresight study. In order to achieve these targets, it was decided by the Supreme Council for Science and Technology to establish the Turkish Research Area in 2004. Public funding for STI has increased substantially starting in 2005. As a part of that initiative, new programs and work-flow mechanisms were established, project evaluation and the selection system was restructured, a performance monitoring and assessment system was developed, administrative and legal infrastructure was enhanced, and more importance is placed on national and international collaborations. It is expected that these efforts will make a contribution to the future prosperity of Turkey.

Additional sessions and papers are also discussed in the document, including a study on co-opetition strategy from the patent analysis perspective, strategic management of technology, and various perspectives and applications of knowledge management.
SESSIONS

of ITs’ related support infrastructure such as communication lines, networks, database, and many others. Lastly, organizational aspects comprise the organizational structure, corporate culture, and human resource management. Among these four elements, knowledge and knowledge management processes are the key components of the knowledge management concept. Taken together, this paper also reveals the interconnectedness of all the elements as well as their impact on the overall knowledge management in organizations.

SE-02.2 [R] A Knowledge Management Maturity Model and Application
Junwen Feng; Nanjing University of Science and Technology, China

Many organizations have implemented knowledge management, which has emerged as an issue that managers have to deal with. In order to evaluate the difference among organizations’ knowledge management practices, it is necessary to construct a knowledge management maturity model. Based on the concept of continuous process improvement and the Capability Maturity Model (CMM) of the Software Engineering Institute (SEI), in this paper, a new knowledge management maturity model is constructed, which can be used to describe how organizations support the practices at each maturity level and provide maturity paths that organizations can follow. A commercial bank will be taken as an example to illustrate the application of this model and discuss how to support the practices at each maturity level in a certain organization by using this model.

SE-03 Emerging Technologies-1

Sunday, 7/9/2006, 15:00 - 16:30 Room: Smyrna
Chair(s) Ertunga C Ozkan; University of North Carolina at Charlotte

Kiyoyuki Honda; Japan Advanced Institute of Science and Technology, Japan
Akio Kameoka; Japan Advanced Institute of Science and Technology, Japan

The historical survey on the application process of the bottom blowing technology to the conventional top blown converter was done. Double-pipe tuyere technology invented by Sawai and Lee enabled the pure oxygen injection from the bottom of the Basic Oxygen Furnace. This breakthrough made the steelmaking technology focus on the effect of bath-stirring. Many kinds of tuyeres were introduced to the real equipment at the same time. According to the survey, not only the “natural selection” but also the “adaptive radiation” and the “convergence,” which are concepts used in biology, are observed. In the steelmaking industry, there is much mutual communication about technology, this “open minded culture” causes more easily “natural selection.” But the fact is reverse. Based on this discovery, a model is introduced which describes the reason why technological evolutions divide into some different types. If the introduction of new concepts to the company occurs simultaneously, the “adaptive radiation” will happen first. And the concluding point of the way to the “natural selection” or the “convergence” is in the existence of mutual interaction between the technology and the environment. Using this model, the directions where the existing technology develops can be forecasted.

SE-03.2 [R] The Nanotechnology Debate: Does It Exhibit Social Learning for Controversial Technologies?
Rosan Karakas Dilik; TUSSIDE, Turkey

Risk controversies have become an inseparable part of contemporary life. The subjects of controversies are diverse, but risk and benefit arguments appear to be similar across cases. Advocates promote new technology through benefit arguments; others raise concerns in regard to its possible risk. Different views become polarised, and often new technology generates a bitter dispute within society. It appears that the same debate is recurring in the case of nanotechnology. This paper examines the social learning process in the case of the nanotechnology debate by comparing it with the nuclear power and GM crops debates. The research consists of an exploratory case study conducted between April and June 2004 in the UK. Qualitative research methods are employed to explore the nature of the nanotechnology debate and to analyse social learning process. Semi-structured interviews with the stakeholders of the nanotechnology debate are triangulated with other sources of data. The Cultural Theory of Risk is used as theoretical framework to chase different viewpoints about the possible risks of nanotechnology and to explore learning process.

SE-03.3 [R] Managing Technology: The Technology Valuation Approach
Yan Ru Li; Aletheia University, Taiwan
Yiche Chen; Yuan-Ze University, Taiwan

In recent years, technology valuation has been seen as an important decision-making mechanism for high-tech business. It involves not only technical steps of valuation (for instance, financial engineering) but also the strategic management of a technology. Unfortunately, the academic concept of technology valuation has not been explored scientifically until recently. This paper is designed to help bridge the gap by exploring the concept and context of technology valuation. We develop a new “technology evaluation framework” addressing the concepts and differences between terms such as technology assessment, technology valuation, technology pricing and technology price to make them more understandable. We then establish a “hybrid valuation formula” which expands the traditional cost or income perspective, and recent option perspective by suggesting strategic choice and a combination of valuation tools in order to mitigate the impacts of risks and uncertainties that a technology usually bears. From cases of TFT-LCD investment in Taiwan, we further discuss the concept of these perspectives that companies apply and evidenced a sound performance if companies apply the hybrid model properly. Finally, we reveal the possible existence of a “strategic value space” for a technology if it’s to be planned or valued strategically by a company. Our results expand views in technology valuation, both in academia and in practice. We help clarify evaluators’ or managers’ roles and responsibilities in valuing and applying their technologies better.

SE-04 TUTORIAL: Shift to Platforms

Sunday, 7/9/2006, 15:00 - 16:30 Room: Troy

Speaker(s) Mary Doyle; Intel Corporation

Disruptive technologies, changing global socioeconomic conditions, increasingly sophisticated customers—these things are driving a new approach to innovation and design at Intel and throughout the industry. The new world is a world where emerging markets outpace the growth of other markets, where the rate of innovation makes possible uses of computing that have never before been imagined, and where solutions delivered to customers are increasingly complex. Addressing these trends demands: A user-centered platform-oriented approach where platforms are designed from the outside in and that comprehend everything from microprocessors to communications infrastructure to the application software needed to deliver a complete end user experience. A focus on user experiences that haven’t even been imagined by understanding early on what people value and what experiences are possible through new emerging technologies, and working with end users and the ecosystem to create a joint vision of these unprecedented new uses. Expansive ecosystem collaboration initiatives to enable the best ideas and technologies to emerge and to be brought to market as cohesive solutions. This presentation will describe Intel’s approach to innovation and how an user-driven, collaborative approach will drive the future of computing.

SE-05 Manufacturing Management-1

Sunday, 7/9/2006, 15:00 - 16:30 Room: Ephesus
Chair(s) Omer Saatcioglu; Middle East Technical University

SE-05.1 [A] An Analysis of the Economics of Photomask in Semiconductor Manufacturing
Charles M Weber; Portland State University, United States
C. Neil Berglund; Portland State University, United States
Patricia Gabella; SEMATECH, United States

This paper provides survey data for benchmarking and analyzes the photomask manufacturing lifecycle. The contents of the paper can be summarized as follows: Survey data indicate that: • There is wide variation in mask shops in average labor content per mask, in the staffing strategies employed, and in the fraction of engineering plates produced. • Both
This is true also for consumers in more developed countries (Ensor and Condon, 2005). This paper presents the preliminary findings of a study of the development of Internet banking services in Turkey. A qualitative approach formed by a number of interviews with some of the high-ranking bank managers was applied to explore the role of the market research in the development of Internet banking services. The key findings of the study are the management implications of the adoption of Internet banking and the role of new product development in the creation of Internet banking services in Turkey. The most noteworthy finding of the study was that the banks in this study are developing and introducing their services with very limited scientific market research.

SE-06.2 [R] Mobile Banking as Business Strategy: Impact of Mobile Technologies on Customer Behaviour and Its Implications for Banks
Rajnish Tiwari; Hamburg University, Germany
Stephan Base; Institut for Technology and Innovation Management, Germany
Cornelius Herstatt; Hamburg University of Technology, Germany
Mobile Commerce is gaining increasing acceptance amongst various sections of society. This growth can be partly traced back to technological and demographical developments that have been influencing important aspects of the socio-cultural behaviour in today’s world. The need for mobility seems to be the driving force behind Mobile Commerce in general. Mobile Banking, availing of bank-related financial services via mobile devices, builds a cornerstone of Mobile Commerce. An empirical survey of customer acceptance conducted within the frame of our research clearly reveals a major, growing interest in Mobile Banking. However, since the degree of interest and the willingness to pay for individual services, it seems to be necessary to design specific services, taking the needs and wishes of relevant target groups into consideration. Banks ought to therefore employ mobile channels with a clear business focus. This paper examines the opportunities for banks to generate revenues by offering value-added, innovative mobile financial services while retaining and even extending their base of technology-savvy customers.

SE-06.3 [R] Technological Innovation in Knowledge Intensive Business Services: An analysis of the Brazilian Context
Alair H Ferreira; UNICAMP, Brazil
Ruy Quadros; UNICAMP, Brazil
Knowledge Intensive Business Services (KIBS) are the center of the rearrangement of industrial production and service chains nowadays. Aiming to maximize their results, these businesses use diversification, partnerships, networks, mergers and acquisitions, among other strategies. An important dimension of the diversification and growth of KIBS in developing countries is their growing internationalization. The objective of this paper is analyzing the characteristics of KIBS in Brazil to contribute to the comprehension of how the implications of this process can be contradictory for the capacitation of local KIBS: on one hand they have access to new technologies and integration into international service streams; on the other, there is some abandonment of the research and development activities which are so vital for the maintenance of critical competences for KIBS. This analysis focuses on the generation of technological innovation in the Brazilian context, comparing it with published international data. It is based on a research done by PAEP, the first research on services innovation in Brazil, using the Oslo Manual guidelines. Partnerships between local and international companies and research centers were found to be important for the constant growth shown by KIBS. Other conclusions and recommendations related to this sector are also presented.

SE-07.1 [R] Developing an Enterprise Specific Application Portfolio Assessment Method: From Architectural Principles to Measures
Åsa Lindström; KTH, Royal Institute of Technology, Sweden
Rickard Berntsson; KTH, Royal Institute of Technology, Sweden
This paper presents a method for assessing an application portfolio. The method has two
levels, starting with architectural principles, i.e. rules that define and motivate what IT-related decisions can be made within an enterprise. In the assessment, the principles constitute the foundation for making decisions on which applications to retain, modify or phase out. In the second step, the architectural principles are decomposed into high-level measures that are based on more detailed measures. The measures are used to examine the compliance between the architectural principles and the application. The presented assessment method is time-efficient and presents the assessment in an easy-to-grasp tree-structure. The method has been validated by experts, and an assessment of one application has been carried out at Scania in order to validate the method. Scania is a large multinational vehicle manufacturer.

SE-07.2 [A] Korea Technology Assessment Model (Radio Frequency Identification)

Jiyeon Ryu; Korea Institute of S&T Evaluation and Planning, Korea, South

Technology assessment (TA) was originally regarded as an analytic activity, aimed at providing decision makers with objective standards before they made the decision whether or not to introduce new technology. Nowadays, TA process and results are used to form a consensus from diverse opinions. TA is related to political, environmental, and social issues. Some of these issues include protecting the ozone layer and the building of nuclear facilities. Advanced countries in Europe and the US have already adopted TA in hopes of making appropriate decisions. These countries feel that TA will help establish a national consensus by opening the results and the process. In order to reflect international trends, the Korean Government enacted the National Science and Technology Basic Law in 2001. KISTEP (Korea Institute of Science and Technology Evaluation Planning) performed a TA in RFID with 25 experts from such fields as science, technology, culture, society and industry. The major goal is improving industrial and economic outputs by focusing on technology standardization and patent analysis. The social and culture experts were able to forecast positive and negative outcome from the RFID field including privacy-invasion, environment, safety, and social problems. After analyzing the pros and cons, the experts suggested how to narrow the gap between these two perspectives. This paper will analyze the Korean TA model and show the results and limitations of RFID. Finally, based upon these findings, we will attempt to suggest policy implication.

SE-07.3 [R] The Application of the Neuro-Fuzzy Computing Technique for the Forecasting of the R&D Project Performance

Yu-Shan Chen; National Yunlin University of Science & Technology, Taiwan
Ke-Chun Chang; Aletheia University, Taiwan

This study used the Adaptive Neuro-Fuzzy Inference System (ANFIS) and ordinary least squares (OLS) regression to forecast the R&D project performances of Taiwanese IC design companies through three explanatory variables: the fitness of project environment, R&D project manager’s skills, and the effectiveness of team work. The results showed that the accuracy of ANFIS in this study was 65.52% better than 55.17% of OLS regression model. Therefore, the ANFIS is more accurate than OLS regression to forecast the R&D project performance. Besides, this paper investigated the relationships between the R&D project performance and its determinants, and pointed out their non-linear nature under the complex and uncertainty environment nowadays. This study showed that these three explanatory variables had inverse U-shaped effects on the R&D project performance with ANFIS which had more managerial implications than OLS regression which only indicated that these three explanatory variables were positively associated with the R&D project performance. Hence there existed optimal levels and U-shaped effects of these three determinants for the R&D project performance.

SF-01 Strategic Management of Technology-2
Sunday, 7/9/2006, 17:00 – 18:30
Chair(s) Kelly R. Cowan; Portland State University
Room: Regency-1

SF-01.1 [R] 2nd Generation Business Modeling: Smart Innovation Planning Method Managing the Link to Corporate Value Creation for R&D Outputs
Hitoshi Abe; Oki Electric Industry Co., Ltd., Japan
Kichiro Shinokura; Pioneer Corporation, Japan
Akihiko Suzuki; Chubu Electric Power Co., Inc., Japan
Hiroshi Kubo; Yokogawa Electric Corporation, Japan
Hiraku Sakuma; Japan Techno-Economics Society, Japan

The purpose of this paper is to report the recent results of the study on business modeling
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method conducted for the purpose of offering a convenient tool for engineers and researchers in order to enhance corporate value from R&D outputs. “Japan’s lost decade” has forced companies to change R&D management and R&D operation style. We propose the value creation framework of business modeling method for R&D outputs including the strategic roadmapping method, which we called “the 2nd generation business modeling”. We applied this method to several real-world cases to show its effectiveness. This study represents the result of over three years (fall 2002) of work with the value creation framework of business modeling method for R&D outputs, done by a group of researchers from JATES (Japan Techno-Economics Society).

SF-01.2 [R] Strategic Planning, Technology Roadmaps and Technology Intelligence: An Integrated Approach
Eugenio M Lopez-Ortega; National University of Mexico, Mexico
Tamara Alcantara; National University of Mexico, Mexico
Sonia Briceno; National University of Mexico, Mexico

This paper presents the utilization of a technology roadmap and technology intelligence techniques within a process of strategic planning in a technological research and development center (TRDC). The first section presents a methodological scheme in order to carry out the strategic planning process in a TRDC. This scheme integrates different techniques as technology roadmaps and technology intelligence. The second section presents the steps of a technology roadmap construction in order to describe the TRDC objectives. Expert groups in the technology fields related to the TRDC carry out the technology roadmap construction. These expert groups need to be informed systematically about the technology tendencies in their fields. The third section describes briefly the technology intelligence system (TIS) concept and its main components. Through the TIS, the expert groups receive and discuss information related to tendencies in their technology fields. The TIS must be integrated to the TRDC as a part of its daily activities. Finally, the fourth section discusses several conclusions related to the expert groups operation within the strategic planning process and the technology roadmap construction and the TIS implementation.

SF-01.3 [A] An Integrated Study of Global Competitiveness at Firm Level: Based on the Data of China
Ning Ma; Beijing University of Technology, China
Li Wang; Beijing Research Center in Science of Science, China

This paper proposes a theory framework at the firm level of the sources of global competitiveness and how innovative capability results in competitive advantage. The framework identifies three interdependent innovative capability dimensions, which offer insight into the sources of sustainable international competitive advantages over time: technological capability, managerial capability and resource exploiting capability. Then the paper analysis the linkage of these three components of innovative capability with a firm’s competitiveness in an international context, and describes how a firm can develop and sustain competitiveness through the operation in the environment of globalization. Finally, the empirical analysis is done to prove the hypothesis of the interaction pattern between innovative capability and global competitiveness based on data from 213 firms in the Beijing area. The study reinforces the importance of innovative capability composition in internationalization decision-makings and suggests further research in this context.

SF-02 Information/Knowledge Management-3
Sunday, 7/9/2006, 17:00 - 18:30
Room: Regency-2
Chair(s) Abdullah Uz Tansel; Baruch College - City University of New York

SF-02.1 [R] ERP Implementation and Information Systems Success: A Test of DeLone and McLean’s Model
Jeff C Fan; National Yunlin University of Science & Tech., Taiwan
Kwoting Fang; National Yunlin University of Science & Tech., Taiwan

The present research develops and tests a theoretical extension of DeLone and McLean’s model of information system (IS) success that explains personnel belief that contributes to user’s utilization of ERP (Enterprise Resource Planning) systems. The extended model is tested using the structural equation model (SEM); a survey of 202 end-users from ten Taiwanese enterprises that have implemented Data Systems’ workflow ERP systems is conducted. The theoretical model proposed in this study provides insight into how the concept of useful perception is incorporated into DeLone and McLean’s model and plays a critical mediated role to influence system usage and its associated satisfaction. The implications of these findings for researchers and practitioners are discussed.

SF-02.2 [R] A DSS for Shift Design and Workforce Allocation in a Call Center
Aslı S Erdem; Bogazici University, Turkey
Burak Gedikli; Bogazici University, Turkey

Workforce scheduling, shift design and call allocation are the major problems in call center management. The aim of the call center manager is to allocate and dynamically update the workforce so that the incoming calls are answered in the shortest possible time, above certain service level measures. The software tools developed to aid decision making in these areas use the models that are based on Erlang-C calculations. However, the strict assumptions of Erlang-C often lead to invalid decisions. Especially at peak times during the day, dynamic updates in the proposed design are inevitable. In this study, a framework for a decision support system is proposed for designing the shifts and allocating the agent workforce to the shifts in a call center so that target service levels are met. In the proposed system, shifts are designed by solving a linear optimization model. Using this solution as the input, a simulation model is developed to dynamically update the workforce so that the minimum required service level is met at all times. The proposed DSS is illustrated on an existing call center system, alternative designs are generated and compared.

SF-02.3 [R] The Knowledge Management with Balance Scorecard in Food Product Development Process
Krisda Bisalayaputra; Ubonratchatanee University, Thailand
Kochone Punkorn; Ubonratchatanee University, Thailand

The main success driver of new product development, organizational culture, is considered another important focused research theme besides information technology. The current researchers focus on the importance of the human supports of new product development. A proper organizational culture must be developed in order to succeed in new product development. The purpose of this research is to study the relationships between the successful implementation of the product development process and specific organizational cultural orientations and attributes. The transfer of knowledge in product development function which will facilitate higher quality of research and development is examined as knowledge context, recipient context, interaction context, and transfer activity context. The study was done in the research and development in food industries with product development function with recognized outcomes. The results confirm the sustainable and desirable organizational culture to be the model for other organizations. The model of organizational culture from this model can be applied by management in organizations to create the organizational culture which will support knowledge transfer to stimulate and sustain success for product development in organizations.

SF-03 Emerging Technologies-2
Sunday, 7/9/2006, 17:00 - 18:30
Room: Smyrna
Chair(s) Rofkan Karakafti Dilek; TUSSIDE

SF-03.1 [R] Challenges to Global RFID Adoption
Nien-Chu Wic; National Chiao Tung University, Taiwan
Michael Nystrom; Inst. of Tech. Mgrn./ Chiao Tung U., United States
Lin-Pu Lin; Inst. of Tech. Mgrn./ Chiao Tung U., Taiwan
Hsiao-Cheng D Yu; Inst. of Tech. Mgrn./ Chiao Tung U., Taiwan

Because of its promise to revolutionize global supply chain management (SCM) systems, Ultra High Frequency (UHF) Radio Frequency Identification (RFID) was recently the cause of much optimism. Wal-Mart mandated its top 100 suppliers to begin using RFID on January 1st, 2005; this day was viewed as a watershed day in the industry. However, that date has come and gone, and the expected rapid industry adoption of RFID has not taken place. This paper
explores the existing challenges and obstacles to RFID’s quick adoption, the potential resolu-
tions and approaches to the challenges, and the migration strategies to expand the RFID
industry.

**SF-03.2 [R] A Decision Model to Analyze Costs and Benefits of RFID for Superior Supply Chain Performance**
Ertunga C Ozekcan; University of North Carolina at Charlotte, United States
Yesim Sireli; University of North Carolina at Charlotte, United States
Maria P Munoz; University of North Carolina at Charlotte, United States
Sriram Mahadevan; University of North Carolina at Charlotte, United States

Radio frequency identification (RFID) is believed to change drastically how supply chains oper-
ate, giving more control and visibility into the materials and information flowing through the
entire chain. While adoption of RFID technology is starting to ramp up, many supply chain play-
ers are still skeptical due to the high costs. The purpose of this paper is to analyze the cost
versus the benefits of RFID. Given the uncertainties regarding the RFID technology and scarci-
ty of related data, a simulation model is built to carry out a net present value (NPV) analysis for
various possible business scenarios. The parameters considered in our simulation experiments
include company size, margins, tag prices, fixed costs, increased sale and margin benefits. The
resulting NPV distributions help us identify the risk and the volumes and margins that make
RFID a viable option.

**SF-03.3 [R] Exploring Everyday Activities for Pervasive Decision-Aid**
Hiroshi Tamura; Hakuhodo Inc., Japan
Tamami Sugasaka; Fujitsu Labs Ltd., Japan
Hirohisa Naito; Fujitsu Labs Ltd., Japan
Minoru Sekiguchi; Fujitsu Labs Ltd., Japan
Satoko Horikawa; Univ. of Tokyo, Japan
Kazuhiro Ueda; Univ. of Tokyo, Japan

In this paper, we explain the process of establishing shopper’s activity models based on a
series of user-research as the basis of pervasive systems for a supermarket. Pervasive sys-
tems have been recognized as the technologies which enable user’s decision aid in his/her
everyday activities. For instance, a smart travel navigation system, which employs embed-
ded and wearable devices and mobile agent technologies, was proposed as a promising
information system for the society: it renders complex tasks into simple subtasks including
providing adequate information regarding transit to the another train at an arbitrary station
for visually-impaired people. Little research on analysis of user’s everyday activities for the
systems design, however, has been conducted. We believe it is important to examine user’s
everyday activities as well as to develop elemental technologies of pervasive systems simul-
taneously, which will become a powerful way of solving a variety of real-world problems.
An important piece of information regarding the model is that a shopper gradually elaborates
each plan primarily conceived at the store into final decision-making at checkout, instead of
buying items according to a well-defined plan as well as just on impulse. We regarded
that the system dynamically adapting to these shopper’s contexts is very different from oth-
er shopper’s decision-aid systems.

**SF-04 Technical Workforce-1**
Sunday, 7/9/2006, 17:00 - 18:30
**Room: Troy**
**Chair(s) William T Flannery; University of Texas at San Antonio**

**SF-04.1 [R] Future-Focused Motivation Management for R&D Personnel**
Kunio Shirahada; The University of Tokyo, Japan
Kiyoshi Nishi; The University of Tokyo, Japan

We analyzed the effect of motivation management by integrating organizational and individual
styles for motivating R&D personnel. To integrate both styles, we focused on the ambitions
of R&D personnel. Through collaboration with a large Japanese automobile company, we
investigated how well managers can motivate subordinates by stimulating their future career
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Note: [R] = Research paper; [A] = Industry Application; [K] = Keynote

SF-06 Technology Management in Services-3
Sunday, 7/9/2006, 17:00 - 18:30  Room: Bizans
Chair(s) Antonie J Jetter; Portland State University

SF-06.1 [R] An Approach for Providing Healthcare Services Using RFID Technology in the Korean Market
Sun-Jin Kim; ETRI, Korea, South
Nae-Su Kim; ETRI, Korea, South
We propose an approach to provide the healthcare services using RFID technology in the Korean market. The proposed healthcare services are served smoothly from registration to examination, treatment, prescription, and next reservation. Necessary information is provided to patients and hospital staff anytime and anywhere by recording and processing medical data produced in each step. To provide successfully the services, the system configuration, the provision method, the value chain, and the roles and benefits of each player in a value chain are stated. The survey results show that the proposed services are mostly important, quite a few respondents have the intention of use and the effects of services are mostly high. We have an option that it is desirable for the hospital complex to become the initial target market of the services. However, much more still remains to be solved technologically, economically and socially.

SF-06.2 [R] Common Cause Special Cause Vital Signs Charts
Dennis Ridley; Florida A&M University, United States
This case is a simulation. It teaches the state of the art in model based vital signs charting. It changes the way that charts are used, viewed and interpreted. VMH is a large hospital. Traditional monitors are currently used to display the patient vital signs of pulse and oxygen saturation. These monitors help practitioners identify when a vital sign falls outside a specified one-size-fits-all range. Traditional charting is labor intensive, receiving low priority relative to immediate patient needs. This makes accuracy and timeliness very difficult. This case shows how to solve this problem by using a new methodology described in U.S. Patent 6897773 “Computer-powered wireless ultra-intelligent real-time monitor (CWMRM).” The methodology is implemented in a monitor named MyPulse (free educational software is available). Vital signs are separated into common cause (internal biological effect) and special cause (external environmental effect) charts. Also, the control limits are customized based on 1) absolute standards dependent on patient age group and sex, and 2) standard deviations from the mean established for each individual patient. The result is accurate advanced notification of unusual numbers and patterns, in real time, by color graphics, sound, print /caller ID phone alert, etc., to local and/or remote locations.

SF-06.3 [A] The Strategy Development of u-Health Service
Misook Sohn; ETRI, Korea, South
Dongwon Han; ETRI, Korea, South
Jeunwoo Lee; ETRI, Korea, South
The healthcare environment is rapidly changing and is being transformed to meet new challenges of the aging and chronically ill. New opportunities by means of ubiquitous computing technologies are arising as an increasingly important role in healthcare fields. As ubiquitous computing technologies are moving into healthcare fields, various Korean healthcare organizations are eager to adopt these technologies, called u-Health. However, it is difficult to realize these new technologies quickly because there are many relevant stakeholders and hurdles to overcome. Unlike many existing technologies, u-Health has broad issues in respect to dealing with people’s lives. In this context, we offer an understandable picture for the successful development of u-Health projects in South Korea.

SF-07 Technology Assessment and Evaluation-3
Sunday, 7/9/2006, 17:00 - 18:30  Room: Tyana-1
Chair(s) Frederick W Betz; Venture2Reality

Seda Turan; Istanbul Technical University Faculty of Management, Turkey
Selmin Danis; Istanbul Technical University Faculty of Management, Turkey
Sitki Gozlu; Istanbul Technical University, Turkey
The purpose of this study is to identify performance criteria for radio frequency identification (RFID) technology in different applications. RFID is used in a wide variety of manufacturing and service industries and every sector has different performance criteria for RFID. The study is focused on tracking vehicles in automobile manufacturing and vehicle identification systems at gas stations. First of all, a literature search is carried out. The performance criteria are classified such as technical, operational, and managerial and then ranked. Automobile manufacturing plants and a large-scale petroleum distribution company are visited. In-depth interviews are held with the authorized experts. The differences in each application are discussed and results are presented.

SF-07.2 [R] Identification of Technology Performance Criteria for CAD/CAM/CAE/CIM/CAL in Shipbuilding Industry
Burak Ömer Saracoglu; UM Denizcilik & Istanbul Technical University, Turkey
Sitki Gozlu; Istanbul Technical University, Turkey
There has been considerable activity regarding the current computer-aided design, computer aided manufacturing, computer aided engineering, computer integrated manufacturing, and computer aided lofting (CAD/CAM/CAE/CIM/CAL) capabilities in the past five years in shipbuilding industry. There are a huge number of reports and papers that provide a detailed description of the deployments at yards, including items such as the network infrastructure, operating systems, databases, and CS capabilities of yards. However, none of them defines performance criteria for the selection of technology. The objective of this paper is to identify the performance criteria for the CS technologies in the shipbuilding industry, which is a traditionally managed and a highly design related custom-made production process. In this pursuit, two basic questions have been asked: 1) in what ways do firms decide to implement a certain technology? 2) after implementing the selected technology and software, how do they decide about their level of satisfaction? Two major groups of CS performance criteria have been identified, and a model is illustrated as a result of performing 40 worldwide interviews. Finally, the major groups of CS technology performance criteria are weighted.

