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# PICMET '06

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## PICMET



**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)*

# PICMET '06

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

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.

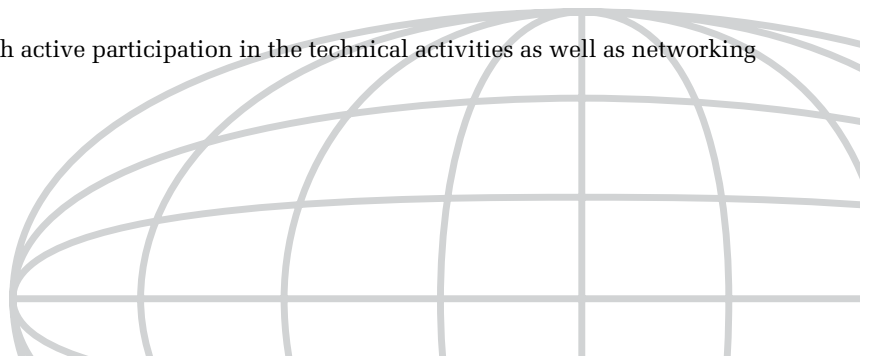
We are pleased and proud to hear from the participants that every PICMET Conference is better than the previous one in terms of its content, quality, and the impact it is making on the technology management field. We believe the PICMET '06 Conference will have a major impact on the growth of the field 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



# PICMET '06

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## 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

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

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**Dr. Gunnar Hambræus**, Royal Swedish Academy of Engineering Sciences – Sweden

**Dr. Kathryn J. Jackson**, Executive

# PICMET '06

## 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.

Dawood Abugharbieh	Nitin Mayande
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Larry Mallak	
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**Deniz Kasap**, TUSSIDE (LAC Coordinator)

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**Refik Ureyen**, TTGV



# ACKNOWLEDGMENTS

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Roche Pharmaceuticals  
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Technopolis Group  
Yeditepe University**





# STUDENT PAPER AWARD

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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

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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



# MEDAL OF EXCELLENCE

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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.

## LTM AWARDS

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### LEADERSHIP IN TECHNOLOGY MANAGEMENT AWARDS

PICMET's Leadership in Technology Management award recognizes and honors individuals who have provided leadership in managing technology by establishing a vision, providing a strategic direction, and facilitating the implementation strategies for that vision. Past recipients include Dr. Andrew S. Grove, CEO of Intel; Norman Augustine, Chairman of Lockheed Martin; Jack Welch, CEO of General Electric; Dr. Modesto A. Maidique, President of Florida International University; Carleton S. Fiorina, Chairman and CEO of Hewlett-Packard Co.; Donna Shirley, Manager of the Mars Exploration Program; Kwan Rim, Chairman of Samsung Advanced Institute of Technology (SAIT); Morris Chang, Founding Chairman, Taiwan Semiconductor Manufacturing Company Ltd. (TSMC); Prof. Dr.-Ing. Dr. Sc. h.c. Bacharuddin Jusuf Habibie, former President, Indonesia, and founder and chairman, The Habibie Center; Dr. Gunnar Hambræus, 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.

### PICMET '06 AWARDEES IN ALPHABETICAL ORDER:

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

Dr. Youngrak Choi is Chairman of the Korea Research Council of Public Science & Technology (KORP). 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 1999-2000 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.



# LTM AWARDS

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## **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

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## 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

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

Second digit	A: 08:30-10:00
shows the time	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	01: Regency-1
digits show the room	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.

# TURKEY GUIDE

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## 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:

[http://www.picmet06.com/pages/airport\\_transfers.aspx](http://www.picmet06.com/pages/airport_transfers.aspx).

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 Taksim 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)

### GEOGRAPHY

Turkey borders the Black Sea, Georgia and Armenia to the northeast; Iran to the east; Iraq to the southeast; the Syrian Arab Republic and the Mediterranean to the south; the Aegean Sea to the west; and Greece and Bulgaria to the northwest. Asia Minor (or Anatolia) accounts for 97 percent of the country and forms a long, wide peninsula, 1650km (1025 miles) from east to west and 650km (400 miles) from north to south. Two east-west mountain ranges, the Black Sea Mountains in the north and the Taurus in the south, enclose the central Anatolian plateau but converge in a vast mountainous region in the far east of the country. It is

here that the ancient Tigris and Euphrates rivers rise.

## 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.



# TURKEY GUIDE

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## 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

GSM 900 and 1800 band networks exist. Main network providers include Avea (website: [www.avea.com.tr](http://www.avea.com.tr)), TELSİM Mobil Telekomunikasyon (website: [www.telsim.com.tr](http://www.telsim.com.tr)) and Turkcell (website: [www.turkcell.com.tr](http://www.turkcell.com.tr)). Coverage is available in most urban areas.

### 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.

# TURKEY GUIDE

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## 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.



# TURKEY GUIDE

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## 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.

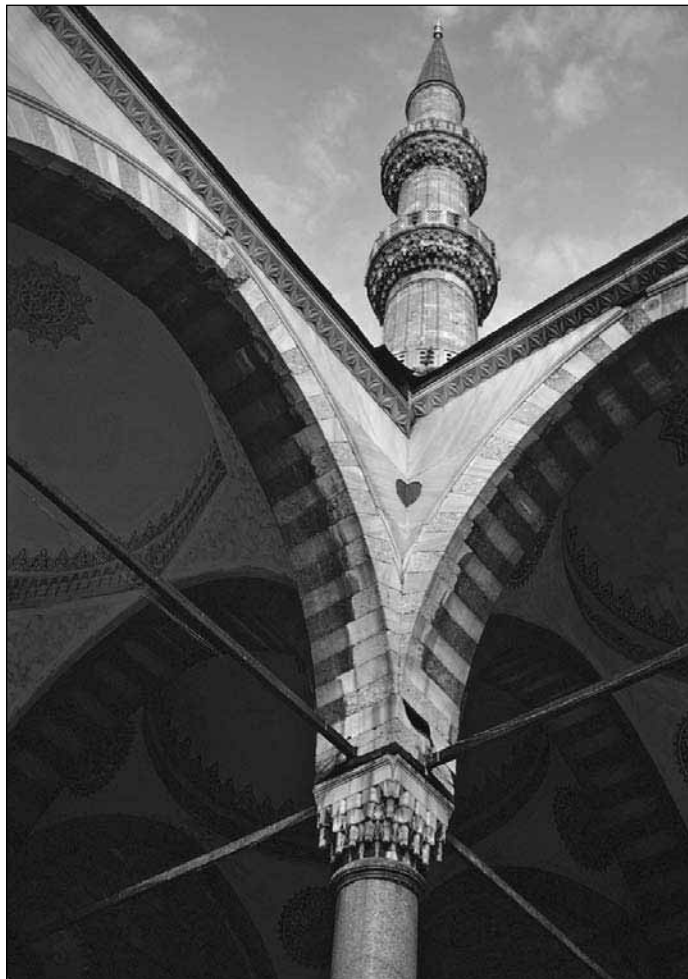
## TIPPING POLICY

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).



# DAILY TOURS

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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 Mevlevi. 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.

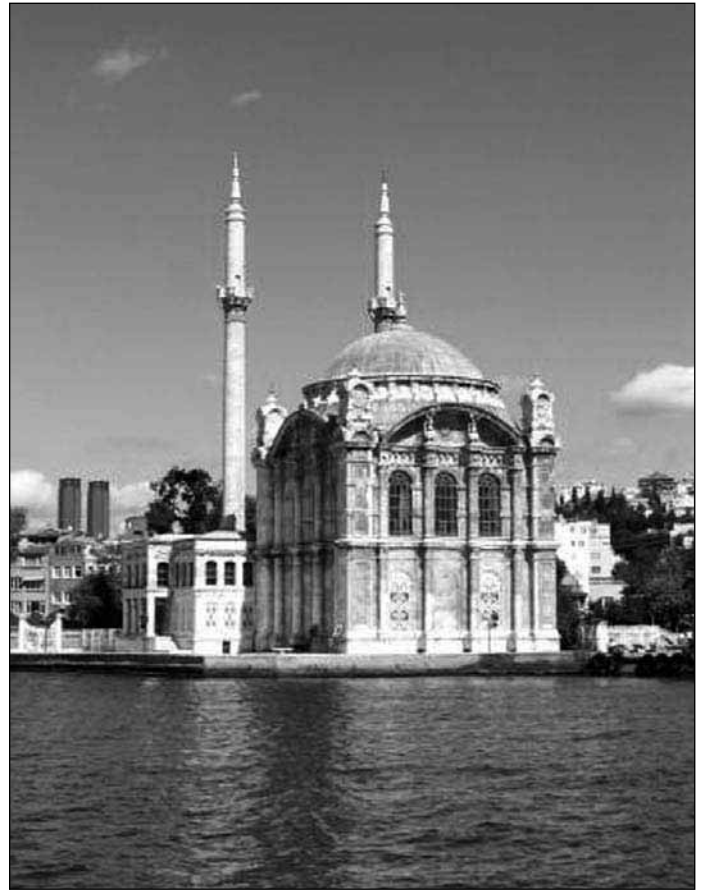
## DAILY TOUR 2

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.

# DAILY TOURS

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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 'Sultanahmet' 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*

# POST-CONFERENCE TOURS

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If you would like to join our post-conference tours, please visit [http://www.picmet06.com/pages/pre\\_post\\_tours\\_in\\_turkey.aspx](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



photo by Dick Osseman

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*

# POST-CONFERENCE TOURS

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- *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*

## **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.



photo by Dick Osseman

- 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.

# POST-CONFERENCE TOURS

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## 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, Kiliclar—can be admired. Detailed



photo by Dick Osseman

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 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 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

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## 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.



photo by Dick Osseman • <http://www.pbase.com/dosseman>

- 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



# RECEPTION

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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](mailto:millerpg@cecs.pdx.edu)*

# SOCIAL EVENTS

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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

DRESS: CASUAL

COST: \$85

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

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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.

## **ARÇELİK 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.



# TECHNICAL PROGRAM

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## 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.



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# SHARE THE PICMET EXPERIENCE

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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

	01 Regency-1	02 Regency-2	03 Smyrna	04 Troy	05 Ephesus	06 Bizans	07 Tyana-1	08 Tyana-2
<b>SA</b> 8:30-10:00	PLENARY-1							
<b>SB</b> 10:30-12:00	Collaborations-1	Information/ Knowledge Management-1	Innovation Management-1	TUTORIAL: Graduate Course on University-to- Industry Technology Transfer	R&D Management-1	Technology Management in Services-1	Technology Assessment and Evaluation-1	
<b>SC</b> 12:00-13:00								
<b>SD</b> 13:00-14:30	PLENARY-2							
<b>SE</b> 15:00-16:30	Strategic Management of Technology-1	Information/ Knowledge Management-2	Emerging Technologies-1	TUTORIAL: Shift to Platforms	Manufacturing Management-1	Technology Management in Services-2	Technology Assessment and Evaluation-2	Technology Forecasting-1
<b>SF</b> 17:00-18:30	Strategic Management of Technology-2	Information/ Knowledge Management-3	Emerging Technologies-2	Technical Workforce-1	TUTORIAL: Project Ekin: Triggering a Cultural Change for Innovation	Technology Management in Services-3	Technology Assessment and Evaluation-3	PANEL: ICT and Development: Exploring Possibilities and Challenges

# DAILY SCHEDULE

## MONDAY JULY 10TH, 2006

	01 Regency-1	02 Regency-2	03 Smyrna	04 Troy	05 Ephesus	06 Bizans	07 Tyana-1	08 Tyana-2
<b>MA</b> 8:30-10:00	PLENARY-3							
<b>MB</b> 10:30-12:00	Technology Transfer-1	Information/ Knowledge Management-4	Technology Management in Biotechnology-1	New Product Development Management-1	Technology Diffusion-1	Technology Management in Telecommunication-1	Decision Making-1	ETMERC Panel Discussion
<b>MC</b> 12:00-13:00								
<b>MD</b> 13:00-14:30	PLENARY-4							
<b>ME</b> 15:00-16:30	Technology Transfer-2	Resource Management-1	Innovation Management-2	Technology Management Education-1	Project/Program Management-1	Technology Management in Telecommunication-2	Decision Making-2	
<b>MF</b> 17:00-18:30	Technology Transfer-3	Resource Management-2			Project/Program Management-2	Technology Management in Telecommunication-3	E-Business-1	PANEL: CTO and CIO Practices in Turkey



# DAILY SCHEDULE

## TUESDAY JULY 11TH, 2006

	01 Regency-1	02 Regency-2	03 Smyrna	04 Troy	05 Ephesus	06 Bizans	07 Tyana-1	08 Tyana-2
<b>TA</b> 8:30-10:00	PLENARY-5							
<b>TB</b> 10:30-12:00	Collaborations-2	Outsourcing-1	Innovation Management-3	Technology Management Education-2	Project/Program Management-3	Technology Management in Telecommunication-4	Technology Assessment and Evaluation-4	Software Process Management-1
<b>TC</b> 12:00-13:00								
<b>TD</b> 13:00-14:30	PLENARY-6							
<b>TE</b> 15:00-16:30	Strategic Management of Technology-3	Technology Adoption-1	Innovation Management-4	Environmental Issues-1	Cultural Issues-1	Technology Management in Telecommunication-5	Globalization-1	PANEL: Meet the Journal Editors
<b>TF</b> 17:00-18:30			Innovation Management-5	New Venture Management-1	Project/Program Management-4	Technology Planning-1	Globalization-2	

**WEDNESDAY JULY 12TH, 2006**

	<b>01 Regency-1</b>	<b>02 Regency-2</b>	<b>03 Smyrna</b>	<b>04 Troy</b>	<b>05 Ephesus</b>	<b>06 Bizans</b>	<b>07 Tyana-1</b>	<b>08 Tyana-2</b>
<b>WA 8:30-10:00</b>	PLENARY-7							
<b>WB 10:30-12:00</b>	Collaborations-3	PICMET Country Representatives Meeting	Innovation Management-6	New Product Development Management-2	Technology Marketing-1	Supply Chain Management-1	Decision Making-3	Manufacturing Management-2
<b>WC 12:00-13:00</b>								
<b>WD 13:00-14:30</b>	PLENARY-8							
<b>WE 15:00-16:30</b>	Collaborations-4	Science and Technology Policy-1	Innovation Management-7	New Product Development Management-3		Supply Chain Management-2	Intellectual Capital-1	PANEL: Strategic Technology Networks
<b>WF 17:00-18:30</b>	Strategic Management of Technology-4	Science and Technology Policy-2	Innovation Management-8	New Product Development Management-4	R&D Management-2	Supply Chain Management-3	Intellectual Capital-2	PANEL: Emerging Foresight Studies in Turkey: National, Sectoral and Corporate Experience

**THURSDAY JULY 13TH, 2006**

	<b>01 Regency-1</b>	<b>02 Regency-2</b>	<b>03 Smyrna</b>	<b>04 Troy</b>	<b>05 Ephesus</b>	<b>06 Bizans</b>	<b>07 Tyana-1</b>	<b>08 Tyana-2</b>
<b>HA 8:30-10:00</b>	PLENARY-9							
<b>HB 10:30-12:00</b>	Strategic Management of Technology-5		Innovation Management-9	New Product Development Management-5	R&D Management-3	Technology Roadmapping-1	TUTORIAL: IT Governance and Audit	
<b>HC 12:00-13:00</b>								
<b>HD 13:00-14:30</b>	PICMET Planning Session							
<b>HE 15:00-16:30</b>		Technology Transfer-4		New Product Development Management-6	R&D Management-4	Entrepreneurship and Intrapreneurship-1		

# SCHEDULE OF SESSIONS

## SCHEDULE OF SESSIONS BY DATE SUNDAY, JULY 9, 2006

Session	Number	Date	Time	Room	Session Title
SA	01	Sunday	08:30 - 10:00	Regency-1	"PLENARY-1"
SB	01	Sunday	10:30 - 12:00	Regency-1	"Collaborations-1"
SB	02	Sunday	10:30 - 12:00	Regency-2	"Information/Knowledge Management-1"
SB	03	Sunday	10:30 - 12:00	Smyrna	"Innovation Management-1"
SB	04	Sunday	10:30 - 12:00	Troy	TUTORIAL: "Graduate Course on University-to-Industry Technology Transfer"
SB	05	Sunday	10:30 - 12:00	Ephesus	"R&D Management-1"
SB	06	Sunday	10:30 - 12:00	Bizans	"Technology Management in Services-1"
SB	07	Sunday	10:30 - 12:00	Tyana-1	"Technology Assessment and Evaluation-1"
SD	01	Sunday	13:00 - 14:30	Regency-1	"PLENARY-2"
SE	01	Sunday	15:00 - 16:30	Regency-1	"Strategic Management of Technology-1"
SE	02	Sunday	15:00 - 16:30	Regency-2	"Information/Knowledge Management-2"
SE	03	Sunday	15:00 - 16:30	Smyrna	"Emerging Technologies-1"
SE	04	Sunday	15:00 - 16:30	Troy	TUTORIAL: "Shift to Platforms"
SE	05	Sunday	15:00 - 16:30	Ephesus	"Manufacturing Management-1"
SE	06	Sunday	15:00 - 16:30	Bizans	"Technology Management in Services-2"
SE	07	Sunday	15:00 - 16:30	Tyana-1	"Technology Assessment and Evaluation-2"
SE	08	Sunday	15:00 - 16:30	Tyana-2	"Technology Forecasting-1"
SF	01	Sunday	17:00 - 18:30	Regency-1	"Strategic Management of Technology-2"
SF	02	Sunday	17:00 - 18:30	Regency-2	"Information/Knowledge Management-3"
SF	03	Sunday	17:00 - 18:30	Smyrna	"Emerging Technologies-2"
SF	04	Sunday	17:00 - 18:30	Troy	"Technical Workforce-1"
SF	05	Sunday	17:00 - 18:30	Ephesus	TUTORIAL: "Project Ekin: Triggering a Cultural Change for Innovation"
SF	06	Sunday	17:00 - 18:30	Bizans	"Technology Management in Services-3"
SF	07	Sunday	17:00 - 18:30	Tyana-1	"Technology Assessment and Evaluation-3"
SF	08	Sunday	17:00 - 18:30	Tyana-2	PANEL: "ICT and Development: Exploring Possibilities and Challenges"

