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PICMET ’08

PICMET

Dear PICMET Guests:

It is a great pleasure for us to welcome you to PICMET ’08.

The world economy, fueled by technological advances, is growing. The new players are entering the world arena and developing economic engines of their own, at a rapid pace. Innovation and economic development are going hand-in-hand in the technology era. The challenge the world is facing now is to make this growth sustainable, rather than just a growth spurt. Sustainability takes many forms. Smart use of the resources is one form of sustainability, development of continuing innovations is another; protecting the environment while maintaining economic growth is still another form.

The primary role of Technology Management is to manage the technologies to assure that they work for the betterment of humankind. This role has never been more important than it is now. It is the responsibility of the Technology Management community to utilize and guide technology effectively to provide the world with the framework for sustainable growth under severe resource constraints and increased competition through innovation and technology development.

This is a big challenge for the leaders and emerging leaders in the Technology Management field. Recognizing this emerging challenge, the PICMET ’08 Conference examines the role of Technology Management for a sustainable economy.

Approximately 640 papers were submitted to PICMET ’08. After they were reviewed by at least one referee from the 104-member Program Committee in a double-blind refereeing process, 295 were accepted for inclusion in the conference. The referees are from universities, industrial organizations and government agencies from around the world. The authors represent about 300 organizations in 36 countries.

The PICMET ’08 Conference has two outputs:

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

The ***Proceedings*** is a 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. The *Proceedings* is divided into 41 sections, listed below, each containing several papers on the topic of the section.

Strategic Management of Technology
Sustainability
Collaborations
Competitiveness
Science and Technology Policy
Innovation Management
Radical Innovations
Emerging Technologies
Entrepreneurship/Intrapreneurship
Information Management
Knowledge Management
E-Business
Decision Making
New Product Development
Project/Program Management
R&D Management
Software Process Management
Manufacturing Management
Supply Chain Management
Outsourcing
Cultural Issues
Environmental Issues
Global Issues
Technical Workforce
Technology Based Organizations
Technology Management Education
Technology Forecasting
Technology Assessment and Evaluation
Technology Roadmapping
Technology Planning
Technology Adoption
Technology Diffusion
Technology Transfer
Technology Marketing
Technology Management in Services
Technology Management in the Health Sector
Technology Management in the Energy Sector
Technology Management in the Defense Sector
Technology Management in Semiconductor Industry
Technology Management in Biotechnology
Technology Management in Telecommunications

(continued on next page)

PICMET ’08

Preparations for PICMET ’08 started six years ago when I met with Antonie deKlerk and Tinus Pretorius in Washington, D.C., to discuss the desirability and feasibility of bringing PICMET to South Africa. The innovative solutions that South Africa has developed and successful results it obtained to sustain its economic growth over the years, especially during the sanctions against it, played an important role in selecting Cape Town as the location of the PICMET conference. We decided on 2008 to celebrate the 100th Anniversary of the University of Pretoria as a leading university with an impressive and immensely successful, rich history.

A large number of colleagues around the world contributed to the success of PICMET ’08. The Local Arrangements Committee (LAC) formed by the technology management leaders in South African universities, industry and government provided the much needed help in coordinating the local activities and contacts with local vendors for more than a year. Under the able leadership of Antonie de Klerk and Tinus Pretorius, the Committee became the liaison between the PICMET headquarters and the local sponsors, vendors, suppliers and service providers. The members of the LAC were Prof. Antonie M. de Klerk (University of Pretoria) (Chair), Prof. Marthinus (Tinus) W. Pretorius (University of Pretoria), Mrs. Mariette Stirk (University of Pretoria), Mr. Cornelis C. van Waveren (University of Pretoria), Dr. Greg Tosen (Eskom), Mr. Andre G. Hattingh (North West University), Dr. Dave Walwyn (Arvir), Miss Marlene E. Mulder (University of Pretoria), Mrs. Erna Gerryts (University of Pretoria), Prof. Leon Pretorius (University of Pretoria), Ms. Hellen Kriek (University of Pretoria), Mr. Marinus du Plessis (Exxaro), Dr. Jörg Lalk (PBMR), Mr. Saurabh Sinha (University of Pretoria), Prof. Nico Beute, (Cape Peninsula University of Technology), Mr. Willem Louw (Sasol Technology), and Prof. Mellet Moll (University of Stellenbosch).

The Country Representatives, under the leadership of Kiyoshi Niwa of the University of Tokyo and Dilek Cetindamar of Sabanci University, provided linkages between PICMET and the regions they represented. The Program Committee reviewed the papers and provided valuable assistance to assure the highest quality of presentations. The Advisory Council provided guidance for the strategic direction of the conference. We acknowledge the strong support provided by each group.

We offer special thanks to Interim President Michael Reardon and Dean Robert Dryden of Portland State University for their continuous support and encouragement.

Ann White coordinated the overall planning for the Conference; Liono Setiowijoso designed, maintained and managed the information systems, and formatted the papers for the *Proceedings*; Kenny Phan managed the registration process; Pisek Gerdsri coordinated the on-site activities; and Jeff Birndorf developed graphic arts for PICMET ’08.