SF-07.3 [A] Range Based Model for Technology Requirements Hybrid Vehicle Technology Assessment Case Study
Stephen W Jordan; Portland State University, United States
Tugrul Daim; Portland State University, United States
This paper presents a performance based technology assessment model. The model was used in a case study aimed at improving the performance (mpg) of a basic hybrid vehicle. The assessment model and case study included a gap analysis, a scouting report for candidate technologies, a technology evaluation and selection model, implementation recommendations, and a diffusion and adoption analysis. Hybrid vehicles are a radical innovation in vehicle manufacturing that can potentially reduce the amount of carbon emissions associated with “mainstream” vehicles. At 50 mpg on the highway, the hybrid performance was equal to non-hybrid performances of lightweight diesel and gas-powered vehicles. The performance declined to approximately 35 mpg in the city when accessories like the air-conditioner or heater were used or the windows were left down and the engine cycled on and off.
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due to frequent start-stop cycles. We focused on improving the performance of the vehicle during the first gallon of gas consumption by adding or swapping components such as batteries, battery chargers, fuel cells, and efficient engines, electrical motors and generators. The improved performance was accomplished by changing the batteries overnight and operating the vehicle in a purely electric-vehicle mode before the engine started. Doubling the mass of NiMH batteries extended the EV-mode range. These two changes together extended the performance range in the city and on the highway. Actual performance of any vehicle is driver and path dependent.

This panel will bring together a range of experts from around the world to explore the potential role of information and communications technologies (ICT) in socio-economic development. Although not specifically aimed at poverty reduction, enterprises such as cybercafés have had the effect of bringing ICT directly to far-flung regions throughout the developing world. G. Grant will address the increasingly paradoxical relationship between ICT and development, and argue that value-producing investment in ICT is beneficially accomplished within the context of supportive institutional arrangements that facilitate their adoption and assimilation. S. Kamel will examine Egypt’s electronic government initiative, a strategic plan formulated by the government to transform its operations through a public-private partnership. He will address the specific challenges faced while operating in a developing country context. M. Jennex will explore if knowledge management (KM) technology can facilitate better exploitation of ICT in developing countries. However, KM principles are not well understood in developing countries for many reasons, including differing work processes, perceptions on the value of knowledge, knowledge sharing practices, power structures, etc. He will discuss these issues within the framework of bringing KM to Ukraine. G. Harindranath and M. Sein will argue that the ambiguous findings and diverse opinions on the role of ICT in development can be attributed to the fact that ICT has mostly been conceptualised as a monolithic, homogeneous entity. They will draw on recent concepts from the ICT literature to propose an integrative framework to study the possible role of ICT in development.

MA-01: PLENARY-3

DATE: MONDAY, 7/10/2006
TIME: 08:30 - 10:00
ROOM: REGENCY-1

MA-01.1 [K] Overall Productivity, Democratization and Human Security

Bacharuddin Jusuf Habibie; former President, Indonesia; Founder and Chairman, The Habibie Center, Indonesia

TBA

MB-01 Technology Transfer

Monday, 7/10/2006, 10:30 - 12:00
Room: Regency-1

Chair(s) Franz Hofer; Graz University of Technology

MB-01.1 [A] A Framework for Technology Transfer

Desai A Narasimhalu; Singapore Management University, Singapore

Technology transfer is often perceived to be transfer of intellectual property (IP). Very few realize that there are other means of transferring technology. Most common means of technology transfer is the transfer of the IP alone. While this is interesting in itself, it is not the best means of transferring technology in all cases. IP such as patents, trademark and copyright-related material can easily be transferred in this manner. However, that is the lowest level of technology transfer possible. The next level of technology transfer is the ability to harness technology from the originating team to the recipient team. This involves having the creator(s) of technology innovation working with a team from the recipient side handling over technology and know-how. Transfer of software works best in this manner. This level is followed by the next higher form wherein the person or team creating the intellectual property is transferred over to the recipient company. This would certainly be of immense value in situations where a trade secret is being transferred. Excellent examples of level three technology transfer are leading and bleeding edge technologies in domains such as space and military. The best form of technology transfer is when the team / the entire organization and the culture are transferred over. This is where the most challenges are met in merger and acquisition situations. The paper will illustrate some examples from experience working in a publicly funded research lab.

MB-02 Information/Knowledge Management

Monday, 7/10/2006, 10:30 - 12:00
Room: Regency-2

Chair(s) Kiyoshi Niwa; University of Tokyo

MB-02.1 [R] Do Learning Organizations have Strokes of Genius?

Charles M Weber; Portland State University, United States

Note: [R] = Research paper; [A] = Industry Application; [K] = Keynote
Do learning organizations have strokes of genius? An empirical study of 34 high technology R&D and manufacturing organizations suggests not. The roots of punctuated equilibrium in organizational learning can be traced to learning activities that occur within organizational subsystems, primarily during R&D. Continuous improvement at the subsystem level contributes significantly to a delayed, rapid surge in organizational performance. Managers coordinate subsystem-level activities to maximize organizational performance by trading off the revenues expected from timely learning against the expected costs. Knowledge accumulated within organizational subsystems can remain hidden from organization-level performance metrics for prolonged periods of time.

**MB-02.2 [R] The Effect of Tacit Knowledge Management on Innovation: Matching Technology to Strategies**

Harold D Harlow; The American University in Cairo, Egypt
Syed Imam; The American University in Cairo, Egypt

This research proposes tacit knowledge management as a tool to manage intellectual capital and the use of the tacit knowledge index (TKI) to assess the level of tacit knowledge within firms and the effect of tacit knowledge on firm performance. We drew on a sample of 108 United States and Canadian firms using knowledge management to determine each firm’s TKI and their use of knowledge management methods. We developed a measure that included both the degree of usage and the tacitness of the knowledge management method and used regression and correlation to statistically analyze the innovation and financial outcomes. Significant relationships were found between a firm’s level of TKI and the firm’s performance. Those firms that have a higher degree of tacit knowledge, as measured by the TKI, perform better on both financial and innovation business metrics.


Akio Nagahira; Tohoku University, Japan
Isao Sugiyai; Kyushu University, Japan
Cornelius Herstatt; Technical University of Hamburg, Germany
Birgit Verworn; Technical University of Hamburg, Germany
Christoph Stockelstron; Technical University of Hamburg, Germany
Yong Cao; Tohoku University, Japan
Takashi Masaki; Tohoku University, Japan

Recently, increased attention has been paid to the front end of New Product Development (NPD). In this paper, we report on the key factors for success with regard to the front end activities of NPD in 513 Japanese companies. We develop and test a causal model of relationships among key variables relating to front end factors and success. The causal model is tested with AMOS using information from 513 completed NPD projects from Japanese manufacturing firms. The results of this study are summarized as follows: First, the more both market uncertainty and technical uncertainties are reduced during the front end, the higher is the effectiveness of NPD projects. Second, the more intensively new projects are planned prior to the start of development, the more both market and technical uncertainties are reduced. Finally, in industry goods firms, it is easy for managers to develop Initial Planning, which has a greater impact on Reduction of Market Uncertainty compared to consumer goods firms. In contrast, as it is very difficult for managers in consumer goods firms to develop an initial plan, managers involve several function members within their project team, and often bring in external resources to reduce market uncertainty.

**MB-03 Technology Management in Biotechnology-1**

**MB-03.1 [R] Keeping Financially Afloat: The Influence of Resources and Social Capital on Financial Capital Acquisition by Small Biotechnology Firms from Large Pharmaceutical Firms at Alliance Formation**

Shanthi Gopalakrishnan; New Jersey Institute of Technology, United States
Joanne L Scillitoe; Michigan Technological University, United States

Strategic alliances with pharmaceutical firms allow small biotechnology firms to acquire needed financial capital in exchange for the sharing of new, cutting-edge technologies. While prior research has considered the importance of resources in biotech firm acquisition of financial capital through the formation of alliances, the role of social capital in this acquisition process has not been explored. This study draws from complementary aspects of the resource-based and social capital theories to examine the factors that influence the extent of financial capital biotech firms acquire upon the formation of alliances with pharmaceutical firms. Results of this study suggest that resource based factors play a greater role in biotech financial acquisition than social capital factors. Specifically, alliances associated with more developed technologies and greater pharmaceutical firm control are associated with greater acquisition of financial capital by the biotech firm. In addition, the credibility of the pharmaceutical firm enables greater biotech financial capital acquisition. However, the social capital of the biotech firm does not appear to enable capital acquisition.


Koiti Shinokazi; Tokyo Fuji University, Japan
Akiya Nagata; Kyushu University, Japan

This paper notices the trust as social capital, and then attempts to investigate how it is treated in the discussion on intellectual property management. Furthermore, this study makes clear enterprises’ cognitions and approaches on trust, and then considers a method of the management of trust based on the data obtained through a survey conducted with questionnaires on pharmaceutical enterprises in Japan. Trust as intellectual property resides in not particular individuals or organizations but such subjects as between an enterprise and its customers. The past framework on the concept of intellectual property does not capture the trust existing among these subjects. This point may cause a limitation to the existing frameworks. As to enterprises’ cognition on trust, almost all enterprises reply on the same answers. But as to the approaches answer tendency are different. We can show a method of management of trust based on these results.

**MB-03.3 [A] Case Study of the Neptune Project: Cascade Microtech Applies Its Measurement Technology to the Emerging Life Sciences Market**

Diana Laboy-Rush; Cascade Microtech, Inc., United States
Eric Liu; Portland State University, ETM, United States
Kritchai Paungchomphu; Portland State University, ETM, United States
Adisorn Tuntikul; Portland State University, ETM, United States
Yucel Helimoglu; Portland State University, ETM, United States

Cascade Microtech, a market leader in advanced electrical metrology systems for semiconductors, has discovered the potential in this market and recently began a project to survey the industry to find a way to address the market with a new product initiative. This project has culminated in the release of a new product targeted at the microfluidics research market, a segment of the life sciences industry. The topic of this report is a case study of the process by which Cascade Microtech researched, identified, developed, and introduced a new product into a new market that resulted in a discontinuous innovation in life sciences research. Specifically, the company applied components of its core technology for the semiconductor industry to the very young microfluidics research market.

**MB-03.4 [A] Design of a Biotechnology Laboratory in Mexico: Key Issues**

Ricardo Arechavala-Vargas; Universidad de Guadalajara, Mexico
Claudia Díaz-Pérez; Universidad de Guadalajara, Mexico

Public research and development labs in Mexico are few, and they have been created only in the last four decades. Little experience is available regarding successful organizational models, as well as best structure and processes in their design. Currently, the need for a research center on Genomics and Biodiversity has become increasingly important, and its design and creation is in process. The design of this center, however, is built on an analysis of similar research institutions abroad, as well as on the basis of what the specialized liter-
atute regards as best practices on several scores. For example, its structure and workflows, as well as its knowledge management practices and infrastructure, will have to be carefully considered. Its impending creation will be of the utmost importance for the country, but it will also become a strategic competitor for international business in the field. This paper discusses the key issues in the design and creation of this organization, and in the development of its research capabilities.

**MB-04 New Product Development Management-1**


Zhen Zhang Sullivan; Stevens Institute of Technology, United States
Patricia J Holahan; Stevens Institute of Technology, United States

Researchers have argued that what may be sound management practice for the development of incremental innovations may well be detrimental to the development of radical innovations. Accordingly, researchers have sought to document differences in development practices for these two classes of innovations. Much of the research that has looked at development practices for radical innovations consists of qualitative, case studies. Because these studies involve so many different types of innovations, developed at different times and under very different circumstances, they provide only a preliminary understanding of how development best practices may indeed differ for different innovation types. This research explores differences in new product development practices among three project types — incremental, more innovative, and radical. To our knowledge, no cross-organizational, quantitative studies have been conducted that document how development practices differ with respect to all three classes of innovations. Using a sample of 82 business units considered “exemplary” product developers, we investigate how development practices differ across these three classes of innovation with respect to process, organization, strategy, culture, and senior management commitment. While it is commonly accepted that incremental and radical innovation should be managed differently, the results of this study suggest otherwise. The management of new product development activities across project types may be more similar than previously thought.

**MB-04.2 [R] Criteria for Assessment/Selection of Innovative Projects**

Wojciech Nasiornykv; University of New Brunswick, Canada

The screening of in-progress projects is among the most important activities related to the management of technology, change, and innovation. Based on preliminary empirical tests it has been found that two sets of criteria may be identified for the purpose of screening innovative projects in SME. First, there are financial, organizational, marketing, and technical, generic, “common sense” embedded criteria. These criteria are consistent across various projects and assessment perspectives. Second, there is a set of criteria that is project and context specific.

**MB-04.3 [A] Value Creation by Turkish Enterprises**

Sunder Kekre; Carnegie Mellon University, United States
Elif B Sarica; Carnegie Mellon University, United States
Gunduz Ulusoy; Sabanci University, Turkey
Nihat Atlantas; Carnegie Mellon University, United States

This study focuses on the resurgence of the automotive and appliance sectors in Turkey’s recent years. The analysis of both these sectors reveals some interesting lessons about technology management and investment strategies for companies to invest in Turkey. We discuss the major changes and project the future in both industries. Turkey seems to be a clear project the future in both industries. Turkey seems to be a clear

**MB-05 Technology Diffusion-1**

**MB-05.1 [A] Diffusion of Management Systems in Multinational Companies: The Case of Dynamic Strategic Planning System**

Alper Alsan; Siemens, Turkey

Multinational companies have different characters for transfer and diffusion of tools and competencies among country organizations. This paper focuses on the diffusion of management systems in multinational companies. The case is about the strategic planning system which was developed by Siemens Turkey and is currently being used by nine country organizations of Siemens. The development history of this tool will be provided together with the diffusion into the country organizations. As a conclusion, critical success factors and challenges for the future will be presented.

**MB-05.2 [R] Information Technology (IT) Diffusion: An Analysis of User Behavior in the Exploitation of IT**

Ilda Tanoglu; Bogazici University, Turkey
Nuri Basgol; Bogazici University, Turkey

The management of technology within the organization is critical in taking full advantage of the benefits provided by the technology. In order to achieve the greatest return on information technology (IT) investment, the diffusion process of IT within the organization should be examined carefully. This paper aims to explore users’ behavior in the exploitation of IT, regarding different stages of the managerial decision making process in different business functional areas, and by means of different tools. For attaining this purpose, a survey has been applied on 30 employees in a large manufacturing company which is about to transfer its operations to a complex ERP system.

**MB-05.3 [R] Management and Diffusion of Technology for Disaster Management**

Ozlem Albayrak; Izmir University of Economics, Turkey

This paper suggests a rationale and a framework to classify technologies used for disaster management, and especially for Disaster Management Information Systems (DMIS). It further aims to present diffusion of DMIS technology innovations and utilizations in Turkey, a country that is exposed to many different sources of disasters. Management of technology utilized for disaster management is a challenging topic because effective disaster management is not only a complex problem which involves many parameters that are usually difficult to measure and identify, but also an important subject which can save lives and millions of dollars. Analysis of the current situation, planning, optimum resource management, coordination, controlling and monitoring current activities and making quick and correct decisions in case of crisis and emergency are only some of the many parameters, whose complete list is very long. Throughout the history of disaster management, existing technologies have been used at different stages of disasters: before, during and after the disasters. Among the several technologies utilized to deal with disasters, DMIS play a key role.

**MB-05.4 [R] Demand Side Innovation Hypothesis in the Complex Consumer Network**

Yuichi Washida; The University of Tokyo/Hakuhodo Inc., Japan
Kazuhiro Ueda; The University of Tokyo, Japan
Yosuke Kinoshita; Hakuhodo Inc., Japan
Keigo Awata; Hakuhodo Inc., Japan

This research examines a new hypothesis of the technological diffusion process in the social network structure among consumers, based on an empirical survey and a complex network simulation. In our hypothesis, the social value of a new technology can be changed by a particular consumer community of the early adopters during the diffusion process, and the competition to win a technological standard in a product category can be highly affected by the early adopter communities, instead of the innovators themselves. This phenomenon has been observed in a variety of high-tech products, such as the latest mobile phone handsets or automobiles in the Japanese consumer market. This phenomenon implies that the innovation can emerge on the demand side as well as on the supply side, in certain types of product markets, even though the consumers themselves cannot produce or improve products.
Translating the value of a new technology is a key issue in the hypothesis, and the process of the translation among consumers can be simulated by a complex network model. In this research, we built a complex network simulation model based on an empirical consumer survey in Japan and explored the general patterns of a technological diffusion under a variety of settings.

**MB-06 Technology Management in Telecommunication-1**
**Monday, 7/10/2006, 10:30 - 12:00**
**Room: Bizans**
**Chair(s): David Probert; University of Cambridge**

**MB-06.1 [A] Innovation Strategy of Mobile Industry in Korea: Case Study of CDMA**
Jong Yong Lee; ETRI, Korea, South
Changok Um; Sangju National University, Korea, South

The successful innovation of CDMA has an important effect upon not only the export competitiveness of the domestic mobile industry but also the diffusion of technology. This achievement of CDMA innovation was possible through the base on the experience of TDX innovation in the 1980s. This paper analyses the innovation system of from TDX to CDMA. The TDX-CDMA innovation system has the general characteristics. National Research Institution (ETRI) learns and absorbs the original foreign technology and the foreign technology owner (Qualcomm) cooperatively within this innovation system. In this respect, the CDMA innovation system is a global collaborative innovation system. However, the CDMA innovation system has fundamental limitations. It needs structural transformation to overcome the problems. Firstly, market expansion is the best policy to secure "technology opportunity." It needs to reinforce the diffusion policy of CDMA technology in order to increase the number of nations adopting the "CDMA method." Second, the CDMA innovation system should be transformed from the established global learning system to the global developing system for ensuring core technology by the expansion of investment to the development of technology of core components and the applied software programs.

**MB-06.2 [R] A Study on the Need for a Method of Improving the Inactive Wireless Internet Service in Korea**
Eok-Soo Han; ETRI, Korea, South
Choon-Soo Ahn; ETRI, Korea, South
Min-Jeong Kim; ETRI, Korea, South

In recent times, mobile communication service providers in Korea have had to contend with the skeptical response of the market with regards to the wireless Internet service using the mobile phone, and the stagnation of both the user pool and ARPU growth. If this trend continues, it is likely that the wireless internet business will be hard hit by subscription withdrawal and a falling market share. Currently, about half of the entire number of users has either withdrawn from the wireless internet service or no longer uses it. Even worse, other communication services such as the high-speed fixed-line internet and WiBro, as well as PSP, PMP, and MPSP, are likely to emerge as intimidating competitive services. In view of these circumstances, this study aims to analyze the causes of the various problems and find a strategic method of improvement, in order to determine the fundamental alternatives that could promote the current wireless internet market and lay the foundations for the growth base of next-generation network services like WCDMA and HSDPA.

**MB-06.3 [R] Vision and Strategy Developing the Next Generation Mobile Communications Technologies**
Seok Ji Park; ETRI, Korea, South

In this article, we present a vision and strategy for developing B3G mobile communications technology in Korea. Mobile communications technology has evolved for satisfying the customer needs continuously. It is expected that future mobile communications will provide safety, health care, convenience, pervasive environments, knowledge based, high culture life, and human relationship services to users in time beyond the 3rd generation. The 3G mobile communications services have launched recently to make new business opportunities in Korea, but they have many limitations such as the expensive usage fee and low transmission speed. Thus there is much concern regarding the next stage of 3G services to overcome previous restrictions. We suggest service functionalities and technical characteristics vision and strategy for providing the beyond 3G (B3G) mobile communications. Vision has established based on the user’s demand as well as on new communications technologies. However, B3G services should meet service requirements in terms of price and data transmission speed. B3G services can guarantee very high transmission speed and various multimedia services like the picture phone with low price. From the point of view of networks, the access networks need to be converged and integrated in order to support these services. Different types of handsets will be available to meet various user’s requirements and usage patterns. B3G services could be a solution that satisfies customers’ need for new mobile communications services overcoming existing restrictions.

**MB-07 Decision Making-1**
**Monday, 7/10/2006, 10:30 - 12:00**
**Room: Tyana-1**
**Chair(s) Neil Eidin; Indiana Univ. - Purdue Univ.- Indianapolis (IUPUI)**

Trina M Chatka; NASA Langley Research Center, United States
Bruce A Conway; Embry-Riddle Aeronautical University, United States
Rezit Unal; Old Dominion University, United States

Addressing uncertainty early in system design phase is a key task for project managers of high technology, one-of-a-kind systems. However, a primary challenge in quantifying and studying uncertainty during conceptual design of such systems is the lack of historical data. This study presents an expert-judgment elicitation methodology utilized to address uncertainty in conceptual launch vehicle design. The methodology seeks to obtain expert judgment opinion for quantifying uncertainties as probability distributions so that multidisciplinary risk analysis studies can be performed. Using the methodology, a set of questionnaires was developed to qualify and quantify uncertainty associated with design parameters as a set of probability distributions. Aggregation techniques are also presented as part of the methodology to provide an approach to aggregate multiple expert judgments into a single probability distribution. An application exercise for a launch vehicle is presented.

**MB-07.2 [R] An Application of an Analytical Hierarchical Process in the Investigation of the Logistics Process and in the Selection of the Transportation Type**
Pinar Kilicogullari; University of Kocaeli, Turkey
Sezai Isik; University of Kocaeli, Turkey

The term logistics, which is heard a lot these days, expresses different activities performed during a production process such as planning, procurement, transportation and the storing of materials. In parallel to the technological advancements, rates and varieties of production as well as its distribution channels are growing in number and causing complexities in logistics activities of companies. During a production process, starting from the establishment of demand until the final shipping is materialized, the companies are to determine material requirements and necessary stock levels, to establish storage procedures of end-products and to choose their distribution strategies. The aim of this study is to define the logistics system and the system management, to introduce logistics understanding of different companies in Turkey, and, by a decision analysis approach, to achieve improvements in this field. “Decision analysis techniques under uncertainties” are investigated. To this end, an Analytical Hierarchical Process model is employed in the selection of the most suitable way of transportation between two given locations in Turkey. The criteria used in the selection of transportation types are identified as the cost, the speed and the safety. The results of this study indicate that railway transportation, which is not widely used in Turkey, is also an alternative and suitable means of transportation.

**MB-07.3 [R] Critical Gaps in Portfolio Management Implementation: A Brazilian Case Study**
Marisa Padovani; University of SãO Paulo, Brazil
In the existing literature on portfolio one meets diverse approaches, referred to the techniques of classification, selection, prioritization and projects management. The main objective of this article is to investigate the practice of portfolio management in a Brazilian company, and to identify gaps and opportunities of improvement. The empirical research carried out for this work is of qualitative nature and it was conducted by the case study method. The case choice criteria have been the following ones: Brazilian Company with intensive capital and, nationally and internationally remarkable for its revenues, investment policies and its portfolio of projects. The selected company acts in the chemical and petrochemical segments with private and national capital. It has been collected 5 years data on the portfolio of projects of the referred organization, getting a picture of the sorts of the developed projects and their numbers, their characteristic results in terms of fulfilling their datelines and their budgets. The period of analyses was set so that it would allow a valuation of the outcome resulted from the decisions. It was possible to verify the practical application of the techniques proposed in the literature for the classification, the selection of the projects and the portfolio management. It was also possible to identify some critical variables for the implementation of the projects of the company in study, signaling that they are critical factors of success for implementations of projects in Brazil. For the found problems, the present work proposes solutions to be confirmed in future studies.

**MD-08 SPECIAL SESSION: ETMERC Panel Discussion**  
**Monday, 7/10/2006, 10:30 - 12:00**  
Panelist(s)  
John Aje; University of Maryland  
Alan Brent; University of Pretoria  
William T. Flannery; University of Texas at San Antonio  
Dundar Kocaoglu; Portland State University  
Antonie de Klerk; University of Pretoria  
Tinus Pretorius; University of Pretoria  
Kringe Visser; University of Pretoria

ETMERC (Engineering and Technology Management Education and Research Council) is the organization of the heads or their designees of the educational programs and departments in engineering and technology management throughout the world. These include all programs with a variety of titles, including but not limited to engineering management, technology management, MOT, innovation management, etc. ETMERC operates under the auspices of PICMET as an all-inclusive organization, not limiting its affiliation to any professional society. Its objective is to provide leadership in developing educational guidelines, curriculum strategies, evaluation criteria, and research agenda for the field. All educators and academic researchers are invited to attend this special meeting to meet ETMERC’s Executive Committee, to participate in ETMERC’s strategy development for future activities, and to share ideas and experiences with colleagues from around the world.

**MD-01: PLENARY-4**

**DATE:** MONDAY, 7/10/2006  
**TIME:** 13:00 - 14:30  
**ROOM:** REGENCY-1

**MD-01.1 [K] Competitive Positioning and Innovation Power of Turkey**  
Cengiz Ulluta; Vestel Electronics, Turkey

Based on recent studies carried out by the World Economic Forum, OECD and the EU, competitive positioning and the innovation capabilities of Turkey will be discussed. Macroeconomic, public institutions and business perspectives defining the above factors will be analyzed. Recent developments and observations will be shared complementary to the above studies. Real cases representing the competitive and innovative power of Turkey that have resulted in global market share will be presented, and relevant success factors will be discussed.

**MD-01.2 [K] Dynamics of National R&D Program Evaluation in Korea**  
Hee-Yol Yu; KISTEP, Korea, South

Given the increasing significance of government-funded R&D programs in Korea, the importance of an efficient implementation of those programs based on the objective evaluation seems certain to increase. As part of the efforts for enhancing the efficiency of the public R&D, the Korean government has recently reformed the administrative system of S&T, establishing the Office of Science and Technology Innovation (OSTI) within the Ministry of Science and Technology and reorganizing the Korea Institute of Science and Technology Evaluation and Planning (KISTEP) for specialized support for OSTI. In line with this reform, the country is undergoing a paradigm shift in R&D activities; from “PIE” (planning-implementation-evaluation) to “EPI.”

This presentation will introduce how Korea’s national evaluation system has evolved and how government-funded R&D programs are evaluated in Korea, and it will address current issues encountered in the process of evaluation. It will also suggest some reform measures for the improvement of evaluation practice. Finally, some suggestions for promoting international cooperation in evaluation will be made. It is hoped that this informative presentation on the evaluation system of R&D programs in Korea will convey some meaningful insights to policy makers and experts in this area from around the world.

**ME-01 Technology Transfer-2**

**Monday, 7/10/2006, 15:00 - 16:30**  
Room: Regency-1

**Chair(s)** Martin Ingañas; Swiss Federal Institute of Technology

**ME-01.1 [R] Technology Transfer between Universities and Companies: Results of an Empirical Survey of Companies and University Researchers in Styria (Austria)**  
Franz Hofer; Graz University of Technology, Austria

This research paper is based on a study realized for a doctoral thesis (in progress as of January 2006). The aim of the thesis is to identify suited support measures to further improve technology transfer between universities and companies. Researchers at Graz University of Technology as well as Styrian companies were questioned regarding their current technology transfer features, characteristics and importance of barriers and motives. In total 177 companies and 81 university researchers responded to the questionnaire, giving a response rate of about 12 per 7%. The results are interesting and allow setting up a typology for university researchers and companies following an already existing classification in combination with the importance of barriers. Unlike others the typology does not take the characteristics of companies and university researchers as starting point but their current technology transfer combined with their answers regarding the importance of barriers. The research paper presents some of the most interesting results and then introduces the typology, which can be used to identify specific support measures for the different clusters according to their actual needs.