## MONDAY, JULY 10, 2006

MA	01	Monday	08:30 - 10:00	Regency-1	"PLENARY-3"
MB	01	Monday	10:30 - 12:00	Regency-1	"Technology Transfer-1"
MB	02	Monday	10:30 - 12:00	Regency-2	"Information/Knowledge Management-4"
MB	03	Monday	10:30 - 12:00	Smyrna	"Technology Management in Biotechnology-1"
MB	04	Monday	10:30 - 12:00	Troy	"New Product Development Management-1"
MB	05	Monday	10:30 - 12:00	Ephesus	"Technology Diffusion-1"
MB	06	Monday	10:30 - 12:00	Bizans	"Technology Management in Telecommunication-1"
MB	07	Monday	10:30 - 12:00	Tyana-1	"Decision Making-1"
MB	08	Monday	10:30 - 12:00	Tyana-2	SPECIAL SESSION: "ETMERC Panel Discussion"
MD	01	Monday	13:00 - 14:30	Regency-1	"PLENARY-4"

# 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

WB	02	Wednesday	10:30 - 12:00	Regency-2	SPECIAL SESSION: "PICMET Country Representatives Meeting"
WB	03	Wednesday	10:30 - 12:00	Smyrna	"Innovation Management-6"
WB	04	Wednesday	10:30 - 12:00	Troy	"New Product Development Management-2"
WB	05	Wednesday	10:30 - 12:00	Ephesus	"Technology Marketing-1"
WB	06	Wednesday	10:30 - 12:00	Bizans	"Supply Chain Management-1"
WB	07	Wednesday	10:30 - 12:00	Tyana-1	"Decision Making-3"
WB	08	Wednesday	10:30 - 12:00	Tyana-2	"Manufacturing Management-2"
WD	01	Wednesday	13:00 - 14:30	Regency-1	"PLENARY-8"
WE	01	Wednesday	15:00 - 16:30	Regency-1	"Collaborations-4"
WE	02	Wednesday	15:00 - 16:30	Regency-2	"Science and Technology Policy-1"
WE	03	Wednesday	15:00 - 16:30	Smyrna	"Innovation Management-7"
WE	04	Wednesday	15:00 - 16:30	Troy	"New Product Development Management-3"
WE	06	Wednesday	15:00 - 16:30	Bizans	"Supply Chain Management-2"
WE	07	Wednesday	15:00 - 16:30	Tyana-1	"Intellectual Capital-1"
WE	08	Wednesday	15:00 - 16:30	Tyana-2	PANEL: "Strategic Technology Networks"
WF	01	Wednesday	17:00 - 18:30	Regency-1	"Strategic Management of Technology-4"
WF	02	Wednesday	17:00 - 18:30	Regency-2	"Science and Technology Policy-2"
WF	03	Wednesday	17:00 - 18:30	Smyrna	"Innovation Management-8"
WF	04	Wednesday	17:00 - 18:30	Troy	"New Product Development Management-4"
WF	05	Wednesday	17:00 - 18:30	Ephesus	"R&D Management-2"
WF	06	Wednesday	17:00 - 18:30	Bizans	"Supply Chain Management-3"
WF	07	Wednesday	17:00 - 18:30	Tyana-1	"Intellectual Capital-2"
WF	08	Wednesday	17:00 - 18:30	Tyana-2	PANEL: "Emerging Foresight Studies in Turkey: National, Sectoral and Corporate Experience"

## THURSDAY, JULY 13, 2006

HA	01	Thursday	08:30 - 10:00	Regency-1	"PLENARY-9"
HB	01	Thursday	10:30 - 12:00	Regency-1	"Strategic Management of Technology-5"
HB	03	Thursday	10:30 - 12:00	Smyrna	"Innovation Management-9"
HB	04	Thursday	10:30 - 12:00	Troy	"New Product Development Management-5"
HB	05	Thursday	10:30 - 12:00	Ephesus	"R&D Management-3"
HB	06	Thursday	10:30 - 12:00	Bizans	"Technology Roadmapping-1"
HB	07	Thursday	10:30 - 12:00	Tyana-1	TUTORIAL: "IT Governance and Audit"
HD	01	Thursday	13:00 - 14:30	Regency-1	SPECIAL SESSION: "PICMET Planning Session"
HE	01	Thursday	15:00 - 16:30	Regency-1	"Strategic Management of Technology-6"
HE	02	Thursday	15:00 - 16:30	Regency-2	"Technology Transfer-4"
HE	04	Thursday	15:00 - 16:30	Troy	"New Product Development Management-6"
HE	05	Thursday	15:00 - 16:30	Ephesus	"R&D Management-4"
HE	06	Thursday	15:00 - 16:30	Bizans	"Entrepreneurship and Intrapreneurship-1"
HE	07	Thursday	15:00 - 16:30	Tyana-1	TUTORIAL: "eGovernment - process improvement"

# SCHEDULE OF SESSIONS

## SCHEDULE OF SESSION BY ROOM

Session	Number	Date	Time	Room	Session Title
SA	01	Sunday	08:30 - 10:00	Regency-1	“PLENARY-1”
SB	01	Sunday	10:30 - 12:00	Regency-1	“Collaborations-1”
SD	01	Sunday	13:00 - 14:30	Regency-1	“PLENARY-2”
SE	01	Sunday	15:00 - 16:30	Regency-1	“Strategic Management of Technology-1”
SF	01	Sunday	17:00 - 18:30	Regency-1	“Strategic Management of Technology-2”
MA	01	Monday	08:30 - 10:00	Regency-1	“PLENARY-3”
MB	01	Monday	10:30 - 12:00	Regency-1	“Technology Transfer-1”
MD	01	Monday	13:00 - 14:30	Regency-1	“PLENARY-4”
ME	01	Monday	15:00 - 16:30	Regency-1	“Technology Transfer-2”
MF	01	Monday	17:00 - 18:30	Regency-1	“Technology Transfer-3”
TA	01	Tuesday	08:30 - 10:00	Regency-1	“PLENARY-5”
TB	01	Tuesday	10:30 - 12:00	Regency-1	“Collaborations-2”
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”
WA	01	Wednesday	08:30 - 10:00	Regency-1	“PLENARY-7”
WB	01	Wednesday	10:30 - 12:00	Regency-1	“Collaborations-3”
WD	01	Wednesday	13:00 - 14:30	Regency-1	“PLENARY-8”
WE	01	Wednesday	15:00 - 16:30	Regency-1	“Collaborations-4”
WF	01	Wednesday	17:00 - 18:30	Regency-1	“Strategic Management of Technology-4”
HA	01	Thursday	08:30 - 10:00	Regency-1	“PLENARY-9”
HB	01	Thursday	10:30 - 12:00	Regency-1	“Strategic Management of Technology-5”
HD	01	Thursday	13:00 - 14:30	Regency-1	SPECIAL SESSION: “PICMET Planning Session”
HE	01	Thursday	15:00 - 16:30	Regency-1	“Strategic Management of Technology-6”
SB	02	Sunday	10:30 - 12:00	Regency-2	“Information/Knowledge Management-1”
SE	02	Sunday	15:00 - 16:30	Regency-2	“Information/Knowledge Management-2”
SF	02	Sunday	17:00 - 18:30	Regency-2	“Information/Knowledge Management-3”
MB	02	Monday	10:30 - 12:00	Regency-2	“Information/Knowledge Management-4”
ME	02	Monday	15:00 - 16:30	Regency-2	“Resource Management-1”
MF	02	Monday	17:00 - 18:30	Regency-2	“Resource Management-2”
TB	02	Tuesday	10:30 - 12:00	Regency-2	“Outsourcing-1”
TE	02	Tuesday	15:00 - 16:30	Regency-2	“Technology Adoption-1”
WB	02	Wednesday	10:30 - 12:00	Regency-2	SPECIAL SESSION: “PICMET Country Representatives Meeting”
WE	02	Wednesday	15:00 - 16:30	Regency-2	“Science and Technology Policy-1”
WF	02	Wednesday	17:00 - 18:30	Regency-2	“Science and Technology Policy-2”
HE	02	Thursday	15:00 - 16:30	Regency-2	“Technology Transfer-4”
SB	03	Sunday	10:30 - 12:00	Smyrna	“Innovation Management-1”
SE	03	Sunday	15:00 - 16:30	Smyrna	“Emerging Technologies-1”
SF	03	Sunday	17:00 - 18:30	Smyrna	“Emerging Technologies-2”
MB	03	Monday	10:30 - 12:00	Smyrna	“Technology Management in Biotechnology-1”
ME	03	Monday	15:00 - 16:30	Smyrna	“Innovation Management-2”

# SCHEDULE OF SESSIONS

TB	03	Tuesday	10:30 - 12:00	Smyrna	“Innovation Management-3”
TE	03	Tuesday	15:00 - 16:30	Smyrna	“Innovation Management-4”
TF	03	Tuesday	17:00 - 18:30	Smyrna	“Innovation Management-5”
WB	03	Wednesday	10:30 - 12:00	Smyrna	“Innovation Management-6”
WE	03	Wednesday	15:00 - 16:30	Smyrna	“Innovation Management-7”
WF	03	Wednesday	17:00 - 18:30	Smyrna	“Innovation Management-8”
HB	03	Thursday	10:30 - 12:00	Smyrna	“Innovation Management-9”
SB	04	Sunday	10:30 - 12:00	Troy	TUTORIAL: “Graduate Course on University-to-Industry Technology Transfer”
SE	04	Sunday	15:00 - 16:30	Troy	TUTORIAL: “Shift to Platforms”
SF	04	Sunday	17:00 - 18:30	Troy	“Technical Workforce-1”
MB	04	Monday	10:30 - 12:00	Troy	“New Product Development Management-1”
ME	04	Monday	15:00 - 16:30	Troy	“Technology Management Education-1”
TB	04	Tuesday	10:30 - 12:00	Troy	“Technology Management Education-2”
TE	04	Tuesday	15:00 - 16:30	Troy	“Environmental Issues-1”
TF	04	Tuesday	17:00 - 18:30	Troy	“New Venture Management-1”
WB	04	Wednesday	10:30 - 12:00	Troy	“New Product Development Management-2”
WE	04	Wednesday	15:00 - 16:30	Troy	“New Product Development Management-3”
WF	04	Wednesday	17:00 - 18:30	Troy	“New Product Development Management-4”
HB	04	Thursday	10:30 - 12:00	Troy	“New Product Development Management-5”
HE	04	Thursday	15:00 - 16:30	Troy	“New Product Development Management-6”
SB	05	Sunday	10:30 - 12:00	Ephesus	“R&D Management-1”
SE	05	Sunday	15:00 - 16:30	Ephesus	“Manufacturing Management-1”
SF	05	Sunday	17:00 - 18:30	Ephesus	TUTORIAL: “Project Ekin: Triggering a Cultural Change for Innovation”
MB	05	Monday	10:30 - 12:00	Ephesus	“Technology Diffusion-1”
ME	05	Monday	15:00 - 16:30	Ephesus	“Project/Program Management-1”
MF	05	Monday	17:00 - 18:30	Ephesus	“Project/Program Management-2”
TB	05	Tuesday	10:30 - 12:00	Ephesus	“Project/Program Management-3”
TE	05	Tuesday	15:00 - 16:30	Ephesus	“Cultural Issues-1”
TF	05	Tuesday	17:00 - 18:30	Ephesus	“Project/Program Management-4”
WB	05	Wednesday	10:30 - 12:00	Ephesus	“Technology Marketing-1”
WF	05	Wednesday	17:00 - 18:30	Ephesus	“R&D Management-2”
HB	05	Thursday	10:30 - 12:00	Ephesus	“R&D Management-3”
HE	05	Thursday	15:00 - 16:30	Ephesus	“R&D Management-4”
SB	06	Sunday	10:30 - 12:00	Bizans	“Technology Management in Services-1”
SE	06	Sunday	15:00 - 16:30	Bizans	“Technology Management in Services-2”
SF	06	Sunday	17:00 - 18:30	Bizans	“Technology Management in Services-3”
MB	06	Monday	10:30 - 12:00	Bizans	“Technology Management in Telecommunication-1”
ME	06	Monday	15:00 - 16:30	Bizans	“Technology Management in Telecommunication-2”
MF	06	Monday	17:00 - 18:30	Bizans	“Technology Management in Telecommunication-3”
TB	06	Tuesday	10:30 - 12:00	Bizans	“Technology Management in Telecommunication-4”
TE	06	Tuesday	15:00 - 16:30	Bizans	“Technology Management in Telecommunication-5”
TF	06	Tuesday	17:00 - 18:30	Bizans	“Technology Planning-1”

# SCHEDULE OF SESSIONS

WB	06	Wednesday	10:30 - 12:00	Bizans	“Supply Chain Management-1”
WE	06	Wednesday	15:00 - 16:30	Bizans	“Supply Chain Management-2”
WF	06	Wednesday	17:00 - 18:30	Bizans	“Supply Chain Management-3”
HB	06	Thursday	10:30 - 12:00	Bizans	“Technology Roadmapping-1”
HE	06	Thursday	15:00 - 16:30	Bizans	“Entrepreneurship and Intrapreneurship-1”
SB	07	Sunday	10:30 - 12:00	Tyana-1	“Technology Assessment and Evaluation-1”
SE	07	Sunday	15:00 - 16:30	Tyana-1	“Technology Assessment and Evaluation-2”
SF	07	Sunday	17:00 - 18:30	Tyana-1	“Technology Assessment and Evaluation-3”
MB	07	Monday	10:30 - 12:00	Tyana-1	“Decision Making-1”
ME	07	Monday	15:00 - 16:30	Tyana-1	“Decision Making-2”
MF	07	Monday	17:00 - 18:30	Tyana-1	“E-Business-1”
TB	07	Tuesday	10:30 - 12:00	Tyana-1	“Technology Assessment and Evaluation-4”
TE	07	Tuesday	15:00 - 16:30	Tyana-1	“Globalization-1”
TF	07	Tuesday	17:00 - 18:30	Tyana-1	“Globalization-2”
WB	07	Wednesday	10:30 - 12:00	Tyana-1	“Decision Making-3”
WE	07	Wednesday	15:00 - 16:30	Tyana-1	“Intellectual Capital-1”
WF	07	Wednesday	17:00 - 18:30	Tyana-1	“Intellectual Capital-2”
HB	07	Thursday	10:30 - 12:00	Tyana-1	TUTORIAL: “IT Governance and Audit”
HE	07	Thursday	15:00 - 16:30	Tyana-1	TUTORIAL: “eGovernment - process improvement”
SE	08	Sunday	15:00 - 16:30	Tyana-2	“Technology Forecasting-1”
SF	08	Sunday	17:00 - 18:30	Tyana-2	PANEL: “ICT and Development: Exploring Possibilities and Challenges”
MB	08	Monday	10:30 - 12:00	Tyana-2	SPECIAL SESSION: “ETMERC Panel Discussion”
MF	08	Monday	17:00 - 18:30	Tyana-2	PANEL: “CTO and CIO Practices in Turkey”
TB	08	Tuesday	10:30 - 12:00	Tyana-2	“Software Process Management-1”
TE	08	Tuesday	15:00 - 16:30	Tyana-2	PANEL: “Meet the Journal Editors”
WB	08	Wednesday	10:30 - 12:00	Tyana-2	“Manufacturing Management-2”
WE	08	Wednesday	15:00 - 16:30	Tyana-2	PANEL: “Strategic Technology Networks”
WF	08	Wednesday	17:00 - 18:30	Tyana-2	PANEL: “Emerging Foresight Studies in Turkey: National, Sectoral and Corporate Experience”



# PERSONAL SCHEDULE

	Sunday	Monday	Tuesday	Wednesday	Thursday
<b>8:30 – 10:00 (A)</b>	Plenary (Regency)	Plenary (Regency)	Plenary (Regency)	Plenary (Regency)	Plenary (Regency)
<b>10:00 – 10:30 Coffee Break</b>					
<b>10:30 – 12:00 (B)</b>					
<b>12:00 – 13:00 Lunch Break</b>					
<b>13:00 – 14:30 (D)</b>	Plenary (Regency)	Plenary (Regency)	Plenary (Regency)	Plenary (Regency)	PICMET '07 and PICMET '08 Planning Session (Regency)
<b>14:30 – 15:00 Coffee Break</b>					
<b>15:00 – 16:30 (E)</b>					
<b>16:30 – 17:00 Coffee Break</b>					
<b>17:00 – 18:30 (F)</b>					
<b>20:00 – 23:00</b>	Welcome Reception (Pool Side)	Dinner at Bogazici University	Awards Banquet (Regency)	Dinner Cruise on the Bosphorus (optional)	Night Club (Optional)

Notes:

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# PLENARIES

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## 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 (TÜBİTAK) 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 (MUFE) (1994-2000), where she established Master and Doctoral Programs of Engineering Management. She led Continuous Quality Improvement activities at MUFE, which is the first Turkish public organization that became a finalist at the European Quality Award in 2000. She also led MUFE 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*



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*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 Hochschule, 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*

# PLENARIES

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, Sabanci and Eczacibasi) 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, Sabanci and Eczacibasi) 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-*

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supported research institutions.