The members of the Program Committee who reviewed the papers in a double-blind refereeing process were: Mustafa Abbas, Remal H Abotah , Dawood Abugharbieh, Nuran Acur, John O Aje, Fatima M. Albar, Mutib Algannas, Audrey Alvear, Muhammad Amer, Hacer Ansal, Elif Baktir, Nuri Basoglu, Rian Beise-Zee, John Bers, Frederick W Betz, Andrew P Black, James Brossard, Ferhan Cebi, Dilek Cetindamar, Kah-Hin Chai, C. M. Chang, Hongyi Chen, K.L. Choy, Darin G Colby, Michael Cole, Kelly R Cowan, Scott W Cunningham, Greg Daneke, Pranabesh Dash, Haluk Demirkan, John P. Dismukes, William (Ike) Eisenhauer, Anthony S. Erickson, M. Hosein Fallah, Dave Fenwick, John Garlitz, Nathasit Gerdsri, Pisek Gerdsri, Anatole Gershman, Bridget Haggerty, Ted R Heidrick, Abram Hernandez, Patricio Hernandez, Boonkiart Iewwongcharoen, Antonie J. Jetter, Martin Jetton, Shimei Jiang, Liz Kennedy, Jinho Kim, Jisun Kim, Pang Ryong Kim, Sun-Jin Kim, Gul Kremer, Isak Kruglianskas, Ann-Marie J. Lamb, Scott A. Leavengood, Linda Lin, Hilary T. Martin, Nitin Mayande, Mitali Monalisa, David W. Moore, Songphon Munkongsujarit, Steven F. Nahas, Ramin Neshati, Paul Newman, Leon Oerlemans, Cagla Ozen Seneler, Athar Pasha, Peerasit Patanakul, Robert Phaal, Kenny Phan, Marthinus W Pretorius, David R. Probert, Jang W. Ra, Avnish Rastogi, Guillermo Rueda, Rosine H Salman, Leonardo P. Santiago, Halime I. Sarihan, Neslihan Sener, Liono Setiowijoso, Gerald B. Sheble, Aaron J. Shenhar, Kunio Shirahada, Sabin Srivannaboon, Kathryn E. Stecke, Kevin Steensma, Jasper L. Steyn, Patt Suntharasaj, Ilknur Tekin, Alfred E. Thal, Jr., Thien A. Tran, Cherie C. Trumbach, Cornelis C. van Waveren, Ozalp Vayvay, Priya Venugopal, Wayne Wakeland, Kelly D. Waugh, Charles M. Weber, Gerry Williams, Clark E. Wilson, Diane Yates, Deok Soon Yim, and Brent A. Zenobia.

The PICMET Board of Directors set the direction of the Conference. Vince Reindl and John Schipper of Omnipress worked with PICMET from the beginning to the end of the conference planning effort. Their professionalism and superb expertise assured the high quality production of the PICMET *Proceedings* on schedule. We acknowledge the support of these colleagues and hundreds of others who contributed to PICMET's success, and express our gratitude to all of them.

We believe the PICMET ’08 *Proceedings* and this *Bulletin* contain some of the best knowledge available on Technology Management for addressing the challenges and opportunities of a sustainable economy. We hope they will contribute to the success of technology managers and emerging technology managers throughout the world.

Sincerely,

Dundar F. Kocaoglu
President and CEO

PICMET '08

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Portland State University

ADVISORY COUNCIL

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

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

Dr. Daniel Berg, Professor and Former President, RPI – USA

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Dr. Joseph Bordogna, Deputy Director, NSF – USA

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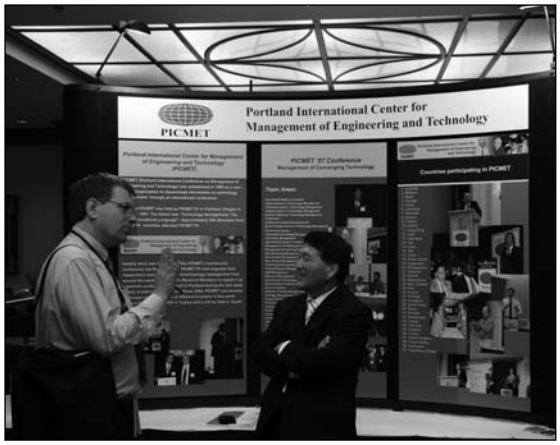

Dr. Joseph W. Cox, Oregon University System Distinguished Service Professor – USA

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

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

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

Dr. Eric von Hippel, Professor, MIT – USA

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

Dr. Rosalie Zobel, The European Commission – Belgium

PICMET '08

PROGRAM COMMITTEE

The Program Committee consisted of 104 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.

Mustafa Abbas
Remal H Abotah
Dawood Abugharbieh
Nuran Acur
John O Aje
Fatima M Albar
Mutib Algannas
Audrey Alvear
Muhammad Amer
Hacer Ansal
Elif Baktir
Nuri Basoglu
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Cornelis C van Waveren
Ozalp Vayvay
Priya Venugopal
Wayne Wakeland
Kelly D Waugh
Charles M Weber
Gerry Williams
Clark E Wilson
Diane Yates
Deok Soon Yim
Brent A Zenobia

LOCAL ARRANGEMENTS COMMITTEE (LAC)

Antonie M. de Klerk, University of Pretoria (LAC Chair)
Marthinus Pretorius, University of Pretoria (LAC Co-Chair)
Mariette Stirk, University of Pretoria (LAC Coordinator)

LAC MEMBERS

Cornelis van Waveren, University of Pretoria
Leon Pretorius, University of Pretoria
Marlene Mulder, University of Pretoria
Hellen Kriek, University of Pretoria
Mellet Moll, University of Stellenbosch
Nico Beute, Cape Peninsula Univ. of Technology
Erna Gerryts, University of Pretoria
Saurabh Sinha, University of Pretoria
Andre Hattingh, North West University
Greg Tosen, Eskom
Willem Louw, Sasol Technology
Dave Walwyn, Arvir
Jörg Lalk, PBMR
Marinus du Plessis, Exxaro

ACKNOWLEDGMENTS

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Student Paper Award

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

AUTHOR

Xiuli He

ADVISOR & CO-AUTHOR

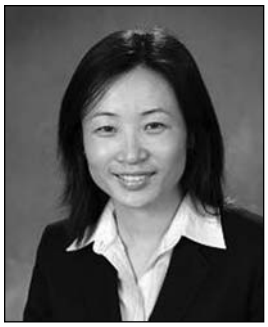
Suresh P. Sethi

UNIVERSITY

University of Texas at Dallas, USA

PAPER TITLE

"Cooperative Advertising and Pricing in a Dynamic Stochastic Supply Chain: Feedback Stackelberg Strategies"



ABSTRACT

Cooperative (co-op) advertising is an important instrument for aligning manufacturer and retailer decisions in supply chains. In this, the manufacturer announces a co-op advertising policy, i.e., a participation rate that specifies the percentage of the retailer's advertising expenditure that it will provide. In addition, it also announces the wholesale price. In response, the retailer chooses its optimal advertising and pricing policies. We model this supply chain problem as a stochastic Stackelberg differential game whose dynamics follows Sethi's stochastic sales-advertising model. We obtain the condition when offering co-op advertising is optimal for the manufacturer. We provide in feedback form the optimal advertising and pricing policies for the manufacturer and the retailer. We contrast the results with the advertising and price decisions of the vertically integrated channel, and suggest a method for coordinating the channel.