**ME-01.2 [R] Knowledge Flow from Scientific Sector to Private Firms: Review on the Policy of Technology Transfers in Japan**  
Akiya Nagata; Kyushu University, Japan

Expectations for cooperation between industry and the academic sector, as a means for recovering their industrial competitiveness, have been heightened in Japan since the latter half of the 1990s. Recognition in the 1980s showed the policy of technology transfer from universities to private enterprises was actively implemented in the United States and proved to be fruitful, to a certain extent, in contributing toward the economic growth of the country. This, as well as an orientation for taking this example as a model for Japan’s own purposes, is in the background of such debate over the policy. However, any operation relating to the redefining of the reality recognized as a prerequisite for the policy is already a non-issue. This is to say that the perception of expectations that are in the background for cooperation between industry and the academic sector, which is driven with the TLO as the axis, shows that “the flow of knowledge from universities to the industrial sector was much less in Japan in comparison with countries like the United States” or that “the flow of knowledge through the transfer of intellectual property from universities can promote innovation in the industri-
al sector" are considered to be stylized facts hardly ever verified through experience. This paper presents an attempt to contribute towards offering evidence based on debates over policies by investigating the stylized facts with experiential data. The results of our analysis indicated that the flow of knowledge from the scientific sector to private firms in Japan was not necessarily less than that of the United States. Further, it was also indicated that enterprises in Japan utilized the domestic scientific sector and not scientific sectors overseas, as useful sources of information for innovations. Furthermore, the results of the analysis for industries made it apparent that the importance of intellectual property as a medium of knowledge flow from universities to private enterprises was limited in nature in Japan.

ME-01.3 [R] Technology Transfer as Team Building: An Empirical Analysis of University TLOs in Japan
Dal Senoo; Tokyo Institute of Technology, Japan
Michi Fukushima; Tohoku University, Japan
Shigemi Yoneyama; Musashi University, Japan
Toshiya Watanabe; Tokyo University, Japan

The "transfer of university technology" is not only a one-way transfer process of technological outputs matching a scientific discovery with a market need, but also the building of teams of university and business people working towards the common goal of technological knowledge creation. The role of university Technology Licensing Offices (TLOs) is to facilitate this long-term partnership. The result of a questionnaire survey of university TLOs in Japan (n=40) reveals that "individual type TLOs" (where TLO performance is merely the sum of each member's individual output) were fewer than expected, while "organizational type TLOs" (where TLO performance depends on organizational assets or collaboration among members) were dominant. Yet, when considering such factors as the TLO's mission, the members' employment status and previous occupations, and the time allocation for each TLO activity, differences among TLOs were observed. Hence, by analyzing these organizational factors, those affecting the TLO's performance were identified. The implications of this research are that TLOs where either (1) the proportion of full-time or permanent members is high, or the number of staffs with previous work experience in private companies is important, or (2) the time allocation ratio between sales, legal affairs and strategic activities is approximately 6:2:2, may enjoy greater performance.

ME-02 Resource Management-1
Monday, 7/10/2006, 15:00 - 16:30
Chair(s): Suresh Sethi; University of Texas at Dallas
Room: Regency-2

ME-02.1 [R] Data Envelopment Analysis Evaluation of Canadian Resource Companies
Zijiang Yang; York University, Canada

In today's competitive atmosphere, financial management is a key indicator of a corporation's efficiency. The top management wants to identify and eliminate the underlying causes of inefficiencies, thus helping their firms to gain competitive advantage, or, at least, meet the challenges from others. Consequently, productivity management has become part of their management practices. This paper presents an evaluation of profitability and operating efficiency of 63 Canadian resource companies during year 2004 using Data Envelopment Analysis (DEA). The results show that there is potential to improve the performance for Canadian resource industry from both operating and profitability perspectives. The results also suggest that the examined companies are more profitable than operationally efficient and company size is a factor to affect the performance.

ME-02.2 [R] Models of Resource Agility of an Enterprise
Stefan Trzcielinski; Poznan University of Technology, Poland

Agility is meant as a feature enabling the enterprise to use opportunities and avoid threats. Agile enterprise is oriented toward using the market opportunities. The ability is dependent on the resources the enterprise possesses or which are at its disposal. The resources can be classified into four following groups: material technologies, finance, social, and knowledge. In the paper the variety of state of resources are discussed to show their influence on the agility of the enterprise. According to the four above categories of resources, the following models of agility are distinguished: technological, financial, social, and entrepreneurial. Each of the models presents the relation between the state of the resources and both the agility and business risk.

Lakhwinder Pal Singh; National Institute of Technology, India
Arvind Bhardwaj; National Institute of Technology, India
Anish Sachdeva; National Institute of Technology, India

The intense competition in the current marketplace has forced firms to re-examine their methods of doing business. Economic liberalization and globalization of economy is becoming a worldwide phenomenon. However, survival of industry and its economic growth is dependent on the productivity level. This is very true in developing countries like India because of higher population growth, higher interest rates, rising inflation, domestic and international competition, scarcity of raw materials, fiscal deficit, etc. The present work is an empirical study of the impact of quality management practices like Just-in-Time, 5S's tools, suggestion schemes, workers participation, quality circles and ISO certification on performance of SMEs. The performance parameters incorporated for the study were manpower and assets utilization, inventory management, quality aspects, cost aspects, time performance and purchasing procedure. A comprehensive questionnaire was developed and circulated to the different firms and responses were collected for analyzing the data. On the basis of the literature review and the survey of the industry, objectives were identified; the impact was validated on the basis of correlation analysis.

ME-03 Innovation Management-2
Monday, 7/10/2006, 15:00 - 16:30
Chair(s): Charles M Weber; Portland State University
Room: Smyrna

ME-03.1 [A] RECOMM: A Research Capability Maturity Model for Managing Technological Innovations
Desai A Narasimhalu; Singapore Management University, Singapore

Companies, private and publicly funded research institutions have been engaged in research projects and research programs. This paper describes a research capability maturity model for managing technological innovations. The insights for this proposal were derived from studying a variety of research organizations for managing technological innovations in a publicly funded research institute in Singapore. The model was implemented over a period of time with different degrees of success at Kent Ridge Digital Labs, Singapore, which has since been renamed Institute for Infocomm Research. The suggested maturity model has five layers: Ad-Hoc, Directed, Managed, Optimized, and Outsourced. Every research organization is likely to operate in any one of these five levels. The first four levels can easily be managed entirely within an organization. The transition from the fourth to the fifth level is indeed very challenging and requires establishing the right set of frameworks for collaboration. The paper will describe the relationship between an organization's researchers and the research partners and the issues that become important at each of these levels. Some research organizations may have technology innovation directed research projects that operate across all the five levels. The paper will discuss the nature of technology innovation projects that lend themselves best to each of the five levels.

ME-03.2 [R] Technological, Market and Architectural Catching-Up: The Case of Chinese Digital TV Industry
Zijhen Li; Tsinghua University, China
Chengwei Wang; Tsinghua University, China

Most of the current catching-up research focuses on explaining how developing countries have tried to catch up with advanced countries by technological catching-up or market catching-up. This paper examines the experiences of the Chinese digital TV industry and introduces a third catching-up called architectural catching-up, which means an integrated
consideration of self-configuration and external resource and environment. Using this strategy, Chinese firms have won in the competition with foreign first movers, and this should be a good inspiration for developing countries and firms.

**ME-03.3 [A] Development of New Competencies and Practices the Innovation Management to Sustainable Development: The Study of Natura**

Anapartica Morales Vilha; Universidade Estadual de Campinas (UNICAMP), Brazil
Muhamad Ruy Quadros; Universidade Estadual de Campinas (UNICAMP), Brazil

Environment issues have induced firms to search and develop cleaner technologies and production practices. This process has created new business opportunities, which are related to sustainable production and to the conservation of the environment. This paper aims at understanding the implications of innovation trajectories based on the development of sustainable products and technologies for innovation management practices and the related managerial competencies. The study explores the case of a Brazilian leading cosmetics manufacturer, Natura, through the search of secondary data on the company and its industry, as well as the search of primary data by means of interviews accomplished with professionals in the research and development, strategy and marketing areas of Natura. The results show that the company presents a capability of the technological and market opportunities when developing products for market niches not explored in Brazil, besides the effort for implementation of routines entirely new in the company and the mobilization of resources and competencies in its technological innovation management, such as strategic and structural arrangements; relationship with the suppliers and the training of these; technological competencies and knowledge sources; development of products and research and development projects; and marketing strategy.

**ME-04 Technology Management Education-1**

**Monday, 7/10/2006, 15:00 - 16:30**

**Room: Troy**

**Chair(s): Marthinus W Pretorius; University of Pretoria**

**ME-04.1 [A] Determining the Expectation of Kocaeli Industry from Vocational and Technical Education System**

Deniz Kasap; TUSSIDE, Turkey
Zafer Yalcinpinar; TUSSIDE, Turkey
Ozan Ozcan; TUSSIDE, Turkey

Any effective vocational education and training system depends on its congruence with the dynamic forces of the labor market and its respect for the culture it serves. The dynamics of the labor market depend on the needs of industry and commerce and the availability of trained individuals to meet them in their current form and adapt to them in their future form. The province of Kocaeli has become one of the most rapidly growing industrial regions in Turkey and has always been evaluated as an important region for industrial investments. This paper presents a “Need Assessment” study that determines the technical workforce type and amount endowed with knowledge and experience to keep up with the technological changes for Kocaeli industry in Turkey with qualitative and quantitative methods. This paper also examines the potential professions which are going to be crucial within 15 years. A survey was conducted and focus group meetings were arranged with participation of industry and vocational and technical school representatives. The results of this study will be used for the development of a vocational and technical education syllabus by the Ministry of National Education and will be a well-designed tool to develop the cooperation between the Ministry of National Education and Kocaeli industry.


Irthashd Ahmad; Florida International University, United States
Maung K Sein; Agder University College, Norway
Syed M Ahmed; Florida International University, United States
Umart Artuk; Florida International University, United States

In today’s competitive environment, organizations need to innovate in order to simply survive. At the same time, information and communications technology (ICT) has become ubiquitous and an integral part of business processes. Organizations are becoming increasingly dependent on ICT. There is a growing need for professionals who are not simply competent in ICT but also have the ability to manage and creatively exploit the technology to create new ideas. This is especially vital in the engineering field. The construction engineering (CE) and construction management (CM) areas are no exceptions. While the construction industry and academia in construction have embraced ICT enthusiastically, effective implementation in practice and academia has been less than thorough. The small body of research literature in CE and CM has not examined the topic in depth. There are mostly case studies of application of ICT in projects and some conceptual articles that are little more than “tutorials” in various aspects of ICT. Of equal concern is that ICT is just a small part of the curriculum around the world in CM and CE. Even where it is covered, the approach is purely functional (introduction to tools) as opposed to vital aspects such as organizational and process change (consideration of impacts of ICT on the industry, its organizations and the fundamental issues of construction). In this paper, the authors examine the current state of graduate construction curriculum in regards to coverage of ICT. Based on a survey of construction curriculum in leading educational institutions around the globe, we will present an analysis of the current state and the emerging trends in incorporating ICT in construction education. Based on our analysis, we will suggest approaches to effectively develop the ICT curriculum in construction education.


Murat K Yurtseven; Yeditepe University, Turkey
Walter W Buchanan; Texas A&M University, United States

The aim in this paper is to remain some of the approaches available for developing quantitative models of dynamic processes in system development. The review is performed through a systems engineering perspective with the intention of guiding systems engineering students and practitioners in the modeling process. The major conclusion drawn from the study is that some formal approaches to hierarchical system modeling should receive more attention in the treatment of the subject matter.

**ME-05 Project/Program Management-1**

**Monday, 7/10/2006, 15:00 - 16:30**

**Room: Ephesus**

**Chair(s): Alper Camci; University of Central Florida**

**ME-05.1 [R] Technology Complexity in Projects: Does Classical Project Management Work?**

Alper Camci; University of Central Florida, United States
Timothy Kolbou; University of Central Florida, United States

After World War II, project management emerged as a management discipline to manage large high technology projects, like nuclear missiles and space program. But recent evidence suggests that technology projects either fail to reach their goals or fail completely. Project management style is the management paradigm that guides the managers of an organization in perceiving and dealing with the management problems. Like other human intellectual processes, project management styles are influenced by the scientific paradigms. Classical project management is based on the scientific management theories which are based on the mechanistic Newtonian paradigm, where universe is assumed to be deterministic. But during the last decades of the 20th century the complexity paradigm based on the chaos and complex adaptive system theories emerged as a contender paradigm. This paper aims to develop measures for assessing project technology complexity and project management styles by employing a survey of project management professionals. The results of confirmatory and exploratory factor analyses provide strong evidence that the final measures for project technology complexity and project management styles have adequate validity and reliability. Finally, both theoretical and practical contributions of this research are discussed.

**ME-05.2 [A] Toward a New Project Management Maturity Model**

Joca Stefanovic; Stevens Institute of Technology, United States

Note: [R] = Research paper; [A] = Industry Application; [K] = Keynote
ME-06.3 [R] A Study on Retaining Existing Customers In the Korean High-Speed Internet Service Market

Min-Jeong Kim; ETRI, Korea, South
Soon-Ju Koh; ETRI, Korea, South
Young-Joon Park; ETRI, Korea, South

Telco's business circumstances have been deteriorating owing to the diversity of customer needs and fierce competition in the market. As such, Telcos must concentrate not only on obtaining new customers and retaining their existing customers, but also on improving customer satisfaction and loyalty. Firstly, in order to heighten customer satisfaction, it is essential to understand the causes of dissatisfaction and either minimize or eliminate them. In this paper, we study the problem of building subscriber lines with minimal length of duct in telecommunications networks. For designing a physical distribution system or integrated circuit, this problem is known as the k-Minimum Spanning Tree or k-MST problem, and it has been widely studied before. In this paper, we propose heuristic algorithms to compute good approximations for subscriber lines. Our simulation results show that the proposed heuristic algorithms offer affordable computing time compared with general k-MST algorithms without compromising over the length of duct.
why or even how to best apply particular decision aids. Rather than developing further tech-
niques, this paper reviews the relevance and limitations of existing techniques. This is drawn
from an ongoing research project which seeks to support technology managers in select-
and applying existing decision aids and potentially in the design of future decision aids.
It is intended that through improving the selection of decision aids, decision performance
can be increased, leading to more effective allocation of resources and hence competitive
advantage.

**ME-07.2 [R] An Investigation on Information and Gender-Based Power In
Product Design Decision-Making**

Gul Okudan Kremer; Pennsylvania State University, United States
Can E Mutluer; Pennsylvania State University, United States

The goal of the designed experiment and subsequent analyses presented in this paper was
to investigate the power distributions especially with regards to gender in mixed-gender
groups engaged in product design decision-making. The task involved determining the set
of design criteria pertaining to consumer products with varying gender orientations, and rat-
ing the criteria for their importance according to various stakeholder interests. Results indi-
cate that group level acceptance of the contributions was indeed impacted by the type of
the product that the decision-making focused on, and that this impact can be attributed to
the perceived knowledge levels of the individuals due to their expected familiarity with the
product.

**ME-07.3 [R] Fuzzy Cognitive Maps for Engineering and Technology
Management: What Works in Practice?**

Antonie J Jetter; Portland State University, United States

Due to a lack of available data, many early planning decisions in Engineering and Technology
Management have to be based on experts’ opinions and their qualitative statements about
evolving technologies, markets and general business environments. Several authors have
suggested the use of Fuzzy Cognitive Maps (FCMs) to analytically support these decisions
with simulation models that can cope with qualitative information. However, only little prac-
tice experience is documented. Based on multiple case studies and an extensive literature
review, the paper reviews the state-of-the-art of FCM-practice and introduces a six-step
guideline for practitioners and researchers who wish to apply FCMs to real-world problems.

**Note:** [R] = Research paper; [A] = Industry Application; [K] = Keynote
 SESSIONS

solvos based their submissions, partially or fully, on previously developed solutions from their own and/or someone else’s work, implying an efficient re-use and transformation of existing knowledge and solutions.

MF-02.2 [R] The Evaluation of the Best Timing of Enterprise’s Investment in Mainland China and Estimate Break-Even by the Combination of Scenario Analysis and FMEA Model

James K. Chen; National Chiao Tung University, Taiwan
Benjamin J. C. Yuan; National Chiao Tung University, Taiwan
Ming-Yeu Wang; Aletheia University, Taiwan

The goal of this study is to discuss the best timing of entering China to invest and build a factory. Using the photomask industry of Taiwan as an example, the key variables were derived by the analysis of examining the industrial environment, observing the market and technology of global photomask industry and contrasting with China’s semiconductor industrial environment, and the investment strategies of important manufacturers in the photomask industry in recent years; the relevant variables were obtained by consulting and interviewing with 15 experts in the photomask industry. Business Failure Mode Effect Analysis (BFMEA) was used to discover the important trend of change and was integrated with scenario analysis to obtain the quantitative results as being the reference of investment strategy at the decision making level. Quantitative analysis used in this study developed market and business models. The market model is based on public information as the basis of semiconductor production and experts’ consultations as the references of converting variables to develop the market model of the photomask industry. This market model was used to predict future demands. Analyzed data gained from the market model was applied into the business model to get the relevant information about operation profit. This study found that the fourth quarter in 2003 was the best time point to invest in the photomask industry in China because the 6-inch photomask market had significant growth in 2004, and companies investing China’s photomask market will begin to make profits in 2006.

MF-02.3 [R] Supertug Simulation Feasibility Study

Massoud Bazargan; Embry - Riddle Aeronautical University, United States
Mark Talaga; Embry-Riddle Aeronautical University, United States
Yen-Ping Wu; Embry-Riddle Aeronautical University, United States

In this paper we conduct a feasibility study using simulation for AirTran Airways at their hub in Atlanta Hartsfield-Jackson International Airport (ATL). This study pertains to using super-tugs to transport aircraft to and from the airline’s maintenance facility. The purchasing price for these super-tugs is around a quarter of a million dollars. This study attempts to investigate the possibility of reducing costs through saving jet fuel. This study adopts simulation to analyze the annual savings by studying the numbers needed, as well as the utilization and operation cost for these super-tugs. The results are very interesting, enabling the airline to clearly evaluate the cost and benefits of purchasing new super-tugs.

MF-05 Project/Program Management-2

Monday, 7/10/2006, 17:00 - 18:30 Room: Ephesus
Chair(s): Yoshiyuki Yabuuchi; Shimonoseki City University

MF-05.1 [R] Project Governance for Global Projects

Michiel C Bekker; University of Pretoria, South Africa
Herman Steyn; University of Pretoria, South Africa

In an increasing competitive and globalising business world, the question of governance remains a highly debated and contentious issue. With different countries adopting various approaches towards corporate governance, the question remains: “how do global projects, engaging multiple companies across multiple countries, establish and adhere to common governance principles?” Examples exist where project stakeholders decided to either adopt the host country’s corporate governance principles or the investing country’s corporate governance guidelines. Both approaches resulted in success and failure, posting the question whether governance guidelines should not be developed per project. The reasoning evolved into the development of the concept of project governance, established for specific multi-national, global projects. This paper provides an update on the research towards the establishment of a project governance model for global projects. It provides an overview of the performance of large global projects and the developments toward improving their success rate by creating a governing environment within which projects are set up and managed for success.

MF-05.2 [R] Analysis of Project Management in Software Development

Yoshiyuki Yabuuchi; Shimonoseki City University, Japan
Dundar F Kocaoğlu; Portland State University, United States
Junzo Watada; Waseda University, Japan

Project management is one of central issues in management of technology and engineering. Kathy Schwabie summarized recent statistics that average time overrun is 163% in 2001 and 227% in 1995, and average cost overrun is 145% in 2001 and 189% in 1995. Project management is not very successful. A software development company is expected to provide high quality and functional software to the world. It is difficult to control software quality because software is invisible and cannot be felt with our finger. In addition, it is hard to make its productivity efficient because software is created as a result of brainwork. Generally speaking, a project team is organized to create software. Human relationships and work environment affect software qualities. Therefore, it is very important to study the project management of software development for the cost of management and the quality control. The objective of this paper is to illustrate the influential features of software development projects by analyzing questionnaires collected from several software development companies. In the analysis, a multivariate model is employed to quantitatively evaluate the influential features of software development projects.

MF-05.3 [R] Globalization and Localization of R&D Project Management Process: The Culture Adaptation of Lucent China Research Technology Center

Zhen Li; Tsinghua University, China
Xin P; Tsinghua University, China

In this era of globalization, Western companies have started to explore China as a source of technology. Yet western R&D project management processes are frequently shaped by a number of well-known contrasts between Chinese and Western culture characteristics such as collectivism versus individualism, relationship and group harmony concern versus contractual attitude, strong versus weak uncertainty avoidance, etc. A case study of Lucent China Research and Technology Center shows how R&D project management can be effectively tuned to align with the local culture environment, which is on TL9000 global requirements basis. The overseas company’s branch has recognized the need to adjust key checking points during telecommunication software development and has gained remarkable success in quality improvement and productivity enhancement. At the same time, lessons and recommendations on the adjustment of Chinese culture will be drawn from the case study of international companies that locate R&D projects in China.

MF-06 Technology Management in Telecommunication-3

Monday, 7/10/2006, 17:00 - 18:30 Room: Bizans
Chair(s): Byung-sun Cho; ETRI

MF-06.1 [A] Technology Management and Telecommunications Licensing: The Case of Thailand

Ayuth Jinachaiprat; University of Cambridge, United Kingdom
David Probert; University of Cambridge, United Kingdom
Tony Holden; University of Cambridge, United Kingdom
Prasit Prapin mongkolkarn; National Telecommunications Commission, Thailand

This paper presents a study on the new model of telecommunications licensing. It attempts to shed new light on the concepts that could enhance the effectiveness of telecommunications licensing, with particular reference to the principles of technology management. Narrowband differs from broadband in many ways. Governments, however, have promoted competition in telecommunications by employing the same licensing model without adapt-
optimal return policy, including price as a decision variable, is presented in this paper. A model for obtaining the optimum return policy in conjunction with the optimum pricing generosity of the return policy because the sales increase, but decrease as the cost increases. The trade-off here is in the increase in the cost. The profit function increases with the can be gained by the seller by way of increased sales if they could offer an easy return policy and ease of return. Basically, they design their supply chain more for the fulfillment rather than the reverse logistics. Much internet sellers have problems offering a clear return policy and ease of return. Basically, they design their supply chain more for the fulfillment rather than the reverse logistics. Much internet sellers have problems offering a clear return policy and ease of return. Basically, they design their supply chain more for the fulfillment rather than the reverse logistics. 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Much internet sellers have problems offering a clear return policy and ease of return. Basically, they design their supply chain more for the fulfillment rather than the reverse logistics. Much internet sellers have problems offering a clear return policy and ease of return. Basically, they design their supply chain more for the fulfillment rather than the reverse logistics. Much internet sellers have problems offering a clear return policy and ease of return. Basically, they design their supply chain more for the fulfillment rather than the reverse logistics. Much интернете."
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The Washington Accord and the EUR-ACE Project represent two such initiatives aimed at standardized quality assurance processes. Other initiatives include joint international degree programs, faculty and student exchanges, and the creation of international scholarships. In the domain of research and technology transfer, international research collaborations have been formed between universities and industry. In addition, the advent of the establishment of companies in an academic setting with a multi-national focus is creating a buzz, which has generated significant interest in the international industrial community. While these initiatives have been gaining increasing acceptance internationally, they also have generated questions. In the long run would they be remembered as well-intended academic dreams, or would they be an integral part of the globalization process? The authors will address these questions in the light of progress made in international education-related activities in engineering, and in international research collaborations.

TA-01.2 [K] Major E-Commerce Profits Depend on IP Protection in Developing World

Thomas H Lipscomb; Annenberg Center for the Digital Future (USC), United States

For some time there has been a basic belief among developing countries that “intellectual property rights” were simply another holdover from Western Imperialism. And new struggling economies did not feel they could carry the additional burden of paying royalties to wealthy nations who should have provided this material to them for free. One of the worst offenders in this area was the young United States. American theft of European literary and industrial patents and intellectual property was so flagrant for the first 125 years of its existence that famous authors like Dickens and Thackeray went on speaking tours of the US to try to convince Americans to stop pirating their books. It took more than a century for a reluctant United States to institute its first copyright laws. But in an age of digital technology, which Stanford economist Paul Rohrer has called “the greatest lever of capital in history,” there are huge advantages in joining in IP treaties earlier rather than later. Since the cost of developing intellectual property is so much lower than other forms of invention and deployment, the profits are far higher, and the time from development to marketplace is much shorter. Small countries can create astonishing levels of wealth by protecting their own and agreeing to protect and license the IP of others. We will review the experiences of countries like Mexico, Korea, India and others in seeing the pros and cons in action of different policies.

TB-01 Collaborations-2

Tuesday, 7/11/2006, 10:30 - 12:00

Room: Regency-1

Chair(s): Alan Brent; University of Pretoria


Masaru Yanine; University of Tokyo, Japan

This study examined how collaboration networks are formed among university, industry and the public sector and work for the creation of innovation, analyzing the case of the development of lead-free solders in the electric and electronic industry in Japan, Europe, and the United States. The structure of innovation networks on lead-free solders is analyzed with quantitative methods of social network analysis, based on data on the membership of research and development projects and scientific papers. While initiatives to regulate the use of lead for soldering were made earlier in the United States, development and adoption of lead-free solders progressed significantly in Japan through the formation of research and development networks. To implement an effective transition to lead-free solders, cooperation and coordination was indispensable among relevant actors, including those working on chip implementation, solders, manufacturing equipment, parts, devices, print boards, and measurement instruments. In the absence of a domestic institutional framework for regulating the use of lead, it was crucial that university researchers, working from a relatively neutral position, took the initiative in creating collaboration networks for the formulation of industry-wide roadmaps for technological development and implementation, evaluation and standardization of various specifications, and accumulation of scientific and technological knowledge.

TB-01.2 [R] Business School-Industry Cooperation: Lessons from Case Studies

David W Birchall; Henley Management College, United Kingdom
J. J. Chanaron; Henley Management College, United Kingdom

University-industry collaboration is seen as an important contributor to innovation as new thinking is transferred from seats of learning into practical products and services. In particular, this seems to be the case where firms seek access to knowledge of new technologies and technical problem solving. However, is it relevant in the case of business schools? The study reported in this paper is based on insights gained from membership of a long-standing network between business schools and firms in the automotive industry supported by the EU’s Leonardo project. The research reported in based on a detailed examination of practical cases of joint business school-firm activities. Based on this case analysis, a model is presented along with emerging critical success factors for sustainable joint activities across the different modes identified. Finally, areas for further research are highlighted.

TB-01.3 [A] Mapping out Technological Capabilities in Research Institutions as Tool for Prospecting R&D Outsourcing Opportunities: A Methodology Developed for the R&D Centre of a Major Car Assembler

Ruy Quadros; UNICAMP - State University of Campinas, Brazil
Flavia L Condori; Unicamp - State University of Campinas, Brazil
Rubia C Quintão; UNICAMP - State University of Campinas, Brazil
Glícia Vieira; UNICAMP - State University of Campinas, Brazil

The paper discusses the results of a project aimed at developing and testing a methodology for the identification, qualification and classification of capabilities of Brazilian research groups in technologies applicable to the automotive industry. The project was commissioned by Renault’s Technocenter in Paris. The paper presents the context of the project, that is, the increasing de-centralization of R&D by multinational corporations, also in the form of R&D outsourcing to foreign research institutions (UNCTAD 2004). In the case of the automotive industry, it is argued that Brazilian research institutions are becoming an important basis for outsourcing. The paper describes the major steps of the methodology, discussing some of the critical difficulties: 1. definition of scope, strategy and concepts of the mapping out methodology; 2. identification of the potentially relevant research groups; 3. methods for approaching informers and collecting data; and 4. data treatment: organization of databank. The result of this project is a database with quantitative and qualitative information on technological competencies applicable to the automotive industry in the technological areas of Materials, Power-trains, Fuels, Manufacturing Technologies, Embedded Electronics and Ergonomics. The databank comprises approximately 200 research groups in various science and engineering disciplines.