- 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

## PLENARY SESSION — 5

DATE: TUESDAY, JULY 11, 2006

TIME: 08:30—10:00

ROOM: REGENCY BALLROOM

SESSION CHAIR: DR. ANTONIE DEKLERK,

EXECUTIVE DIRECTOR, UNIVERSITY OF PRETORIA,  
SOUTH AFRICA

## KEYNOTE-1

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

**Dr. H. Chik M. Erzurumlu, Dean Emeritus, Maseeh College of Engineering and Computer Science, Portland State University, USA**

**“Engineering Education and Research in the Global Context: An Academic Dream or Reality?”**

During the past two decades, the rapid evolution of business and industry into an increasingly global context has created a need for strategies aimed at international collaborations in engineering education and research. In the domain of engineering education, several international initiatives have led to the development of uniform evaluation criteria for engineering programs that benefit both employers of engineers and engineering professionals. 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 will they be remembered as well-intended academic dreams, or will 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.

*Dr. Robert D. Dryden was appointed Dean of Engineering and Applied Science at Portland State University (PSU) in 1995 and is a University Professor and Professor of Mechanical Engineering. He also served as Vice Chancellor of the Oregon University System for Engineering and Computer Science from*

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1997 - 2003. His duties included liaison with the Oregon State System of Higher Education's Capital Center in the Portland Metropolitan area.

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 (IIE): 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<sup>3</sup>).

## 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

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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.*

*Mr. Lipscomb has had numerous speaking engagements at colleges and universities such as Harvard, Stanford, Pennsylvania, Columbia, Cairo University, Fordham, Howard, Indiana, Cooper Union, New York University and the College of William and Mary. He has additionally spoken to organizations such as The Davos World Economic Forum's Industry Summit, The Council on Foreign Relations, The Ambassadors' Roundtable, The New York Conference on Digital Publishing, The SIGCAT Foundation, The Association of American Publishers, The Seybold Conference, and The National Center for Automated Information Retrieval.*

*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.*

*He is the author of articles in The New York Times, The Wall Street Journal, The Washington Post, Harpers, The Nation, etc, as well as a regular commentator for Intellectualcapital.com. He has served in numerous non-profit positions including the boards of PEN, the George Polk Award in Journalism, The International Center for Economic Growth, The New York University Center for Copyright in New Media, The Museum Digital Licensing Collective, The Governor's Island Technology Center and the Gibraltar-American Council. He is a Fellow of The Digital Copyright Forum and a member of The Council on Foreign Relations and The New York Academy of Sciences.*

## PLENARY SESSION — 6

DATE: TUESDAY, JULY 11, 2006

TIME: 13:00—14:30

ROOM: REGENCY BALLROOM

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

**Dr. Edward B. Roberts, David Sarnoff Professor of the  
Management of Technology, MIT Sloan School of**

# PLENARIES

**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.).*

## **PLENARY SESSION — 7**

DATE: WEDNESDAY, JULY 12, 2006

TIME: 08:30—10:00

ROOM: REGENCY BALLROOM

SESSION CHAIR: FARUK ECZACIBASI, ECZACIBASI CORPORATION, TURKEY

## **KEYNOTE-1**

**Dr. Rosalie Zobel, Director, IST Research; Information Society and Media Directorate-General, European Commission, Belgium**

### **“Technology Management with a Global Perspective. A European Vision for the Next Phase of IMS”**



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



# PLENARIES

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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 Tutunbank 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.*

# PLENARIES

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## 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.*

# PLENARIES

## KEYNOTE-2

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

### **“Hydrogen Energy System: Implementation Through Pilot Projects”**

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.*

## PLENARY SESSION — 9

DATE: THURSDAY, JULY 13, 2006

TIME: 08:30—10:00

ROOM: REGENCY BALLROOM

SESSION CHAIR: DR. KIYOSHI NIWA, DEPARTMENT OF GENERAL SYSTEMS STUDIES, UNIVERSITY OF TOKYO, JAPAN

## KEYNOTE-1

**Dr. Eiichi Maruyama, Center for Intellectual**

# PLENARIES

## 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.*



# SPECIAL SESSIONS

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## 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.

# TUTORIALS

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## 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.

# TUTORIALS

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- 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, EPHEBUS

**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](http://www.focusinnovation.net)). She also acts as the country



# TUTORIALS

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.



# PANELS

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## 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.

## 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.

## 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.

## 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

# PANELS

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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.



# DOCTORAL COLLOQUIUM

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COLLOQUIUM FOR DOCTORAL STUDENTS AND  
JUNIOR FACULTY

## **“CRITICAL STAGES AND CAREER PATHS FOR THE PH.D. STUDENT”**

DATE: SATURDAY, JULY 8, 2006

TIME: 13:30 – 17:30

LOCATION: TROY (ON THE LOBBY FLOOR)

REGISTRATION: PARTICIPANTS REGISTER FOR THE  
COLLOQUIUM WHEN THEY  
REGISTER FOR PICMET. THERE IS  
NO ADDITIONAL FEE FOR  
ATTENDING THE COLLOQUIUM.

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

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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.

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## 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

# WORKSHOPS

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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

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## 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

# WORKSHOPS

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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

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## 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

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### SB-01 Collaborations-1

Sunday, 7/9/2006, 10:00 - 12:30

Room: Regency-1

Chair(s): David W Birchall; Henley Management College

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#### 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 Kan; 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 partner 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 Sher; National Chi Nan University, Taiwan*

Small and medium-sized enterprises (SMEs) in Taiwan, seemingly weak, are in fact competitive within the global environments. 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*

*Beom-Soo Park; ETRI, Korea, South*

*Ha-Jae Chung; 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.

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### SB-02 Information/Knowledge Management-1

Sunday, 7/9/2006, 10:30 - 12:00

Room: Regency-2

Chair(s) Asli S Erdem; Bogazici University

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#### SB-02.1 [R] Challenges in Semantic Web Technologies: A First Iteration towards a Root Cause Analysis

*Koenraad Vandenborre; Hogeschool Gent, Belgium*

*Charles Milligan; Sun Microsystems, United States*

*Marc Rabaey; Defense, Brussels Free University, Belgium*

*Herman Tromp; Ghent University, Belgium*

Recent developments of new technologies are aimed at opening the contents of data sources to the wider area of the Internet. These data sources are to be found on the lower layer of the Semantic Web Architecture while the higher layers try to bring the contents of the data sources to the Internet in an inter-operable way through the use of technologies like XML (eXtensible Markup Language), RDF (Resource Description Framework) and Ontology. This paper first comments on the Semantic Web Architecture as documented by Tim Berners-Lee. It further describes some challenges observed in attaining the goal. Finally, the paper aims to describe (a first iteration to identify) the root causes for the challenges observed.

#### SB-02.2 [R] Assessing the Business Value of Using Information Systems: Case of UTI Egypt

*Sherif H Kamel; The American University in Cairo, Egypt*

UTI Worldwide Inc is an international, non-asset based supply chain management company. It provides air and ocean freight forwarding, contract logistics, customs brokerage and other logistics-related services. It serves a large and diverse base of global and local companies, including customers operating in industries such as pharmaceuticals, apparel and chemical. UTI uses its global network, information systems, relationship with transportation providers and expertise in outsourced logistics services to optimize the operation of its customers' global supply chains. This paper demonstrates how UTI Egypt uses information technology across its different managerial levels in terms of decision-making process, overcoming problems, and operating its businesses. The research is both quantitative as well as qualitative in nature. The analysis of the findings were based on three elements: generally accepted information technology theories (such as the technology acceptance mode), compiled research regarding IS implementation methods, and system evaluation techniques. This research reflects the first phase of a wider-scale research that should cover more companies in an attempt to develop a profile for IT implementations within the context of the environment in Egypt and identify some lessons learned for similar implementations in other developing nations.

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### SB-03 Innovation Management-1

Sunday, 7/9/2006, 10:30 - 12:00

Room: Smyrna

Chair(s) Anthony Di Benedetto; Temple University

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#### SB-03.1 [R] Accelerating Commercialization of University Output by Translating It into Social Value

*Masanori Namba; Ritsumeikan Asia Pacific University, Japan*

# 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 partially involved gathering, organizing, and analyzing of 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**

*Khalik Ahmad; Department of Business Administration, KENMS, IIUM, 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 really 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-04 TUTORIAL: Graduate Course on University-to-Industry Technology**

### **Transfer**

**Sunday, 7/9/2006, 10:30 - 12:00**

**Room: Troy**

**Speaker(s) Elliot A Fishman; Stevens Institute of Technology**

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 is 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 I discuss findings on the suitability of various readings.

### **SB-05 R&D Management-1**

**Sunday, 7/9/2006, 10:30 - 12:00**

**Room: Ephesus**

**Chair(s) Joseph P Martino; Yorktown University**

## **SB-05.1 [R] Case Studies on How to Enhance the Chance of Technical Breakthrough and (Pseudo) Serendipity**

*Isaburo Fukawa; Corporate R&D, Asahi-Kasei Corporation, Japan*

Technical breakthrough and (pseudo) serendipity (hereinafter TB&S) found in the experiments are the important triggers and promoters for R&D and innovation. It is often said that 2-3 research groups publish similar research results simultaneously in the world. TB&S, especially (pseudo) serendipity can differentiate the research results of one group from those of the other group. By collecting examples of research projects of chemistry and material science in a corporation and academia, we examined and classified them using key factors. About 20 common factors are deduced from the events of TB&S. We postulate from the study that in order to enhance TB&S, the key factor is the combination of Unexpected experiment (Amateur experiment) and outstanding scientific acumen and passion of Professional. We discussed how to realize the combination of Unexpected experiment and Professional in laboratories from several view points. We also discussed how to plan Unexpected experiments intentionally.

## **SB-05.2 [R] Building External Network on Intellectual Property Through Joint R&D Service Outsourcing: The Case of Taiwan's SMEs**

*Mei-Chih Hu; Feng Chia University, Taiwan*

*Chien-Tzu Tsai; Feng Chia University, Taiwan*

While the effect of division of labor and specialization meets the trend of technology changes, the economic scale of joint R&D service is complementary with the nature of the resource limited SMEs (Small Medium Enterprises). As a latecomer country, Taiwan's industry experienced numerous intellectual property (IP) litigations and infringements from their competitors since the 1990s. This study demonstrates that how Taiwan's SMEs overcame this difficulty through joint R&D service outsourcing, which is emerging as a new and important catalyst to reinforce its innovative capacity and build its external network on intellectual property activities. The jointed efforts associated with interdisciplinary experts greatly increase the 'freedom of action' on product commercialization and reduce business risks from marketing and patent infringements where the potential benefits are huge. The most important result of this study indicates the importance of government funding and the significance of joint R&D outsourcing for the fast-follower Taiwan's SMEs, in which IP value-added and R&D outcome will achieve a more comprehensive protection, by means of building IP portfolio including patents, designs, trademarks and trade secrets.



# SESSIONS

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## **SB-05.3 [R] Determinants of Firm R&D Investment: Evidence from China**

Hua Cheng; Zhejiang Sci-tech University, China

Xianping Chen; Zhejiang Sci-tech University, China, China

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.

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## **SB-06 Technology Management in Services-1**

**Sunday, 7/9/2006, 10:30 - 12:00**

**Room: Bizans**

**Chair(s) Dennis Ridley; Florida A&M University**

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## **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 man-

agement in the Service Sector 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 services 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.

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## **SB-07 Technology Assessment and Evaluation-1**

**Sunday, 7/9/2006, 10:30 - 12:00**

**Room: Tyana-1**

**Chair(s) Seda Turan; Istanbul Technical University**

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## **SB-07.1 [R] Valuation of R&D and Patent: An Economic Value Added Perspective**

Chun-Yao Tseng; Tunghai University, Taiwan

Cheng-Hwai Liou; National Tai-Chung 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.

## **SB-07.2 [A] Evaluation of Innovation Survey Systems and Providing a Framework for Innovation Survey in Iran**

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

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development as the oldest indicator of research and scientific activities, and then in considering the flows and defects in the measurement of research and development, as well as non-linear realities of modern economics, an innovation survey is introduced as the latest mechanism for technological activities. In the second part of the paper, an appropriate framework for an innovation survey at the national level is proposed through the use of field research. Having, first of all, considered the potential and capabilities of each of the current innovation surveys at the national level, the appropriate approach is adopted; then through the direct approach of technology policy classification, the status of innovative activities in Iran is determined. At the same time, we discuss the possibility of evaluation of current indicators of the innovation survey based on the situation in Iran. Finally, considering the results of the field research, we offer appropriate and possible indicators for an innovation survey at the national level.

## SD-01: PLENARY-2

DATE: SUNDAY, 7/9/2006

TIME: 13:00 - 14:30

ROOM: REGENCY-1

### SD-01.1 [K] The Impact of Science

*Nuket Yetis; TUBITAK, 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.

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## SE-01 Strategic Management of Technology-1

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

Room: Regency-1

Chair(s) Robert Harmon; Portland State University

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### SE-01.1 [A] The Role of Technology for Strategic Planning Systems: The Case of Dynamic Strategic Planning System

*Alper Alsan; Siemens, Turkey*

*Alper Celebi; Siemens, Turkey*

*Özgür Kalan; Siemens, Turkey*

Strategic planning and control is the key management system for creating success. All systems are comprised of three dimensions: process, tool and content. Technology plays a critical role for the accomplishment of well-structured systems. This paper focuses on Dynamic Strategic Planning System – a tool developed by Siemens Turkey and used by nine country organizations of Siemens. The main objective of this paper is to explain the reasons for the selection of technologies by considering the three dimensions in order to develop a tool according to customer requirements.

### SE-01.2 [R] Technology Management Activities and Tools: The Practice in Turkey

*Dilek Cetindamar; Sabanci University, Turkey*

*Ozge Can; Sabanci University, Turkey*

*Okan Pala; Sabanci University, Turkey*

The diffusion of management techniques is as difficult as the diffusion of technologies. This paper aims to find out how technology management is perceived and utilized in Turkish firms. The research is based on a survey that consists of 89 company responses out of the biggest 500 firms in the Turkish industry. The investigation consists of 1) the degree of diffusion in terms of technology management activities such as technology planning as well as 2) the techniques and tools used in technology management such as simulation. The literature review indicates 11 technology management activities ranging from strategy to utilization and 36 technology management techniques / tools. The results show that Turkish managers try to utilize technologies rather than creating them and they use 11 techniques more often than others and many important tools such as technology life cycle are not diffused yet. The paper ends with a discussion of findings.

### SE-01.3 [A] A Study of Co-opetition Strategy from the Patent Analysis Perspective: The Case of Manufacturers in the Stent Market

*Kuei-Kuei Lai; National Yunlin University of Science & Technology, Taiwan*

*Fang-Pei Su; National Yunlin University of Science & Technology, Taiwan*

*Calvin S Weng; National Yunlin University of Science and Technology, Taiwan*

*Chiau-Ling Chen; National Yunlin University of Science & Technology, Taiwan*

*Mei-Lan Lin; National Yunlin University of Science & Technology, Taiwan*

Technology innovation is one of the important driving forces to companies' market shares and the development of market structure. The information of technology innovation and its evolutionary path can be explored by patent analysis. Therefore, for those firms which need large investment and high business performance, such as interventional cardiology medical devices, integrating patent information with business strategy is the critical issue. In terms of the technological trajectories of stent technology, the dominant design is started from percutaneous transluminal coronary angioplasty (PTCA) through bare metal stent (BMS) to drug-eluting stent (DES). Those technologies have high path dependence with one another. The competition of stent manufactures is getting intensive because of global increasing needs. From a resource-based view, adopting co-opetition strategy is the essential way for firms to keep sustainable competitive advantage. In the last decade, patent was a major tool of co-opetition strategy. This study applies patent data in USPTO during 1984 to 2005 and constructs patent indicators by patent information to verify the process of technology evolution. On these grounds, we can understand the relative technological position and technological strength of those major manufactures in this industry and also inspect their changes on position and business scope to examine the relationship between each firm's technology strategy and business strategy.