LTM AWARD

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—USA; Norman Augustine, Chairman of Lockheed Martin—USA; Jack Welch, CEO of General Electric—USA; Dr. Richard M. Cyert, President of Carnegie Mellon University—USA; Dr. Modesto A. Maidique, President of Florida International University—USA; Ms. Carleton S. Fiorina, Chairman and CEO of Hewlett-Packard Co.—USA; Ms. Donna Shirley, Manager of the Mars Exploration Program—USA; Mr. Jong-Yong Yun, Vice Chairman and CEO of Samsung Electronics, Inc.—Korea; Dr. Joseph Bordogna, Deputy Director of the National Science Foundation (NSF)—USA; Dr. Chun-Yen Chang, President of National Chiao Tung University—Taiwan; Dr. Kwan Rim, Chairman of Samsung Advanced Institute of Technology (SAIT)—Korea; Dr. Gunnar Hambraeus, member of the Swedish Royal Academy of Science and former President and Chairman, Royal Swedish Academy of Engineering Sciences—Sweden; Dr. Morris Chang, Founding Chairman, Taiwan Semiconductor Manufacturing Company Ltd. (TSMC)—Taiwan; Dr. Pairash Thajchayapong, Permanent Secretary, Ministry of Science and Technology—Thailand; Dr. Eric von Hippel, Professor and Head of the Technological Innovation and Entrepreneurship Group, Sloan School of Management, Massachusetts Institute of Technology—USA; Prof. Dr.-Ing. Dr. Sc. h.c. Bacharuddin Jusuf Habibie, former President, Indonesia, and founder and chairman, The Habibie Center—Indonesia; Dr. Youngrak Choi, Chairman, Korea Research Council of Public Science & Technology (KORP)—Korea; Dr. Tsuneo Nakahara, Adviser to CEO (past Vice Chairman) of Sumitomo Electric Industries, Ltd.—Japan; Dr. Mehmet Nimet Ozdas, Dept. of Mechanical and Control Engineering, Istanbul Technical University—Turkey; Dr. Edward B. Roberts, David Sarnoff Professor of the Management of Technology and Chair, Massachusetts Institute of Technology (MIT) Entrepreneurship Center—USA; Dr. Harold A. Linstone, Editor-in-chief, Technological Forecasting and Social Change, University Professor Emeritus, Systems Science, Portland State University—USA; Dr. Yoshio Nishi, Director of Research of the Stanford Center for Integrated Systems, Director of the Stanford Nanofabrication Facility, and Research Professor in the Department of Electrical Engineering at Stanford University—USA.

PICMET '08 AWARDEE:

Gideon de Wet

Professor Emeritus, University of Pretoria—South Africa

Dr Gideon de Wet's formal academic qualifications are the degrees BSc B.Eng (Electron) and PhD Eng., awarded by the University Stellenbosch in South Africa. Post-graduate studies include the Diploma in Digital Electronics, Philips International Institute for Technological Studies, Eindhoven, Netherlands; Advanced Course in Control Engineering, University of Cambridge, UK; Advanced Executive Programme, University of South Africa; MOT Summer School, MIT, Cambridge, Massachusetts, USA. He has published a number of professional papers and presented papers at several international conferences.

He has been involved in the management of technology for many years. He was the founder manager of the Institute for Maritime Technology (IMT) in Simon's Town. As General Manager: Research at Armscor, he played a significant part in the creation and operation of the technology development and management system of the defense community during the 1980s. He was the first incumbent of the Chair for Engineering Management at the University of Pretoria, where he taught management of technology and entrepreneurship at post-graduate level for more than 10 years. As a director of LGI and Technotron Pty Ltd., he participated in the establishment of a number of high-tech ventures. He was also the first Director: Intellectual Capital of DataFusion (Pty) Ltd. He has served on the boards of directors of several high-tech companies, several times as chairperson.

He started the Policy Studies Unit at CSIR, and expanded his field of interest to the level of the national innovation system and science and technology policy. This included participation in activities in countries like Chile, Mauritius and New Zealand and consultation for the United Nations' Economic Commission for Africa.

Although he is officially retired, he still undertakes consulting work and teaching. He was invited to teach at the University of Canterbury in Christchurch as Visiting Erskine Fellow on two occasions, the most recent being August to December 2006.

General Information

CONFERENCE FOCUS

The world economy, fueled by technological advances, is growing. The new players are entering the world arena and developing economic engines of their own, at a rapid pace. Innovation and economic development are going hand-in-hand in the technology era. The challenge the world is facing now is to make this growth sustainable, rather than just a growth spurt. Sustainability takes many forms. Smart use of resources is one form of sustainability, development of continuing innovations is another; protecting the environment while maintaining economic growth is still another form.

The primary role of Technology Management is to manage the technologies to assure that they work for the betterment of humankind. This role has never been more important than it is now. It is the responsibility of the Technology Management community to utilize and guide technology effectively to provide the world with the framework for sustainable growth under severe resource constraints and increased competition through innovation and technology development.

This is a big challenge for the leaders and emerging leaders in the Technology Management field. Recognizing this emerging challenge, the PICMET '08 Conference examines the role of Technology Management for a sustainable economy.

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 '08 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 technology-based organizations
- 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 a technical specialty to management positions while maintaining their identity in technical fields

PROGRAM

The PICMET '08 program consists of

- A Ph.D. Colloquium, "Getting Your PhD….And Beyond," Sunday, July 27, 13:00-17:00 in the Marco Polo Room.
- 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 '08

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

The publications will be available to PICMET '08 attendees at the registration desk.

General Information

REGISTRATION POLICY

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

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

**The one-day and student registration fees do not include the evening social events.*

SESSION AND PAPER DESIGNATIONS

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

First digit shows the day

M: Monday
T: Tuesday
W: Wednesday
H: Thursday

Second digit shows the time

A: 08:30-10:00
B: 10:30-12:00
C: 12:00-14:00
D: 14:00-15:30
E: 16:00-17:30

Third and fourth digits show the room

01: Ballroom West
02: Ballroom East
03: Sir Francis Drake
04: Marco Polo
05: Bartholomew Diaz
06: Vasco da Gama
07: Prince Edward Island
08: Seal Island
09: Robben Island
10: Dassen Island

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

PRESENTATION GUIDELINES

SESSION GUIDELINES

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

SESSION CHAIR GUIDELINES

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

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

SPEAKER GUIDELINES

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

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

AUDIO/VISUAL EQUIPMENT

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

E-MAIL

Computers with Internet connections are provided on the Old Harbour Level to give you the opportunity to check your e-mail and to send messages. Wireless access is available in the designated areas.