TB-02 Outsourcing-1

Tuesday, 7/11/2006, 10:30 - 12:00

Room: Regency-2

Chair(s): Erdogan Sener, Indiana University - Purdue University

TB-02.1 [R] Offshore Outsourcing, an Opportunity Rather Than a Threat

Ad J van de Gevel; Tilburg University, Netherlands

It is the purpose of this paper to evaluate the causes and consequences of offshore outsourcing of manufactured products and services to developing countries. Outsourcing is just a new way of doing international trade leading to gains from trade, and its effects on wages and jobs are not qualitatively different from trade in goods. Offshoring is not the exporting of jobs. It represents the importing of services. It will be argued that the best way to destroy jobs is for the government to try and protect them. The best way to create more jobs is to allow for their destruction.

TB-02.2 [R] The Nature of Knowledge and Decisions on Activity Sourcing: An Innovation Model

Ana Redondo-Cano; University of Valencia, Spain
Guillermo Pérez-Bustamante; University of Oviedo, Spain

The main drivers for R&D collaboration uncovered by the economic literature are the access...
to external capability and costs. Very seldom the nature of knowledge has been considered a determining factor for activity externalisation. This paper analyses the role of the nature of knowledge in the lock of innovation. Then, a knowledge management model for the internalisation of innovative activities is developed. The model proposed allows executives to summarize their strategic reflection about innovation, leading to a more coherent decision-making process. The research is implemented to the innovative activities performed by Spanish firms in the agro-chemical industry. The empirical evidence supports the existence of a positive incidence of tacit knowledge on the internal performance of an activity, though it is altered by the existence of capable suppliers to perform an activity. This economic sector also allows us to implement the model and categorize the firms operating in the Spanish agrochemical sector according to their behavior in the innovation spiral.

**TB-02.3 [R] Outsourcing and Flexibility**

Ángel Martínez-Sánchez; University of Zaragoza, Spain
M. José Vela Jiménez; University of Zaragoza, Spain
Pilar de Luis Carnicer; University of Zaragoza, Spain
Manuela Pérez Pérez; University of Zaragoza, Spain

This study examines the direct, concurrent effect of several economic and organizational theories on the outsourcing decision, and analyses the relationship between outsourcing and other workplace flexibility dimensions, as well as their concurrent impact on firm performance. The results of a survey to a sample of 156 Spanish firms reveal that outsourcing intensity is positively explained by production cost advantages, transaction costs, environmental dynamism, and firm strategy. External cooperation and firm performance are not predictors of outsourcing. Financial performance is positively explained by outsourcing and functional flexibility, and negatively by external numerical flexibility. Firm maturity is a negative moderator on the relationship between outsourcing and financial performance. Innovation performance is positively explained by outsourcing and functional flexibility, and firm maturity is also a negative moderator on outsourcing and firm performance. And strategic flexibility is positively explained by outsourcing and internal numerical flexibility, and negatively by external numerical flexibility.

**TB-03 Innovation Management-3**

Tuesday, 7/11/2006, 10:30 - 12:00
Room: Smyrna
Chair(s): Reinhard W Prügl; Vienna Univ. of Economics & Business Adm.

**TB-03.1 [A] Pictures of the Future: Industrial Foresight and Innovation Source**

Dietmar Theis; Siemens AG CT SM CM, Germany

As one of the world’s leading companies in electrical engineering and electronics, Siemens is an innovation leader and trendsetter in its many businesses. To foster our competitiveness we systematically have to identify technologies with major growth potential, recognize technological breakthroughs, anticipate future customer needs and new business opportunities. This strategic planning of the future has resulted in versatile tools called “Pictures of the Future”. The paper intends to introduce this new method and discuss its value in the creation of innovations.

**TB-03.2 [R] Moderating Effects of Climate and External Support on Transformational Leadership and Technological Innovation: An Investigation in Creative Ventures in Turkey**

Lale Gumuskouglu; Bilkent University, Turkey
Arzu Iliev; Hacettepe University, Turkey

The purpose of this study was to investigate the influence of transformational leadership on technological innovation at the organizational level. Specifically, it was proposed that transformational leadership would have a positive effect on organizational climate and support received from external organizations. These relationships were tested on 163 R&D personnel and managers of 43 micro- and small-sized Turkish entrepreneurial software development companies. The results confirmed the positive impact of transformational leadership on organizational innovation, which was measured with a market-oriented criterion developed specifically for developing countries and newly developing industries. Furthermore, the relationship between transformational leadership and organizational innovation was stronger when external support was at high levels than when there was no external support. The moderating effect of an innovation-supporting climate was not significant. Managerial implications as well as policy recommendations are provided, for micro- and small-sized enterprises in particular.

**TB-03.3 [R] Creativity Engineering for Continuous and Discontinuous Innovation**

Justin Lin; Chaoyang University of Technology, Taiwan

Concurrent engineering (CE) has been widely implemented in industries to cause the developers to consider all elements of product lifecycle during the product design phase. And, it has been proved that concurrent engineering has its most impact on helping industries find design change requirements in the early design stage, and delivering rapid time to market for a new product. However, although concurrent engineering is a very effective approach for product design team-up, it does not help generate genuine product concepts. As stated by Miller and Morris, to succeed in innovation, it is first necessary to find effective and practical models, which must be observable systems that achieve consistent results. Further, the goal of innovation must be a consistently effective, manageable practice of continuous innovation and discontinuous innovation. In order to build a successful innovation model, research has been done to investigate how concurrent engineering can be extended to a new concept which will cover not only the downstream phase from design concept to the entire product design process, but also the upstream phase from brainstorming to the generation process of new product concepts. Results show that a product knowledge and innovation (PKI) system based on the concepts of creativity engineering (CE-I), which is extended from the current practice of concurrent engineering, can be used to achieve the goal for both continuous and discontinuous innovation.

**TB-04 Technology Management Education-2**

Tuesday, 7/11/2006, 10:30 - 12:00
Room: Troy
Chair(s): William T Flannery; University of Texas at San Antonio

**TB-04.1 [R] Empirical Study on the Enhancement of the Quality of Cyber Education**

Joo-hyun Park; ETRI, Korea, South
Pang Ryong Kim; ETRI, Korea, South
Hong-woo Lee; Kyungpook National University, Korea, South

With the society growing more information-oriented, educators have started researching a new education paradigm called cyber education. Research is currently lacking indicators as to what will be the achievements, advantages, and disadvantages of operating cyber education. Therefore, this paper outlines the objectives of such research. First, this paper discusses the concept and features of cyber education by conducting a preliminary study and reviews its difference with conventional, face-to-face education. Indicators for measuring the efficiency of cyber education and satisfaction of students as the education target are then constructed. Finally, through empirical analysis by measuring the quality level and satisfaction of students taking cyber education, areas for improvement are identified. Cyber education has been considered an independent educational system following countless efforts toward the facilitation of cyber education; still, students are highly dissatisfied when it comes to some factors. In particular, seeking simultaneous interaction with students is known to be important; as in conventional, face-to-face education, both the educational content and professor’s competency influence student satisfaction. Furthermore, the excessive control of classes makes encouraging student motivation currently difficult in cyber education.

**TB-04.2 [R] Career/Technical Education and Workforce Readiness: Perceptions, Implications, and Considerations**

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

Note: [R] = Research paper; [A] = Industry Application; [K] = Keynote
SESSIONS

H. Oner Yurtseven; Indiana University-Purdue University Indianapolis, United States
Patricia L. Fox; Indiana University-Purdue University Indianapolis, United States
In the U.S., Career/Technical Education (CTE) prepares high school students for the workplace, higher education, and civic involvement. In many instances, however, CTE’s value to current and prospective students, parents, employers, and others is ambiguous or ill-informed. This paper outlines the evolution of CTE; identifies key changes and challenges to CTE in recent years; presents results of a recent study of the perceptions held by CTE graduates in engineering/science/technology and other related fields; and identifies the implications CTE has on lifelong learning, workforce readiness, and economic development activities. Considerations for college and university faculty and administrators, employers, and policymakers, among other stakeholders, will be discussed, and recommendations for policy, practice, and future research will be identified.

TB-04.3 [A] Analysis of the Engineering and Technology Management (ETM) Educational Programs
Audrey Averar; Portland State University, United States
Guillermo R Rueda; Portland State University, United States
Ivan P Hernandez; Portland State University, United States
Dundar F Kocaoglu; Portland State University, United States
This paper presents an analysis of 142 universities offering degree-granting programs in Engineering and Technology Management (ETM) worldwide. The data gathered in a study conducted by Portland State University’s Department of Engineering and Technology Management in 2003-2004 are used for identifying the similarities and differences among ETM programs based on the academic unit in which they are offered. This paper is a follow-up to previous papers in 1977, 1981, 1984, 1990, 1994 and 2005 [1-6]. Program characteristics such as the number of students, the courses offered, the degrees granted, the faculty, the research areas, geographic location, funding, faculty, and teaching methods are analyzed.

TB-05 Project/Program Management-3
Tuesday, 7/11/2006, 10:30 - 12:00
Chair(s): Hans J Thamhain; Bentley College
Room: Ephesus

TB-05.1 [R] Study on the Concept of ‘Architecture’ to Analyze the Organization of Construction Projects
Satoshi Yoshida; The University of Tokyo, Japan
Tomonori Yashiro; The University of Tokyo, Japan
Construction is one of the main industries. The total cost to be invested and the total number of laborers are quite large ratio in every country. At same time, construction has almost every kind of element of industrial action, because buildings are complicated products and every construction project should be for a custom-made building. In spite of the importance of this field, there is no much research analyzing the total construction system because of its many complicated elements. The concept of “Architecture” is one of the methods to analyze artificial systems such as product, organization, or construction process. The “architecture” concept is focused on the interfaces between the elements of an artificial system, because interfaces tend to identify the characteristics of whole of the system. This paper proposes three discussions. Firstly, the methodology of how to understand the tendency of organization “Architecture” is proposed. With this methodology, it is possible to describe and understand the characteristics of construction organizations in different areas. The organization “Architectures” in typical construction projects in Japan and the UK are indicated. Secondly, the characteristics of products “Architecture” are analyzed. Each organization “Architecture” type provides its own suitable products “Architecture.” Finally, this paper focuses on the products with integral organizations. There are some serious problems about over-specification of products with these organizations.

TB-05.2 [A] An Application of 6 Sigma Methodology for Project Management Process Improvement
Banu Babacan; Arcelik A.S., Turkey
Deniz Karabulut; Arcelik A.S., Turkey
Melda Polat; Arcelik A.S., Turkey
In large-size companies, since numerous cross-functional projects are running concurrently, project management is one of the critical processes for competitiveness. At Arcelik Research & Development Center, a well-defined project management process and an established IT infrastructure have been used since 1999. Since 6-sigma is a methodology that can also be used for transactional process improvements, we decided to implement a DMAIC (define-measure-analyze-improve-control) approach to the project management process. As it is well known, the nature of R&D projects contains technical uncertainty which leads to difficulties in planning. The aim of the 6-sigma study is to decrease the duration mean and variance of the projects and to improve resource utilization. In this paper, we will discuss the application of 6-sigma methodology, the results of the study and share the experiences.

TB-05.3 [R] Antecedents and Consequences of Project Team Potency: An Investigation of the Role of Project Team Culture in the Development of Project Team Potency
Zvi H Arzonson; Stevens Institute of Technology, United States
We examined the effect of project team culture on the evolution of project team potency in a sample of 110 project teams. Little is known about the factors responsible for the development of project team potency - the collective belief of a project team that it can be effective. Results revealed that project team culture is related to project team potency, and that project team potency is related to project success. Our findings provide project leaders with a tool on how to enhance project success by influencing project team potency, through a change in project team culture.

TB-06 Technology Management in Telecommunication-4
Tuesday, 7/11/2006, 10:30 - 12:00
Chair(s): Ayuth Jirachaipravit; University of Cambridge
Room: Bizans

TB-06.1 [R] Estimating the Cost of Universal Service Obligation: A Review of International Practices and Comparative Analysis
Hyomin Baek; ETRI, Korea, South
Eunjin Choi; ETRI, Korea, South
Jaeho Byun; ETRI, Korea, South
It is only natural, given that the competition environment and policy priorities in the telecommunications market vary from one country to another, that methods for assessing the cost of universal service obligations differ as well. In Korea, with the introduction of LRIC for assessing the universal service cost in 2004, the national telecommunications authority (MIC) is preparing for a substantial revision of the current cost assessment method, and discussions on details of changes to be introduced are in full swing. This paper will explore estimation methods for universal service costs adopted by countries around the world by dividing them into three large categories, and compare practices concerning two of the major issues surrounding the assessment of universal service obligation cost - universal service cost ceiling and intangible benefits - to provide directions for changes to be introduced to Korea’s own cost estimation model.

TB-06.2 [A] A Study on Value Assessment of Internet Service in Korea
Sun A Kang; ETRI, Korea, South
The purpose of this study is a value assessment of the high-speed internet service in the Korean market. We use the consumer surplus concept of economics and PE (perception and expectation) GAP theory, which is the difference between the subscriber’s expectation and satisfaction at marketing. But there is a difficulty with scoring Likert scaling as a result of perception minus expectation because arbitrariness may intervene during the scoring process, and it could reduce the confidence and objectivity of this study. So we presume consumer surplus of economics only. A trial of value assessment of telecom services using the consumer surplus concept is meaningful because there is no similar study on that value assessment. Also, this study has meaning that we come up with demand function and con-

Note: [R] = Research paper; [A] = Industry Application; [K] = Keynote
Universal service regulation has been introduced in order to expand a penetration of telephone services in respect of government policies and have evolved resulting from market openness and fully competitive market-based regulations. What are the approaches of competitive market-based regulations that the price controls and access charge controls have been introduced. Regulators have taken account of the regulatory direction of universal service obligation strongly related to price controls and access charge controls. In Korea, Universal Service Fund was founded in 2000 after a local telephone service competitor entered. Prior to 2000, access charges included switching costs and universal service cost incurred providing network access to use telephone services at an affordable rate. Besides, local call price control was permitted by the government and it was not allowable to rebalance rates by Universal Service Provider, and the rates did not recover the cost of providing the services. This paper presents the review of Universal Service regulation through the integrated analysis on access charge controls and price controls in several countries and the relationships between the three regulations.

**TB-07 Technology Assessment and Evaluation-4**

**Tuesday, 7/11/2006, 10:30 - 12:00**

**Room: Tyana-1**

**Chair(s): Åsa Lindström; Royal Institute of Technology / KTH**

**TB-08 Software Process Management-1**

**Tuesday, 7/11/2006, 10:30 - 12:00**

**Room: Tyana-2**

**Chair(s): Nuri Basoglu; Bogazici University**


Mooyoung Choi; KISTEP, Korea, South
Sun Kyung Kim; KISTEP, Korea, South
Hee Jong Yang; KISTEP, Korea, South
Min Ho So; KAIST, Korea, South
Sang Youb Lee; KISTEP, Korea, South

It is very important to assess the technology level to establish an S&T strategic plan. Technology level assessment is generally performed by an expert opinion survey. Although an expert can assess the technology level comprehensively, it is hard to present an objective explanation supporting the expert opinion. On the other hand, publication and patent statistics present objective data to complement expert opinion. In this study, the objective method to assess the technology level was developed. Technology levels of five key technologies - “digital broadcasting”, “secondary batteries”, etc. - were compared by assessing research performance with SCI publication and US patent for 10 years (1994 - 2003). Keywords were decided to select publications and patents corresponding to a specific technology. Quantitative and qualitative comparisons were performed by using several indicators, such as the number of publications and patents, the internationally standardized number of citations, etc., and the ranking among 35 countries, including OECD countries, was evaluated. In addition, excellent research institutes and international collaboration trends were investigated. The USA was ranked in the world’s top position in five key technologies in terms of publications and patents. Korea was the second and the fifth ranking among 35 countries in “secondary batteries” and “high performance multi-functional textile materials,” respectively. Japan was within the fifth ranking in five key technologies.

**TB-07.2 [R] Contribution to Quality of Life: Cross-National Validation of New Metrics for Mobile Data Service Technology in Korea and Japan**

Jinwook Kim; Yonsei University, Korea, South
Min Kyung Lee; Yonsei University, Korea, South
Hun Choi; Yonsei University, Korea, South
Yumi Maeda; Mitsubishi Research Institute, Japan

Kazuaki Naruse; Toshiba Corporation, Japan

Every technology, especially in ubiquitous computing area, should be geared to improve the quality of their users’ life ultimately. In order to achieve this goal, the important pre-requisite is to measure the contribution of the technology to quality of life reliably and validly. This study provides a theoretical as well as an empirical basis for the development of better measures for the contribution of a mobile data service technology to the quality of its users’ lives. The reliability and validity of the proposed metrics were verified through online surveys in Korea and Japan. The survey results also indicated that critical mobile data services could be identified based on the degree of contribution to the quality of life of mobile data-service users. Moreover, the critical services were found to be different between Korea and Japan.
pose that the ERP product mostly matching with the processes of the organization should be selected, processes of the organization should be changed for being compatible with the ERP system and system users should be educated, new qualified people should be hired, etc. for making the system more familiar to people. Here the point is that all of these are done for keeping differences between the ERP system, processes, and people at minimum level because this minimalism will avoid adoption problems. This study not only handles ERP adoption problem from a newer perspective, but also provides insight to managers about managing the change and utilizing their resources efficiently for adopting the ERP software across the organization.

**TE-01 Strategic Management of Technology-3**

**Chair(s):** Jamshed J Mistry; Worcester Polytechnic Institute

**Tuesday, 7/11/2006, 15:00 - 16:30**  
**Room: Regency-1**

**TE-01.1 [R] Perspectives on Global Supply Chain Supply-Side Risk Management**

Abbas Foroughi; University of Southern Indiana, United States  
Marvin Albin; University of Southern Indiana, United States  
Mehmet Kocakulah; University of Southern Indiana, United States

Recent geo-political events, such as terrorism and political instability, and geological and climatologic disasters, have underscored the potential risks to global supply chains and their catastrophic financial impact on global companies. Disruptions can occur anywhere along the supply chain—at the inbound or supplier side, during the internal processes inside the company’s facilities, or at the outbound or customer-facing side. This paper focuses on risks to the inbound/supplier side part of the supply chain, in which parts or services move from the supplier to the manufacturer or retailer. The paper begins with a discussion of the reasons for increasing supply chain vulnerability, and then describes major threats to supply chains. Section IV discusses the way Supply Chain Risk Management is used to identify threats, assess them, and determine what actions should be taken to manage them. The paper then explains how the outcome of risk assessments can guide firms to handle risks, through forecasting, appropriate use of single or multiple suppliers, risk sharing, information sharing and collaboration with suppliers, flexible supplier relationships, and security prevention measures. The paper concludes with a discussion of research needs in the supply chain risk area.

**TE-01.2 [R] Reducing the Conflict between Accounting and It Brought About by ERP, Compliance and Ethical Issues**

Marvin Albin; University of Southern Indiana, United States  
Mehmet Kocakulah; University of Southern Indiana, United States  
Abbas Foroughi; University of Southern Indiana, United States  
Brian L. McGuire; University of Southern Indiana, United States

The emergence of Enterprise Resource Planning (ERP) software applications as well as more recent compliance issues have forced many previously separate and independent information technology (IT) and accounting tasks and responsibilities to become tightly coordinated. In addition, the growing emphasis on ethics and the laws created to enhance corporate responsibility, accountability, and compliance in the United States (such as the Sarbanes-Oxley Act and the Control Objectives for Information and Related Technology) are putting a strain on the relationship between accounting and IT. This paper will identify areas that have caused problems and suggest ways to reduce or lessen the resultant tension.

**TE-01.3 [R] Strategic Business and It Alignment: A Prioritized Theory Diagram**

Enrique J Silva Molina; National University of Engineering and KTH, Nicaragua  
Leonel J Piazzaola Prado; National University of Engineering and KTH, Nicaragua  
Mathias Ekstedt Ekstedt; Royal Institute of Technology (KTH), Sweden

Many academic and practitioners’ studies have shown that misalignment or lack of alignment between information technology (IT) and business strategies is one of the main reasons why enterprises fail to exploit the full potential of their IT investments. Furthermore, organizations that have accomplished a high degree of alignment are often associated with better business efficiency and effectiveness performance. Consequently, strategic business and IT alignment (SBITA) has consistently been one of the top concerns of the Chief Information Officer (CIO) in an enterprise. Despite these facts, there is little consensus on what SBITA really is; there are few documented theories, concepts and operational approaches for identifying, measuring, improving and maintaining the SBITA level in an enterprise. This paper is based on the strategic alignment model (SAM) proposed by Henderson & Venkatraman in 1993, which is considered one of the most widespread and accepted models among the alignment community. Basically, all later alignment models and consulting practices start from this model. The SAM consists of a set of alignment sub-topics, which have been used for prioritizing the SBITA topic. An extensive literature survey has been carried out and the most relevant and cited references in the field have been categorized accordingly to the sub-topics of the SAM. Doing so provided an indication of how important the alignment community finds the different aspects of SBITA.
TE-01 Technology Adoption-1
Tuesday, 7/11/2006, 15:00 - 16:30
Room: Regency-2
Chair(s): Guillermo Rueda; Portland State University

TE-02.1 [A] A Technology Development Methodology Developed for Application on the Solar Chimney Structure
Cobus Van Dyk; University of Stellenbosch, South Africa
Solar chimney power plants require dimensions exceeding current structural design limits for them to be economically feasible, thus calling for the scaling up of known technology and the implementation of newer technologies, pushing forward technological boundaries. This paper proposes a process for the management of the technological development required to move toward realization of the chimney structure of the solar chimney. The Technology Development Methodology (TDM) is developed as such a management process which quantifies high-level system performance while, subsequently, measuring the effect of low-level technological advance on the system. In this way the effect of technological change on the performance of the system is quantified. The system analysis process provides the backbone for the TDM while Management of Technology extends the process. System analysis, decision making, technology identification, technology assessment and technology strategy methods from literature are reviewed in order to synthesize the TDM and define steps for its application. The implemented TDM should yield to the technology manager quantified insight into the technologies implemented in the system and their performance and level of development, providing a base for sound decision making.

TE-02.2 [R] Management Issues in the Adoption of Telework Amongst SMEs in Europe
Keith Dickson; Brunel Business School, Brunel University, United Kingdom
Fintan Clear; Brunel Business School, Brunel University, United Kingdom
This paper seeks to highlight key managerial issues facing small- and medium-sized enterprises (SMEs) during the adoption of telework, based on the findings of a recent European Commission-funded project conducted in five European regions located in Italy, France, Finland, Hungary and the UK. Teleworking can be defined as working offsite (e.g. at home, at a customer site, on the move) whilst linked all day or for some period in the day to the employing organisation’s ICT systems. Increasing interest in its adoption has led to many analytical studies that have investigated managerial/organisational issues in the implementation of telework in large firms, but little research has been conducted on smaller firms. A quantitative survey, involving over 1500 firms in the five regions, focused on a comparative analysis of attitudes to telework and current teleworking activities, whilst the qualitative research component, involving face-to-face interviews with over 50 stakeholders in each region, examined related issues at individual firm-level. Both sets of findings show high levels of adoption of the necessary technological equipment but much lower levels of active preparation and managerial enthusiasm for its widespread implementation. Issues of employer/employee trust, work autonomy, change management practices and regional infrastructural support are discussed.

TE-03 Innovation Management-4
Tuesday, 7/11/2006, 15:00 - 16:30
Room: Smyrna
Chair(s): Dietmar Theis; Siemens AG CT SM CM

TE-03.1 [A] Dynamics of ‘Technological Creativity’ as a Decision in Knowledge Creation Processes
Tanik Baykara; TUBITAK MRC, Turkey
“Creativity” is defined as the ability to produce original, novel and unexpected work with high quality. It is the most essential factor in the knowledge creation processes. “Technological Creativity” is highly fostered in “knowledge-creating” organizations for innovation of new products, new processes and services. Creative individuals can lead to new scientific findings and novel solutions for technical problems and limitations. At an organizational level, knowledge creation is one of the sources of innovation for sustainable competition in the market. In this presentation, the concept of “technological creativity”, based on various theoretical approaches (e.g. Investment Theory) will be assessed to develop a dynamic model for organizational knowledge-creation process. The model covers the strategies for the development of technological creativity as a decision in organizations and includes the following attributes: intellectual capabilities, knowledge, thinking styles, individual abilities, motivational factors and inner/outer environments. The decision model will also suggest certain methodologies and processes adaptable to a variety of organizational structures.

TE-03.2 [R] Innovation Performance Measurement: Expert vs. Practitioner Views
David W Bichlau; Henley Management College, United Kingdom
George Tostigas; Arthur D. Little, Switzerland
Innovation presents many challenges to organisations, one of the trickiest being its measurement. However, the old saying “if you can’t measure it you can’t manage it” emphasises the importance of performance measurement to enable effective management. This seems to be essential in developing the innovation path, although many see it as a ‘chaotic’ process. Previous research has produced a considerable number of potential metrics but only limited outcomes in relation to the challenges one has to face when trying to match the metrics framework to overall innovation strategies. Recent studies on practitioner experiences by the authors have resulted in five scales covering Future Focus, Market Impact, Capabilities and Image, Process, Sustainability and Overall Effectiveness. Dependent upon the firm’s primary purpose in measurement, different scales were emphasised. This research has also identified dilemmas facing those confronted with designing and justifying a measurement approach. The research reported here extends the earlier research by canvassing ‘academic experts’ in innovation management and comparing and contrasting their views to those of practitioners. The reported outcomes should be of particular interest to those involved in delivering educational programmes and training in innovation management.

TE-03.3 [R] Efficient Identification of Leading-Edge Expertise: Screening vs. Pyramiding
Eric von Hippel; Massachusetts Institute of Technology, United States
Nikolaus Franke; Vienna Univ. of Economics & Business Adm., Austria
Reinhard W Prügl; Vienna Univ. of Economics & Business Adm., Austria
In order to find ideas for leading edge innovations, the lead user method recently gained much interest. A very important step in this method is the identification of lead users. Recently, there is a notable switch towards a technique we term “pyramiding”. Instead of selecting the most appropriate users from a large but finite sample (“screening”), the pyramiding technique, a modified version of the snowball sampling method, relies on the fact that people with a strong interest in a topic or field tend to know people more expert than themselves. For example, good IT professionals tend to know the identity of IT people who are even more skilled than they are. In this article, we empirically compare the efficiency of both methods and identify the factors impacting the efficiency of the pyramiding method. For this we conduct a large-scale experiment in which we simulate 292 pyramiding “chains”. Findings have implications for managing an efficient search for leading-edge expertise.

TE-04 Environmental Issues-1
Tuesday, 7/11/2006, 15:00 - 16:30
Room: Troy
Chair(s): Robert Harmon; Portland State University

Kelly R Cowan; Portland State University, United States
Robert Harmon; Portland State University, United States
Fossil fuels will remain the dominant source of energy well into the 21st century. Carbon sequestration is a potential solution for limiting the atmospheric release of carbon dioxide emissions that may contribute to global warming. If successful, carbon sequestration would enable the continued use of established, economically viable energy sources until the technological, economic, social, and ecological feasibility of radically new energy sources such as
TE-04.2 [R] Enabling Ecologically Sustainable Global Development for the Semiconductor Capital Equipment Industry

Dawood Abugharbieh; Portland State University, United States
Robert Harmon; Portland State University, United States

Reducing ecological impact of global economic development is an important emerging trend; this research will present an adaptable business framework to benefit from this trend in the context of semiconductor manufacturing. There is an apparent need for new market-based strategies that will reduce the ecological footprint of new products. Numerous industries have specifically identified this as a relevant business objective, therefore generating streams of research spanning business social responsibility, public policy, global standards, and regulations among others. The majority of existing research is contained in separate domains with no apparent attempt at an interdisciplinary approach to address the ecologically sustainable development challenge. However, the socioeconomic nature of such a problem presents a unique complexity to business, which necessitates the inclusion of both commercial and psychological dimensions. Existing research provides little insight for how to proceed with customer driven approaches for the development of ecologically and economically sustainable products. A commercial framework is needed to fully deploy the resourcefulness of business institutions towards the goal of sustaining global growth. Developing marketing models that encompass customer economic and social motivations is a suitable framework for including ecological considerations in the business decision-making process. Factors relating to customer belief about environmental utility of ecological product attributes, perceptions of the economic importance of these attributes, and ecological concern affect global new product development in such framework.