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## SE-02 Information/Knowledge Management-2

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

Room: Regency-2

Chair(s) Koenraad Vandenborre; Hogeschool Gent

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### SE-02.1 [R] Knowledge Management Architecture: Building Blocks and Their Relationships

*Varintorn Supyuenyong; Asian Institute of Technology, Thailand*

*Nazrul Islam; Asian Institute of Technology, Thailand*

Although the concept of knowledge management emerged in the early 1960s, it has taken momentum in recent years. However, the literatures in this area is scattered both in the academic and practicing arena. Some research focuses on knowledge management with respect to the specific organization type such as R&D organization. Others concentrate on organization development and individual behavior in implementing knowledge management. This paper presents a holistic approach to knowledge management by incorporating various models and propositions within the knowledge discourse. The knowledge management architecture consists of four elements, namely: knowledge components, knowledge management process, information technology (IT), and organizational aspects. Knowledge component includes knowledge definition and knowledge categories, which has often been viewed differently by various researchers. Knowledge management process, on the other hand, contains the steps and activities to deal with knowledge while information technology consists

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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 process are the key components of the knowledge management concept. Taken together, this paper also reveals the interrelatedness 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.

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## **SE-03 Emerging Technologies-1**

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

**Room: Smyrna**

**Chair(s) Ertunga C Ozelkan; University of North Carolina at Charlotte**

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### **SE-03.1 [A] Discovery of the "Adaptive Radiation and Convergence Phenomena" in the Technology Evolution Processes - Case of Development of Combined Blowing Converter in the Steelmaking Process**

*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 Savard/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 developments can be forecasted.

## **SE-03.2 [R] The Nanotechnology Debate: Does It Exhibit Social Learning for Controversial Technologies?**

*Rosan Karakas Dilek; 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 valuers' or managers' roles and responsibilities in valuing and applying their technologies better.

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## **SE-04 TUTORIAL: Shift to Platforms**

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

**Room: Troy**

**Speaker(s) Mary Doyle; Intel Corporation**

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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.

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## **SE-05 Manufacturing Management-1**

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

**Room: Ephesus**

**Chair(s) Omer Saatcioglu; Middle East Technical University**

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### **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

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scheduled and unscheduled downtime of pattern generation tools, in particular those that run above 50kV, was exceedingly high. • The wide variation in the financial indicators suggests that all participants may have significant cost-reduction opportunities within their operations. To identify these opportunities, the authors propose detailed follow-on studies of cost structure, management structure, and procedures within mask shops. The empirically grounded model of the photomask lifecycle suggests that • The number of masks demanded, their price, and the investment patterns of photomask shops vary dramatically over the photomask manufacturing lifecycle. • Yield, capital productivity, and economies of scale are the critical drivers of profitability in photomask manufacturing. These findings imply that • A bifurcation of Moore's Law is likely to occur. The ASIC and foundry business will continue in 130 nm. Producing at 65 nm geometries and beyond will be reserved for high performance, high volume "best-selling" designs. Nonetheless, some of the larger foundries are pursuing 90 nm and 65 nm technology, probably in anticipation of producing some high volume best sellers. • The trend to outsource mask making is reversing towards vertical integration. • The trend towards introducing fewer designs is likely to continue. Mask shops will not be able to take advantage of economies of scale. The resulting consolidation pressure is likely to trigger further merger-and-acquisition activity among photomask manufacturers. • To survive in this intensely competitive environment, photomask manufacturers must coordinate development with their customers and suppliers, as well as operate under business models that stress capital productivity.

## **SE-05.2 [R] A Study on How to Maintain Their Competitive Advantages: An Empirical Analysis of Taiwanese Footwear Manufacturing Firms**

*Chuang-Chun Chiou; Da-Yeh University, Taiwan*

*Tai-Hsi Wu; Da-Yeh University, Taiwan*

*Jenteng Tsai; Tunghai University, Taiwan*

In this paper, we study how Taiwanese footwear manufacturing firms maintain their competitive advantages in the environment where many firms have been shifted to low-wage level countries. According to reports of The British Footwear Association regarding the global footwear export statistics, Taiwan was the biggest exporter of footwear products during the years from 1976 to 1987. However, in the past two decades many Taiwanese firms have moved their production function to Southeastern Asian countries such as Thailand, Indonesia, Vietnam, and China. Meanwhile, they still keep their high-value jobs in Taiwan. Since footwear manufacturing industry is labor intensive, how Taiwanese firms cope with the threat from the competitors of low-wage countries is an interesting research topic. Based on our research we find some strategies for maintaining competitive advantage. We summarize the several strategies which are effectively adopted. Firstly, utilizing the technological innovation capacities and product design experiences which have been well-built over the past three decades; secondly, keeping continuous improvement of quality; thirdly, establishing their own brand names for their own products; fourthly, managing their own market channels; fifthly, reinforcing their flexibility for specific customer demand; and finally, making use of the labor-division concept and keeping high value-added jobs in Taiwan.

## **SE-06 Technology Management in Services-2**

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

**Room: Bizans**

**Chair(s) Daniel Berg; Rensselaer Polytechnic Institute**

## **SE-06.1 [R] Innovation in the Service Sector: Exploring the Adoption of Internet Banking Services in Turkey**

*Sena Ozdemir; University of Portsmouth, United Kingdom*

*Paul Trott; University of Portsmouth, United Kingdom*

*Andreas Hoecht; University of Portsmouth, United Kingdom*

The Internet has become the latest technology to be utilised by the banks to attract new customers and develop new markets. Internet banking offers great opportunities for banks to increase their transactions, extend their customer bases and to decrease their operational costs. It also provides some benefits to consumers such as convenience (i.e. time saving), personalization, freedom (i.e. accessibility) and cost advantages. Nonetheless, branch banking still continues to be the dominant channel compared to their technological counterparts.

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 Buse; Institut for Technology and Innovation Managemet, 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, availment 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 vary 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 Technology Assessment and Evaluation-2**

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

**Room: Tyana-1**

**Chair(s) Burak Ömer Saracoglu; UM Denizcilik & Istanbul Technical University**

## **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

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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.

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## **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.

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## **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-Chiun 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 rate 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 nonlinear 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.

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## **SE-08 Technology Forecasting-1**

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

**Chair(s) David Probert; University of Cambridge**

**Room: Tyana-2**

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## **SE-08.1 [R] Analysis on the Business Strategy and Policy for the Alternative Fuel Vehicle: Using Stated Preference Data**

*Yeonbae Kim; Seoul National University, Korea, South  
Gicheol Jeong; Seoul National University, Korea, South  
Jiwoon Ahn; Seoul National University, Korea, South  
Jeong-Dong Lee; Seoul National University, Korea, South*

In this paper, we attempt to analyze consumer preference for the alternative-fuel vehicles based on data from a stated preference using the conjoint analysis. Five possible fuel types (gasoline, diesel, CNG, LPG, Hybrid (electricity+gasoline)) are covered in conjoint cards. To estimate and analyze consumer preference, discrete choice model is used. Specifically, Bayesian mixed logit model is used. Based on estimating results, we discuss the business strategy and policy for the alternative fuel vehicle. To analyze the effect of future technical and policy changes on the demand of alternative fuel vehicles, market simulation is conducted.

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## **SE-08.2 [A] Forecasting the Future of Hybrid Vehicles in the U.S. Using AHP and Scenarios as Forecasting Tools**

*Diane Yates; Portland State University, United States  
Maria Nava; Portland State University, United States  
Watcharin Witthayaweerasak; Portland State University, United States  
Tugrul Daim; Portland State University, United States*

Our paper examines the future of hybrid vehicle technology using the AHP method in combination with four scenarios: Status Quo, Catastrophic, Environmental Milieu, and Economic Milieu. Each scenario has its own set of criteria that must be examined in conjunction with the set of objectives and alternatives presented in the AHP method. Some of the objectives in the AHP method include: alternative fuel sources, cultural influences, emergent powers, economics, and the environment. A separate AHP analysis is repeated for each scenario.

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## **SE-08.3 [R] Technological Positions and Capabilities: The Case of Large Taiwanese Semiconductors Manufacturing**

*Kuei-Kuei Lai; National Yunlin Univ. of Science and Tech., Taiwan  
Calvin S Weng; Takming College/National Yunlin University of Science, Taiwan  
Fang-Pei Su; National Yunlin University of Science & Technology, Taiwan*

It is well understood that innovations and technologies rarely arise in isolation. Technological developments accumulate or are built up upon others. Enterprises invest huge resources on R&D to maintain competitive advantages, and patents then identify their innovations. An important component of the patent application procedure is the "prior art" provision. Patents that are identified as technological precursors to current innovations or technologies are referred to as "prior art". Therefore, there are some relations and commonalities among technologies. Linkages of technologies evolve as a citation network in any coherent domain. Patent citations can find out technological building relations among innovations and identify technological positions. Citation network can trace out their possible technological trajectories. In this paper, we propose a citation-analytic approach for identifying a firm's technological positions and for discussing the strengths of technological capabilities and their evolution. The citation analyses and MDS configurations demonstrate the evolution of technological positions and the change of technological capabilities on the sample of 9 large Taiwanese semiconductors producers from 1991 to 2001.

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## **SF-01 Strategic Management of Technology-2**

**Sunday, 7/9/2006, 17:00 - 18:30**

**Room: Regency-1**

**Chair(s) Kelly R. Cowan; Portland State University**

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## **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  
Kiichiro 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-making and suggests further research in this context.

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## **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**

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## **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**

*Asli S Erdem; Bogazici University, Turkey*  
*Burak Gediko lu; 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 Bisalyaputra; Ubonrachatanee University, Thailand*  
*Kochoke Punikom; Ubonrajathaneen 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.

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## **SF-03 Emerging Technologies-2**

**Sunday, 7/9/2006, 17:00 - 18:30**

**Room: Smyrna**

**Chair(s) Roflan Karakafi Dilek; TUSSIDE**

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## **SF-03.1 [R] Challenges to Global RFID Adoption**

*Nien-Chu Wu; National Chiao Tung University, Taiwan*  
*Michael Nystrom; Insti. of Tech. Mgn./ Chiao Tung U., United States*  
*Tin-Ru Lin; Insti. of Tech. Mgn./ Chiao Tung U., Taiwan*  
*Hsiao-Cheng D Yu; Insti. of Tech. Mgn./ 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

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explores the existing challenges and obstacles to RFID's quick adoption, the potential resolutions 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 Ozelkan; 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 operate, 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 players 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 scarcity 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; Hakuho Inc., Japan  
Tamami Sugasaki; 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 systems 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 embedded 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 simultaneously, 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 vague plans primarily conceived at the store into final decision-making at checkouts, 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 other shopper's decision-aid systems.

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## **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**

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## **SF-04.1 [R] Future-Focused Motivation Management for R&D Personnel**

*Kunio Shirahada; The University of Tokyo, Japan  
Kiyoshi Niwa; 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 ambitions. To obtain the quantitative data of the investigation, questionnaires were administered to subordinates. As a result of analysis, we confirmed the positive impact on work

motivation by management toward stimulating ambition and motivating work. In addition, we proposed a hypothesis; two processes, creating ambition and connecting work and ambition logically, must be done for managers to motivate their subordinates.

## **SF-04.2 [R] Making It All Work: The Engineering Graduate of the Future, a UK Perspective**

*Nigel Spinks; Henley Management College, United Kingdom  
Nick Silburn; Henley Management College, United Kingdom  
David W Birchall; Henley Management College, United Kingdom*

Despite a rapid growth in the number of young people attending university, the UK engineering industry still faces serious challenges meeting its graduate recruitment needs. At the same time, rapid change is actually increasing the need for graduate engineers who can meet the challenges of a complex, globalized industry. It is against this background that Henley Management College, on behalf of the Royal Academy of Engineering, undertook a study of industry's needs of engineering graduates. In this paper, the authors report the results of research into the extent to which UK undergraduate engineering education fulfils the current and expected requirements of the UK engineering industry. Through in-depth interviews with leading employers, the researchers identify current expectations, anticipated changes in the industry and the future skills needs of engineering graduates. A typology of future engineering roles and their requisite attributes is proposed. Features of undergraduate engineering education supporting the development of the capabilities sought are also identified. The results are compared to findings from other studies including that by the US National Academy of Engineering. The study has relevance to course designers as well as companies seeking to influence university engineering programs.

## **SF-04.3 [A] Investigating the Profile of Potential New Energy Innovators: An Example from UNIDO-ICHET Website Users**

*Mavis Tsai; Shih Hsin University, Taiwan  
Scott Warren; Manatee Community College, United States  
Rede Song; Shih Hsin University, Taiwan  
JingYi Gao; Shih Hsin University, Taiwan*

The innovators play vital roles in promoting the acceptance of new technology. This is a poll for investigating the profile of potential new energy innovators. The researchers tried to describe the new energy potential innovators' profile via the variables of demographics, information sources, opinions regarding hydrogen energy safety, familiarity about new energy media issues, innovativeness, opinion leadership, their usage of the UNIDO-ICHET website and opinions regarding new energy policy. The researchers sent out e-mails and posted invitations on related forums to invite the potential interviewees to participate in this online poll. The questionnaire of this poll for new energy potential innovators was designed in May 2005, and this survey was formally conducted between 11 August 2005 and 11 January 2006. The research method is an online survey and a voluntary sample. This survey successfully collected 1126 new energy innovators' information. The data was analyzed using SPSS statistics software. The profiles of the potential new energy innovators tend to be male, actively involved in energy related activities, highly dependent on the internet to get or produce information related to new energy issues, and have a very positive perception about hydrogen energy (HE), except they tend to agree HE is expensive.

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## **SF-05 TUTORIAL: Project Ekin: Triggering a Cultural Change for Innovation**

**Sunday, 7/9/2006, 17:00 - 18:30**

**Room: Ephesus**

**Speaker(s) Sirin Elci; Technology Management Association**

**Ihsan Karatayli; Technology Management Association**

**Lale Gumusluoglu; Bilkent University**

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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 uni-

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versity 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.

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## **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**

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### **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 (CWURM)." 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 playing an increasingly important role in healthcare fields. As ubiquitous computing technologies are flowing into healthcare fields, various Korean healthcare organizations are eager to adopt these technologies, called u-Health. However, it is difficult to real-

ize 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

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## **SF-07 Technology Assessment and Evaluation-3**

**Sunday, 7/9/2006, 17:00 - 18:30**

**Room: Tyana-1**

**Chair(s) Frederick W Betz; Venture2Reality**

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### **SF-07.1 [R] Performance Criteria for Radio Frequency Identification Technology: Cases of Vehicle Identification Systems in Gas Stations and Automobile Manufacturing**

*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 two 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 (C5)} 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 C5 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 C5 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 C5 performance criteria have been identified, and a model is illustrated as a result of performing 40 worldwide interviews. Finally, the major groups of C5 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 charging 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.

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**SF-08 PANEL: ICT and Development: Exploring Possibilities and Challenges**  
**Sunday, 7/9/2006, 17:00 - 18:30** **Room: Tyana-2**  
**Panelist(s) G. Harindranath; Royal Holloway, University of London**  
**Maung Sein; Agder University College**  
**Jonathan Liebenau; London School of Economics**  
**Sherif Kamel; American University in Cairo**  
**Gerald Grant; Carleton University**  
**Murray Jennex; San Diego State University**

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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 cyber-café have had the effect of bringing ICT directly to far-flung regions throughout the developing world. G.Grant will address the seemingly 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

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**MB-01 Technology Transfer-1**  
**Monday, 7/10/2006, 10:30 - 12:00** **Room: Regency-1**  
**Chair(s) Franz Hofer; Graz University of Technology**

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**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 copyrighted 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 hand-over 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 handing 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-01.2 [A] Measuring the Science-to-Market Gap: The Case of New Energy Technologies

*Martin Inganäs; Swiss Federal Institute of Technology, Switzerland*  
*Mikael Harder; Swiss Federal Institute of Technology, Switzerland*  
*Christian Marx; Swiss Federal Institute of Technology, Switzerland*

In the face of global climate change and industrialization, the need for new energy technologies has become an urgent and evident issue. Yet, the global use of fossil fuels and non-sustainable energy technologies is still very high. For the IEA countries in the year 2001, the share of renewable energy in the total primary energy supply constituted 5.5%, and since 1970, the share of renewable energy in electricity production decreased from 24% to a total of 15%. With the aim of improving our understanding of the factors that affect the commercialization of new energy technologies, this paper investigates the NET science-to-market gap for the European context. By means of a qualitative industry analysis, an overview is given of the different actors including research institutes, technology providers, policy makers, venture capitalists, and utilities. Arguing that science-industry interaction is a key ingredient for bringing NET to the market, we suggest that the science-to-market gap may be rooted in different stakeholder preferences and expectations along key dimensions of the interaction and its context.