PICMET VOLUNTEERS

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

Cape Town Guide

AIRPORTS:

Cape Town's International Airport has international and domestic sections and is approximately 17km from the city centre. In addition to a VAT refund office, it has an Information Desk and an accommodation hot line.

Flight information may be obtained by telephoning +27(0)21 – 9340407 or visit the website at **www.airports.co.za**

BANKS AND CREDIT CARDS:

Banks are located throughout the city & suburbs and are open from Mon to Fri 09h00 - 15h30, Sat 08h30 - 11h00. Commercial banking services are available at Cape Town International Airport to coincide with international arrivals and departures.

Most international cards are accepted – fuel cannot be purchased on a credit card. Some banks issue a special 'petrol' or 'garage' card for this purpose.

CAR HIRE:

There is stiff competition among the international and local car rental companies which means that there are always specials available. To rent a car you will need a current South African, overseas or international driver's license. It is possible to pick up a car in one city and return it in another.

Some Car rental companies are:

www.avis.co.za
www.imperialcarrental.co.za

CLOTHING:

Being a winter rainfall area, Cape Town is wet and windy from May to August.

CLIMATE:

The seasons are upside down from those in the northern hemisphere. Winter runs from June to August and the sun shines on Christmas Day. Cape Town has a Mediterranean climate with four seasons. In the interior it becomes very hot in summer and during winter snow falls on the highest mountain peaks.

Daylight hours in summer are long, approximately 05:00 to 21:00. In winter the days are much shorter, 07:00 to 18:00. Remember this when planning your day, and get cracking while the sun is shining.

CRIME:

Like any large city, Cape Town has its crime. Petty crime does exist in and around the city center, but most of the serious crime reported is outside of the areas where a visitor would venture to.

Do not walk alone after dark in unpopulated streets or draw attention to money, cameras, jewellery or any valuables. A tourist police assistance unit is located in Tulbagh Square (021 - 4182852/3), which is open 7 days a week from 11h00 until 23h00 (Sunday 09h00 – 21h00). The main charge office in Cape Town is open 24 hours (021 - 4678000).

The national emergency police number for South Africa is 10111.

CURRENCY:

One Rand (R) = 100 cents (c).

Notes issued R200, R100, R50, R20, R10;

Coins issued are R5, R2, R1, 50c 20c, 10c, 5c, 2c, & 1c.

Currency exchange rates are available at banks and published daily in the press.

ELECTRICITY:

220/240 volts AC at 50 Hz.

Three pronged plugs are used, so take an adapter.

Most hotel rooms have 110 volt outlets for electric

Cape Town Guide

shavers and small appliances.

HOURS OF TRADING:

Most shops Mon to Fri 08h30 - 17h00 (Sat 13h00).

Supermarkets generally close at 18h00 (times vary according to the seasons) and some are open Saturday until 17h00 and Sunday to 14h00.

There is late night shopping at the Victoria Wharf (Waterfront) seven days a week.

LANGUAGES:

There are now 11 official languages in South Africa. English is widely spoken and understood.

The most common in the Cape are English, Afrikaans and Xhosa.

The other official languages are: Ndebele, Northern Sotho, Southern Sotho, Swati, Tsonga, Tswana, Venda, and Zulu.

MEDICAL CARE:

Standards of hygiene are high throughout Cape Town and the towns of the Western Cape. South Africa has excellent medical services with highly trained doctors and fully equipped hospitals. Your hotel can call a doctor or you can get a list of approved doctors from your embassy. Doctors are listed in the telephone directory under "Medical", Hospitals under "H".

Ambulances may be called by telephoning 10177.

It is safe to drink tap water anywhere unless a notice specifically warns otherwise. The sun in South Africa is strong and it is essential for visitors to use a good sun screen for protection.

NEWSPAPERS (CAPE TOWN):

Morning papers are: *Cape Times*, *Business Day*

Afternoon papers are: *The Argus*

Sunday papers are: *Sunday Argus*, *Sunday Times*

POST OFFICES:

These are open Mon - Fri from 08h00 - 16h30 & Sat 08h00 - 12h00.

Mail may be addressed to you Post Restante. The main post office in Cape Town has special counters for this purpose. Postage stamps are widely available (e.g. at some cafes and branches of the Central News Agency - CNA).

RELIGION:

Religions in South Africa are represented as follows: Christian 68%, Muslim 2%, Hindu 1.5%, Traditional, Animistic and other 28.5%. To find the place of worship of your choice, consult your hotel, information bureaux and the weekend press for details.

STANDARD TIME:

Is two hours in advance of Greenwich Mean Time, one hour in advance of central European winter time and seven hours in advance of United States Eastern Standard Time throughout the year.

SHUTTLE SERVICES AND TAXIS:

There are no roving taxis in Cape Town, but taxi's can be hired at taxi-ranks or summoned by telephone 021 - 4344444. As part of their services, hotels will be willing to order taxi services on request or offer shuttle services to their guests.

If you are staying at The Westin Grand Cape Town Arabella Quays, the hotel can arrange for either a shuttle (R450 per person, one way) or a taxi (R250 per person, one way) to pick you up at the airport and take you to the hotel. Reservations are required. Please call +2721 41 29999 to make a reservation. Your flight number will be required.

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TIPPING / GRATUITY:

This is expected in South Africa. A guideline for visitors is the following: Porters R5 per item, taxis 10%, waiters and waitresses in restaurants 10%.

TRAVELLERS CHEQUES:

Most international traveller's cheques are accepted, provided they are in an acceptable currency, and may be cashed at most banks. Many hotels and shops also provide this service.

TRAVEL:

Day tours and extended tours can be booked by contacting African Eagle Day Tours (**e-mail: daytours@aecpt.co.za; +021 464 4266; www.daytours.co.za;**) or by visiting the concierge at the Westin Grand Cape Town Arabella Quays.

The exhilarating ascent of Cape Town's Table Mountain is a must for any visitor and provides breathtaking views over the city and its beaches. The panorama stretches from Table Bay to False Bay and around the mountain to the Hout Bay Valley and Kommetjie. On a clear day one has a magnificent view across the Cape Flats to the Hottentots Holland Mountains.