TE-04.3 [A] Green Productivity and Management

Asli N Suder; University, Turkey

Industrial production consumes huge amounts of the world’s resources. Green Productivity (GP) is a strategy for simultaneously enhancing productivity and environmental performance for overall socio-economic development that leads to sustained improvement in the quality of human life. It is the combined application of appropriate productivity and environmental management tools, techniques and technologies that reduce the environmental impact of an organization’s activities, products and services while enhancing profitability and competitive advantage. Green productivity is a dynamic strategy to harmonize economic growth and environmental protection for sustainable development. It offers small and medium businesses a way to achieve a competitive advantage by doing better with less. It is thus a practical strategy to increase productivity and protect the environment simultaneously. Traditional methods of pollution control were not cost-effective. The concept of green productivity assures profitability and resource productivity. Businesses and communities get multiple returns in the form of bottom-line savings; value added products and services, and environmental protection. Green productivity uses a set of management tools, techniques and technologies to encourage innovation and a continuous cycle of productivity gains. The result is competitive enterprises, preservation of the natural resources, and a better quality of life. In Turkey medicine companies are trying to be socially responsible. Especially companies, which have foreign partners, are increasingly looking at making their operations more environmentally sustainable - driven by pressures that are internal (cutting costs, preventive measures etc.), as well as external (an aware clientele, discerning consumers etc.). A number of concepts are currently being used to make businesses more environmentally sustainable. They are directed at both the supply and demand ends of the product lifecycle, and many times spanning the entire continuum.

TE-05 Cultural Issues-1
Tuesday, 7/11/2006, 15:00 - 16:30 Room: Ephesus
Chair(s): Antonie J Jetter; Portland State University


Norhayati Zakaria; Syracuse University, United States
Andrea Amelinckx; University of Lethbridge, Canada
David Wilemon; Syracuse University, United States

With the phenomenon of globalization, the global virtual team is widely recognized as an innovative working structure that relies largely on computer-mediated communication technologies. A global virtual team is defined as a distinct entity whose members come from different geographical locations, may not have a common background, is organizationally dispersed, collaborate using asynchronous and synchronous technologies, and often assemble on an ad-hoc basis. Hence, boundaries such as geographical distance, time, and organizations are no longer major barriers for small teams to work together. Yet, many teamwork challenges remain as these virtual teams engage in globally distributed collaborative efforts. Many of the complexities emerge from cultural differences, divergent mental maps, leadership problems, and technological barriers. The purpose of this paper is to present and synthesize the critical success factors generally accepted as critical in managing effective global virtual teams. The key questions that we address are: (1) what role does the enabling environment play in facilitating globally distributed teamwork collaboration? and (2) how best to manage the critical teamwork success factors in order to develop and manage effective global virtual teams?

TE-06 Technology Management in Telecommunication-5
Room: Bizans

TE-06.1 [A] Trends in Telecommunications Strategic Alliance Regulation

Byung-Sun Cho; ETRI, Korea, South
Shin-Won Kang; ETRI, Korea, South
Seongmin-Min Chae; ETRI, Korea, South

In market economies, competition is viewed as a positive force which can effectively increases the welfare of consumers. Most countries adopting a market-based economic system have competition laws in place to ensure and promote competition. The essential elements of a competition law, common to most national varieties, are regulation of monopoly or oligopoly, regulation of mergers, prohibition of unfair trade practices and prohibition of cartels. The ultimate goal of this body of law is to guarantee effective competition in the market. Meanwhile, starting from the 1990s, we have been witnessing worldwide the practice known as ‘strategic alliance’ among market competitors gaining ground at an accelerating pace. The question facing competition authorities in countries around the world is, therefore, whether strategic alliances are a phenomenon that needs to be regulated by the government. In this paper, we review some countries, and we try to draw a reasonable regulation direction for the telecommunications strategic alliance regulation.

TE-06.2 [A] Mobile Broadband Deployment Strategies for Korea and Demand Analysis

Moon-Koo Kim; ETRI, Korea, South
Jong-Hyun Park; ETRI, Korea, South
Kyeung-yong Lee; ETRI, Korea, South

While fixed communication has its inherent limitations on space and mobility, broadband speed has been an issue to be tackled for wireless communication. To this end, mobile broadband services have been developed and expected to create tremendous synergy effects by combining increased broadband speed of fixed communication and excellent mobility of wireless communication. In the case of South Korea, WiBro and HSDPA are gaining ground...
as the mobile broadband standard. As South Korea is scheduled to launch WiBro and HSDPA commercial services by the first half of 2006, service operators are bound to face fierce competition for the domination of the market and consumer base because both services have much in common when it comes to their service functions and features in the customer’s viewpoint. Given that which to potentially lead the market is a divisive issue even among experts, it is now hard to define their relationship and future prospect for constructive developments of both services. In particular, there have been few, if any, studies conducted to systematically analyze both services from the standpoints of operators (technology) and consumers (market demands) and to deal with practical strategies for vitalizing mobile broadband. Against this backdrop, this paper will go through the following as to mobile broadband centering on WiBro and HSDPA: their conception and significance; background, current status and prospect; technological features and market demands. Based on the studies above, this paper will find ways to promote the compatibility between services, which is critical to vitalize mobile broadband, and propose proper roles concerned parties play.

**TE-06.3 [A] New Regulatory Issues for the Wireless/Mobile VoIP Service in Korea**

Young-Wook Ha; ETRI, Korea, South
Byung-Sun Cho; ETRI, Korea, South
Young-Seong Yoon; ETRI, Korea, South

When the Internet phone service, generally PC-to-Phone, first entered into the telecommunications market, no regulatory issues were arisen in managing the service within the regulatory framework because of low quality, no phone number assignment, etc. However, almost the same quality, increased applications and cheaper price compared with the fixed telecommunications service have changed the regulator’s policy about allowing Internet phone service within market mechanism. While incumbent fixed telecommunications service enterprises had given with tremendous duties to continue the job categorized ‘facilities-based telecommunication service provider’, and which can be unreasonable and unfair if Internet phone service enterprises are allowed to enter into the fixed telecommunications market without any regulation. Thus, the new regulatory framework has worked for the Internet phone service named VoIP service generally in the fixed telecommunications market. Recently, VoIP is provided not only in the fixed telecommunications market but also in the mobile market as Wi-Fi phone is feasible in the wireless LAN environment. Furthermore, bundled service of Wi-Fi and cellular phone service will be launched soon, and the next version will be a mobile VoIP service operating like a cellular phone service. Thus, we have almost ended up with the same problem as when the VoIP service enters into the fixed telecommunications service market. But mobile VoIP service has more obstacles compared with the VoIP service in the fixed market because the expensive license fee is already paid. Thus, in this paper, we forecast the regulatory issues arising when the wireless or mobile VoIP service enterprises enter the mobile market, by analyzing both aspects of the incumbent operator’s rights and the market liberalization.

**TE-07 Globalization-1**

**TE-07.1 [R] Foreign R&D Centers in Korea and Government Policy**

Deok S Yim; STEPI, Korea, South
Ki Kook Kim; STEPI, Korea, South

In today’s globalized economy, foreign R&D activities play an important role in the national innovation system. A foreign R&D center brings both positive and negative effects. The host country expects the foreign R&D center to create jobs, transfer advanced knowledge to local industry and contribute to the qualitative growth of industry; whereas, foreign R&D centers wish to utilize the R&D resources and technological assets of the host country. The Korean government has been trying recently to attract more foreign R&D centers. However, foreign R&D centers in Korea have been discovered not to be active in R&D activities, and their major role is to support product modification rather than develop new products. They perceive Korea’s R&D environment as being less than favorable. It is argued herein that foreign R&D centers in Korea are at the developing stage and would bring more positive effects to Korea if the right R&D environment was provided. In this sense, the role of government in foreign R&D activities is discussed and policy directions are suggested for the Korean government.

**TE-07.2 [A] Globalization of R&D – How to Measure?**

Jungwon Lee; Science & Technology Policy Institute (STEPi), Korea, South

Globalization of R&D is an emerging issue in the technological innovation field. The convergence of technology and increase of investment and risk in innovation are accelerating the globalization trends. Globalization of technological innovation includes the cross-border activities for acquisition, management, utilization and diffusion of technology to get the competitiveness in the global market. Multinational companies play a pivotal role in the process of globalization in technology fields, and they are doing R&D abroad, not just adaptive R&D for local markets, but more basic and innovative R&D for the global market. The governments with high-tech industries also try to develop policy measures to activate globalization of R&D, both inward and also outward aspects. This paper attempts to develop the indicators or index of R&D globalization, which can give meaningful implications for policy makers of governments or decision makers of companies. The author reviews relevant measures and statistics and develops a framework to measure the globalization of R&D. The framework provides indicators for the globalization of R&D, and the pilot survey is conducted for the Korean companies. The author concludes with the suggestion that international cooperation is needed to build up more systematic and significant indicators for the globalization of R&D.

**TE-07.3 [A] Restructuring a Turkish Public Institute in the Framework of EU and Its Needs**

Baris Carikci; Tusside - Bogazici University, Turkey
Fethullah Caliskan; Tusside, Turkey

In this continuously changing world, it is impossible to avoid the effects of these alterations that force companies to rethink their organizational structure. Since companies are challenging the new economic mode, the need for redesigning their structure has become more serious and clear. The firms that give no reactions to these changes have no chance to survive in the competitive markets. Turkey expects to become an EU member at the end of the next decade. The process of becoming an EU member requires reengineering and restructuring of the Turkish public sector, which will be the most challenging event in the history of Turkey. For the last decade, we have faced numerous reengineering projects, many of which were not successful because they lacked a clear strategy and vision. This paper’s aim is to explain the project path for a successful reengineering strategy for a distinguished Turkish public sector firm in the framework of EU expectations and with the participation of all stakeholders. With these clear strategies, the Turkish public sector can hold its position and can answer all the needs of a would-be member of the EU.
The objective of this research is to explore the facilitating role of organization network and ontology in identifying cross-border technology entrepreneurial opportunities to pursue innovations that achieve value creation. Based on a series of case studies of the integrated circuit (IC) design knowledge service industries, we explore the importance of entrepreneurial opportunities and organization boundary spanning in the dynamic process of international entrepreneurial (IE) activities. Previous IE studies have largely been characterized as static, cross-sectional, production sector-oriented and a lack of service sector and/or comparative research. As a result, the characteristics related to the emerging knowledge service sectors, the longitudinal aspects and cross-sector comparisons have largely been unexplored. Prior work in the IE tradition stressed mostly on the judgment-based or purposeful sampling also means that the results are difficult to generalize. There is a major gap in providing rich perspective from multiple informants involved in technology entrepreneurial processes. Through the case studies of several IC design service providers, this research expects to clarify the dynamic transformation process of opportunity and value creation. Specifically, the issue of how the process is supported by the richness and the dynamically integrative effects of the various organization ontological elements is explored with a comparative study of the cross-border cases. Based on the theoretical and empirical findings, the implications will then be drawn out for strategic management of cross-border knowledge service and the associated business policy and practice.

**TF-03.2 [A] A Study of Innovation Management in New Business Creation Through Activation of Discontinuous Innovation**

Yasuyuki Suzuki; Japan Advanced Institute of Science and Technology, Japan
Masakatsu Fujii; Kaneka Corporation, Japan
Isaburo Fukawa; Asahi Kasei Corporation, Japan
Yuji Hirabayashi; Shimizu Corporation, Japan
Masahiko Kanda; Toshiba Corporation, Japan
Tsuneaki Nakamura; Tokyo Gas Co., Ltd., Japan

As explained in C.R. Christensen’s paper, “The Innovator’s Dilemma,” it has recently come to attention that in the large enterprises that lead the Japanese economy, new businesses cannot be created with ease through discontinuous innovation due to their unwillingness to depart from their continuous innovation management style. Some large enterprises, therefore, are willing to implement business creation that may incur risk through methods such as developing Curve-Outs activities, LLCs (Limited Liability Companies), LLPs (Limited Liability Partnerships), venture start-ups, etc. These methods are implemented separately from their regular businesses. On the other hand, there is a move towards new business creation being implemented through practices such as mergers and acquisitions. However, issues related to knowledge transfer or IP (intellectual property) are involved in implementing these operations, and so we cannot claim that new business can be created merely by executing the practices mentioned above. We have studied several cases in pursuit of new and innovative management, since we believe it necessary to identify methods that are complementary to the above ones. In this paper, as management systems that foster the setting up of new businesses while continuing to engage in our principal businesses, we propose, describe, and verify several management systems designed to generate synergy effects within the management system and respond to the need for continuous innovation, and that are able to respond to discontinuous innovation and the need to move into novel business areas.

**TF-03.3 [R] Global Innovation Strategy: Successfully Managing the Innovation Chain in the Semiconductor Industry**

Beate Klingenberg; Marist College, United States
Thomas Lechter; Wesley J. Howe School of Technology Management, United States
Thorsten Teichert; University of Hamburg, Germany

Doomed by the quest to continuously decrease transistor size as predicted by Moore’s law, the semiconductor industry is generally viewed as driven by constant technology innovation. The increasing burden of Research and Development (R&D) and manufacturing costs resulting from this race requires companies to find efficient business models. As in other industries, off-shoring as well as development alliances are widely used. The expansion into other countries is also driven by the need to be close to new markets, leading as an inevitable consequence to a globalization of the R&D function. While these methods are generally accepted, there is little research on how such globally diversified organizations manage their innovation capabilities to maintain competitiveness. This research addresses a strategic gap in management practice and strategic research. It analyzes the requirements for a global innovation strategy in a case study of a semiconductor company with various global R&D, design and manufacturing sites. The research hypothesis derived is the following: Global innovation performance is most successfully accomplished when the innovation chain is globally integrated. The authors conducted interviews with senior managers from different functional units of one company to identify the innovation constraint for this company. As a result, the core competencies and deficits to improve the innovation performance were identified, and a general concept of an innovation strategy addressing the innovation chain is presented.

**TF-04 New Venture Management-1**

TF-04.1 [R] Entrepreneurship or Nucleation? From Tiny Crystals to Ocean via Innovation and Technology
M. Özgür Seydibeyoğlu; Istanbul Technical University, Turkey

The formation of a new business depends on many factors. These are the initial investment budget, the risks, the competitors and the global business medium, but the formation of a new idea is the most critical one among the other factors. The creation of this new idea has been modeled on a material science concept. The formation of a new crystal requires a huge amount of energy from the environment, which is the same case for a new business to start. For the establishment of the new idea and business, there must be a real difference from the other competitors to be able to enter to the market. This can be achieved in many ways. Today, differentiation is mainly based on the technological improvements or completely new technological breakthroughs that the firm presents. This formation of a new crystal is the first step for the firms. The phase after the nucleation is the crystal growth. Finally, the growth results in the formation of a tangible solid material and product. This new idea must be based on the technological improvements. So the universities will be the starting point for these formations where the research is done thoroughly. These nucleating ideas will find places in the techno parks. These new technological ideas will be realized in these research mediums. The proposed abstract will be explained in detail and will be demonstrated with a case from real life.

TF-04.2 [A] Crossing the Chasm: The XID Technologies Story
Desai A Narasimhalu; Singapore Management University, Singapore
Roberto Mariani; XID Technologies, Singapore

XID Technologies is a face processing start up company built initially around a disruptive face recognition technology. The technology innovation came from Kent Ridge Digital Labs, a publicly funded software research laboratory in Singapore. Face recognition is the least intrusive and harmless among the various biometric solutions available in the market. The basic approach to human face recognition is to identify a robust feature set that was unique enough to differentiate amongst the many millions of human faces that the system was required to verify. The technology innovation used by XID framed the problem differently and thereby overcame the challenges posed by poor lighting and tilted or rotated heads. XID developed a pilot application that was in an undiscovered market. This new and yet undiscovered market gave the young company a protection from established face recognition solution vendors focused on well established biometrics markets. XID was embodied to explore developing solutions for other markets once its initial solutions were accepted. It has now several parallel products under development even as its main offering is being brought to market by some of the large solution integrators. The paper describes the transition of XID from a young product start up to its present position as a technology and new solution generator.

TF-04.3 [A] The Venture Capitalist's Choice of Exit Strategy
TF-05 Project/Program Management-4
Tuesday, 7/11/2006, 17:00 - 18:30
Room: Ephesus
Chair(s): Dov Dror; Ben Gurion University

TF-05.1 [R] Three Modes of Deviation Handling: Coping with Unexpected Events in Project Management
Markus Hallgren; Umeå School of Business and Economics, Sweden
Joakim Liljeskold; The Royal Institute of Technology, Sweden

Most of the project management tools suggested in the literature are effective under perfect conditions with unlimited resources. However, by definition, projects are neither unlimited in time nor resources, which creates a gap between the perfect conditions and the reality that most project managers and teams face. The case studies that this paper investigates are based on in-depth participative observations, interviews, emails and other written material. The results are rather surprising as project teams do not seem to use methods suggested in the literature when responding to the sudden appearance of unexpected situations, that is, deviations. The cases give an insight into the dynamics of project management and how informal teams are used to increase speed and flexibility. These informal teams could meet when needed in order to discuss and solve problems or changes. Further, in two of the cases, traditional project planning was not used at the top management level to plan and coordinate the projects. Thus, the cases show that the management of projects according to traditional plans is not the only means of making a project successful. Instead, the creation of a flexible organization that can identify, react and act upon the changes that most likely will occur becomes more crucial in order to be able to successfully deliver the project.

TF-05.2 [R] Interpersonal Power, Politics, and Project Team Alignment
David Wilemon; Syracuse University, United States

In the last two decades impressive gains have been made in our knowledge of project management. Much of this advancement in understanding has focused on creating better tools to plan, organize, execute and control projects. Three areas which have received less attention are how project managers gain support for their projects; how project managers manage change and resistance when managing their projects; and how project leaders create and manage “alignment” with their senior managers and key project sponsors. The major objectives of this presentation are to: 1) review what we know about how project leaders gain and sustain support for their projects; 2) examine how project leaders can effectively deal with various stakeholders and other critical organizational members; and 3) discuss how project leaders and their teams maintain “positive alignment” with senior managers/sponsors. Suggestions for future research will be discussed as well as ideas for training project leaders in the issues discussed in this presentation.

TF-05.3 [R] Managing Conflicts in IT Projects in Brazilian Companies
Fernando José B Laurindo; Universidade de São Paulo, Brazil
Renaio O Moraes; UFOP and FEAD-MG, Brazil

In the last two decades impressive gains have been made in our knowledge of project management. Much of this advancement in understanding has focused on creating better tools to plan, organize, execute and control projects. Three areas which have received less attention are how project managers gain support for their projects; how project managers manage change and resistance when managing their projects; and how project leaders create and manage “alignment” with their senior managers and key project sponsors. The major objectives of this presentation are to: 1) review what we know about how project leaders gain and sustain support for their projects; 2) examine how project leaders can effectively deal with various stakeholders and other critical organizational members; and 3) discuss how project leaders and their teams maintain “positive alignment” with senior managers/sponsors. Suggestions for future research will be discussed as well as ideas for training project leaders in the issues discussed in this presentation.

TF-06 Technology Planning-1
Tuesday, 7/11/2006, 17:00 - 18:30
Room: Bizans
Chair(s): Tugrul Daim; Portland State University

TF-06.1 [R] A Technology Planning Methodology Based on Axiomatic Design Approach
Tufan Koc; ‹stanbul Technical University, Turkey
Yaprak Mutlu; ‹stanbul Technical University, Turkey

Selection of a technology alternative to implement among many potential ones is a very complex problem. The number of technologies available in the market, potential innovations, technical complexity of products and processes, resource requirements for investment, and time requirement for a particular innovation all contribute to this complexity. Therefore, the need for investing in the most feasible technology requires a multidimensional and systematic approach in the process of technology planning. In this research, the axiomatic design approach will be used for technology planning in manufacturing. In the methodology, the planning problem will be divided into subproblems or self-contained functional elements by decomposition, then the interrelations among these elements will be investigated to find out a feasible technology plan of a firm. A hypothetical example is given to define the methodology.

TF-06.2 [R] Priority Setting of Future Technology Area Based on Korean Technology Foresight Exercise
Seokho Son; KISTEP, Korea, South
Se-Hong Oh; KISTEP, Korea, South
Byeongwon Park; KISTEP, Korea, South

KISTEP (Korea Institute of Sci. & Tech. Evaluation and Planning) has conducted national technology foresight from 2003 to 2004, and its results have been reported to National Sci & Council in May of 2005. In the foresight exercise, the prospect of future Korean society up to the year 2030 was developed. Then, future demands and needs based on the prospects were deduced through a survey of the general public. The technical panels were set up to develop the technology subjects that may satisfy the demands and needs of future Korean society. A total of 761 future technology subjects were Delphi-surveyed. In the survey, various aspects such as realization time, technical level and gap, strategic importance, and obstacle to overcome were assessed. Right after the reporting, the Government carried out the new initiative of the future strategic technology area that can be the new engine of economic growth around the year 2015. A total of 21 technology areas were selected based on their impact on the quality of life, economic growth and public needs. The government vows to make a master plan to execute this program in 2006. In the paper, an overall priority-setting procedure will be described in detail comparing existing R&D program in Korea.
Performance of an R&D program is often evaluated through the quantifiable output measurement indicators if the program is still on-going or it is not yet the time to gather or identify enough outcomes from the program. The output is directly connected to the performance, and the result of performance measurement each year indicates if the program is operated toward the planned outcome or impacts. Planning of R&D programs includes series of activities and expected results chains. The well-planned program should include the feedback system from the performance evaluation results. However, some programs do not show the logically related structure, and performance is expected less satisfactory than the well-planned programs. The modified logic model is employed for the analysis of various program designs. Government-funded programs of 3 major ministries in Korea are analyzed to verify the relationship between the logical planning and performance. The result shows that a logically well-structured program tends to achieve a higher level of performance. In this study, we suggest the technology R&D planning model for performance improvement through the empirical comparisons of the outputs. Further study will include the outcome or impact study with respect to program design.

**WA-01: PLENARY-7**

**DATE:** WEDNESDAY, 7/12/2006  
**TIME:** 08:30 - 10:00  
**ROOM:** REGENCY-1

**WA-01.1 [K] Technology Management with a Global Perspective: A European Vision for the Next Phase of IMS**

Rosalie Zobel; European Commission, Belgium

The Intelligent Manufacturing Systems (IMS) initiative is the world’s only international collaborative R&D framework between industrialized world regions comprising Australia, Canada, the EU and Norway, Japan, Korea, Switzerland and the US. It provides a global framework for industry and academia to cooperate on manufacturing R&D throughout the full innovation cycle and to identify partners world-wide. The IMS scheme for the protection of intellectual property has proven to be particularly beneficial to industrial participants, in particular small- and medium-sized companies, for engaging safely in global collaborations. Surveys amongst participants in IMS projects show that such international collaboration proves beneficial beyond the mere R&D activity as it includes knowledge exchanges on business and market developments as well as extended business collaborations and better cross-cultural understanding. The European part of the IMS initiative has been managed under the European Commission’s Research Framework Programmes 4, 5 and 6. Since the beginning of IMS in 1995, about 40 R&D projects were launched with European participation. These projects involve more than 1,000 companies and research institutions world-wide and represent an international commitment level of around 750 million (with ~200 million of it being European investment). The outcomes of a study which has aimed to assess the effectiveness of the European part of IMS will be presented. The presentation will also describe several activities that were conducted in Europe over the last year with the aim to mobilise the researcher community (academic and industrial) and to present its views on future research under IMS at the 2006 IMS Vision Forum in Seoul.

**WA-01.2 [K] The e-Government Portal in Turkey**

Cancer Onen; Investments and Information Services, OYAK, Turkey

The e-Government Portal is a new endeavor initiated recently in Turkey. It can simply be defined as a single point of contact through which the State will provide public services in a more effective and a more citizen-focused approach. The State shall have the capability to offer secure services to the citizens (G2G) and institutions (G2B) on a 7 days / 24 hours basis through the web and on all mobile devices. In order to facilitate this, a closer and well-defined inter-administration (governmental agency) (G2G) relationship and coordination has to be established, as well. The above-mentioned characteristics clearly suggest that this project should not be regarded as an IT solution to eliminate bureaucracy and paperwork, but more so as a challenging reorganization and a reengineering effort; a reorganization of the internal and inter-administration procedures; and a reengineering of public service processes. The e-Government portal project should definitely be viewed as one of the primary driving forces for a big cultural change and a new way of life for Turkey.
This article presents the results of an empirical study focusing on innovation activities in networks. In the summer of 2005, we interviewed 12 top managers of leading public companies in Germany. In order to develop new products, these companies nowadays have to rely increasingly on partners. However, a large number of unscheduled break-ups of these innovation networks indicates that the established processes do not meet the modified requirements. The goal of our study was to gain insights into the coping strategies of focal companies in dealing with this new challenge. Analyzing the partner selection process, it became clear that there is a significant difference between the selection of known partners and new partners concerning the selection criteria and the information sources used. Therefore, it seems advisable to distinguish between these two groups in the selection process. The main result regarding the project management is that, on the one hand, the companies consider the network management aspects an important success factor for interorganizational projects. On the other hand, they have barely implemented these necessary tasks into their processes. As a result, many problems concerning planning, coordination and evaluation arise. This paper offers possible solutions to these problems.

**WB-01.1 [R] Empirical Study of Innovation Management in Focal Networks: Partner Selection and Realization**

Jan E Borchert; University of Goettingen, Germany
Philipp Goos; University of Goettingen, Germany
Svenja Hagenhoff; University of Goettingen, Germany

This paper describes an analysis of the effects of collaboration based on a survey conducted between 1986 and 2004 of 3,600 collaborations which were made either domestically or globally by 170 Japanese biotechnology companies. Thirty-one of these companies are sampled for quantitative estimation based on panel data models of the effects of collaboration on sales, R&D investment and R&D outcomes over the past 12 years. The effects per individual company are also compared. In addition, the effectiveness of collaboration in the case of European and US global companies is investigated. The collection of long-term panel data is held to be a problem, but for this study we prepared accurate data based on corporate news releases, which are a very reliable source of information. We extend the scope of collaboration into government-firm, academia-firm and inter-firm collaborations in order to analyze the effects on Japanese companies of a wide spectrum of collaborations.

**WB-01.2 [R] The Analysis of Corporate Collaboration Effectiveness by Econometric Methods**

Takeshi Shimada; Japan Advanced Institute of Science and Technology, Japan

This paper addresses the effects of collaboration in network management, and it shows that the selection of partners is of significant importance. The analysis of the network management phase reveals that the selection of partners is crucial for the success of the collaboration. The results also demonstrate that collaboration with experienced partners leads to better results. The paper provides further insight into these different trends in New Jersey and Texas. The authors will examine the evolution of the inventor networks over time for the two States. A quantitative network analysis tool is employed to conduct the comparative study. The results support the earlier observations and demonstrate that the dynamics of the patent-inventor network can be a good predictor for the growth (or decline) of a geographic cluster. The analysis also shows that New Jersey’s telecom cluster is still dominated by the giant players such as Lucent Technologies and AT&T. New Jersey inventors tend to stick with their big employers. The inventors’ network of Texas shows a very different pattern: inventors there are more likely to move around multiple employers. Such movements increase knowledge spillovers and strengthen the local network of researchers, leading to increased innovation output. The Texas network shows a significant increase of connectivity over the past few years, but a similar trend was not found in New Jersey.