## MB-01.3 [R] A Study on Factors Affecting Patent Citation Counts and Patent Licensing in Chemistry Field

*Yong-Gil Lee; Korea Institute of Science and Technology, Korea, South*  
*Jeong-Dong Lee; Seoul National University, Korea, South*  
*Yong-Il Song; Korea Institute of Science and Technology, Korea, South*  
*Yun-Chul Chung; Korea Institute of Science and Technology, Korea, South*  
*Sung-Woo Lee; Korea Research Council of Fundamental Sci. & Tech., Korea, South*

This paper deals with the factors affecting patent citation counts and patent licensing using US patents belonging to Korean public research institutes in the chemistry field. For explanatory factors, research team related variables, invention specific variables, and geographical domain related variables are introduced. Zero inflated count data model is used for patent citation count model, and binary choice models such as Logit and Probit are used for patent licensing model. The results show that research collaboration positively affects both patent citation counts and patent licensing. Some other variables like team size, size of invention, etc. are found to be significantly related to patent citation counts.

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**MB-02 Information/Knowledge Management-4**  
**Monday, 7/10/2006, 10:30 - 12:00** **Room: Regency-2**  
**Chair(s) Kiyoshi Niwa; University of Tokyo**

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**MB-02.1 [R] Do Learning Organizations have Strokes of Genius?**  
*Charles M Weber; Portland State University, United States*

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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.

## **MB-02.3 [R] Impact Analysis of Front End Practices in Innovative New Product Development in Japanese Manufacturing Companies**

*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 Stockstrom; 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 summarised 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.

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

**Monday, 7/10/2006, 10:30 - 12:00**

**Room: Smyrna**

**Chair(s): Jeff Butler; Manchester University**

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## **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*

*Michael D Santoro; Lehigh 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.

## **MB-03.2 [R] Management of 'Trust' as Intellectual Property: Analysis with a Questionnaire Survey for the Intellectual Property Sector in Pharmaceutical Enterprises**

*Kaori Shinozaki; 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 Lin; 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-

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ature 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.

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

**Monday, 7/10/2006, 10:30 - 12:00**

**Room: Troy**

**Chair(s): Antonie J Jetter; Portland State University**

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### **MB-04.1 [R] Exploring How Product Development Practices Differ for Radical, More Innovative and Incremental Innovations**

*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 practice 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 Nasierowski; 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 Sarpcu; Carnegie Mellon University, United States*

*Gunduz Ulusoy; Sabanci University, Turkey*

*Nihat Altintas; 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 winner though there are some factors that could reverse the trend. The research is a joint field study partnership between Carnegie Mellon and Sabanci Universities.

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## **MB-05 Technology Diffusion-1**

**Monday, 7/10/2006, 10:30 - 12:00**

**Room: Ephesus**

**Chair(s) Keith Dickson; Brunel Business School, Brunel University**

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### **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 Basoglu; 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.

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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..

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## **MB-06 Technology Management in Telecommunication-1**

**Monday, 7/10/2006, 10:30 - 12:00**

**Room: Bizans**

**Chair(s): David Probert; University of Cambridge**

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### **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." Secondly, 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 MP3P, 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 transmis-

sion 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.

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## **MB-07 Decision Making-1**

**Monday, 7/10/2006, 10:30 - 12:00**

**Room: Tyana-1**

**Chair(s) Neil Eldin; Indiana Univ. - Purdue Univ.- Indianapolis (IUPUI)**

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### **MB-07.1 [R] An Expert Judgment Approach for Addressing Uncertainty in High Technology System Design**

*Trina M Chytka; NASA Langley Research Center, United States*

*Bruce A Conway; Embry-Riddle Aeronautical University, United States*

*Resit 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*

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Marly M. Carvalho; University of São Paulo, Brazil

Antonio R. N. Muscat; 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 empiric 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.

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## **MB-08 SPECIAL SESSION: ETMERC Panel Discussion**

**Monday, 7/10/2006, 10:30 - 12:00**

**Room: Tyana-2**

### **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**

**Krige 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 Ullav; 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.

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## **ME-01 Technology Transfer-2**

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

**Room: Regency-1**

**Chair(s) Martin Inganäs; 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 respective 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-

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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**

*Dai 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 TLOs' 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**

**Room: Regency-2**

**Chair(s): Suresh Sethi; University of Texas at Dallas**

## **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.

## **ME-02.3 [R] Quality Management Practices vs. Performance of SMEs: An Empirical Study of Indian Industries**

*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 dependant 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**

**Room: Smyrna**

**Chair(s): Charles M Weber; Portland State University**

## **ME-03.1 [A] RECAMM: 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**

*Jizhen 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

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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.

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

Anapatricia Morales Vilha; *Universidade Estadual de Campinas (UNICAMP), Brazil*  
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 perception 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.

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

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

**Room: Troy**

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

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## **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 Özcan; *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.

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## **ME-04.2 [A] Developing Managers of Tomorrow: The State of ICT in Construction Engineering Education**

Irtishad Ahmad; *Florida International University, United States*  
Maung K Sein; *Agder University College, Norway*  
Syed M Ahmed; *Florida International University, United States*  
Umut 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 ubiq-

uitous 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 who 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 pure 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.

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## **ME-04.3 [R] Quantitative Modeling of Dynamic Processes for Systems Development: A Review**

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

The aim in this paper is to review 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 intension 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.

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

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

**Room: Ephesus**

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

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

Alper Camci; *University of Central Florida, United States*  
Timothy Kotnour; *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.

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

Joca Stefanovic; *Stevens Institute of Technology, United States*

# SESSIONS

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*Aaron J Shenhar; Stevens Institute of Technology, United States*  
*Dov Dvir; Ben Gurion University, Israel*

The long-established project management mindset is focused on process, efficiency, and "getting the job done." Traditionally, a project is considered successful if it is completed on time, within budget, and to specifications. This mindset has influenced the writing of many books, the development of applications, and the construction of maturity models, which test a company's operational excellence in projects. Yet, in spite of this impressive growth in the discipline, most projects still do not meet time and budget goals and many only achieve moderate business success. Recent studies have suggested that since projects are initiated for business results, the mindset must be focused on achieving these results, rather than just meeting time and budget goals. This suggests going beyond the traditional focus on operational excellence. According to this mindset, project managers should be considered as leaders, who must focus on the strategic, operational, and human sides of project leadership. Based on this concept we suggest in this paper a three dimensional maturity model for the assessment of project management. We will define the model and its dimensions and provide initial empirical evidence on how actual projects are rated on the three dimensional maturity.

## **ME-05.3 [R] A Stakeholder Approach to Minimizing Risks in Complex Projects**

*Terrance M Skelton; Bentley College, United States*  
*Hans J Thamhain; Bentley College, United States*

This paper presents the findings of a three-year field study into the management practices and business processes of enterprise risk management (ERM) focused on complex, technology-based new product developments. While the study examines also the effectiveness of analytical tools and techniques, it probes especially into the organizational processes and into stakeholder interactions as a means of identifying risks early in the project lifecycle and dealing with these risks collectively within the network of stakeholders. The results from this field study show that effective risk management involves a complex set of variables related to task, people, and organizational environment. The results identify specific barriers and drivers to effective risk management, and provide insight into the type of organizational environment and managerial leadership conducive to (i) identifying risks early and (ii) minimizing their impact on company performance. We show that project team leaders must be capable of more than just understanding the tools and techniques of enterprise risk management (ERM), but must also understand the infrastructure and work processes of their organizations, and deal with the complex social, technical and economic issues that determine the culture and value system of the enterprise. Further, the specific stakeholder involvement, conducive to risk reduction, will be discussed together with criteria for managerial effectiveness and critical support functions.

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## **ME-06 Technology Management in Telecommunication-2**

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

**Room: Bizans**

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

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## **ME-06.1 [R] Common Cost Separation for Each Service in Mobile Telecommunication Network**

*Taehan Kim; ETRI, Korea, South*  
*Jeong-Tae Kim; ETRI, Korea, South*  
*Tchanghee Hyun; ETRI, Korea, South*

In mobile telecommunication market, the demand for non-voice services including wireless data service and short message service is constantly increasing especially in Korea. Keeping up with the demand, many carriers extend their network facilities to accommodate those kinds of traffic. And more portions of the facilities, which were used for voice service only in the past, are now being used commonly for various services at the same time. The issue on the situation is how to separate the common cost to each service because the evaluation of separation ratio has a significant impact on the inter-carrier compensation such as interconnection price. In this paper, a separation methodology based on the resource usage of each service is proposed. In detail, three kinds of service were considered including voice, data,

and short message service. After examining the current regulation of Korea for common cost separation, this paper looks over the accrual of common cost on CDMA2000-1x mobile network. After that, the unit unification is done for the basis of the separation to the three services, which are measured by different units: seconds for voice, packet or bytes for wireless data transfer, and frequency for short message service.

## **ME-06.2 [A] Heuristic Algorithms for Building Subscriber Lines in Telecommunication Networks**

*Jeong-Tae Kim; ETRI, Korea, South*  
*So Young Park; ETRI, Korea, South*  
*Taehan Kim; ETRI, Korea, South*  
*Tchanghee Hyun; ETRI, Korea, South*

We study the problem of building subscriber lines with minimal length of duct in telecommunication 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 demonstrate that for building subscriber lines, general k-MST algorithms do not offer the suitable computing time because they are based on greedy algorithm and there are many factors to calculate. Thus, we re-formulate the problem in terms of minimizing the computing time, rather than the length of duct. 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.

## **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, the causes of customer complaints are first determined by conducting a focus group interview with Korean users of the ultra-high speed Internet services. Then, a questionnaire is formulated drawing on the results of the interview, and a phone survey is conducted with 104 service users. Secondly, the casual relationship between service quality, customer satisfaction, and customer loyalty is demonstrated using an SEM (Structural Equation Model) based on the results of the survey. Finally, we set out to determine the key elements that exercise an influence on customer satisfaction and loyalty, and suggest which of these elements Telcos should manage above all others so as to improve customer loyalty.

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## **ME-07 Decision Making-2**

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

**Room: Tyana-1**

**Chair(s): Antonie J Jetter; Portland State University**

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## **ME-07.1 [R] Shortening the Decision Distance: Selecting Decision Aids for Improved Technology Investment Performance**

*Charles Romito; University of Cambridge, United Kingdom*  
*David Probert; University of Cambridge, United Kingdom*  
*Clare Farrukh; University of Cambridge, United Kingdom*

Deciding which technology to invest in is a recurring issue for technology managers, and the ability to successfully identify the right technology can be a make or break decision for a company. The effects of globalisation have made this issue even more imperative. Not only do companies have to be competitive by global standards but increasingly they have to source technological capabilities from overseas as well. Technology managers already have a variety of decision aids to draw upon, including valuation tools, for example, DCF and real options; decision trees; and technology roadmapping. However, little theory exists on when, where,



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why or even how to best apply particular decision aids. Rather than developing further techniques, 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 selecting 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 rating the criteria for their importance according to various stakeholder interests. Results indicate 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 practice 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.

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### **MF-01 Technology Transfer-3**

**Monday, 7/10/2006, 17:00 - 18:30**

**Room: Regency-1**

**Chair(s): Jeff Butler; University of Manchester**

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## **MF-01.1 [R] The Marketing of Technological Knowledge: An Empirical Analysis of Licensing Activities from University TLOs to the Industrial Sector in Japan**

*Shigemi Yoneyama; Musashi University, Japan*

*Michi Fukushima; Tohoku University, Japan*

*Dai Senoo; Tokyo Institute of Technology, Japan*

*Toshiya Watanabe; Tokyo University, Japan*

Technology licensing can be interpreted as a marketing activity that includes setting a target user, demonstrating the value of technology, negotiating prices, planning effective promotion, and so forth. Many companies as well as university Technology Licensing Organizations (TLOs) that pursue profit from technological assets, recognize the significance of the marketing perspective on technology licensing. However, not all companies and TLOs are able to achieve a satisfactory performance in their activities. This is mainly because the marketing of technology needs a different approach from those of the marketing of consumer goods, service goods, and industrial goods. Technology as knowledge is invisible and highly uncertain in the process of value realization, and this requires idiosyncratic marketing approaches. In this paper, we address the nature of technology marketing in comparison with the marketing of other goods and discuss key factors of success for higher licensing performance based on a questionnaire survey and the case analysis of TLOs in Japan. Major findings of the research show the importance of selecting a license target in the early stage,

enhancing the visibility of the technology, and presenting the feasibility and usability of the technology in the context of the licensees' business field. We will further discuss the difference in approaches depending on the type of technology.

## **MF-01.2 [R] Key Factors in the Transfer of Technology from Universities in the United States and Implications for Emerging Technology Economies**

*William T Flannery; University of Texas at San Antonio, United States*

*Minerva R. Garcia Delgado; University of Texas at San Antonio, United States*

For the most part, technology transfer from universities in the United States is still not considered to be an efficient process. Reasons for this inefficiency vary, with the most obvious being the dramatically different missions of universities and businesses. Still, universities are viewed as essential sources of innovation for generating and sustaining economic growth. Of special interest in countries with emerging technology-based economies is the role of technology transfer and universities in these efforts. This research looked at six recent studies of commercialization efforts in universities in the United States in an effort to identify key factors influencing the transfer of technology between universities and businesses. These include: university/business collaboration, general university business practices, organizational characteristics, resource networks, innovation speed, and technology selectivity and support processes. The "lessons learned" from these areas are then examined as to their applicability in less developed economies attempting to tap technological innovations in university laboratories for economic growth.

## **MF-01.3 [A] Benchmarking University Technology Transfer: An Exploratory DEA Study**

*Timothy R Anderson; Portland State University, United States*

*Francois F Lavoie; Portland State University, United States*

*Tugrul U Daim; Portland State University, United States*

Services represent the largest part of the US economy and employ three-quarters of the US workforce. One great example is IBM that has long been more of a services company than a computer company. Services can be difficult to analyze and their outputs may not provide results that can be easily converted to dollars. Universities are also considered a part of the service economy. They provide education as well as innovations resulting from their research. This paper focuses on the service of transferring research results into other sectors. Many stakeholders such as academic researchers, Technology Transfer Offices (TTOs) and private industry are involved in technology transfer. This paper presents exploratory work to assess and confirm the relevancy of DEA as a productivity evaluation tool applied to university technology transfer. The paper also includes the success stories within US universities as well as alternative DEA methods to assign weights to certain outputs in terms of the relative importance of these outputs.

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### **MF-02 Resource Management-2**

**Monday, 7/10/2006, 17:00 - 18:30**

**Room: Regency-2**

**Chair(s): Charles M. Weber; Portland State University**

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## **MF-02.1 [R] Broadcast Search in Problem Solving: Attracting Solutions from the Periphery**

*Karim R Lakhani; MIT, United States*

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 involve 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

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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.

## **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 supertug 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.

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## **MF-05 Project/Program Management-2**

**Monday, 7/10/2006, 17:00 - 18:30**

**Room: Ephesus**

**Chair(s): Yoshiyuki Yabuuchi; Shimonoseki City University**

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## **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, posing 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 Kocaoglu; Portland State University, United States  
Junzo Watada; Waseda University, Japan*

Project management is one of central issues in management of technology and engineering. Kathy Schwalbe 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**

*Jizhen Li; Tsinghua University, China  
Xin Pu; 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.

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## **MF-06 Technology Management in Telecommunication-3**

**Monday, 7/10/2006, 17:00 - 18:30**

**Room: Bizans**

**Chair(s): Byung-sun Cho; ETRI**

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

*Ayuth Jirachaipravit; University of Cambridge, United Kingdom  
David Probert; University of Cambridge, United Kingdom  
Tony Holden; University of Cambridge, United Kingdom  
Prasit Prapinmongsolkarn; 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 adapta-

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tions to suit narrowband and broadband characteristics. As a result, telecommunications license has been ineffective in promoting fair competition and ensuring practical implementation. Taking the concepts in technology management, this paper proposes a new model of telecommunications licensing. This paper applies the proposed licensing model to help the National Telecommunications Commission (NTC) license telecommunications service in Thailand. By taking technology and business characteristics of narrowband and broadband into consideration, the NTC's telecommunications licensing can effectively promote fair competition as well as ensure practical implementation in Thailand.

## **MF-06.2 [A] Strategic Management of Technological Innovation (SMTI) in Korean Telecom Service Sector: Focused on Its Contribution to the Sustainable Industrial Development and Economic Growth**

*Chan Son; ETRI, Korea, South*

From its catching-up stage, the Korean telecom service sector is now approaching the advanced one with its continuous rapid introduction of new world services like WiBro (Mobile WiMAX), DMB, HSDPA, etc. However, the previous literature has been focused upon defining and classifying the abstract components for explaining the overall picture of sectoral innovation system (SIS) and the upgrading process of a country's industrialization stage through it, but with little further consideration toward the operational definition of organization and interaction among heterogeneous actors within each country's specific institutional contexts to see the working mechanism of SIS. This paper assumes that while the type and rate of technological innovation in the telecom sector would be determined by its technological characteristics and institutional contexts, the creation and diffusion of it would be largely influenced by the organization and interaction between actors and markets. By analyzing several services newly emerging in the Korean telecom service sector and operationally defining the interplay of 4 innovation-wide dimensions such as type, rate, creation, and diffusion, etc., this paper attempts to draw a conceptual framework to more clearly visualize the formats of a technological innovation system and to suggest how to strategically manage the dynamics of it.