The mountain is sculpted from sandstone and it rises 1086 metres above the bay. Its flat summit measures nearly 3km from end to end. The mountain is home to approximately 1470 species of plants. Many of these are endemic, i.e. appearing nowhere else on earth. Included are the rare Silver Tree and the wild orchid Disa Uniflora.

The Cableway was opened in 1929 and today conveys some 600,000 people to the summit annually. It provides safe access and the trip takes about six minutes.

On the summit there is a restaurant and a souvenir shop, from which letters bearing the Table Mountain postmark can be sent. Short walks may be taken from the cable-station, and the flora that may be seen in the different seasons makes it an essential trip for nature lovers.

It is not advisable to climb the mountain without someone experienced who knows the route well. There are some 350 recognised paths to the summit, some undemanding and some extremely difficult.

Kloof Nek is linked to the 669 metre Lion's Head, which in turn is connected by a lion's body to a rump known as Signal Hill. Along the road are superb views over the city and Atlantic Seaboard. The spiral pathway up Lion's Head passes through silver trees and spring flowers and provides a breathtaking panoramic view. Along the way visit the old Mosque. Signal Hill was once used as a semaphore post for communication with ships at sea, and it is from here that the noon gun is fired each day.

The scene from here at night, of the city lights with the backdrop of a floodlit Table Mountain, is an extremely romantic sight.

Cape Town's Victoria and Alfred Waterfront development has grabbed the imagination of Capetonian and visitor alike. With majestic Table Mountain as a backdrop and the unique interest of the 'working harbour', it is not surprising that the 'Waterfront' has

become Cape Town's most popular attraction. Its success has largely been built upon local support and attracts over a million visitors a month, of which 70% are Capetonians.

For over a century The Dutch East India Company contributed to the development of the Cape of Good Hope. The arrival of their merchant ships, laden with spices and treasures from markets explored, caused great excitement in the community. Times have changed, yet the same spirit lives on at the Waterfront Craft Market, where craftsmanship and artistry of an ageless quality are captured in a market for the explorer at heart.

Shops cover gemstones, curios and fancy fashions to the silliest souvenirs. It is also well stocked with

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restaurants, taverns, cinemas, theatres and a variety of entertainment including boat trips and charters. Try the historical walks.

It is advisable to first visit the V&A Waterfront Information Centre. They are there to help you with friendly advice, directions and up-to-the minute information on activities and events. They will even

arrange bookings for tours and taxis.

A trip to Robben Island Museum is a must for any visitor to Cape Town. Visit the prison cell where Nelson Mandela spent many of his years in prison. For nearly 400 years, Robben Island, 12 kilometres from Cape Town, was a place of banishment, exile, isolation and imprisonment. It was here that rulers sent those they regarded as political troublemakers, social outcasts and the unwanted of society. During the apartheid years Robben Island became internationally known for its institutional brutality. The duty of those who ran the Island and its prison was to isolate opponents of apartheid and to crush their morale. Some freedom fighters spent more than a quarter of a century in prison for their beliefs. Those imprisoned on the Island succeeded on a psychological and political level in turning a prison 'hell-hole' into a symbol of freedom and personal liberation. Robben Island came to symbolise, not only for South Africa and the African continent, but also for the entire world, the triumph of the human spirit over enormous hardship and adversity.

The Two Oceans Aquarium offers an exciting insight into the indigenous fresh and seawater creatures of South Africa.

The Victoria Wharf Shopping Centre forms the bulk of the retail space at the Waterfront, and presents the shopper with a wide variety of national retailers, boutiques and services, along with a large selection of restaurants, coffee shops and fast food outlets.

The Alfred Mall & Pierhead is situated within the historic Pierhead and overlooks the small craft harbour and adjacent dry dock. Those seeking quality specialist artefacts, jewellery, curios and art with a nautical or African flavour will find a wonderful selection here.

The Red Shed Craft Workshop, adjoining the Victoria Wharf centre, is filled with an eclectic mix of handmade merchandise and art and has an atmosphere that brings the shopper closer to the creator.

The Waterfront Craft Market represents the Waterfront's culture of entrepreneurship and micro business development. This vibrant indoor craft market, adjacent to the Two Oceans Aquarium, features a diverse assortment of innovative designs and traditional handcrafts, antiquities and holistic lifestyle accessories.

The South African Maritime Museum has the largest collection of model ships and some fascinating artifacts. There is also a floating exhibit, the S.A.S. Somerset.

Other items of historical interest are the Time Ball Tower (which was once used by ships in the bay to set the time) and the Old Clock Tower, built in 1887. The topmost floor housed the clock mechanism, while the bottom floor housed the elaborate tide-gauge operated by a float on the water below. The Clock Tower Centre, across the swingbridge from the Pierhead, is the latest addition to the V&A Waterfront's retail offering. It brings South African crafts, arts, designs and foods together in one centre, along with facilities appealing to tourists and locals alike.

Cape Fur Seals can be viewed by taking a boat ride around the harbour.

WINELAND INFORMATION:

The fertile green valleys of Cape Town's winelands are surrounded by proud mountain ranges. Towns and villages have many historic homesteads and monuments, and every so often fruit orchards are to be seen, whose produce may be found in all corners of the world. It is the Mediterranean climate and winter rainfall area of the southwestern Cape that produces some of the best wines in the country. The rich, fertile soils along the Breede River and especially the areas of Somerset West, Stellenbosch, Franschhoek and Paarl,

CAPE TOWN GUIDE

have become world famous for their whites, reds, sherries, ports and brandies.

WINELANDS - HELDERBERG

The Helderberg area includes Somerset West, Strand and Gordon's Bay. The drive to Somerset West takes just 30 minutes from Cape Town along the N2. Close to Stellenbosch, this residential centre has a delightful setting and many of its residents commute to Cape Town daily. The historic N.G. Kerk (Dutch Reformed Church) was built in 1820 and is worth a visit. Visit the Vergelegen estate which eventually led to the downfall of Willem Adriaan van der Stel's corrupt regime.

Just 5 minutes from Somerset West is the seaside resort

of the Strand, which has a 5 km stretch of beach with warm water and safe swimming. This is a favourite area for anglers.

Gordon's Bay is a water-sport paradise and a charming fishing village. Its position is marked by the painted giant 'GB' and anchor sign on the mountainside above the bay. The quaint fishing and yacht harbour bring a Mediterranean atmosphere to this enchanting haven.