**WB-01.3 [R] Interactions of Software Technology with Technologies and Social Issues: Interfaces and Requirements for Interdisciplinary Collaboration**

Nihan Yildirim; Istanbul Technical University - Alarko Holding GoC, Turkey

Today's world may be best described as a "rapidly changing, interacting, evolving network of systems". In this complicated structure, understanding multiple dynamics of change for emerging key technologies is a big challenge for developing countries. This raises the importance of scientific future studies like foresighting within the technology management discipline. The interaction frequency of some emerging key information technologies like software is outstanding. Software improves evolution, and this evolution is powered by not only interactions of software technology with other technologies and social factors. Analysis is based on findings of specific foresighting practice that was conducted in Turkey including Delphi and scenario planning processes. The output was a long list of research themes that highlights the importance of closer conversation and collaboration between social scientists and software technologists. A rising need for strong interdisciplinary collaboration forces will be the first priority in the S&T agenda of developing countries like Turkey, where the collaboration culture is still immature.

**WB-02 SPECIAL SESSION: PICMET Country Representatives Meeting**

Wednesday, 7/12/2006, 10:30 - 12:00 Room: Regency-2

Speaker(s): Kiyoshi Niwa; The University of Tokyo

PICMET has more than 80 Country Representatives from 52 countries. They provide news items for the PICMET Newsletter, TMN (Technology Management News), about developments in technology management; disseminate PICMET information; identify authors and session chairs; recommend nominees for PICMET awards; submit proposals for the location of future PICMET conferences; and represent PICMET in their countries. All current country representatives and those who want to join the Country Representatives organization are invited to attend this special session to discuss the roles of the country representatives and the future strategies that are being developed for making PICMET information and activities readily available throughout the globe.

**WB-03 Innovation Management-6**

Wednesday, 7/12/2006, 10:30 - 12:00 Room: Smyrna

Chair(s): Gul Guven; ESC Lille

**WB-03.1 [R] Dynamics of Inventors’ Network and Growth of Geographic Clusters — Evidence from Telecommunications Industry of NJ & TX**

Jiang He; Stevens Institute of Technology, United States
M. Hossain Fallah; Stevens Institute of Technology, United States

Geographic clusters are key carriers of regional economic development by promoting local competition and cooperation. As time goes on, clusters progress through different life-cycle stages due to both external and internal forces. Considering the importance of technology spillovers in growth of innovation, any cluster strategy has to consider the technology spillover activities carefully, though the task could be challenging. An earlier study of telecommunications clusters in New Jersey and Texas demonstrated New Jersey’s telecom industry has been struggling to recover from the impact of deregulation and the economic downturn while Texas appeared moving ahead in terms of overall telecommunications innovation output. This paper provides further insight into these different trends in New Jersey and Texas. The authors will examine the evolution of the inventors’ networks over time for the two States. A quantitative network analysis tool is employed to conduct the comparative study. The results support the earlier observations and demonstrate that the dynamics of the patent-inventor network can be a good predictor for the growth (or decline) of a geographic cluster. The analysis also shows that New Jersey’s telecom cluster is still dominated by the giant players such as Lucent Technologies and AT&T. New Jersey inventors tend to stick with their big employers. The inventors’ network of Texas shows a very different pattern: inventors there are more likely to move around multiple employers. Such movements increase knowledge spillovers and strengthen the local network of researchers, leading to increased innovation output. The Texas network shows a significant increase of connectivity over the past few years, but a similar trend was not found in New Jersey.

**WB-03.2 [R] Modularity in Innovation Alliances**

Ricarda Bauncker; University of Greifswald, Germany
Thorsten Teichert; University of Hamburg, Germany

Alliances often aim to improve innovation by a flexible configuration of components contributed by partnering firms. However, while modular innovation has received increasing attention, we find few results about inter-organizational design. Extending the ideas on modular innovation within firms, this study delivers a more fine-grained picture of modularity and synergistic specificity and their consequences on the outcomes of inter-firm collaboration, particularly on outcome-blending. Contextual factors are provided by comparison of two industries: Biotechnology and new media represent two ends of a continuum between (1) highly technology-laden with long time-to-market, and (2) highly design-laden and fast-to-market innovations. Based on a survey of more than 300 enterprises, we find that alliances in both industries achieve a synergistic blending of collaboration outcomes. Applying a two-
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group structural equation model, we reveal differences according to hypothesized relationships. Findings are related to market and technology characteristics. First, we found structural modularity and synergistic specificity to be different, even negatively related in Biotech. Second, this study identifies that in New Media synergistic process specificity has positive impact on synergistic outcome blending. In contrast, the corresponding parameter in the biotechnology group was not significant. Third, structural modularity has a positive effect on outcome blending in Biotechnology, contrasting to no effect in New Media.

**WB-03.3 [R] Innovation Networks: A Framework**
Mercy Escalante Ludueña; University of São Paulo - FEA - Brazil, Brazil
Adalberto Fischmann; University of São Paulo-FEA Brazil, Brazil
José de Jesús Pérez Alcázar; University of São Paulo EACH Brazil, Bermuda

This paper presents a methodology to develop innovation networks with virtual links, which is currently under development. It considers stages of analysis, design, implementation, and follow-up and can be applied to both large companies and SMEs. Fragmented approaches have predominance in literature, and for this reason we want to close that gap somehow within the framework of a systemic, dynamic, organic, and transparent approach. The methodology values the already existing contributions from which new elements have been added, especially the support of electronic networks (ICT). We consider that innovation in networks must transcend spatial frontiers, thus considering virtual links since they turn the organizations faster and more flexible, therefore facilitating a more efficient access to information and knowledge, considered the key aspects in today's interactive innovation process. The research methodology was bibliographical, documental, and exploratory.

**WB-04 New Product Development Management-2**
Wednesday, 7/12/2006, 10:30 - 12:00
Room: Troy
Chair(s): Donald Gerwin; Carleton University and Erasmus University

**WB-04.1 [A] Product Portfolio Management in the Context of Enterprise Portfolio Management**
Michael M Menke; HP, United States

Portfolio management has its roots as a decision making and prioritization process in key functional areas like new product development, capital projects and IT. However, the portfolio decision problem exists at every level of the organization, from the CEO on down. Examples at the senior management level include what markets to attack, what businesses to be in and how to allocate discretionary investment resources across those businesses. Moreover, the choices made at the higher levels of an organization constrain and direct the decisions at lower levels in important ways. In general, making good decisions at any place in an organization requires understanding the decision framework (or decision network or hierarchy) that is necessary for the entire organization to function and be successful. Most organizations lack a process to link and coordinate all of their decisions. Enterprise portfolio management is the emerging discipline of understanding the relationship of all the portfolio decision processes in an organization and aligning them to ensure that the organization is maximizing its business success and financial return on investment across the enterprise. The related concepts of strategic enterprise decision management and enterprise portfolio architecture are also discussed.

Paulo C Miguel; USP, Brazil

With the increasing levels of market competitiveness, many companies recognize the importance of planning product families and managing their portfolio. In this sense, this paper describes an implementation of a portfolio management system in a company within the process industry. The company has 13 platform projects, from which a number of derivative projects are derived from each platform. This portfolio is analyzed before projects are considered for development based on a scoring system. Projects are rated on criteria such as: type of project, level of innovation, technological difficulty, objective, selling forecast, and strategic importance. Prioritization is then established using a 1 to 5 Likert scale, and resources are allocated to prioritized projects. The company set up a project committee either to manage its portfolio or to analyze the performance each development project individually as the project goes to the development process. The paper also highlights the link between the portfolio management and the new product development process. An analysis of projects with regard to how novel they are to the company and to the markets is outlined as well. The paper concludes that the portfolio management implementation was effective and well-aligned with company strategy although some adjustments were necessary.

**WB-05 Technology Marketing-1**
Wednesday, 7/12/2006, 10:30 - 12:00
Chair(s): Kelly R Cowan; Portland State University

**WB-05.1 [R] Branding and Technology Management**
Türkay Dereci; University of Gaziantep, Turkey
Aybeniz A Ar; Balikesir University, Turkey
Alptekin Durmusoglu; University of Gaziantep, Turkey

Globalization and the advance of technologies (particularly internet) have changed and will continue to change things like behaviors of customers as well as the competition strategies of companies. The competition by classical strategies (i.e., low cost, high quality, etc.) has become impossible. The customers still ask for high-quality and low-cost products/services; however, their needs are now rapidly changing, highly specific and customized. Product life cycles are relentlessly shortened and the importance of new product development has been recognized. The companies should respond to these changes in environment and should provide a suitable product variety in order to survive and be competitive in the market. They are looking for powerful competition strategies. It is well worth pointing out that “technology and its management” is considered to be the most valuable competition weapon that adds value to the products. However, products have nowadays become homogeneous in the eyes of customers, so there is still a need for differentiation of technology products, which can be achieved through an effective branding strategy. The companies which have not realized the role of brands in global competition for the past two decades have lost some of their market power. Today, the companies producing technology products really need “branding” as a key weapon in order to differentiate themselves from their global challengers. Therefore, the companies focusing on producing innovative and technology products should invest in “branding” and should implement an effective “brand management” strategy along with “technology management” continuum, of course, without diminishing the quality dimension which is essential to survive. One of the goals of the technology management is commercialization in which inventions and innovations are converted into marketable products and processes. Therefore, branding could be used as a reinforcing marketing element in the technology management continuum. The paper will underline the following issues: why technology companies need “branding”/”brand management”; how “technology management” continuum benefits from “branding”/”brand management”; how brand management is synchronized with the “technology management”; the effect of brand naming; and the effect of technological advances on the brand names.

Jong-soo Kyung; Chungbuk National University, Korea, South
Byung-woon Kim; ETRI, Korea, South
Dong-hye Lee; ETRI, Korea, South

This study is a comparative analysis of the “Market Structure - Market Performance Model” based on Industry Life Cycle theory, which is used as the non-hierarchical cluster analysis for categorizing growth stages (Embryonic-Growth-Maturity). To analyze the relationship between market structure and market performance, 46 countries’ 22 quarters (from 1st. 1999 to 4th. 2004) and 1,012 panel data were collected. In the result of this study, differences of market structure - market performance by development stage (Embryonic-Growth-Maturity) - are identified. In the embryonic stage, players have positive influence, but it has negative influence in the growth and mature stage. In the embryonic stage, rate of churn
Reverse Logistics (RL) has been stretching worldwide, involving all the layers of supply chains in various industry sectors. Efficient RL operations are mandatory for organizational sustainability. Since returns are typically characterized by uncertainties in quality, quantity, and time, they pose a greater challenge to manage efficiently. In addition to this, the issue gets complicated when there is a great deal of variation from returned materials. In this paper, we develop methods to extract useful information from the Reverse Supply Chain (RSC) for feeding the Forward Supply Chain (FSC). Specifically, we categorize the return reasons according to the supply chain actor who was responsible for the return. For a given actor, we perform a “cause and effect” analysis and enlist the possible return reasons. We suggest recommendations on how to use this information as a feedback to FSC. The implication of this feedback is two-fold: (1) It will increase the performance of the FSC and (2) It will minimize the number of products that enter the RSC in the future.

**WB-06.2 [R] An Application of Expert System Approach for Supplier Evaluation and Selection**

Murat Altuntas; Istanbul Technical University, Turkey
Demet Bayraktar; Istanbul Technical University, Turkey
Ferhan Cebi; Istanbul Technical University, Turkey

The conditions of global competition are becoming more difficult in all the industries. All companies are competing with global and local rivals. Suppliers have played a crucial role for companies to outperform their rivals in competitive markets. This increases the importance of the supplier evaluation and selection process, which is a multi-dimensional decision making process containing various variables, quantitative and qualitative criteria, heuristics and experiences of managers. Development of expert systems simulating this multi-dimension-
off between various alternatives to improve their performance through advances in risk and portfolio management. The technique used for evaluating investment alternatives is the main driver of portfolio management and resulting capital allocation. In this paper, a collection of exploration, exploitation projects are used in the portfolio analysis and optimization. The stochastic simulation technique is used to carry out economic evaluations for assets where probability distributions are introduced for geological, technical, and economic inputs. In this technique, variables are sampled out from the input probability distributions and used to compute the economic outputs with allowances for dependencies between input parameters. By repeating this process multiple iterations, distributions of output are generated, which are then used as input for portfolio analysis and optimization. The portfolio analysis is carried out using the optimization methodology pioneered by Harry Markowitz to determine the mix of projects that provides the maximum expected return for a given level of risk. A sophisticated general-purpose optimizer is used to solve for optimal portfolios. By contrasting portfolio optimization results with the result of traditional capital allocation techniques and comparisons of efficient frontiers in the solution envelope platform, this paper demonstrates how modern portfolio theory and the integrated portfolio management approach provide management a superior setting for allocating capital.

**WB-07.3 [A] An Integrated Approach to the Technological Design and Operational Management of Cellular Manufacturing Systems**

Akif Asil Bulgak; Concordia University, Canada
Steve Ah Koon; Concordia University, Canada

The purpose of this study is to develop an integrated mathematical programming approach that would address both the technological design and the operational management issues in Cellular Manufacturing Systems. The Cell Formation Problem (CFP) is an essential aspect in the design of Cellular Manufacturing Systems (CMS). It consists in forming part families and machine cells in such a way that the former can be assigned to the latter. This first step is important as decisions are made regarding various structural and operational issues, thereby determining the effectiveness of the CMS design. A recurring theme in research is a piecemeal approach when formulating CMS models. In this paper, we propose an integrated approach to CMS design where production planning and system reconfiguration decisions are also incorporated. We also consider the presence of multiple process plans, alternate process routings and dynamic deterministic production requirements. The NP-hardness of our proposed model prevents the use of direct computational techniques to solve real-life instances of the problem. We first solve small-scale instances of the model using Extended Lingo and then propose heuristic approaches for real-life applications.

**WB-08.1 [R] Self-Assessment System in Strategic Sourcing for the Hong Kong Toy Industry**

Tony Ching-Tung Chan; City University of Hong Kong, Hong Kong
Kwai-Sang Chin; City University of Hong Kong, Hong Kong
Ping-Kit Lam; City University of Hong Kong, Hong Kong

Since the 1980s many Hong Kong toy companies have transferred their manufacturing operations to China in order to take advantage of not only low labor and land costs, but also a sufficient labor force, a situation which is difficult to obtain in Hong Kong. Nowadays, many indigenous Chinese toy companies are well developed which can pose a threat to Hong Kong toy companies, particularly in price. In spite of this, Hong Kong toy companies are still competitive in design capability, product quality, responsiveness, customer services and delivery. Many Hong Kong toy manufacturing activities are sourced to tier suppliers. Through Strategic Sourcing, to improve the sourcing performance in terms of product quality, price and delivery, Hong Kong toy companies can compete with Chinese toy companies and satisfy customers' needs. In this paper, a self-assessment system in Strategic Sourcing has been developed for the Hong Kong Toy Industry to self-assess their Strategic Sourcing. The Self-assessment System has been validated by six Hong Kong toy companies and the results provide information including scores, current performance status, and a strength and weakness profile. By interpreting the results, Hong Kong toy companies can develop an improvement plan by utilizing the self-assessment system as a tool and guideline to formulate appropriate strategies to improve themselves in Strategic Sourcing which, in turn, helps to improve the product quality, price and delivery in order to compete in the toy manufacturing sector.

**WB-08.2 [R] Impact of Man-Machine Interaction Factors on Enterprise Resource Planning (ERP) Software Design**

Cagla Ozen; Bogazici University, Turkey
Nuri Basgolu; Bogazici University, Turkey

Enterprise Resource Planning (ERP) systems integrate processes and functions across the company by using a single data repository. Today ERP systems are not only accepted as simple software packages but a core engine of a framework for business processes. Since adopters of ERP systems have a great number of alternatives during the selection process, software vendors should differentiate their product. Various differentiation policies can be applied by software vendors to achieve competitive advantage in the market. This paper is focusing on one of these policies: area of man-machine interaction. In this study, first, adaptive and intelligent characteristics for the user interface of the ERP package were explored by conducting survey to ERP system end-users. In this survey, we primarily aim to understand and model the factors that are affecting end-user satisfaction with the ERP system and its interface design. The results indicate that ease of use (EU) and usefulness are determinants of end-user satisfaction with ERP system and its interface design. This paper discusses these findings, the models that we were inspired while we had been forming our model, our model framework and finally describes future study opportunities about human and computer interaction analysis and prototyping studies in ERP systems.

**WB-08.3 [R] Industrial Performance Analysis: A Multi-Criteria Model Method**

Sawpee B Sirikrai; Thammasat University, Thailand
John C. S. Tang; Asian Institute of Technology, Thailand

Performance of manufacturing industries become a major concern of policy makers and industrialists. Attempts to understand industrial performance encompass two principal questions: how performance is measured and what drives a superior performance. Strategic management scholars assess performance of firms mainly from the financial aspect while operations management and performance measurement researchers employ multi-dimensional indicators. The strategic management literature provides two different theories to explain factors driving the performance of firms: the industrial organization and the resource-based view. The former emphasizes effects of industrial competitive environment, but the latter focuses on capabilities of particular firms. The operations management literature asserts that excellence manufacturing processes are drivers of competitive performance. Because of these diverse perspectives, there are authors who advocate uses of multiple theories to explain performance, but limited work has been done on examining the relationship between the drivers and the indicators using multiple perspectives. This paper proposes the use of the analytic hierarchy process (AHP) to examine the effects of the performance indicators and the drivers on the overall industrial performance. The automotive components industry is adopted for the model’s illustration.

**WD-01: PLENARY-8**

**DATE:** WEDNESDAY, 7/12/2006
**TIME:** 13:00 - 14:30
**ROOM:** REGENCY-1

**WD-01.1 [K] Sustainability: The Management System Property**

Naim H. Afgan; Instituto Superior Tecnico, Portugal

Sustainable development is a strategic goal of modern society, reflecting contemporary demand for economic, social, political and environmental development. Access to affordable and reliable economic growth, drawn from environmentally acceptable sources of supply, is an important feature of sustainable development. This keynote speech presents a review of
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the sustainability concept by addressing sustainability; appraising a range of sustainability policies and identifying ways to overcome the shortcomings in their implementation. Sustainability is one of the buzz words recently introduced to our vocabulary to explain the present state of life support systems. In this respect, there are several definitions, each one describing a specific aspect of sustainability. For example, the management system is a complex system that requires adequate tools to measure sustainability as an element of that complexity. The sustainability notion is characterized by a multi-dimensional structure including indicators with different scales. This presentation will highlight the historical background of sustainability development and emphasize its importance in the validation of the management system. The complexity of the management system is defined as a structure of elements which comprise individual functionality within the management system. Each element is described with a number of indicators. A “Sustainability Index” is derived as the quality measure of the management system with agglomeration of the indicators. The methodology is based on a multi-criteria evaluation of the system. The quality of the management system is an important property which requires specific measurement procedures and methodologies. The evaluation method that will be presented in this keynote is based on a list of priorities among the various alternatives under consideration. An essential feature of the method is to assess the effects of different constraints on the priorities. In summary, this presentation is aimed to demonstrate the sustainability assessment of management systems using aggregated economic, environmental, social and technological indicators. In this framework, the sustainability assessment is seen as the quality measurement of the management systems. “Sustainability Index” is introduced for the quantification of the appropriate indicators to evaluate the management systems and to determine their quality.

Erol Inletmen; Bogazici University, Turkey

Literature points to different approaches in the implementation of “Strategic Alliances” and “Learning Technologies”. Here we argue that there is an “appropriate” strategic alliance approach for every learning technology. In order to map approaches in both fields, we suggest the use of the concept of “complexity index” based on the labor input required. Using this index, we attempt to map learning technologies—book, video and web—against strategies alliances—collaboration, coalition and consolidation respectively. In this paper we present the experience of the last decade while introducing a new learning technology—we shall call it networked/forum-in the educational process. We here argue that by creating “constellations of learners” as a strategic alliance, the motivation of both the learners and the instructors—which act as only as another more experienced participant—is enhanced. This new approach to education requires reinventing the traditional tools, processes and the participation of all the stakeholders involved in the decision making.

WE-01.2 [A] Identifying and Classifying the Determinant Factors of Knowledge Transfer in Strategic Alliances
Hamid Mazloomi Khamseh; ERPI - NANCY and CERAM Sophia Antipolis, France
Dominique Jolly; CERAM Sophia Antipolis, France

Knowledge-based activities are the basis of sustainable competitive advantage in today’s economy. Resource- and knowledge-based authors claim that firms should focus on the creation and accumulation of knowledge-based competencies in order to yield long-term survival. Several authors have emphasized the value addition of alliance relationships in the knowledge development and learning processes of organizations. Over the past decades, thanks to the opportunities provided by the inter-firm co-operations for knowledge transfer, knowledge access and learning, strategic alliances have become one of the most useful organizational forms for creating new knowledge in technology, product and market development. This paper aims to identify and classify factors affecting knowledge transfer in strategic alliances. First, knowledge-related issues in strategic alliance literature are reviewed. Second, the importance of recognizing factors affecting knowledge transfer through strategic alliances is considered. Finally, the paper suggests a classification of factors that should be considered by alliance managers and all professionals involved in policy making, planning and executing inter-firm alliances. Four categories are distinguished: the characteristics of knowledge, the factors related to absorptive capacity, the reciprocal behavior of the partners, and finally, the nature and form of alliance activity.

WE-01.3 [A] Value Creation through Strategic Alliances: The Importance of the Characteristics of the Partners and the Resources Brought by Them
Maryam Nasiryan; CERAM Sophia Antipolis, France
Dominique Jolly; CERAM Sophia Antipolis, France

The joint creation of value, the accumulation and reconfiguration of resources and the development of new resources are critical factors in the formation of strategic alliances. Many authors investigated the role of resource exchange and types of partners in alliance performance. This paper is an explanatory study that presents a framework to describe the potential value creation in alliances. This framework focuses on the value added in alliances according to the congruence of partners’ profiles and the nature of resources brought by them. First, we present the alliance motivations and the benefits mentioned in the literature. The motives of alliances are important because they affect the resources contributed in alliances and decision making in partner selection. Then we examine the researches which have studied value creation according to the nature of resources brought by the partners and/or the origin of the partners in strategic alliances. Finally, we present an integrated framework that considers these two factors together to explain the desirable value created through strategic alliances. In this paper we attempt to bring the main findings of past research together and to analyze it in order to clarify better the different options to gain more value through alliance formation.

WE-02 Science and Technology Policy-1
Wednesday, 7/12/2006, 15:00 - 16:30 Room: Regency-2
Chair(s): Deok S Yim; STEPI

Philip L. Gardner; TRIUMF, Canada
Vijay K Verma; TRIUMF, Canada
Brendan Payne; TRIUMF, Canada

Research leadership is characterized as visionary while research management is sometimes viewed as being process oriented and administrative. Many studies have proposed that the 21st century will be the age of the knowledge-based economy, but how can the wide spec-
trum of today's economies all structure their knowledge generating sector to prosper? In general terms, research leadership is the ability to foresee the emerging scientific road and drive the research sector with respect, confidence, loyalty, willing cooperation and commitment to follow that path. It involves focusing the efforts of a group of people toward a common goal and inspiring them to work as a real team. In comparison, research management is the administrative ability that focuses primarily on planning, organizing, and developing processes and methodologies to ensure that the research team effort is effective, efficient and successful. In a research environment, all research managers are not necessarily leaders, but the most effective managers over the long-term may prove to be good leaders as well. Both leadership and management are important because leadership emphasizes communicating the vision and then motivating and inspiring project participants to deliver higher performance, while management focuses on getting things done. The discussion will explore the difference between research leadership and research management and the importance of balancing both to achieve overall economic and social success in the 21st century. Statistical comparisons will be made between North America and Europe in the developed world, the emerging economies of India and China, and the stark contrast that exists in the developing economies of Africa.

WE-02.2 [R] An Analysis of R&D Policy Framework towards Information Society
Seok Ji Park; ETRI, Korea, South
The information and communications technology (ICT), which is described as a source for a new knowledge-based society, has played an important role for building a foundation for future society. It has been providing a variety of knowledge-based information services and compatibility enhancements of the information society. The government has promoted an expansion of ICT, supplying foundations with R&D investments for new society developments. Equipped with an independent supply of the technology, which is required for developing government policy, there have been tremendous efforts put into development the new industry and socio-economy through various demands for the information and telecommunication technology. Consequently, various technological advancements like the world best broadband Internet access and usage rate, and the first commercialized WiBro(Wireless Broadband Technology) and DMB(Digital Mobile Broadcasting Technology) will be set a high value as a world best level. These results have been feasible through the effective R&D policy and investments on technological development, which have been systematic and continuous driving forces. The research has suggested the political implications on interconnections among various policies; those are based on dependency of R&D policy on information and telecommunication, while building the information society in Korea. Having identified the diverse characteristics of the R&D Policy from the history of information and telecommunication in Korea, the research has analyzed the framework of those R&D policies on building the information society in terms of the institutional system and policy operation. The research proves that the R&D policy of supplying technologies for a long-term period helps to achieve the construction and advancement of ICT industry, the efficient operation of information and telecommunication business and service, and the activation of information utilization.

WE-02.3 [R] Economic Effects and Some Implications on Introduction of Indirect Access Scheme into LM Market in Korea
Byung-Soon Kim; Electronics & Telecommunications Research Inst., Korea, South Young-Suk Kim; Information and Communications University, Korea, South
This study analyzes the economic effects that are expected when competition in the LM market intensifies with the introduction of the indirect access policy. To that end, this study estimates consumer surplus and operator’s profit variation with the introduction of the indirect access policy, by combining actual data (or estimated values) such as price elasticity, call volume, usage rates, and access charges, as well as assumptions about forecasted competition. According to the results of the analysis, it has been found that the increase in consumer surplus will to a large extent be due to LM rate reductions as competition toughens with introduction of the indirect access policy into the LM market. However, the net profit of the new indirect access service providers is found to be insignificant. In particular, analysis suggests that the net profit will be negative if the rate drops by 20% compared with the current price level once that policy has been adopted, and further suggests that reductions in the investment of incumbent fixed network service providers is inevitable since the net profit is likely to drop significantly, even when the access charge revenue increases from the indirect access service providers. Consequently, it is evident that more a cautious policy should be pursued before adopting the indirect access system in the LM market, and prior scrutiny should be made regarding the means of compensating for the loss in the local NTS section before making any decision.

WE-03 Innovation Management-7
Wednesday, 7/12/2006, 15:00 - 16:30
Chair(s): Thorsten Teichert; Universitaet Hamburg
Room: Smyrna

WE-03.1 [R] Pioneering Customer’s Potential Task in Innovation: Separation of Idea-Generator and Concept-Planner in Front-End
Shinya Kasuga; University of Michigan, United States
How to create value for the mass customers through innovation - whether technological innovation or business model innovation - has attracted increasing research attention from the field of strategy and innovation management, such as Christensen's theory of disruptive innovation. Many local enterprises in China, like UTStarcom, have achieved great market success through business model innovation to provide cheap but good enough products or services that ordinary Chinese citizens can afford, rather than expensive ones with excessive functions. This exploratory work attempts to explore new potential sources of latecomer advantage implied in the phenomena of overshooting, described by Christensen, and extends the theory of secondary innovation with new business model dimensions. A business model framework, comprised of value proposition and value network, is proposed to explain the process of how a latecomer creates and realizes the economic value latent in the acquired technology for the mass customers in developing countries. Secondary innovation, in terms of value creation, can be conceived as an iterative process initiated by the discovery of a new business model for a technology-based acquisition which leads to development, production, and marketing tasks striving for the secondary commercial success of the acquired technology within a new value network, especially in developing countries.