## **MF-06.3 [R] The Economic Value of Converged Communications and Broadcasting Services Using Nonparametric Regression Approach**

*Choonmo Ahn; ETRI, Korea, South*  
*IlSoo Roh; ETRI, Korea, South*

We apply a semi-parametric estimator for binary discrete response data to the estimation of a dichotomous choice contingent valuation model. This estimator is based on the statistical modeling of so-called current status data in biostatistics. This methodology can be used without making non-theoretically motivated assumptions on consumers' preferences. The approach is illustrated using a contingent valuation survey of willingness to pay for next generation converged communications and broadcasting services.

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## **MF-07 E-Business-1**

**Monday, 7/10/2006, 17:00 - 18:30**

**Room: Tyana-1**

**Chair(s) Abram Hernandez; Portland State University**

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### **MF-07.1 [R] Optimal Return Policy for e-Business**

*Samar Mukhopadhyay; University of Wisconsin Milwaukee, United States*  
*Robert Setoputro; University of Wisconsin Milwaukee, United States*

In a direct supply chain, the seller directly sells to the final customers, eliminating the need of intermediaries. Customers like the convenience but sacrifice the benefit of physical inspection of the product, increasing the probability of dissatisfaction and the likelihood of return. Many 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 can be gained by the seller by way of increased sales if they could offer an easy return policy. The trade-off here is in the increase in the cost. The profit function increases with the generosity of the return policy because the sales increase, but decrease as the cost increases. A model for obtaining the optimum return policy in conjunction with the optimum pricing policy giving the optimal strategy would be very useful. A profit-maximization model to obtain optimal return policy, including price as a decision variable, is presented in this paper.

Managerial guidelines for making optimal decisions to influence market parameters are also developed.

## **MF-07.2 [R] A Fuzzy Negotiation Model of e-Commerce and Its Implementation**

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

We usually decide to accept or reject the offer based on the utility function in the traditional automatic negotiation of E-commerce so that we reject the offers whose utility is lower than a specified value. Here we evaluate the acceptability based on the fuzzy set theory and the membership function. Since different issues have different effect on the negotiators, we state the combined concession in the multi-issue negotiation for the negotiators. We put forward a more practical negotiation model than the traditional negotiation model and state the process of a fuzzy multi-issue negotiation model of e-commerce to implement on computer, and we give pseudo-code program of negotiation by changing one issue at one time.

## **MF-07.3 [R] Optimal Ordering Policies in Systems with Partially Observed Inventories/Demands**

*Alain Bensoussan, University of Texas at Dallas*  
*Metin Cakanyildirim, University of Texas at Dallas*  
*Suresh P. Sethi, University of Texas at Dallas*

We review recent developments in the analysis of inventory systems with partial observations. States of these systems are conditional distributions evolving in infinite dimensional spaces over time. Unnormalized probabilities are used to transform nonlinear state equations to linear ones. This allows the existence of optimal policies to be proved in these systems. In a model where the current inventory is not observed but a past inventory level is fully observed, a sufficient statistic serves as a finite dimensional state. Here we can establish the optimality of the basestock policies, which generalizes the corresponding classical models with full information.

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## **MF-08 PANEL: CTO and CIO Practices in Turkey**

**Monday, 7/10/2006, 17:00 - 18:30**

**Room: Tyana-2**

**Panelist(s) Dilek Cetindamar; Sabanci University**

**Nuri Duzgoren; Kordsa**

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Even though there is extensive literature on CEO, CTOs are highly neglected topic in management. Whatever the name is adopted, either CTO or CIO name, 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 the practices of CTOs might bring insightful views about what is missing at the theoretical realm.

## **TA-01: PLENARY-5**

**DATE: TUESDAY, 7/11/2006**

**TIME: 08:30 - 10:00**

**ROOM: REGENCY-1**

## **TA-01.1 [K] Engineering Education and Research in the Global Context: An Academic Dream or Reality?**

**Robert D. Dryden; Portland State University, United States**

*H. Chick M. Erzurumlu; Engineering Accreditation Commission of ABET, United States*

During the past two decades, the rapid evolution of business and industry into an increasingly global context has created a need for strategies aimed at international collaborations in engineering education and research. In the domain of engineering education, several international initiatives have led to the development of uniform evaluation criteria for engineering programs that benefit both employers of engineers and engineering professionals.

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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 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.

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## **TB-01 Collaborations-2**

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

**Room: Regency-1**

**Chair(s): Alan Brent; University of Pretoria**

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## **TB-01.1 [R] University-Industry Collaboration Networks for the Creation of Innovation: A Comparative Analysis of the Development of Lead-Free Solders in Japan, Europe and the United States**

*Masaru Yurime; 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 Consoni; Unicamp - State University of Campinas, Brazil*

*Rubia C Quintão; UNICAMP - State University of Campinas, Brazil*

*Glicia 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.

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## **TB-02 Outsourcing-1**

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

**Room: Regency-2**

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

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## **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

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to external cognitive capabilities 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 locus 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 behaviour 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 organisational theories on the outsourcing decision, and analyses the relationship between outsourcing and other workplace flexibility dimensions, as well as their concurrent impact of 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.

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## **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.**

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## **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 tool 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 Gumusluoglu; *Bilkent University, Turkey*  
Arzu Ilsev; *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 innovation. Furthermore, this effect was proposed to be moderated by an innovation-supporting 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 workable 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. Result shows that a product knowledge and innovation (PKI) system based on the concepts of creativity engineering (CE-II), which is extended from the current practice of concurrent engineering, can be used to achieve the goal for both continuous and discontinuous innovation.

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## **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**

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## **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 differences 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*

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*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 policy-makers, 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 Alvear; 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**

**Room: Ephesus**

**Chair(s): Hans J Thamhain; Bentley College**

## **TB-05.1 [R] Study on the Concept of 'Architecture' to Analyze the Organization of Construction Projects**

*Satoshi Yoshida; The University of Tokyo, Japan*  
*Tomonari 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 not 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 DMA-IC (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 Aronson; 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**

**Room: Bizans**

**Chair(s): Ayuth Jirachaipravit; University of Cambridge**

## **TB-06.1 [R] Estimating the Cost of Universal Service Obligation: A Review of International Practices and Comparative Analysis**

*Hyunmi Baek; ETRI, Korea, South*  
*Eunjin Cho; 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-

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sumer surplus under the flat charging circumstances. We expect that it could be used as a reference in a future value assessment study and be applied to value-based pricing.

## **TB-06.3 [R] Universal Service Regulations with United Perspectives on the Access Charge Controls and Price Controls**

*Eunjin Cho; ETRI, Korea, South*

*Jaeho Byun; ETRI, Korea, South*

*Hyunmi Baek; ETRI, Korea, South*

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.

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## **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**

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## **TB-07.1 [A] Technology Level Assessment of Five Key Technologies: Application of Publication and Patent Analysis**

*Moonjung Choi; KISTEP, Korea, South*

*Sun Kyung Kim; KISTEP, Korea, South*

*HeeJong 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**

*Jinwoo Kim; Yonsei University, Korea, South*

*Minkyung 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.

## **TB-07.3 [R] Dynamic Approach to Assess Industrial Technological Competitiveness**

*Doohee Hwang; Sejong University, Korea, South*

*Jang Jae Lee; Korea Institute of S&T Evaluation and Planning, Korea, South*

*Sunyang Chung; Institute for Technological Innovation (ITI), Korea, South*

Industrial technological competitiveness is the major issue for many countries. Therefore, many experts are concerned with how to measure competitiveness of industrial technologies. The purpose of this paper is to suggest a reasonable methodology of investigating the competitiveness of industrial technologies. There has been strong demand for measuring technological competitiveness. For example, the program Growth Engine Industries Technologies demands reasonable measurement of technological capabilities. However, there has been no sufficient systematic on this area. Therefore, in this paper, we will suggest a more systematic approach to measure competitiveness of industrial technologies. In particular, we emphasize new indicators, which are composed of position, process and path.

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

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

**Room: Tyana-2**

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

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## **TB-08.1 [R] An Approach to Monitoring the Success Factors in Software Business in Small and Medium Size Software Companies**

*Jari Soini; Tampere University of technology, Finland*

*Harri Keto; Tampere University of Technology, Finland*

*Timo Mäkinen; Tampere University of Technology, Finland*

From a technology management perspective, it is important to be aware of the factors which are assumed to be success factors in business operations. In the software business there are many special characteristics which affect the "placing" of these success factors in the software processes. These critical success factors must be recognized and it must be possible to monitor, measure and evaluate them continuously. This paper presents the opinions of small and medium sized software companies' (SME) managements, regarding what internal success factors are most important to monitor in the software processes. From the results we are able to see how managements are oriented to follow up these critical success factors and how the outlook correlates with the previous research on critical success factors in the software business.

## **TB-08.2 [R] Optimizing the Change Management of Enterprise Resource Planning Systems Implementations**

*Onur Kerimoglu; Bogazici University & Beko Electronics, Turkey*

*Nuri Basoglu; Bogazici University, Turkey*

Although Enterprise Resource Planning (ERP) systems are being used widely all around the world, they also carry out many problems as well as their benefits. These systems are well known for enhancing cross-functional efficiency and effectiveness through the integration of all information flowing throughout an organization. However, during different project life cycle stages of ERP systems, this integration may not be provided because of the formulation of gaps, which are greater than the optimum level, among different parties like ERP system, processes of the organization and system users. Within this study, existing gaps between these parties are modeled for different project stages respectively. In common the model pro-

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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.

## **TB-08.3 [R] Six Sigma and Software Development Process: DMAIC Improvements**

*Antonio C Tonini; Universidade de São Paulo, Brazil*

*Mauro M Spínola; Universidade de São Paulo, Brazil*

*Fernando José B Laurindo; Universidade de São Paulo, Brazil*

Six Sigma increases quality by reducing process variability and aligning customer's expectations, providing high financial returns. First applied in manufacturing companies, it also becomes very effective for finance, management and service in general, including software development. DMAIC (Define-Measure-Analyze-Improve-Control) has been widely used as the method for Six Sigma implementation projects in manufacturing, once its procedures are based on the well known PDCA (Plan-Do-Check-Act) principles. However, it does not fulfill appropriately all software development requirements, which leads to research for introducing new practices in the DMAIC method or developing other methods and techniques. Based on a research performed through a multiple case studies, it is possible to suggest improvements in the DMAIC method. Some of the considered issues are: cost evaluation, time and customer satisfaction impact on business; improvement processes verification; organizational standardization and learning achieved from Six Sigma projects. The main result is a proposal of a specific roadmap for Six Sigma projects application in software development process improvement, which includes the treatment of the aspects found..

## **TD-01: PLENARY-6**

**DATE: TUESDAY, 7/11/2006**

**TIME: 13:00 - 14:30**

**ROOM: REGENCY-1**

### **TD-01.1 [K] Perspectives on Technological Entrepreneurship**

*Edward B. Roberts; MIT Sloan School of Management, United States*

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.

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

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

**Room: Regency-1**

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

### **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 Kocakülâh; 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 Kocakülâh; 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 Plazaola 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 according to the sub-topics of the SAM. Doing so provided an indication of how important the alignment community finds the different aspects of SBITA.



# SESSIONS

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## **TE-02 Technology Adoption-1**

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

**Room: Regency-2**

**Chair(s): Guillermo Rueda; Portland State University**

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### **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**

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### **TE-03.1 [A] Dynamics of 'Technological Creativity' as a Decision in Knowledge Creation Processes**

*Tarik 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 theoret-

ical 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 Birchall; Henley Management College, United Kingdom*

*George Tovstiga; 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 Prögl; 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**

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### **TE-04.1 [R] Carbon-Sequestration Technologies and Global Warming: A Review of the Ecological Impact and Market Potential of Managing Carbon Emissions**

*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

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as hydrogen can be realized. Clean carbon-based energy presents a potentially practical solution to fill the energy gap. It enables the use of current energy sources and infrastructure while minimizing the negative impact of fossil fuels on the environment. Businesses and consumers will be minimally impacted. Carbon sequestration may also offer a solution when traditional carbon-based fossil fuels run out or can no longer be extracted or used economically. As more bio-fuel sources are developed, they can be used with carbon-sequestration technology to create a truly sustainable energy industry with the potential to reverse some of the effects of global warming. This paper examines the current state of the art in carbon sequestration technologies and assesses their ecological impact and market potential.

## **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**

### **TE-05.1 [R] Critical Success Factors in Managing Global Virtual Teams: Review, Synthesis, and an Evolving Research Agenda**

*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**

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

**Room: Bizans**

**Chair(s): Byung-sun Cho; ETRI**

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

*Byung-Sun Cho; ETRI, Korea, South*

*Shin-Won Kang; ETRI, Korea, South*

*Seongmin-Min Cha; ETRI, Korea, South*

In market economies, competition is viewed as a positive force which can effectively increase 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*

*Kyoung-yong Jee; ETRI, Korea, South*

*Sunmi 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

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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-Seog 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.

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## **TE-07 Globalization-1**

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

**Room: Tyana-1**

**Chair(s): Mehmet Dönmez; Istanbul Technical University**

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### **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 (STEP), 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

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## **TE-08 PANEL: Meet the Journal Editors**

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

**Room: Tyana-2**

**Panelist(s): Timothy R Anderson; Portland State University**

**Jeff Butler; University of Manchester**

**Anthony Di Benedetto; Temple University**

**Tugrul Daim; Portland State University**

**Joseph P Martino; Yorktown University**

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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

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## **TF-03 Innovation Management-5**

**Tuesday, 7/11/2006, 17:00 - 18:30**

**Room: Smyrna**

**Chair(s): Tarik Baykara; TUBITAK MRC**

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## **TF-03.1 [R] Organization Ontology for Innovation and Entrepreneurship for Cross-Border Knowledge Services in the Globalizing IC Design Industries**

*Yee-Yeen Chu; National Tsing Hua University, Taiwan*

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Wen-Chung Hsu; *National Tsing-Hua University, Taiwan*

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 purposive 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 Carve-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 Lechler; *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

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

**Tuesday, 7/11/2006, 17:00 - 18:30**

**Room: Troy**

**Chair(s): M. Ozgur Seydibeyoglu; Istanbul Technical University**

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### **TF-04.1 [R] Entrepreneurship or Nucleation? From Tiny Crystals to Ocean via Innovation and Technology**

*M.Özgür Seydibeyoglu; 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 emboldened 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**

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Chuan-Hung Wang; *Taiwan University, Taiwan*

Fang-Mei Tseng; *Yuan Ze University, Taiwan*

Profit is the venture capitalist's ultimate goal. Therefore, it is vital for there to be an optimal exit strategy choice for maximal returns on investment. Few previous studies address the issue of exit strategy, resulting in an absence of full-scale research. The relationships among the influencing factors, exit strategies, and investment duration are probed in this study. Fourteen influencing factors are sorted and separated into five dimensions. The results show that: 1) The better the external economic environment, the less the technical risk, and the more capital and better management and operations of the investee's company, the easier it will be for venture capitalists to construct a good exit strategy; 2) the hypothesis about venture capitalists' financial affairs and investment duration are not supported; and 3) finally, an exit choice strategy equation is constructed in this study by means of which venture capitalists can either learn about important factors or else quickly make an optimal exit decision.

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## TF-05 Project/Program Management-4

Tuesday, 7/11/2006, 17:00 - 18:30

Room: Ephesus

Chair(s): Dov Dvir; Ben Gurion University

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### TF-05.1 [R] Three Modes of Deviation Handling: Coping with Unexpected Events in Project Management

Markus Hällgren; *Umeå School of Business and Economics, Sweden*

Joakim Lillieskold; *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*

Renato O Moraes; *UFOP and FEAD-MG, Brazil*

IT projects have assumed an important role nowadays in the turbulent competitive scenario. Meanwhile, project management has had another important issue for implementing strategies that enable companies to face the menacing competition. This paper intends to identify the main sources of conflicts in IT projects, as well as the most common practices to solve them. This study was performed considering the different stages of the development life cycle. There are five macro-strategies used for solving these conflicts: withdrawal, smoothing, forcing, compromise and problem solving. The concept of waterfall model for software developing process was also used. Although this model presents several limitations, it was chosen for this study due to its large adoption in the Brazilian companies' context. This life cycle model presents the following phases: analysis, design, coding, testing, implementation and maintenance. The adopted methodological approach was a survey among IT professionals. The research was performed through self-fulfilled questionnaires sent by e-mail or answered on an Internet web site. The answers were evaluated in order to eliminate some problematic cases. The valid answers were analyzed through statistical tools.

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## TF-06 Technology Planning-1

Tuesday, 7/11/2006, 17:00 - 18:30

Room: Bizans

Chair(s): Tugrul Daim; Portland State University

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### TF-06.1 [R] A Technology Planning Methodology Based on Axiomatic Design Approach

Tufan Koc; *Istanbul Technical University, Turkey*

Yaprak Mutu; *Istanbul 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.

### TF-06.3 [A] Development of Technology R&D Planning Models for Performance Management

Jiyoung Park; *Korea Institute of S&T Evaluation and Planning, Korea, South*

# SESSIONS

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Hyun Cheol Kim; Korea Science and Engineering Foundation, Korea, South  
Donghoon Oh; Korea Institute of S&T Evaluation and Planning, Korea, South

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 also 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.