WINELANDS - STELLENBOSCH

Only 30 minutes' drive from Cape Town lies the town of Stellenbosch, the second oldest town in South Africa. The settlement was established in 1679.

The Stellenbosch Tourist Information Office and the Stellenbosch Wine Route Office are in Market Street - start to your tour here! Many of the historical buildings are close by and it is possible to discover some of Stellenbosch on foot.

The Toy & Miniature Museum is situated behind the Information Bureau and is the only one of its kind in South Africa.

Close to Market Street is the town square, known as Die Braak, where there are some interesting buildings. The VOC Kruithuis (Powder House) (1777), the Old Rhenish Mission, the Church of St Mary (1852), the Coachman's Cottage and the old Burgerhuis (1797) are all worth visiting.

Dorp Street has the longest row of historical buildings in the country. In the lower part of Dorp Street is an elegant, gabled mansion that houses the Rembrandt van Rijn Art Museum. Next door is the Stellenryck Wine Museum. Other interesting buildings include the Theological College, the Old Reading Room, the Old Parsonage, the Old Lutheran Church (now an art gallery), Stellenbosch Gymnasium, La Gratitude, Voorgelegen and Oom Samie se Winkel, one of Stellenbosch's first general dealer stores. It is crammed with traditional fare, bric-a-brac, curios and other exciting goods. There is also a delightful tea garden.

The Stellenbosch Village Museum, in Ryneveld Street, is a superb collection of historic houses ranging in periods from 1709 to 1850; and each is restored and furnished in the style of its particular period.

Following the Stellenbosch Wine Route is one of the most enjoyable ways of seeing the southwestern Cape.

SHOPPING:

CAPE TOWN:

Adderley Street has shopping centres, malls and many interesting gift shops catering to the visitor. The area is well known for its curio and fashion shops, as well as many well known jewellery stores which offer quality goods for the discerning buyer.

St George's Mall has a number of interesting boutiques and around the corner is Greenmarket Square with its flea market and fashion boutiques. Long Street has many small charming shops, reflecting the character of Cape Town.

The V&A Waterfront has a variety of shops (open 7 days a week) from curios to fashion and has late trading hours.

CAPE TOWN GUIDE

ATLANTIC SEABOARD:

Sea Point has many fashion and clothing shops down its Main Road, as does Camps Bay. Hout Bay has several craft shops and there are artists, potters and sculptors who reside in the area and sell their craft.

FALSE BAY COAST:

The False Bay coastline is known as the Treasure Coast and is dotted with many charming shops selling a variety of wares. The small village of Kalk Bay and Simon's Town offer the most.

CLAREMONT:

Claremont is the shopping mecca of the Southern Suburbs and Cavendish Square is its main attraction.

NORTHERN SUBURBS:

Tyger Valley Shopping Centre is at the centre of the Northern Suburbs and is the largest shopping centre in the Cape and is conveniently situated between Cape Town and the Winelands.

OUTDOORS AND ADVENTURE:

Bungy-jumping - the ultimate in outdoor adventure, including the highest bungy-jump in the world at Bloukrans.

Canoeing - White water enthusiasts will be pleased to know that the Cape's rivers will oblige. Trips on the Breede, Berg, Dorings and Orange Rivers may be arranged.

Cricket has been played in Cape Town since the early days of British occupation. South Africa's cricket team is one of the best in the world and facilities at Newlands Cricket Grounds are outstanding. Visitors are urged to attend provincial and international matches.

Cycling - Cape Town is home to the famous Argus Cycle Tour of the Peninsula, which takes place in March every year.

Deep sea game fishing - Some of the finest big game fishing in the world is available here - in particular longfin and yellowfin tuna and broadbilled swordfish.

Gym - Most hotels have facilities.

Hiking is popular among the locals, and Table Mountain can get rather crowded on a Sunday. It is not advisable to climb up the mountain without someone experienced who knows the route well.

Horse racing in Cape Town is closely entwined with local life. There are two tracks - Kenilworth and Durbanville. Racing takes place every Wednesday and Saturday.

Horse riding enthusiasts may arrange outrides with The Riding Centre (021 - 7905286) in Valley Road, Hout Bay.

Rugby is the favourite sport of South Africans and the Springbok team are national heroes.

Sail boarding (windsurfing) is another favourite, with Blouberg beach the main area. Langebaan Lagoon and Clanwilliam Dam are also popular.

Sailing - The Royal Cape Yacht Club is situated at the docks in Table Bay. The Cape-to-Rio Yacht Race starts from here every two years - the next race will be in January 2002. Rothman's Week regatta starts mid-December. Keel boats are also harboured at Simon's Town in False Bay. Multihull sailing is popular at Fish Hoek and Hout Bay. Sailing on dams, lagoons and rivers is also popular.

Scuba diving is one of the largest growing sports in Cape Town and there are many areas suitable for this exciting sport.

Surfing is popular in Cape Town and some of the world's leading surfers are resident here. Spectacular surfing competitions are held during the summer months.

Tennis courts are to be found at most hotels and there

are many sports clubs in and around the city which will accommodate visitors.

EATING OUT:

TRADITIONAL CUISINE:

Local cuisine is as international as the ancestors of today's South Africans. When one thinks of South African dishes, it is easy to imagine sosaties braaied over an open fire, a thick bredie or a sweet Malay curry. However, dishes such as sweet and sour pork, spaghetti Bolognese, veal schnitzel and roast beef and Yorkshire pudding are equally as South African.

FISH AND SEAFOOD:

Oceans cold and tropical provide a generous, varied catch of fish and seafood. From fish & chips to crayfish (lobster), langoustine and prawns, and all the trimmings can be indulged if visitors so wish.

Among the fine seafood also available is: hake, kabeljou, kingklip, sole, white-steenbras, red-steenbras, Cape salmon, yellowtail, angelfish, tuna, bluefish, snoek, perlemoen, calamari (squid), octopus, oysters and mussels.

FOR CARNIVORES:

Cape Town's restaurants serve hefty portions which are enough to satisfy any appetite. The quality of meat is extremely good and the variety wide. Beef, lamb and veal dominate menus with venison being popular in winter.

Chicken and duck are available at most restaurants. South Africans are extremely fond of (and good at) braaiing (barbecuing), and boerewors (sausage), kebabs and lamb-chops are popular.