WE-03.2 [R] Innovating to Create Value for the Mass Customers in Developing Countries: New Dimensions of Secondary Innovation
Xiaobo Wu; Zhejiang University, China
Rufei Ma; Zhejiang University, China
Wei Zhang; Zhejiang University, China
How to create value for the mass customers through innovation - whether technological innovation or business model innovation - has attracted increasing research attention from the field of strategy and innovation management, such as Christensen's theory of disruptive innovation. Many local enterprises in China, like UTStarcom, have achieved great market success through business model innovation to provide cheap but good enough products or services that ordinary Chinese citizens can afford, rather than expensive ones with excessive functions. This exploratory work attempts to explore new potential sources of latecomer advantage implied in the phenomena of overshooting, described by Christensen, and extends the theory of secondary innovation with new business model dimensions. A business model framework, comprised of value proposition and value network, is proposed to explain the process of how a latecomer creates and realizes the economic value latent in the acquired technology for the mass customers in developing countries. Secondary innovation, in terms of value creation, can be conceived as an iterative process initiated by the discovery of a new business model for a technology-based acquisition which leads to development, production, and marketing tasks striving for the secondary commercial success of the acquired technology within a new value network, especially in developing countries.

WE-03.3 [R] Innovations in India: Criteria and Obstacles
Souryo D Meira; Indian Institute of Management Calcutta, India
The study of innovations in emerging economies is important for several reasons. They have...
large potential markets and can be drivers of these economies. The successful ones can make a big difference in a region and may well have a global impact. Finally, these innovations represent a wider spectrum of innovations than those commonly studied. India is rapidly becoming a part of the global economy and given its market potential it would be of interest to study innovations in India. The findings would be useful for the strategic and tactical planning of foreign companies in India, as well as for Indian firms who need to assess their own global competitiveness. This paper focuses on what might be appropriate criteria for judging an innovation as successful in an emerging economy such as India and on identifying obstacles to innovativeness. While a case may be made that Indian innovations should be judged by global criteria, we argue here that there is a wide range of incremental innovations that should be considered and judged by a broader set of criteria. This paper develops and discusses these additional criteria. However, even with such a set, emerging economies have a poor record of producing innovations. Therefore we review the literature and identify key obstacles to innovativeness. The lessons may be applicable to other emerging or developing economies.

WE-04.1 [R] An Evaluation of Analytic and Simulation Models for Organizing the Steps in New Product Development

Nadia Bhuiyan; Concordia University, Canada
Donald Gerwin; Carleton University and Erasmus University, France
Vince Thomson; McGill University, Canada

Organizing the new product development (NPD) process, in terms of how to locate the steps in the process in relation to each other and determine the information processing links between the steps, is a significant issue for both researchers and practitioners. For example, this work has helped us to understand the appropriateness of concurrent versus sequential engineering. This paper compares analytic and simulation models for organizing the process. By examining inputs, outputs, and means of converting inputs into outputs for 13 different models, we indicate which significant NPD features the analytic and simulation categories tend to incorporate. Knowledge of these differences in features between the two types of models then leads us to explain variations in the results that are obtainable and to also suggest needed improvements. Because an ability to incorporate more features is not the whole story, we also examine a type of model’s receptiveness to interpretation and validation, capacity for optimal solutions, and ability to evaluate alternative organizational arrangements for the NPD process. Finally, we indicate ways in which the two types of models can complement each other.


Nuri Basoglu; Bogazici University, Turkey
Tugrul Daim; Portland State University, United States
Onur Kerimoglu; Bogazici University, Turkey
Ece Sotuoglu; Bogazici University, Turkey
Ilda Tanoglu; Bogazici University, Turkey

Diffusion of technology into enterprises has been perceived as a by-product of other management activities, rarely taken as an independent focus. Becoming object or subject of the technology, management concept needs to update the meaning of this interaction; now then it seeks out a role that looks after technology actively. In an organization, managing the information technology capability, exploiting the existing information capacity, and transforming all assets into a value may be realized at an optimum setup. However, this setup should always be aligned based on the context of the entities. Enterprise-wise management systems have to be based on a framework that is capable of running daily activities, strategic thinking, and also providing every possible ingredient to cook new products for attaining survival. An integrated view of strategic technology management will be depicted in this study.

WE-04.3 [R] CMM Implementation and Organizational Learning: Findings from a Case Study Analysis

Emilio Bellini; Universita del Sannio
Corrado Lo Storto; Universita’ di Napoli Federico II, Italy

Methods and practices adopted by software professionals to develop and maintain software are believed to have significant impact on the project outcomes in terms of development cost and product quality. Disciplined methods and practices are expected to result in better control over the software development process. Even though there is a great awareness that software quality is largely dependent on the way the development process is carried on, there is lack of empirical evidence supporting the effect of software development processes on life-cycle productivity or quality and particularly of the impact of CMM certification on productivity improvement. This paper, using qualitative and quantitative data relative to the software process improvement initiative in which the Italian branch of a multinational software company was engaged from Jan. 1997 to May 2001, investigates the impact of CMM certification on organizational learning. In particular, a knowledge management perspective is adopted to explain the software development process increase in productivity. Data suggest the idea that CMM can effectively support and address knowledge management and learning within a software organization. Organizations using a well-structured process model such as the CMM can use the process infrastructure it provides for organizational learning. As an organization moves up the CMM levels, predictability is increased, risk is better managed and reduced and organizational learning is enhanced.

WE-06 Supply Chain Management-2

Wednesday, 7/12/2006, 15:00 - 16:30 Room: Bizans

WE-06.1 [A] RFID Applications in the Third-party Logistics Industry

Amer Haradan; University of Texas at Arlington, United States
Jamie Rogers; University of Texas at Arlington, United States
Man Chen; University of Texas at Arlington, United States

Radio frequency identification (RFID) is a generic form for technologies that use radio waves to automatically identify individual items. This paper starts with a historical review of the evolution journey from bar coding to RFID technology, and will explore the new trends and applications of RFID with emphasis on logistics and warehousing applications. RFID services/applications are of two folds: providing services in compliance with suppliers/customers requirements, and innovative applications developed to improve the supply chain efficiency and the overall performance for logistics providers, suppliers and customers. In this paper, we will see how Ryder Systems Inc. is leading the logistics industry in developing RFID applications that will benefit not only Ryder, but also other logistics companies and the entire supply chain. These applications include various warehouse functions such as cycle counting, physical counting and other inventory management functions, receiving, and shipping. Automated data collection and RFID generally reduce operating cost, increase shipping accuracy, eliminate manual data entry, and provide real-time visibility. We will discuss the impact and value of RFID as well as the challenges and issues associated with RFID. The paper will also focus on the integration of RFID with materials handling systems and warehouse management systems.

WE-06.2 [A] Supply Chain Management Strategies and Applications: A Benchmarking Study in Plastic Profile Industry

Turan Paksoy; Selcuk University, Turkey
Mustafa Atilla Aricioglu; Selcuk University, Turkey
Hasan Kursat Gules; Selcuk University, Turkey
Kemal Alataykiran; Selcuk University, Turkey

Benchmarking is the process of determining the performance of an enterprise in comparison to its competitors having a better position in the market and deciding how “these competitors” reached this performance level and finally using obtained information to establish a foundation for the goals of the enterprise. Benchmarking has an old origin if it is consid-
The development of the case companies, while six criteria were identified that can be applied on an either fir- nal or external nature. Up to four different stages of IP management were found throughout the case companies, which are two of the six greatest in the Turkish market, are benchmarked based on a questionaire.

**WE-06.3 [R] Study of Supply Chain Models in Vietnamese Footwear Industry**

Chengter Ho; National Kaohsiung University Of Applied Sciences, Taiwan

Viet Anh Nguyen; Hanoi University of Business and Management, Vietnam

The main purpose of this study is to focus on the kind of supply chain that is currently in application in the Vietnamese footwear industry. This research will help us understand the current supply chain model of the Vietnamese footwear industry and its positive contribution to the footwear industry in general. The study has resorted to a survey method, specifically a direct questionnaire method. Though the sample size has been fixed as 280, it has been successful to get 54 questionnaires completely filled-in from the managers of 54 Vietnamese footwear industry participants. The most significant results of the study include: (i) the supply chain model that is being currently put in use in the Vietnamese footwear industry is observed to be almost agile; (ii) the research has found that the current supply chain models in practice are able to help the industry participants to improve productivity, save cost, manufacture efficiently, improve performance on marketing and sales, increase customer satisfaction, build and maintain good relationship with the suppliers.

**WE-07 Intellectual Capital-1**

*Chair(s): Ozgur Ozturk; Istanbul Technical University*

**WE-07.1 [R] Towards Strategic Intellectual Property Management - Events During the Development: Evidence from Biotech SMEs**

Frank Tietze; Hamburg University of Technology, Germany

Ove Granstrand; Chalmers University of Technology, Germany

Cornelius Herstatt; Hamburg University of Technology, Germany

In the emergence of a pro-patent and intellectual capital era, the management of Intellectual Property (IP) is currently undergoing major changes. IP management systems are becoming increasingly complex and strategic in handling an integrated portfolio of IPRs and intellectual assets rather than just “administering” patents, trademarks and copyrights as single, independent assets in an operational management way. Our paper analyses the development of IP management in a sample of German and Swedish Dedicated Biotechnology Firms (DBFs) with the main focus on the following two research questions: (1) Which events trigger the development towards a more strategically oriented IP management? (2) Can distinctive stages be identified and characterized in the development of IP management systems? The empirical part of our study draws primarily on 12 personal interviews with leading managers from six larger German and Swedish dedicated biotechnology firms (DBFs) with “rich experience” in IP management that were founded between 1984 and 1997. During our study we found that shifts towards an advanced IP management were triggered by single crucial events (e.g. litigation) or an accumulated sum of incremental events, of either an internal or external nature. Up to four different stages of IP management were found throughout the development of the case companies, while six criteria were identified that can be applied to characterize an IP management stage.

**WE-08 PANEL: Strategic Technology Networks**

*Panelist(s): Dilek CETINDAMAR; Sabanci University, Gunduz Uluosoy; Sabanci University*

**WE-08.3 Strategic Management of Technology-4**

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

**WF-01.1 [R] A New Approach for the Diagnosis of Strategic Problems in Technology Management**

Omer Livivcioglu; Yeditepe University, Turkey

Baybars Soyak; STK Gumruk Musavirligi, Turkey

Technology Strategy Vectorial Model (TSVM) – as named by authors - introduces a new approach for strategic management of technology. TSVM interprets organizational technology strategy as a vector in a 2D circular coordinate system where azimuth refers to strategic direction and radius to strategic magnitude. Researchers propose TSVM as a tool for measuring the actual organizational technology strategy and evaluation of strategic performance. Four cardinal strategic directions (Innovative, Conservative, Adaptive, and Erratic) and five levels of strategic magnitude - where 5 is the strongest and 1 is the weakest - are employed in the model for expressing the strategic vectors. The strategic vectors of individuals will be measured by a carefully-designed questionnaire. Measured individual vectors are summed with a specifically designed software program and thereby the resultant organizational vector is calculated. Besides determining exact organizational technology management status in terms of strategic direction and magnitude, the model is also expected to be useful for the diagnosis of strategic problems such as strategic deviation and deficiency. Strategic deviation refers to the directional deviation from the intended direction and strategic deficiency refers to the difference between the intended and measured strategic magnitudes. TSVM is proposed as a new tool to help decision makers see the gap between where they are and where they want to be and apply the appropriate correction.

**WF-01.2 [R] Outsourcing SWOT Analysis for Some US Industry**

MD B Sarder; University of Texas at Arlington, United States
Jamie K Rogers; University of Texas at Arlington, United States
Edmund Prater; University of Texas at Arlington, United States

Outsourcing is proven as a good idea for many firms that need to reduce operating costs and improve information technology operations. But it remains important for them to select the appropriate outsourcing activities. Many companies will be hurt by hastily following the herd down the outsourcing path without thoroughly evaluating the benefits and risk associated with it. Some companies even do not ask themselves the fundamental question for outsourcing such as, will it add value to their customer? Or will it reduce their overall costs? If they can answer yes, it might be a candidate for outsourcing. In this research we tried to evaluate the outsourcing benefits and its underlying risks in the context of three US companies from different businesses. A SWOT analysis was done to find the best candidate of outsourcing for a particular company.

**WF-01.3 [R] Bottleneck Technologies - Applying the Constraints Approach to Technology Management: Evidence from Case Studies**

Roman Bourellier; ETH Zurich, Swiss Federal Institute of Technology, Switzerland
Karin Löffler; ETH Zurich, Swiss Federal Institute of Technology, Switzerland

Companies are looking for simple and market-oriented approaches to technology management. In our research project, this challenge is tackled by means of a bottleneck-focused concept. We will apply the theory of constraints to technology management. The aim is to
show how a bottleneck technology approach can contribute to opportunities for how resources should be allocated, provide insights as to where innovation might come from, and put forth evidence on how to avoid surprise.

WF-02 Science and Technology Policy-2
Wednesday, 7/12/2006, 17:00 - 18:30
Room: Regency-2
Chair(s): Philip Gardner; TRIUMF

WF-02.1 [A] Assessment of an Incentive for Investment in Automotive Manufacturing in a Developing Economy for Promoting Global Competitiveness
Jasper L Steyn; University of Pretoria, South Africa
Martin Kaggwa; Automotive Industry Development Centre, South Africa

The Productive Asset Allowance of the Motor Industry Development Programme in South Africa was assessed as a means of promoting global competitiveness in automotive manufacturing technology in a developing economy. The PAA provides incentives for investment in productive assets (including research and development expenditure) with the objective that the investment should be at a level of technology that would allow for globally competitive manufacturing. Applications and claims by local subsidiaries of multinational vehicle assemblers and component manufacturers as well as local component manufacturers were assessed. In addition assessment reports by independent engineering consultants were reviewed. It was found that over a period of some 7 years significant investment had occurred to a value of some USD 2 billion and also at a level of technology that allowed globally competitive manufacturing. However, no technology was developed as part of the programme that could contribute to these firms’ sustained competitive advantage in securing orders for the manufacturing of next generation models or their components. This is attributed to investment in productive assets being a lower risk option than investment in technology development.

WF-02.2 [R] Regional Systems of Innovation in Canada: Two Case Studies
Claudia Díaz-Pérez; Universidad de Guadalajara, Mexico
Ricardo Arechava-Ley-Vargas; Universidad de Guadalajara, Mexico

The need for the development of regional innovation systems is widespread and recognized in many countries. Quite a few studies have examined individual clusters with the purpose of identifying their essential components and of determining the conditions in which they may arise and prosper. In most of the literature, however, it is recognized that there is little firm knowledge about their development process, and about the ways in which they can be promoted and fostered. The “path specificity” of their developments seems to hinder attempts at identifying specific measures that can promote their appearance and growth in contexts different from those where they already have. Canada’s effort in this endeavour, however, seems to be paying off since the country can boast of several burgeoning innovation clusters, some of which seem to be responding to specific policy measures at the regional level. In this study we have aimed at elucidating the structure and dynamics of two innovation clusters in British Columbia: the biotechnology innovation cluster, and the fuel cell innovation cluster, in order to gain a better understanding of their structure, their dynamics, and the way in which they respond to specific efforts by their actors and promoters.

WF-02.3 [R] R&D Internationalization in Developing Country: A Study Focused on Case Studies of Korea’s International Joint Research Projects
Yooduk Jun; IITA, Korea, South
Jin-Ha Kim; IITA, Korea, South
Hanjoo Kim; IITA, Korea, South

Knowledge creation by technology-based enterprises is increasingly becoming internationalized. Innumerable technology-based companies attempt to position their R&D centers in places where markets are rapidly growing or new technologies are actively developed. Then what are key factors in R&D internationalization of developing countries? How do those factors result in such diversified patterns of internationalization? Are they, in fact, related to the rapid growth of IT technologies in Korea? One of objectives of this study is to define the nature of Korea’s R&D internationalization, which has been making rapid progress recently. With this objective, we examined the cases of research projects conducted jointly with major international R&D institutes, and inducement of foreign R&D centers, analyzing the pattern of cooperative activities. The targets of the case study were international joint research projects conducted during the period from 1998 through 2000, under the sponsorship of MIC (Ministry of Information and Communication). We also conducted a survey on motives of multinational corporations which have recently established R&D centers in Korea. For the research, we made reference to documents relating R&D activities in the IT industry published by government agencies and research administration bodies, as well as relevant articles. Due to the nature of R&D activities in the IT industry, which limits the usefulness of documents in identifying their distinctive features, we also interviewed key researchers engaging in the projects. Motives, objectives and issues were surveyed through structural interviews, and industrial, technological features were identified through non-structural interviews.

WF-03 Innovation Management-8
Wednesday, 7/12/2006, 17:00 - 18:30
Room: Smyrna
Chair(s): Shinya Kasuga; University of Michigan

WF-03.1 [R] Technology Catch-Up in China Compared with Japan: A New Development Model
Yong Cao; Tohoku University/Huazhong University of S&T, Japan
Hiroaki Sakai; Kanazawa Institute of Technology, Japan
Xielin Liu; National Research Center for S&T, China
Akio Nagahira; Tohoku University, Japan
Yasutaka Iguchi; Tohoku University, Japan

This paper contrasts these contexts and describes an alternative model of catch-up that can be discerned through an examination of the industries in which Chinese firms are competing successfully. The purpose of this paper is to identify the key features of the Chinese catch-up process to propose an alternative model of catch-up that takes into account key features of the current environment, some of which differ critically from Japan. First, we review the Japanese catch-up processes during the 1960s - 1980s to highlight key features. Next, we introduce our framework that is grounded in China’s experience, and describe China’s on-going catch-up process in those terms. We then look specifically at the mobile phone handset industry to illustrate the catch-up process in China. Finally, we discuss the general implications of our framework for both research and policymaking.

WF-03.2 [R] Innovative Behavior of the South African Defense Related Industries
André J Buys; University of Pretoria, South Africa

This paper presents a comparative analysis between the innovative behaviours of the defence related industries and other industrial sectors in South Africa. Defence industries are often viewed as constituting the most innovative sector of the manufacturing industry of a country. This industrial sector usually scores high on R&D effort, but the research question is whether this translates into a correspondingly high output of new or improved products and services. This study is based on a survey of companies in the defence related industries and the findings are compared with those of the most recent National Innovation Survey of manufacturing and service industries in South Africa. Some of the variables that were investigated are R&D effort, innovation expenditure, innovated products and services; expert performance, innovation partners and information sources for innovation. The study highlights the main differences and similarities between the innovative behaviours of the defence related industries and other industries.

WF-03.3 [R] Discontinuous Innovation in Technology-Based Start-Ups from Chinese Manufacturing Industry
Haifang Wang; Dalian University of Technology, China
Chunyou Wu; Dalian University of Technology, China

Against a background of global competition, the rapid change of discontinuous technology presents ongoing challenges to technology-based start-ups. This paper aims to explore the
possibility and paths towards discontinuous innovation for latecomer firms in such developing countries as China. Based on the in-depth field investigation with selected entrepreneurial firms in the manufacturing industry, we seek to examine whether the technology-based start-ups in China can achieve rapid growth and deliver discontinuous innovation. The technique of technology roadmapping is employed to analyze the evolutionary process in which technology, product and market interact in three typical new ventures. From the findings in this study, we propose an integrative framework to leverage resources and capabilities in the entrant firms and put forward suggestions for effective management of discontinuous innovation. Implications for managers, policy-makers and further research are also discussed.

WF-04 New Product Development Management-4
Wednesday, 7/12/2006, 17:00 - 18:30
Chair(s): Michael Menke; Hewlett-Packard

WF-04.1 [R] Managing Cross-Functional Integration of Complex Developments
Hans J Thanhain; Bentley College, United States
The demand for faster and more cost-effective product developments encouraged the creation of new project management platforms, designed to expedite and streamline new product development, R&D-to-market. Systems such as Design for Manufacture (DFM), Integrated Product and Process Development (IPPD), Structured Systems Design (SSD), Stage-Gate Processes, and perhaps the oldest and most widely used IPD concept of Concurrent Engineering (CE), all promise more flexible and more effective new product development processes. Yet, for many managers the results were mixed regarding overall project performance. The paper reports the findings of a three-year field study of over 60 complex technology-based product developments in 10 companies. The drivers and barriers toward cross-functional cooperation are examined together with the type of process stages, leadership style and organizational environment most conducive to effective product integration. Specific suggestions are being made for enhancing cross-functional linkages, involvement, commitment, communications and decision-making, factors that ultimately determine new product success.

WF-04.2 [A] An Experiential Approach for Evaluating Product Development Capabilities
Jason Patton; Syracuse University, United States
David Wilemon; Syracuse University, United States
New product development is frequently the most challenging and costly activity undertaken by firms. This paper presents the results from a case study of a process developed to assist one high technology firm assess its capabilities to innovate. This company had suffered several innovation problems, such as delivering new products behind schedule and over the targeted development budget. The consequences of these performance problems directly impacted customer satisfaction levels as well as created a decline in product profitability. The Innovation Capabilities Assessment process used entailed in-depth field interviews with key development participants; the use of a custom designed innovation assessment instrument; feedback of the study's findings to key development managers, team members and senior managers; and specific recommendations for company-wide development improvement. We suggest that other technology companies can use our Innovation Capability Assessment methodology. Several directions for future research regarding innovation capability assessment methods are proposed.

WF-04.3 [R] The Hidden Risks of Structural NPD Portfolio Inconsistencies: Experiences from an International Joint Venture
Thomas G Lechter; Stevens Institute of Technology, United States
Thorsten Fiechtner; Universitaet Hamburg, Germany
The discussion about the composition of new product development portfolios is quite well established. Several frameworks are offered to determine the risks and the value of NPD project portfolios. These suggested approaches are mainly based on the evaluation of single projects and their aggregation to the portfolio level, but they do not consider technological interactions between the projects within a portfolio and their consequences for the risks. We analyze the joint venture between AT&T and BT (British Telecom) to conceptualize these problems. What started out with a radical innovative technological vision ended in a failure with some losses from three to five billion US$. Our study focuses on the analysis of the NPD portfolio. The data was collected by analyzing public documents and by 18 in-depth interviews with nine key members of the management board. The planned NPD portfolio at the official start of Concert was compared with the finally implemented projects to identify the technological interactions between the projects and their consequences for the portfolio risks. In total we could identify 15 different initially planned projects. In the end, two thirds of the original projects were finished, but they did not achieve the intended level of innovativeness due to a technological inconsistent portfolio structure.

WF-04.4 [R] Relationship Component of Supplier Involvement in New Product Development (NPD) Process
Ozalp Vayvay; Marmara University, Turkey
Emine Cobanoglu; Marmara University, Turkey
As developing the right product at the shortest time to the market at the right quality level and price is a necessity due to shortening of product life cycle, and increased global competition, close interaction of the supplier with the customer increases new product development efficiency. Existence of relationship components, communication, commitment and trust is very important for the close interaction of the supplier with the customer. An effective supplier involvement in the new product development process decreases the complexity of the development process and avoids suppliers’ manufacturing and technological constraints. The main objective is to match the supplier capabilities with the customer requirements. This is only possible with a close relationship between the supplier and customer. The study emphasizes the importance of the relationship between the supplier and the customer and the effect of the relationship on the supplier involvement in the new product development process.

WF-05 R&D Management-2
Wednesday, 7/12/2006, 17:00 - 18:30
Chair(s): Elif F Babayi it; Arçelik

WF-05.1 [A] Remodeling Method for Business Models of R&D Outputs
Fumiaki Ishii; The Kansai Electric Power Co., Inc., Japan
Hiraku Sakuma; Japan Techno-Economics Society, Japan
Hitoshi Abe; Oki Electric Industry Co., Ltd., Japan
Bianca Fazekas; Portland State University, United States
The authors report recent results of a study on a business modeling method conducted for the purpose of offering a convenient tool for engineers and researchers which would enhance corporate value from R&D outputs. The “Japanese lost decade” has forced companies to change R&D management and R&D operation style. We propose the remodeling method to evaluate and improve business models of R&D outputs. We applied this method to several cases in the real world to show its effectiveness. This study represents the result of over three years (fall 2002) of work with this method, done by a group of researchers from JATES (Japan Techno-Economics Society).

WF-05.2 [A] The Effects of Leadership Characteristics on the Performance of R&D Projects
Eui-song Kim; Seoul National University, Korea, South
Dong wha Keum; Korea Institute of Science and Technology, Korea, South
Yong-II Song; Korea Institute of Science and Technology, Korea, South
Yun-Chul Chung; Korea Institute of Science and Technology, Korea, South
Existing research in R&D performance has mainly focused on the effects of funding, research fields and/or regional R&D networks on the performance of R&D projects. In this paper, we argue that if we take micro-level variables into consideration, project leadership may be much more influential than any other environmental variables. The current study is designed

Note: [R] = Research paper; [A] = Industry Application; [K] = Keynote
to explore the effects of the characteristics of project leaders or research teams on R&D performance, based on R&D performance records of individual laboratories, which take part in the National Research Laboratory (NRL) program. To test the model, we take a look at the effects of leadership on the performance of participating research labs. Some of the indicators of R&D leadership characteristics include educational level of project leaders/research team, team size, age, foreign doctor, and individual R&D networks. The results bear interesting policy implications and provide guidelines for selecting research labs for national R&D programs.

WF-05.3 [A] Research Transformation Aligning with Business Strategy  
Yunko Sawatani; Tokyo Research Lab, IBM, Japan  
Mission, process, and the contribution of research organization have been changed to increase business values from research outputs. This paper talks about research transformation from basic technological research to the recent service research focusing on business professional services domain in the information technology industry. The paper gives a case study of research transformation in the information technology industry, discusses what kinds of transformations have occurred to increase the business value of research outputs into products, service engagements, emerging business creation, innovation creation, how research management processes evolve to align with business strategy, with introduction of new roles, measurements, processes, and programs, and investigates those transformations from value chains, innovation management, and business processes perspectives. The paper also covers recent initiatives of innovation creation and transformation.

WF-06 Supply Chain Management-3  
Wednesday, 7/12/2006, 17:00 - 18:30  
Chair(s): Turan Paksoy; Selcuk University

WF-06.1 [R] Exploring the Role of Value in the Technology Sourcing Decision  
C. Helen Takacs; Cleveland State University, United States  
Alok Chakrabarti; NJIT, United States  
New product development is a process that involves the combination and configuration of a multitude of individual technologies. Research and experience show that all firms, even those that are very large, have resource limitations that prevent them from maintaining and developing all of the necessary technologies in-house. The question for firms concerning the management of individual technologies is a complex one. This research adds to our present knowledge of the technology sourcing decision by exploring how the value of a technology is related to whether a firm develops a technology internally or sources it through some external means. This research is set in the medical devices industry, and the conceptual model linking value to technology sourcing is based on previous literature and on exploratory interviews conducted in Finland and the United States. The model is tested with survey data gathered from American firms on 162 individual technologies. The results indicate that the relationship between value and internal sourcing is strongest when value is defined operationally (reduces costs) than when it is defined strategically (increases differentiation). Additionally, the uniqueness of a technology is antecedent to its value.

WF-06.2 [A] A Simulation Based DSS Design for Supply Chain Management  
Aslı S. Erdem; Bogazici University, Turkey  
A. Ünün Sancar; Bogazici University, Turkey  
This study focuses on improvement of supply chain performance in one of the biggest commodity product manufacturers in Turkey. The aim is to generate a tool running as a Decision Support System (DSS) and provide an easy to use simulation environment for the supply chain managers in decision making. In the current supply chain system the manufacturer offers a discount option if the orders placed by a distributor exceed a certain quota. The quota is determined beforehand and may differ for each distributor according to the mutual agreement. In the “Monthly Quota” system, the distributors receive a discount for their unit purchasing price, if they reach their individual quota at the end of the month. As an improvement of the current supply chain system, “Rolling Horizon” strategy is proposed where the quotas are checked every time an order is placed by a distributor. Two simulation models are developed by using ARENA software and integrated into a DSS that uses MS-Excel for data input and output purposes. The DSS environment is used to compare the monthly quota strategy and the rolling horizon strategy with different performance measures.