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## TF-07 Globalization-2

**Tuesday, 7/11/2006, 17:00 - 18:30**

**Room: Tyana-1**

**Chair(s): Deok S Yim; STEPI**

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### TF-07.1 [R] Reorganizing the Firm Boundaries of Innovation in the Global Environment

JJari Hyvarinen; Tekes, Finnish Funding Agency for Technology and I, Finland

This paper investigates those mechanisms regarding how the global aspects have shaped the boundaries of the firm. A main driving force of reshaping new boundaries is innovation. The main logic of the paper is to connect dominant theories of the firm – transaction cost, contracting, information, location, and make-or-buy – to those foundations of globalization that might explain new shapes of firm boundaries. The paper addresses the role of markets, organizational forms, human capital and R&D, outsourcing and FDI decisions that might facilitate the globalization process. It also discusses country effects, i.e. about path-dependent changes in a political climate, improvements in national institutions and overall development of information technology that has made it possible for new participants to take part in ongoing globalization. Finally, it compares whether globalization of production has different pathways than globalization of R&D as a potential research opportunity in the future.

### TF-07.2 [A] Globalization Effects: Management of Technology between Two Firms in a Mutual Relationship

Arzu Karaman; Yildiz Technical University, Turkey

Mehmet Dönmez; Istanbul Technical University, Turkey

The global arena is highly competitive for firms who try to sell similar, even though differentiated, products; but on the other hand, this weakness may prove to be a strength for firms nourishing innovative ideas by making use of the flexibilities imposed by globalization and gain competitive advantage by the usage of appropriate technology. In this paper, the effect of globalization on the new product development process is investigated where a firm is moving its production to another firm in another country, which is usually a developing country, so as to reduce the total cost of production and therefore maximize profits. The major gain for the firm operating in the developing country is the transfer of technology from the master firm, but the management of this technology involves the interaction between the two firms, which may prove to be problematic. This paper focuses on the problems that emerge between the two firms in such a mutual relationship and tries to build up a conceptual model that explains this relationship. A case study is carried out where a firm in a developing country is trying to satisfy the needs of the master company to exemplify a real-life situation.

### TF-07.3 [A] Virtual Environments, Virtual Works, Virtual Lives?

Gonca Telli Yamamoto; Okan University, Turkey

Ali Telli; Tubitak Bilten, Turkey

Michael Featherstone; Jacksonville State University, Turkey

Patricia Borstoff; Jacksonville State University, United States

Technological advances mostly in Internet and mobile technologies affect our lives in myriad ways. Globally, these technologies are used in many environments; the usage of these technologies also creates virtual environments. The concepts of time, place, language and boundaries disappear; many people from different countries and cultures can communicate with each other and work together. However, besides its benefits, working with many different people brings many problems to be solved such as time synchronization, language gaps, and cultural differences. To observe the problems of virtual environments as a case study, a virtual study group has been established between Turkish and American student groups. In this paper, the observations of this group study will be presented.

## WA-01: PLENARY-7

**DATE: WEDNESDAY, 7/12/2006**

**TIME: 08:30 - 10:00**

**ROOM: REGENCY-1**

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### 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 industrialised 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 ? 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 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

Caner Oner; 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 (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 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.

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## WB-01 Collaborations-3

**Wednesday, 7/12/2006, 10:30 - 12:00**

**Room: Regency-1**

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

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**Chair(s)** Erol Inelmen; Bogazici University

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

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

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 analyse the effects on Japanese companies of a wide spectrum of collaborations.

**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 interacting technologies, but social, economical, political, sociological, and psychological factors as well. In order to open the opportunity window which software technology offers, developing countries need to understand these interfaces and design their S&T policies accordingly. In this conceptual framework, this paper discusses the role of interactions in software evolution and tries to identify prior interfaces of software technology with other technologies and social factors. Analysis is based on findings of a 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.

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**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.

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**WB-03 Innovation Management-6**

**Wednesday, 7/12/2006, 10:30 - 12:00**

**Room: Smyrna**

**Chair(s): Gul Guven; ESC Lille**

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**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. Hosein 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 Bouncken; *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 Ludeña; 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 followup 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.

### **WB-04.2 [R] A Case Study on Portfolio Management Implementation and its Relation with Product Development Process in a Company from the Process Industry**

*Paulo C Miguel; USP, Brazil*

With the increasing levels of market competitiveness, many companies realise 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 analysed 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. Prioritisation is then established using a 1 to 5 Lickert scale, and resources are allocated to prioritised projects. The company set up a project committee either to manage its portfolio or to analyse 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**

**Room: Ephesus**

**Chair(s): Kelly R Cowan; Portland State University**

### **WB-05.1 [R] Branding and Technology Management**

*Türkey Dereli; 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.

### **WB-05.2 [R] A Comparative Analysis on Market Structure-Market Performance Model by Growth Stages in Global Mobile Market**

*Jong-soo Kyung; Chungbuk National University, Korea, South*

*Byung-woon Kim; ETRI, Korea, South*

*Dong-hee 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



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has negative influence and it has positive influence in the growth stage, and it has negative influence again in the mature stage. This change shows that mobile density, HHI, players and rate of churn are also changed by the development stage. Finally, this study identified that structural changes cause differences in market performance as well.

## **WB-05.3 [A] Demand Forecast and Market Development Strategy for Corporate Portable Internet Market**

*Moon-Koo Kim; ETRI, Korea, South*  
*Jong-Hyun Park; ETRI, Korea, South*  
*Kyoung-Yong Jee; ETRI, Korea, South*  
*Sunmi Lee; ETRI, Korea, South*

The portable internet market, touted for its strong potential since its formative stage, has been recently receiving renewed attention for the prospects of its corporate segment. The new technology makes it possible for corporate customers to easily connect to internal information systems and conveniently access the internet from outside locations, in wired as well as wireless mode, and has the potential to improve efficiency and productivity in customer management, inventory management and logistics. In this paper, we predict the demand in the corporate portable internet market and suggest business strategies for market development. To do this, we conducted a series of focus group interviews (FGI) on corporate employees – general employees and sales department employees – and surveyed 300 companies located in the Seoul and metropolitan area and employing 50 workers or over. We analyzed the results of this survey and interviews to measure the potential intention to use portable internet service and identify usage behaviors and patterns, and present implications for marketers at the level of deployment strategy.

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## **WB-06 Supply Chain Management-1**

**Wednesday, 7/12/2006, 10:30 - 12:00**

**Room: Bizans**

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

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## **WB-06.1 [R] Linking Forward Supply Chain Performance with Reverse Supply Chain Returns**

*Srikanth Yellepeddi; University of Texas at Arlington, United States*  
*Santhanam Rajagopalan; University of Texas at Arlington, United States*  
*Jamie K Rogers; The University of Texas at Arlington, United States*

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 sustenance. 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-

al problem solving process of a human being has gained importance in the past years. The aim of this study is to point out the importance of supplier evaluation and selection in the buying process and also to develop an expert system for supplier evaluation and selection. The proposed expert system is called ESforSES (An Expert System for Supplier Evaluation and Selection). ESforSES was applied in a large-scale electronic company. The results of the application show that ESforSES is a reliable and objective system for evaluating and selecting suppliers, and it may be utilized by small- and medium-sized companies by making some modifications and improvements according to their requirements and strategies.

## **WB-06.3 [R] Functional Integration of Manufacturing Enterprises**

*MD B Sarder; University of Texas at Arlington, United States*  
*Don H Liles; University of Texas at Arlington, United States*  
*Jamie K Rogers; University of Texas at Arlington, United States*

Enterprise integration connects and combines people, processes, systems, and technologies to ensure that the right people and the right processes have the right information and the right resources at the right time. Many researchers have contributed towards the integration of manufacturing enterprises but still there is a need to develop a method to guide manufacturing enterprises towards integration. This research focuses to achieve the above objective of functional integration of manufacturing enterprises by developing a methodology, which enables manufacturing enterprises to be competitive in the present marketplace. An Enterprise Integration Index (EII) has been established to represent the current status of a manufacturing enterprise. This index measures the effect of integration across all functions of manufacturing enterprise.

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## **WB-07 Decision Making-3**

**Wednesday, 7/12/2006, 10:30 - 12:00**

**Room: Tyana-1**

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

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## **WB-07.1 [R] A Problem Solving Perspective on A Problem Solving Perspective on Evaluating Knowledge Management Technologies: Using Fuzzy Linear Programming Technique for Multiattribute Group Decision Making with F**

*Yasemin Claire Erensal; Dogus University, Turkey*  
*Esra Albayrak; Galatasaray University, Turkey*

The aim of this paper is to develop a framework to aid in the evaluation and selection of KM tools and technologies. In this paper, we investigate the fuzzy linear programming technique (FLP) for multiple attribute group decision making (MAGDM) problems with preference information on alternatives. To reflect the decision maker's subjective preference information and to determine the weight vector of attributes, the linear programming technique for multidimensional analysis of preference (LINMAP) is used. The LINMAP method is based on pairwise comparisons of alternatives given by decision makers and generates the best compromise alternative as the solution that has the shortest distance to the positive ideal solution. Our aim is to develop a LINMAP in MAGDM problem, where decision makers (DM) give their preferences on alternatives in a fuzzy relation. Through the proposed methodology in this research, enterprises can reduce the mismatch between the capability and implementation of the KM technology, and greatly enhance the effectiveness of implementation of the KMS. Finally, the developed model is applied to a real case of assisting decision-makers in a leading logistics company in Turkey to illustrate the use of the proposed method.

## **WB-07.2 [A] An Integrated Portfolio Management Solution: The Case of an Upstream Oil and Gas Portfolio Optimization By M. Erdogan, B. Mudford, C.T.Davis, D. Stegemeier**

*Meftun Erdogan; Landmark Graphics Corporation, United States*  
*Brett Mudford; Constellation Power Source, United States*  
*Chuck T Davis; Landmark Graphics Corporation, United States*  
*Dave Stegemeier; Halliburton, United States*

Allocating limited capital to investment opportunities effectively is critical for the success of any business. E&P executives must also select which projects to fund, and consider the trade

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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 Manufacturing Management-2**

**Wednesday, 7/12/2006, 10:30 - 12:00**

**Room: Tyana-2**

**Chair(s): Ridvan Berber; Ankara University**

## **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

vide 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 Basoglu; 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 (EoU) 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**

*Sajee 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..

## **WD-01.2 [K] Hydrogen Energy System: Implementation through Pilot Projects**

*T. Nejat Veziroglu; University of Miami, United States*

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 programme 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.

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## **WE-01 Collaborations-4**

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

**Room: Regency-1**

**Chair(s): Nihan Yildirim; Istanbul Technical University - Alarko Holding GoC**

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## **WE-01.1 [A] Mapping 'Strategic Alliances' with 'Learning Technologies' Appropriately**

*Erol Inelmen; 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 Nasiriyar; 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 motives 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.

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## **WE-02 Science and Technology Policy-1**

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

**Room: Regency-2**

**Chair(s): Deok S Yim; STEPI**

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## **WE-02.1 [A] Balancing Research Vision and Research Management to Achieve Success in the 21st Century**

*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-

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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-Woon Kim; Electronics & Telecommunications Research Inst., Korea, South*  
*Seong-Ho Seol; 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 prof-

it 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.

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## **WE-03 Innovation Management-7**

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

**Room: Smyrna**

**Chair(s): Thorsten Teichert; Universitaet Hamburg**

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### **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*  
*Kiyoshi Niwa; The University of Tokyo, Japan*

Achieving innovations that allows customers to work on a task they have never thought of before is one of the key issues for a firm to pioneer a new market. In frontier business areas, not only customer's needs (what they want) are implicit but also their tasks (what they want to accomplish) are inarticulated as well. An important question in such a situation is: in what way can we pursue innovations that pioneer customer's potential task? Although there are a number of studies in R&D management which help firms to focus on the customer's existing tasks, managerial principles to promote innovations towards customer's potential tasks are still unclear in traditional arguments. In our study, we propose a model to help understand the process of concept planning and embodiment in innovation, apply it to eight cases, and compare innovations that pioneered customer's potential tasks (e.g., 3M Post-it® and Polymerase Chain Reaction (PCR) DNA test) with those which did not. We then suggest that, in order to discover customer's potential task during the front-end, (1) the concept planner should delegate the idea-generation role to other people, and (2) application of a unique idea should be investigated by people different from the idea-generator.

### **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**

*Soumyo D Moitra; Indian Institute of Management Calcutta, India*

The study of innovations in emerging economies is important for several reasons. They have

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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.

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## **WE-04 New Product Development Management-3**

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

**Room: Troy**

**Chair(s): David Wilemon; Syracuse University**

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### **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 the 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.

### **WE-04.2 [A] A Framework for Product Development: Analysis of Software Industry**

*Nuri Basoglu; Bogazici University, Turkey*

*Tugrul Daim; Portland State University, United States*

*Onur Kerimoglu; Bogazici University, Turkey*

*Ece Sofuoglu; 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. Enterprisewise management systems have to be based on a framework that is capable of running daily activities, strategical thinking, and also providing every possible ingredient to cook new products for attaining survival. An integrated view of strategical 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..

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## **WE-06 Supply Chain Management-2**

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

**Room: Bizans**

**Chair(s) C. Helen Takacs; Cleveland State University**

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

*Amer Hamdan; 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 Alaykiran; 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-

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ered as sampling, comparing, copying and applying processes, but as a management tool it has been executed in the USA since the 1990's. It is a much more new research field in Turkey. The absolute benchmarking approach is a continuous process because of the rapid changes in market. New entrepreneurs in the market develop the business process, create new technologies and improve operations. The goal of the enterprises performing benchmarking is to be the best in the market. For achieving this goal they have to follow the path of continuous development. Once having reached this goal, they should focus on developing new processes in order to protect the obtained level. Thus, benchmarking becomes a continuous struggle to improve enterprise performance. In this study, the supply chain management strategies and applications of two plastic profile manufacturer firms, which are two of the six greatest in the Turkish market, are benchmarked based on a questionnaire.

## **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**

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

**Room: Tyana-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**

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

**Room: Tyana-2**

**Panelist(s) Dilek Cetindamar; Sabanci University  
Gunduz Ulusoy; Sabanci University**

## **Mahmut Kiper; TUBITAK**

**Alphan Manas; Teknoloji Holding**

The number of inter-firm relations within these networks increases significantly, leading to an exponential growing degree of complexity perceived by those involved in this new type of organization. Additionally, collaborations move away from long-term binding to more loosely connected entities with a more short-term orientation to capture emerging market opportunities, calling 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.

## **WF-01 Strategic Management of Technology-4**

**Wednesday, 7/12/2006, 17:00 - 18:30**

**Room: Regency-1**

**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 Livvarcin; Yeditepe University, Turkey  
Baybars Soyak; SYK 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 the measurement of 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 three 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 Boutellier; 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

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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.

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## **WF-02 Science and Technology Policy-2**

**Wednesday, 7/12/2006, 17:00 - 18:30**

**Room: Regency-2**

**Chair(s): Philip Gardner; TRIUMF**

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### **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 Arechavala-Vargas; Universidad de Guadalajara, Mexico*

The need for the development of regional innovation systems is widespread and recognised 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.

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## **WF-03 Innovation Management-8**

**Wednesday, 7/12/2006, 17:00 - 18:30**

**Room: Smyrna**

**Chair(s): Shinya Kasuga; University of Michigan**

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### **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; export 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**

*Hailong 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

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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.

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## **WF-04 New Product Development Management-4**

**Wednesday, 7/12/2006, 17:00 - 18:30**

**Room: Troy**

**Chair(s): Michael Menke; Hewlett-Packard**

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### **WF-04.1 [R] Managing Cross-Functional Integration of Complex Developments**

*Hans J Thamhain; 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 (DMF), 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 work processes, 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 Pattit; 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 Lechler; Stevens Institute of Technology, United States*

*Thorsten Teichert; 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 pro-

jects 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.

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## **WF-05 R&D Management-2**

**Wednesday, 7/12/2006, 17:00 - 18:30**

**Room: Ephesus**

**Chair(s): Elif F Babayi it; Arçelik**

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### **WF-05.1 [A] Remodeling Method for Business Models of R&D Outputs**

*Fumiaki Ishida; 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-seong Kim; Seoul National University, Korea, South*

*Dong wha Keum; Korea Institute of Science and Technology, Korea, South*

*Yong-Il 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



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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**

*Yuriko 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**

**Room: Bizans**

**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 [R] A Simulation Based DSS Design for Supply Chain Management**

*Asli S Erdem; Bogazici University, Turkey*

*A. Ürün 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**

**Chair(s): Frank Tietze; Hamburg University of Technology**

### **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 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**

*Mehdi 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**

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## 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 TRIZ, 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

Tarik 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 develop-

ment adaptable for organizational structure. The model emphasizes a "work-flow" approach and focuses on regular evaluation and assessment of decisions, outputs and limitations in each step for reducing potential risks. Other characteristics of the model are: focused on customer and stake-holder satisfaction; covers the whole process; adapted from the best-practices; combines all the functions within the organization, such as engineering, manufacturing, support, services, purchasing, management, control, etc.