FRUIT AND VEGETABLES:

Fresh vegetables from the farms in the Western Cape come daily to the markets where they are purchased by restaurateurs with a knack for finding the best quality.

Fruit is plentiful and deliciously sweet. Apples, oranges, naartjies, grapes, peaches, plums, strawberries, pears and cherries come from the temperate regions, while the tropics provide bananas, avocados, pawpaws, grenadillas, pineapples, and mangoes.

FOREIGN FOODS:

There are many foreign restaurants in Cape Town catering to the ethnic population and the increasingly adventurous locals. Visitors may choose from dozens of cultural cuisines, mostly from Europe and Asia. Chinese, Japanese, Thai and Indian styles of cooking are well represented.

WINE AND BEER:

Wine has been made here since Jan van Riebeeck's first vineyard was planted at Bishopscourt. Simon van der Stel started the winelands of Constantia, and Stellenbosch, Paarl, Somerset West and Franschhoek areas are currently producing some of the best wines in the world. Beer is a favourite drink among the locals, and the South African climate encourages a few pints at the end of a hard day's work. Castle and Lion lager are the most popular and South African breweries are major sponsors of local sport.

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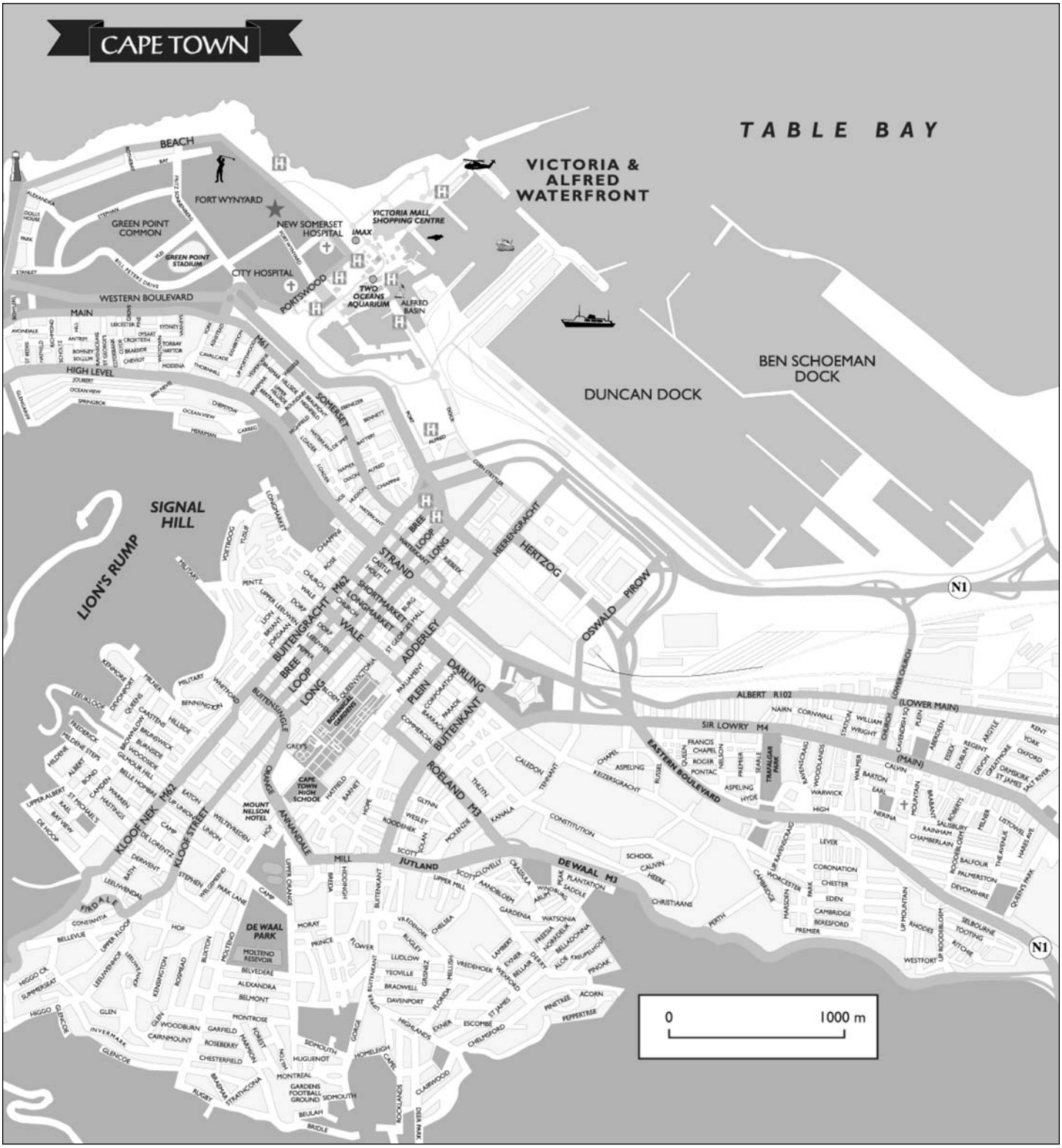