WF-07 Intellectual Capital-2  
Wednesday, 7/12/2006, 17:00 - 18:30  
Room: Tyana-1

WF-07.1 [R] Patent Right Competition Law Interface  
Ozgur Ozturk; Istanbul Technical University, Turkey  
Pinar Ozturk; Mehmet Gun&Co., Turkey  
IP rights and patent rights in particular are considered among the most valuable assets of companies producing technologies. It is generally said that patent right gives the owner the right to exclude others from making, selling, using and importing the patented invention. Although this is true in terms of a purely legal point of view, the patents actually function as bargaining tools in today's highly competitive environment. Companies form joint ventures, enter into manufacture and distribution agreements with local businesses in order to penetrate the foreign markets. License agreements are not uncommon between the competitors. These agreements may have adverse effects on competition and thus are scrutinized closely by competition authorities. Clauses on exclusive dealing, allocation of markets and customers, price fixation, grant-backs, and the obligation not to challenge the validity of a licensor's patent in license agreements are particular matters of concern. Settlement agreements between competitors in the course of an invalidity action against a patent, and patent pools should be considered from the competition rules perspective as well. Accordingly, competition rules are essential in the decision-making process of companies for those who want to utilize their patents, unless they assume to take the risks of heavy fines and invalidated contracts.

WF-07.2 [R] Empirical Analysis of Royalty Compensation in Korea-China Online Game Licensing  
Youngho Nam; Kookmin university, Korea, South  
This study empirically investigates the royalty compensation in Korea-China online game license agreements. Since 2001, around 60 Korean-developed online games, especially MMORPG (massively multiplayer online role playing games), have been published in China through license contracts. Among them, 15 games were used as samples for this study. Some characteristics of royalty compensations in Korea-China license agreements are derived based on interviews with management of Korean game developing firms who made license contracts with Chinese publishers. First, a typical contract format is an initial fee plus running royalty, and the basis of running royalty is various kinds of sales revenues. Second, in the past three years, the initial fee has increased very rapidly, while royalty rates were relatively stable. Third, royalty bases which need financial audits have been avoided since 2003. It is found that Korean developers prefer a royalty base whose reliability is checked through online. Fourth, it is proved that the royalty rates in the online game industry are much higher than those in other industries. It may result from "winner-takes-all" characteristics of the information goods industry. Finally, it is found that developers prefer a larger initial fee to a higher royalty rate. Both parties spend more time discussing the initial fee than running royalty in the negotiation process.

WF-07.3 [R] Intellectual Property System in Iran: A Comparative Study  
Mohdi Goodarzi; Ministry of Industries and Mines of I.R. of Iran, Iran  
Kamran Bagheri; Research Institute of Petroleum Industry, Iran  
This paper is based on research performed to evaluate the Intellectual Property (IP) system in Iran and its role in national technology development. First, it reviews the most important features of the Iranian IP regime and its role in the Iranian national innovation system. Then, it benchmarks the Iranian IP system against the national IP systems in Japan, Korea and China. Finally, it raises several policy implications that should be carefully considered in both IP and technology policy-making in Iran at the national level.

WF-08 PANEL: Emerging Foresight Studies in Turkey: National, Sectoral and
SESSIONS

Corporate Experience
Wednesday, 7/12/2006, 17:00 - 18:30
Room: Tyana-2
Panelist(s): Nuri Basoglu; Bogazici University
Alper Alsan; Siemens
Ozcan Saritas; Istanbul Technical University
Tugrul Daim; Portland State University

Foresight studies are mushrooming across countries. The national foresight studies are increasingly being adopted by sectorial associations and companies. The diffusion and use of the results of foresight studies are not automatic and require intensive efforts.

HA-01: PLENARY-9

DATE: THURSDAY, 7/13/2006
TIME: 08:30 - 10:00
ROOM: REGENCY-1

HA-01.1 [K] RIKEN and Its New Technology Transfer Scheme
Eiichi Maruyama; RIKEN, Japan

RIKEN is one of the oldest private research institutes in Japan. Established in 1917, it had a brilliant history of social contribution in producing venture businesses for more than 60 companies in the 1930s. After World War II, RIKEN became a government-supported research institute that was similar to national ones. In 2003, however, RIKEN became one of the Independent Administrative Institutes like other National Research Institutes, and in 2004 it initiated a unique technology transfer program, referred to as "Integrated Collaborative Research Programs," in which industrial sectors play leading roles through exchange of leadership in technology transfer between public domains and industrial sectors. It is working quite successfully so far, and this keynote will discuss the program in detail.

HA-01.2 [K] MOT By Using Scientific Methodology in Samsung R&D
Se Ho Cheong; Samsung Advanced Institute of Technology, Korea, South

Only those who can create or develop dominant design will survive. The followers will not. Therefore, we must be a front-runner. In order to survive, we are developing dominant design by using scientific methodology at Samsung R&D. We have used various policies to develop advanced MOT within a short time. We have connected the strategy to business units and adopted scientific methodologies under the motto of R&D innovation. In the past, Samsung’s technical success was dependent on the CEO’s leadership and prediction. But, as there are many of the world's best products in Samsung, MOT through systematic methodologies is keenly required. When we initiate projects, we pursue "Doing the right thing." With a technology roadmap, we plan strategy together with customers, and set up the appropriate strategy. With technology tree, we bring out the core technology and design the best project plan. With TRZ, we discover creative ideas. When we execute projects, we pursue "Doing the right way." With QFD, we decide on parameters that are managed by scorecard. At the R&D process gate, we determine whether the project’s goals can be achieved by checking this scorecard, and characterize and optimize the parameters through DOE.

HB-01 Strategic Management of Technology-5
Thursday, 7/13/2006, 10:30 - 12:00
Room: Regency-1
Chair(s): Robert Harmon, Portland State University

HB-01.1 [A] The Role of Strategic Technology Management in Research & Development Activities for the Innovation of New Products, New Process and Services
Tanrık Baykara; TUBITAK MRC, Turkey

A 5-phase model is suggested for innovating new products, new processes and services for high-tech organizations. The model includes a series of work flow described in each phase starting with initial idea generation and description of the program. The role of the strategic technology management is to orchestrate and integrate all the activities within the program. This paper will present the whole process and draw a typical model for a product development.
HB-03.1 [R] A New Approach to the Concept of Anatolian Industrial and Technological Corridor in Southern Turkey Using Social Innovation Instruments
Ahmet Ayhan; Selcuk University, Turkey

In order to increase the national income, to reverse the domestic migration, to decrease the inequality between regions, and to provide a planned development, there is a need to establish a second corridor as Anatolian Industrial and Technological Corridor (AITC), extending across 10 cities from Konya to Diyarbakir beside the Marmara corridor. This concept will form a basis to improve the competitive power by innovation in present traditional technologies and also will cause the development of high technology areas resulting in sustainable regional development. AITC, found in a rapidly developing stage in economic, social and cultural aspects, is expected to be the second biggest industrial region and an important part of the national innovation policy and system within 20 years. Technology diffusing through the whole society is often dependent upon social innovations; therefore, technical innovations should be supported by social innovation components and related actions: strengthening societal confidence and trust, promoting intellectual capacities, creating new innovative enterprises and a learning community as well as social entrepreneurs; building a sustainable infrastructure for greater social inclusion, mobilization of community, and forming centers for social innovation as a forum and collaborative networks. For this purpose, some social scientific instruments in the frame of defined needs of AITC can be used like the Experimental Social Innovation and Dissemination (ESISD) model.

HB-03.2 [R] Management of Technological Innovation in the Lebanese Industry
Toufic Mezher; American University of Beirut, Lebanon
Walid Nassrallah; American University of Beirut, Lebanon
Aref Alameddine; American University of Beirut, Lebanon

As the management of technology is an interdisciplinary field, its effects stretch out to reach the individual, the organization and the nation. On the individual level, it promotes and improves one’s social standing; on the organization level, it helps firms maintain a competitive edge; on the national levels, it contributes to shaping the public policy. In this paper, the effects of MOT on the organizational level are assessed through conducting a technology audit on a vast number of Lebanese companies spread over several industrial sectors. The technology audit model (TAM) that was proposed in 1996 by Garcia-Arreola was used to assess the important issues such as the technological environment, technologies categorization, markets and competitors, innovation process, value-added functional and acquisition and exploitation of technology. Its main objectives are to determine the current technological status, stress areas of opportunity, and take advantage of the firm’s strong capabilities. Forty Lebanese companies operating in the financial sector, manufacturing sector, information and communication technology (ICT) sector, food sector, and software technology sector were surveyed. The data collected was analyzed to identify the different technology management strategies across the different sectors. The results reflect on the level of appreciation and importance of technology management as per the views of the sectors surveyed. It introduces a set of steps and strategies that should be carried out by the government, the private sector, and the education sector to promote technological innovation and development.

HB-03.3 [A] The Innovation Process of the Microwave Heat Technology
Gül Güven; ESC Lille, France

The objective of this paper is to illustrate a case of process innovation, the microwave heat technology created by a ready-meals producer. The microwave heat treatment is a technological innovation because it has successfully, commercially exploited the microwave oven technology (an invention) as it became embodied into a new process which was new to the world. This paper is structured to facilitate the formation of linkages between innovation theory and the innovation process.

HB-04.1 [R] Feature Analysis of an Information Systems Product Development
Ecêhan Sövuquoi; Bogazici University, Turkey
Nuri Basoglu; Bogazici University, Turkey

Improving the product development processes are gaining importance as the competitive business environment creates this need. “Customer” becomes the main focus in the new product development area, and customer desires take the first place in this matter. To coordinate the product development processes, companies increase collaboration and support decision making between the customers and the firm. This study aims to understand and characterize potential users of a new product through idea sharing of users and create a new product concept through developing the common features that users prefer most. Especially during the product conceptualization stage, the customer ideas are taken through a two-phase study. In this paper, we will summarize the first phase of the study; a pretest questionnaire that tries to understand the target users and which functions and features they give priority, compare their preferences and the level of them by using scales. The product is the e-mail systems. The existing e-mail usage characteristics of the current products have been collected from internet, written resources and catalogs of these products. These existing characteristics are compared with the ideal e-mail system characteristics and scaled in the questionnaire study. The findings of this study become the feedback for the extended interview.

HB-04.2 [R] A Multi-Stage Problem Formulation for Concept Selection for Improved Product Design
Gül Okudan Kremer; Pennsylvania State University, United States
Rohan Shivalkar; Pennsylvania State University, United States

In this paper, a new concept selection method is proposed and its application is demonstrated. The utility theory based proposed method formulates the concept selection problem as a multi-stage decision. The proposed method has improvements in its ease of use, and accounting for potentially coupled decisions in comparison to other methods found in the literature. We first present a comprehensive review of the existing concept selection methods, and then explain the proposed approach. The paper concludes with its application on a case study along with recommendations for future work.

HB-04.3 [R] TRIZ and Axiomatic Design: A Review of Manufacturing Case-Studies & Their Compatibility
Rohan Shivalkar; Pennsylvania State University, United States
Gül Okudan Kremer; Pennsylvania State University, United States

With increasing competition in the market, expediting the problem solving process has become crucial in the industry. Techniques such as Theory of Inventive Problem Solving (TRIZ) and Axiomatic Design (AD) have been widely applied for this purpose. This paper reviews practical applications of TRIZ and AD in solving industrial problems related to designing and manufacturing. We propose that application of these two techniques synergistically to solve a problem will increase the efficiency and quality of the problem solving process. This has been demonstrated using a real life case-study of manufacturing tool design.

HB-05.1 [A] Developing Synergy for Distributed R&D by Using Audit Mechanism
Elif F Babayigit; Arcelik, Turkey
Semsettin Ekster; Arcelik, Turkey

New Product Development is the core process for every company that is future oriented.
SESSIONS

As Arçelik, having a distributed R&D organization, we have chosen to adopt the stage-gate approach to our NPD process by using an internal audit mechanism. The audit mechanism Arçelik developed and applies aims to approximate the NPD process to excellence. The audit is carried out according to the gap analysis methodology used for diagnosing the high priority improvement needs. The results are presented as improvement areas and best practices, in top-management and senior-management level meetings. The mechanism provided a PD coordination platform for the central and distributed R&D units whose outputs are also fed back into the audit mechanism. The method developed as an analytical process monitoring tool also interfaced with project-management, knowledge management, collaboration and performance measurement tools, which are also vital for NPD performance. By this study Arçelik earned a continuous improvement mechanism maintaining a common baseline process which is flexible enough to deal with uncertainty. It is also seen as a nudder mechanism in the course of NPD progress up the maturity ladder from ad-hoc, to the levels repeatable, defined, managed, and optimized.

HB-05.2 [R] Linking R&D and Marketing for Innovation: A Literature Review
Abraham Hernandez; Portland State University, United States

There is no doubt that innovation takes creativity and vision. But is this sufficient for commercial success? Can the vision of a handful of technologists be clear enough to produce products that will appeal to millions? In most cases this is a difficult proposition. And as products become more sophisticated, greater demands are put on those involved in product development. The technical skills required to produce most products today requires a high degree of specialization. This can leave R&D personnel disconnected from customers. The solution is to create a stronger link between R&D and Marketing. There are, however, numerous barriers to creating this strong link. These can include, but are not limited to, organizational difficulties and cultural differences. In the case of new product development this can be detrimental, limiting the innovativeness of the company. Therefore, it is proposed that the innovativeness as well as the commercial success of products depends on the strength of the linkage between R&D and Marketing. This paper explores the existing literature to validate this statement, explain the difficulties with integrating R&D and Marketing, and presents methods for improving the relationship.

HB-05.3 [R] R&D Industry: An Emerging High-End Service
Lucheng Huang; Beijing University of Technology, China
Yafei Luo; Beijing University of Technology, China

Along with the development of the externalization of R&D, R&D activities are showing the trend of their industrialization. The paper provides in the first place the definition of the R&D service industry with the discussion of the differences between the R&D service industry and its related industries, such as the cultural industry, the creative industry, the information technology industry, the traditional service industry. Then it goes on to analyze the causation of the emergence of the R&D service industry with the advancement of the structure of sub-industries based on those of R&D services industry. Finally, the paper estimates the general trend of R&D services industry and argues the reasons why we should develop the R&D service industry.

HB-06 Technology Roadmapping-1
Thursday, 7/13/2006, 10:30 - 12:00
Chair(s): Tugrul Daim; Portland State University
Room: Bizans

HB-06.1 [R] Value Roadmapping: A Structured Approach for Early Stage Technology Investment Decisions
Marcel Dissel; University of Cambridge, United Kingdom
Rob Phat; University of Cambridge, United Kingdom
Clare Farrukh; University of Cambridge, United Kingdom
David Probert; University of Cambridge, United Kingdom

Deciding to invest in early stage technologies is one of the most important tasks of technology management and arguably also the most uncertain. It assumes a particular significance in the rise of technology companies in emerging economies, which have to make appropriate investment decisions. Technology managers already have a wide range of methods and tools at their disposal, but these are mostly focussed on quantitative measures such as discounted cash flow and real options techniques. However, in the early stages of technology development there seems to be a lot of dissatisfaction with these techniques as there appears to be a lack of accuracy with respect to the underlying assumptions that these models require. In order to complement these models this paper will discuss an alternative approach that we call value roadmapping. By adapting roadmapping techniques, the potential value streams of early stages technologies can be plotted and hence a cleaner consensus-based picture of the future potential of new technologies emerges. Roadmapping is a workshop-based process bringing together multi-functional perspectives, and supporting communication in particular between technical and commercial groups. The study is work in progress and is based on a growing number of cases.

HB-06.2 [R] Customizing the Technology Roadmapping Technique for Software Companies
Andre L Fleury; Universidade de Sao Paulo, Brazil
Francis Hunt; University of Cambridge, United Kingdom
Mauro M Spinola; Universidade de Sao Paulo, Brazil
David Probert; University of Cambridge, United Kingdom

Software importance keeps growing fast and consistently for many organizations. The growth of software functionality in manufactured products and the emergence of digital media, convergent spaces including digital content, software, and multi-channels to the market, are recent examples of organizational changes where software assumed a central position for the corporate strategy. This paper analyzes the alignment between strategic objectives and software development processes at software companies and proposes a methodology to ensure that development processes are aligned with the corporate capabilities required to exploit future market opportunities. The methodology includes the categorization of different software companies according to their core capabilities and the customization of the technology roadmapping technique for software companies. The research process included the realization of case studies and a survey.

HB-06.3 [A] Building Energy Efficiency Technology Roadmaps: A Case of Bonneville Power Administration (BPA)
Tugrul U Daim; Portland State University, United States

This paper presents a technology roadmap developed for Energy Efficiency at Bonneville Power Administration (BPA). The paper presents 8 technology roadmaps for energy efficiency: heat pump water heaters, heat pumps w/o resistance, evaporative cooling, LED lighting, industrial process improvement, integrated building design (passive strategies), smart appliances, and demand response. The paper also describes how the technologies and roadmaps were put together.

HB-06.4 [R] Using Patent Information for New Product Development: Keyword-Based Technology Roadmapping Approach
Sungjo Lee; Seoul National University, Korea, South
Seongyong Kang; Korea Industrial Technology Foundation, Korea, South
Maengho Oh; Ministry of Commerce, Industry & Energy, Korea, South
Karpseo Kim; Korea Industrial Technology Foundation, Korea, South
Euisuk Park; Korea Industrial Technology Foundation, Korea, South
Seonghoon Lee; Seoul National University, Korea, South
Yongtae Park; Seoul National University, Korea, South

In recent days as rapid changes in markets and technologies increasingly shorten the lifetime of products, it is becoming essential for firms to constantly develop the new products into markets. Technology roadmaps, therefore, are considered to be efficient, effective tools for connecting both product and technology planning collectively, thus being widely accepted by firms. However, those roadmaps and their methodologies hitherto proposed generally tend to have overstated the qualitative, expert-dependent knowledge rather than incorporating objective information. In addition, useful methodologies are often observed to
lack, to facilitate a large variety of decision-makings faced in roadmapping processes. Consequently, this paper proposes a new approach: keyword-based technology roadmapping method by using the patents which contain relatively objective information, a quantitative method to support the reliable decision-making processes. Hence, the text-mining technique is utilized in this study to extract the relevant information on which the portfolio analysis, co-word analysis and network analysis are carried out, resulting in three different types of product-technology maps. Also, these maps demonstrate the applicability as to where to be applied usefully in a specific step of roadmapping processes. These techniques are highly expected to reflect the objective, quantitative information to roadmapping, and to effectively help improve the overall roadmap quality at the end.

**HE-02 Technology Transfer-4**
Thursday, 7/13/2006, 15:00 - 16:30  Room: Regency-2
Chair(s): Omer Saatcioglu; Middle East Technical University

**HE-01 SPECIAL SESSION: PICMET Planning Session**
Thursday, 7/13/2006, 13:00 - 14:30  Room: Regency-1
Speaker(s): Timothy R Anderson; PICMET
Antonie J Jetter; Portland State University
Charles M Weber; Portland State University
Dundar F Kocaoglu; Portland State University
Kiyoshi Niva; The University of Tokyo
Tugrul U Daim; Portland State University

Please join us in providing feedback on PICMET '06 and developing the plans for upcoming PICMETs. All PICMET attendees are invited to participate in helping make future PICMET meetings as productive as possible.

Note: [R] = Research paper; [A] = Industry Application; [K] = Keynote
edge networks formation affects the success of NPD processes.

**HE-04.2 [R] Engineering Students Decision-Making Process: The Role of Aspirations**

Jose Maria Cubillo Pinilla; Polytechnic University of Madrid, Spain

Waldo Perez Aguilar; Polytechnic University of Madrid, Spain

This paper analyses the influence of external factors which affect the decision-making process in the selection of telecommunications engineering studies. Particularly, we have studied the influence of factors related to the generation of expectations about the studies. A survey was conducted on a sample of 701 male and female telecommunications engineering students. The results show the existence of a direct correlation between the choice of telecommunications studies and the prospects of finding a job more easily, getting higher salaries and more prestige. The study shows low vocational orientation for the engineering area selected, but a high vocational orientation for engineering in general.

**HE-04.3 [R] International Comparison of World Commemorative Coins: Design and Technology**

Chae-Suk Lim; Hanyang University, Korea, South

Yang-Taek Lim; Hanyang University, Korea, South

The purpose of this study is to compare designs, shapes, materials, surface treatments, and manufacturing technologies/processes of world commemorative coins. Especially design is a crucial factor to commemorative coins. A keynote for a good commemorative coin design is to crystallize the main themes and concepts of design into the most beautiful forms using metallic materials, in contrast to banknote or stamp design. Comparative view on the designs of world commemorative coins differ depending on regional characteristics and cultural environment. However, based on various commemorative coins, this study concludes that the recent design trend of world commemorative coins has shifted from the conventional simple concept made solely for the purpose of celebrating an event to adjustment to the tastes of collectors, and the quality of designs starts to play a conclusive role in deciding success of failure of coinage. Before the 19th century, the purpose of commemorative coins was to proffer, propagandize and possess while it is now to raise funds for an event and supplement governmental finances and so on, resulting in commercialization of coinage. Furthermore, entering a global age, developing a design fitting international sentiment. Nowadays commemorative coins take up a part of national culture and economy. Moreover, the artistic value which the design of commemorative coins have is being highly appreciated more and more.

**HE-05 R&D Management-4**

**Thursday, 7/13/2006, 15:00 - 16:30**

**Room: Ephesus**

**Chair(s): Hans J Thamhain; Bentley College**

**HE-05.2 [R] Environmental Demands and Strategy Construction in Mexican Research and Development Centers**

Claudia Díaz-Pérez; Universidad de Guadalajara, México

Ricardo Arechavala-Vargas; Universidad de Guadalajara, México

The paper presents an analysis of strategy development processes in research R&D centers, under restrictive and turbulent environmental conditions. Knowledge organizations in less developed economies have particular characteristics: high level professional personnel, unique and intensive work processes, high external resource dependence, and a high environmental uncertainty level. In this context, the strategy development process is different from equivalent processes in other organizations. What kind of strategies do research and development centers develop in restrictive and turbulent contexts? Through which processes are strategies defined? Where in the organization is strategy shaped? How are strategies and organizational learning processes related? Theoretically, the analysis is done under the structure theory and organizational learning perspective. Fieldwork comprises five intensive organizational case studies, which include content analysis of more than 150 semi-structured interviews with managers, research and engineering personnel, technicians and administrative workers. They also include an analysis of formal documents and fieldwork. Results show how different kinds of strategies are defined in R&D centers, and their relationship with organizational learning processes. Emphasis is made on the way strategy links environmental demands with internal resources and processes.

**HE-05.3 [R] Strategies of Innovation and Supports to the Productivity and Competitiveness in Export Industry in Mexico**

María del Carmen Domínguez Rios; Benemérita Universidad Autónoma de Puebla, México

This paper presents an analysis of strategy development processes in research R&D centers, under restrictive and turbulent environmental conditions. Knowledge organizations in less developed economies have particular characteristics: high level professional personnel, unique and intensive work processes, high external resource dependence, and a high environmental uncertainty level. In this context, the strategy development process is different from equivalent processes in other organizations. What kind of strategies do research and development centers develop in restrictive and turbulent contexts? Through which processes are strategies defined? Where in the organization is strategy shaped? How are strategies and organizational learning processes related? Theoretically, the analysis is done under the structure theory and organizational learning perspective. Fieldwork comprises five intensive organizational case studies, which include content analysis of more than 150 semi-structured interviews with managers, research and engineering personnel, technicians and administrative workers. They also include an analysis of formal documents and fieldwork. Results show how different kinds of strategies are defined in R&D centers, and their relationship with organizational learning processes. Emphasis is made on the way strategy links environmental demands with internal resources and processes.

**HE-06 Entrepreneurship and Intrapreneurship-1**

**Thursday, 7/13/2006, 15:00 - 16:30**

**Room: Bizans**

**Chair(s): Tulin Mangir; California State-Longbeach and USC**

**HE-06.1 [A] A Corporate Venturing Case Study in Turkey: SBA (Siemens Business Accelerator)**

Mine Omurtak Öndüygu; Siemens A.f.i., Turkey

Selim Güven; Siemens A.f.i., Turkey

Siemens Business Accelerator (SBA), which was founded in 2002 in Istanbul, is one of the corporate innovation management tools of Siemens Turkey to achieve innovative new products and solutions through dynamic entrepreneurship and technology development potential in Turkey. SBA developed a successful business development and cooperation model with Turkish start-up companies and gathered a huge project evaluation and management experience in Turkey. During four years, over 120 project applications have been evaluated and 10 companies were/are in the Business Incubation programme. SBA is cooperating with universities, technoparks and other technology actors in country. Therefore, the technology management experience of SBA in Turkey is valuable in all aspects as a case study in Turkey's technology and entrepreneurship environment for the other technology management specialists and researchers. This presentation will include the business model of Business Incubation Programme SBA, our experiences in incubation and corporate venturing in Turkey, and furthermore, a successful project of SBA, “Siteapart,” which has been developed in SBA and is about to enter the market; it will be presented as a case study to show the advantages and problems encountered in the application of the incubation model.

**HE-06.2 [R] Entrepreneurship in Lebanon: A Model for Successes and Failures**

Rony El-Souda; American University of Beirut, Lebanon

Toufic Mzeher; American University of Beirut, Lebanon

Walid Nassrallah; American University of Beirut, Lebanon

Maher Ajem; American University of Beirut, Lebanon

Entrepreneurs face different types of difficulties and operate in an unstable environment.
characterized by regional political chaos and local financial, legal, infrastructural, educational and cultural impediments. Small and medium sized enterprises (SMEs) are the heart of any country; they empower its economy, heighten its competitive position and alleviate its employment problems and in general constitute the majority of companies. Understanding the causes of failure of small and medium sized enterprises is a prerequisite for the formulation of public policy and public and private program assistance. The purpose of this research is to find a statistical model for small business failures and successes in Lebanon and to verify whether failures are caused more by internal or external factors. Models of highly developed countries to the least developed ones were used for generating the model, and this country-specific model was realized through surveys that were filled by individuals with a relevant experience in the industry or with an equivalent high degree of education. Analysis was done using ranking, hypothesis testing, and ANOVA statistical analysis; the results showed that failures are mainly due to internal controllable factors. Finally, the research concludes with the results of the analysis and the possible remedies, recommendations and future enhancements.
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Wu, Tai-Hsi ; SE-05.2
Wu, Xiaobo ; WE-03.2
Wu, Yen-Ping ; MF-02.3
Wu, Yuying ; MF-07.2

Y
Yıldırım, Nihan ; WB-01.3; WE-01
Yabuuchi, Yoshiyuki ; MF-05.2; MF-05
Yalcınpinar, Zafer ; ME-04.1
Yamamoto, Gonca Telli ; TF-07.3
Yan, Feng ; MF-07.2
Yang, Heejong ; TB-07.1
Yang, Zijiang ; ME-02.1
Yarime, Masaru ; TB-01.1
Yashiro, Tomonari ; TB-05.1
Yates, Diane ; SE-08.2
Yellepeddi, Srikanth ; WE-06.1
Yetis, Nuket ; SD-01.1
Yim, Deok S. ; TE-07.1; WE-02; TF-07
Yoneyama, Shigemi ; ME-01.3; MF-01.1
Yoon, Young-Seog ; TE-06.3
Yoshida, Satoshi ; TB-05.1
Yu, Hae-Yol ; MD-01.2
Yu, Hsiao-Cheng D. ; SF-03.1
Yuan, Benjamin J. C. ; MF-02.2
Yurtseven, H. Oner ; TB-04.2
Yurtseven, Murat K. ; ME-04.3

Z
Zakaria, Norhayati ; TE-05.1
Zhang, Wei ; WE-03.2
Zobel, Rosalie ; WA-01.1
Hyatt Floor Layout

01: Regency-1
02: Regency-2
03: Smyrna
04: Troy
05: Ephesus
06: Bizans
07: Tyana-1
08: Tyana-2
HYATT FLOOR LAYOUT

01: Regency-1
02: Regency-2
03: Smyrna
04: Troy
05: Ephesus
06: Bizans
07: Tyana-1
08: Tyana-2