### HB-01.2 [R] The Dynamics of the Corporate Food Chain: Strategy, Power, and Position in the Age of Outsourcing

Robert Harmon; Portland State University, United States

L.B. Day; L.B. Day & Company, Inc., United States

Over the past decade manufacturers in industrialized countries initiated strategies to outsource and, subsequently, offshore lower-value manufacturing operations to developing countries, especially Taiwan, Korea, and China. Ostensibly, outsourcing/offshoring was not thought to represent a strategic threat since the functions being outsourced were viewed to be commodity in nature. The visible benefit was the ability to free up resources to focus on higher value functions. At the time, few executives visualized that their new strategic partners would acquire significant technology, design, process, and other knowledge that they would use to move up the food chain and become a potent new class of competitors. This paper introduces the concept of the corporate food chain, explores its theoretical underpinnings, and presents potential implications for managers.

### HB-01.3 [R] Getting the Priorities Right: Literature vs Practice on IT Governance

Mårten Simonsson; KTH, Royal Institute of Technology, Sweden

Mathias Ekstedt Ekstedt; Royal Institute of Technology (KTH), Sweden

The field of IT governance has emerged in order to address organizational issues for IT value delivery to the business. However, a shared view of the definition of IT governance is lacking between researchers and practitioners, and support for decision-making is neither present. A commonly agreed upon definition of IT governance would be useful but has until today not been available. This article presents an IT governance definition based on an extensive literature study. IT governance is the preparation for, making of and implementation of IT-related decisions regarding goals, processes, people and technology on a tactical or strategic level. The components of the definition are prioritized in two different ways. A theoretical prioritization was made to highlight the most important concerns according to 60 different publications. Another prioritization was carried out with a group of Swedish IT governance experts. The opinions of practitioners and literature did mostly align, but differences were identified in the importance of understanding the situation at hand prior to making decisions, and monitoring of the decisions' impacts.

### HB-01.4 [R] Threat and Opportunity Analysis in Technological Development

Husam Arman; University of Nottingham, United Kingdom

Allan Hodgson; University of Nottingham, United Kingdom

Nabil Gindy; University of Nottingham, United Kingdom

Globalisation of competition and the accelerating rate of technology change set difficult challenges for advanced technology-based industries in the new millennium. Companies in these industries must now continually reduce costs and develop better products and services in order to sustain a competitive advantage in an endlessly changing business environment. High research and development (R&D) costs force high technology companies to select more carefully which technologies to invest in. Technologies are introduced into a company in order to make a positive contribution to its products and services. Companies need technology planning in order to make better decisions with regard to strategic corporate planning, R&D management, product development, production and marketing. In this paper, we describe a technology planning support function that is used to analyse relevant information from various sources in order to optimise the impact of technological developments on business and avoid threats that come from both within and outside the sector/industry. This function highlights possible threats and so helps planners and decision makers in making the right decision before the anticipated problem occurs.

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## **HB-03 Innovation Management-9**

**Thursday, 7/13/2006, 10:30 - 12:00**

**Room: Smyrna**

**Chair(s): Tulin Mangir; California State-Longbeach and USC**

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### **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 Diyarbakır 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 (ESID) 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**

*Gul Guven; 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 New Product Development Management-5**

**Thursday, 7/13/2006, 10:30 - 12:00**

**Room: Troy**

**Chair(s): Diana Laboy-Rush; Cascade Microtech, Inc.**

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### **HB-04.1 [R] Feature Analysis of an Information Systems Product Development**

*Ecehan Sofuoglu; 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**

*Gul Okudan Kremer; Pennsylvania State University, United States*

*Rohan Shirwaiker; 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 Shirwaiker; Pennsylvania State University, United States*

*Gul 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 R&D Management-3**

**Thursday, 7/13/2006, 10:30 - 12:00**

**Room: Ephesus**

**Chair(s): Kelly R Cowan; Portland State University**

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### **HB-05.1 [A] Developing Synergy for Distributed R&D by Using Audit Mechanism**

*Elif F Babayigit; Arçelik, Turkey*

*Semsettin Eksert; Arçelik, Turkey*

New Product Development is the core process for every company that is future oriented.

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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 Arcelik 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 Arcelik earned a continuous improvement mechanism maintaining a common baseline process which is flexible enough to deal with uncertainty. It is also seen as a rudder 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**

*Abram 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.

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## **HB-06 Technology Roadmapping-1**

**Thursday, 7/13/2006, 10:30 - 12:00**

**Room: Bizans**

**Chair(s) Tugrul Daim; Portland State University**

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## **HB-06.1 [R] Value Roadmapping: A Structured Approach for Early Stage Technology Investment Decisions**

*Marcel Dissel; University of Cambridge, United Kingdom*

*Rob Phaal; 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 clearer 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 Spínola; Universidade de São 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**

*Sungjoo Lee; Seoul National University, Korea, South*

*Seongryong Kang; Korea Industrial Technology Foundation, Korea, South*

*Maengho Oh; Ministry of Commerce, Industry & Energy, Korea, South*

*Karpsoo 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

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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.

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## **HB-07 TUTORIAL: IT Governance and Audit**

**Thursday, 7/13/2006, 10:30 - 12:00**

**Room: Tyana-1**

**Speaker(s): Erol Lengerli; Audit and Risk Advisory Services**

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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 those 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.

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## **HD-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 Niwa; The University of Tokyo**

**Tugrul U Daim; Portland State University**

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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.

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## **HE-02 Technology Transfer-4**

**Thursday, 7/13/2006, 15:00 - 16:30**

**Room: Regency-2**

**Chair(s): Omer Saatcioglu; Middle East Technical University**

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### **HE-02.1 [R] The Ambivalence of Technology Transfer through Foreign Direct Investments**

*Venantio M Mzenda; University of Pretoria, South Africa*

*André J Buys; University of Pretoria, South Africa*

Foreign Direct Investments (FDI) have been touted as the ideal means through which nations can develop and improve their technological capabilities in order to increase their global competitiveness. It is a known fact that parent companies of FDI are among the world's most important creators of knowledge and technology. However, it is debatable if FDI are the right route to technological capability catching-up for developing countries. This paper attempts at formulating a model that depicts technology transfer (TT) by FDI in the electronics sector in South Africa and make appropriate and enabling policy recommendations for optimal TT. The study sample comprises all FDI in the electronics sector in the country, albeit more than 80% are based in the Gauteng province. Notwithstanding the fact that technological development of countries such as China could be related to the massive inflow of FDI among many other factors, the academic literature reports that some countries have been negatively impacted by FDI. This study investigates this phenomenon and goes a step further by look-

ing at the social networks involved in the TT process.

### **HE-02.2 [A] Aligning Technology and HRD Strategy: A Practical Framework to Support Technology Transfer**

*Clive Reynolds; University of Warwick, United States*

*Susanne Tanner; Warwick Manufacturing Group, United Kingdom*

Innovation and the development of new technology are key elements of sustainability. Successful transfer and diffusion of technology contribute further to this sustainability. One of the key enabling factors in this complex process is people. Their knowledge, skills and behavior are at the core of development and diffusion of technology. Adding to the complexity is that technology comes in many guises and thus the required competencies vary, too. In this context it is perhaps surprising to see how little human factors are considered when technology strategies are set. This indicates either a lack of true understanding or a lack of tools available to tackle the problem. This paper discusses a framework design to help organizations characterize their innovation needs. Following this characterization the skills, knowledge and behaviors required to support innovation and technology strategy can be analyzed. This analysis can then be used to design people development activities aimed at addressing identified requirements. To this extent the framework facilitates an alignment of technology and human resource development aimed at optimizing successful technology transfer. The work looks at theoretical considerations as well as giving an overview of initial applications.

### **HE-02.3 [R] The Role of FDI on Transferring Technology to Korea**

*Oonkyu Lee; Seoul National University, Korea, South*

*Jeong-Dong Lee; Seoul national university, Korea, South*

*Inha Oh; Seoul national university, Korea, South*

FDI (foreign direct investment) is one of the most major channels for international technology transfer. Despite its premise of potential gains from FDI, the evidence is rather mixed on the empirical studies of technology diffusion via FDI. The purpose of this paper is to find empirical evidence for the spillover effect by FDI. This paper studies the role of FDI on transferring technology to Korea. This paper explores the importance of FDI, intra-industry knowledge spillovers from FDI, and R&D's learning effect for firm's productivity using firm-level data for the period 1991-1997 and 1999-2004, since Korea experienced great change in late 1990s and the policy for FDI has largely changed. Empirical results showed quite different aspects for after and before. The intra-firm spillover effects were positive for both periods, while intra-industry spillover effects were positive and negative for before- and after-period, respectively. The change of intra-industry spillover effects means that the government should be concerned to utilize foreign investments.

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## **HE-04 New Product Development Management-6**

**Thursday, 7/13/2006, 15:00 - 16:30**

**Room: Troy**

**Chair(s): Michael Menke; Hewlett Packard**

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### **HE-04.1 [A] Knowledge Transfer for New Product Introduction**

*Laura E Martinez-Solano; University of Warwick, United Kingdom*

This paper analyses how effective knowledge networks formation affects the new product development (NPD) processes of the West Midlands (WM), UK, automotive industry. Most companies (especially in high- and middle-high technology sectors) need to constantly introduce new products in the market in order to remain competitive and survive (Porter 1990, Dicken 1998). Their success highly depends on their ability to obtain and/or develop the latest and most convenient technologies for their products. Companies use NPD processes, which allow them to plan ahead for what and when new technological knowledge is required (e.g. Cooper 2005). Nevertheless, these processes may say nothing about when and how to obtain this knowledge. Then, highly specialised engineers commonly end up developing by themselves management, marketing and other skills in order to identify new technology knowledge sources (Miles 2003, Martinez-Solano 2004). Despite the importance of knowledge networks affecting the firm's capabilities, their formation and interaction remain an ad-hoc and largely informal process that firms are not totally aware of. A survey was sent to 300 companies in the WM automotive sector (FAME 2005), and a couple of case studies were conducted with an OEM and a Tier 1 supplier to illustrate how the effectiveness of knowl-

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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 Aguiar; 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 crystalize 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, Mexico*  
*Ricardo Arechavala-Vargas; Universidad de Guadalajara, Mexico*

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 structuring 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**

*Maria del Carmen Domínguez Rios; Benemérita Universidad Autónoma de Puebla, Mexico*

This study attempts to identify and generate empirical evidence about the characteristics and the strategies of innovation in the export industry in Puebla, Mexico. The first stage of the investigation is developed in a conceptual frame of technological and organizational innovation. A random sample of exporters enterprises located in Mexico was designed using the parameters of Probability. In this town, surveys were applied to know the structural characteristics, technological behavior and competitive development (growth in sales, employment, exports, and public support) in the firm. The quantitative methods employed were discriminant analysis and logistic regression; both will classify the inquired firms in innovating and non-innovating. In other terms, a classifying model is developed in order to rank companies according to their innovative character, applying the two tools of multivariate analysis mentioned above. It will be proved that the concept of innovation is not valued by the firms; many firms with innovating behavior do not believe they perform activities of innovation. This is innovating firms underestimating themselves. It is sustained that innovative firms stand out because they formalize their engineering or research and development activities, and they make changes to the labor organization and development activities. The research will explain how the particular relationship between innovation and R&D activities is established. The main conclusion will be that the percentage of sales devoted to R&D activities as well as the purchase of machinery and equipment abroad are key factors to be considered in an innovating firm.

## **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 Öndüğü; Siemens A.Ş., Turkey*  
*Selim Güven; Siemens A.Ş., 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, "Sitepart," 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 Mezher; American University of Beirut, Lebanon*  
*Walid Nassrallah; American University of Beirut, Lebanon*  
*Maheer Ajam; American University of Beirut, Lebanon*

Entrepreneurs face different types of difficulties and operate in an unstable environment

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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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Veziroglu, T. Nejat ; WD-01.2

Vieira, Glicia ; TB-01.3

von Hippel, Eric ; TE-03.3

## W

Wang, Chengwei ; ME-03.2

Wang, Chia-Nan ; SB-01.1

Wang, Chuan-Hung ; TF-04.3

Wang, Hailong ; WF-03.3

Wang, Li ; SF-01.3

Wang, Ming-Yeu ; MF-02.2

Warren, Scott ; SF-04.3

Washida, Yuichi ; MB-05.4

Watada, Junzo ; MF-05.2

Watanabe, Toshiya ; MF-01.1; ME-01.3

Weber, Charles M. ; HD-01; MF-02; TD-01; ME-03; MB-02.1; SE-05.1

Weng, Calvin S. ; SE-01.3; SE-08.3

Wilemon, David ; WF-04.2; TF-05.2; WE-04; TE-05.1

Witthayaweerasak, Watcharin ; SE-08.2

Wu, Chunyou ; WF-03.3

Wu, Nien-Chu ; SF-03.1

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

Yalçınpınar, 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 ; WB-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, Hee-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

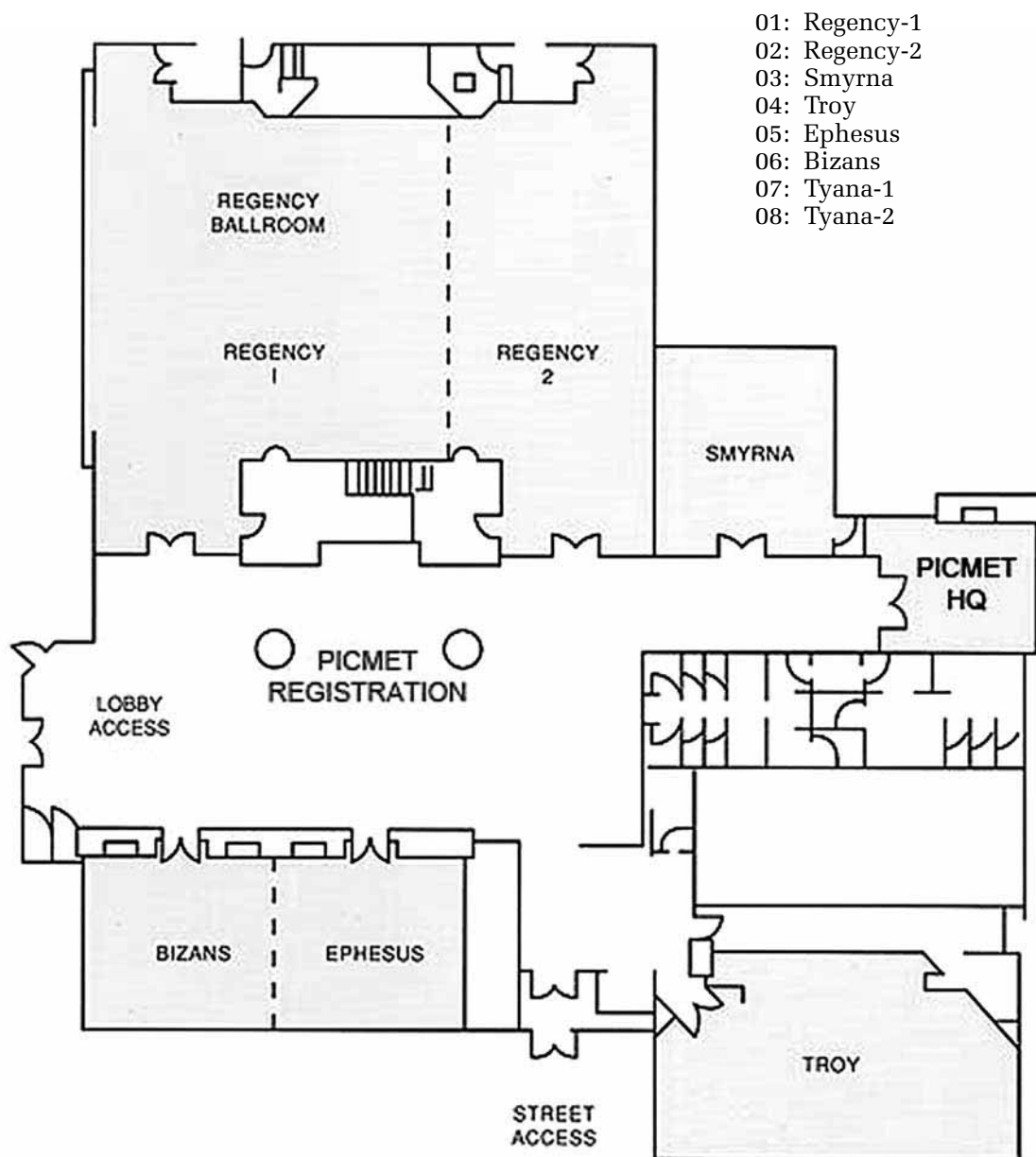
Zakaria, Norhayati ; TE-05.1

Zhang, Wei ; WE-03.2

Zobel, Rosalie ; WA-01.1

# HYATT FLOOR LAYOUT

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# HYATT FLOOR LAYOUT

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- 01: Regency-1
- 02: Regency-2
- 03: Smyrna
- 04: Troy
- 05: Ephesus
- 06: Bizans
- 07: Tyana-1
- 08: Tyana-2