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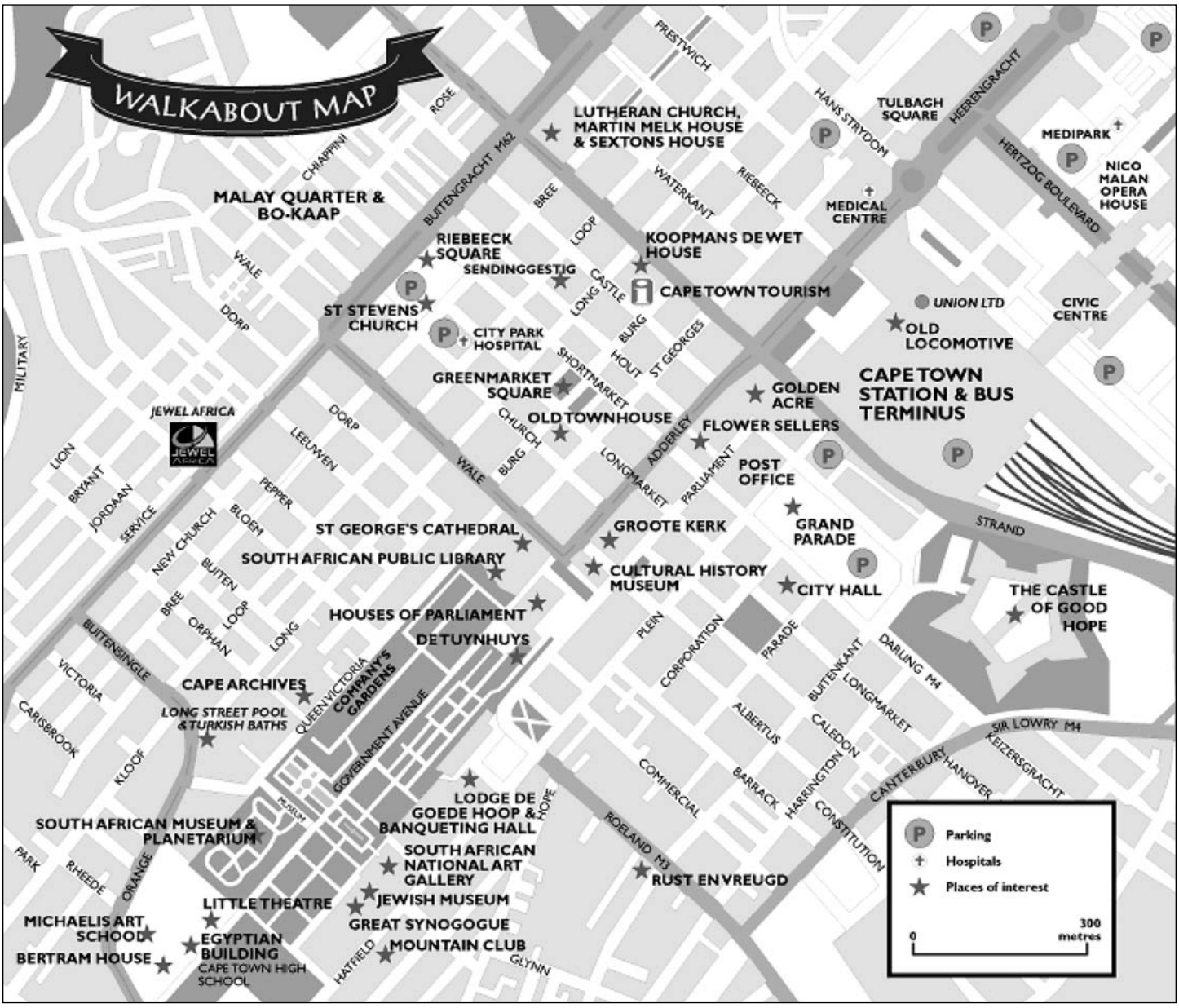


DAILY TOURS

Please take the opportunity to enjoy the beauty and history of Cape Town, the breathtaking Cape Peninsula, or the vineyards of Stellenbosch. **African Eagle Day Tours** offers a wide variety of full- and half-day tours of Cape Town and its environs, a few of which are described below. Tours can be booked ahead by visiting **www.daytours.co.za** or by visiting the concierge at the Westin Grand Cape Town Arabella Quays.

African Eagle Day Tours also offers a variety of extended tours for your post-conference enjoyment to places such as Kruger National Park, the Garden Route, Namibia, and Victoria Falls. Please visit **www.daytours.co.za** for more information.

FULL DAY TOURS

PENINSULA TOUR

Travel along the spectacular coastline of the Peninsula through charming historical villages. Visit the mythical meeting place of the two great oceans and experience the "Fairest Cape of all".

HIGHLIGHTS

- Clifton and Camps Bay
- Twelve Apostles
- Llandudno
- Hout Bay (optional boat trip to Seal Island)
- Chapman's Peak (if open)
- Noordhoek
- Ostrich viewing
- Cape of Good Hope Nature Reserve
- Cape Point
- Cape of Good Hope
- Cape of Good Hope Penguin colony (optional)
- Simon's Town
- Muizenberg
- Constantia
- Kirstenbosch Botanical Gardens

DAILY TOURS: 08:00 – ±17:30
PRICE: R520.00 PER PERSON

Rate includes: Registered tourist guide, transport in air-conditioned vehicle and entrance fees to Cape of Good Hope Nature Reserve, Kirstenbosch Botanical Gardens and Chapman's Peak toll.

Rate excludes: Optional boat trip to Cape Fur Seal Colony in Hout Bay; optional visit to Jackass Penguin Colony at Boulders, funicular at Cape Point and lunch

THE WINE ROUTE

Allow us to take you on a breathtaking journey through the winelands of the Cape. Witness the wine making process, from the vineyard to the bottle, and visit the historical towns of Stellenbosch, Franschhoek and Paarl.

HIGHLIGHTS

Stellenbosch
- City orientation
- Dorp Street
- De Braak
- Free walk into historical town
- Wine tasting on a Stellenbosch Estate
- Cellar tour
- Cheese tasting

Paarl
- Drive through Paarl
- Wine Tasting on a Paarl Wine Estate
- View Nelson Mandela's former prison (Victor Vester)

Franschhoek
- Franschhoek historical village
- Huguenot Memorial (optional)
- Wine Tasting at a Franschhoek vineyard
- Helshoogte Pass
- Optional Cheetah viewing at Spier Wine Estate (time permitting)
- Opportunity to purchase wine
- Minimum 3 wine tastings

DAILY TOURS: 08:00 – ±17:30
PRICE: R520.00 PER PERSON

Rate includes: Registered tourist guide, transport in air-conditioned vehicle, cellar tour, three wine tastings and a cheese tasting.

Rate excludes: Lunch and optional visits

THE BEST OF THE CAPE TOUR

Combine historical Stellenbosch and its wine region with a journey to the Cape of Good Hope and Cape Point.

HIGHLIGHTS

The Peninsula
- Clifton and Camps Bay
- Twelve Apostles
- Llandudno
- Hout Bay
- Chapmans Peak (if open)
- Noordhoek

DAILY TOURS

- Ostrich viewing
- Cape of Goodhope nature reserve
- Cape Point
- Penguin colony (optional)
- Simons Town
- Kalk bay
- Muizenberg
- False bay

The Wine Route
- Stellenbosch orientation
- Wine tasting
- Cellar tour
- Opportunity to purchase wine
- Cheese tasting

DAILY TOURS: 08:00 – ±17:30
PRICE: R610.00 PER PERSON

Rate includes: Registered tourist guide, transport in air-conditioned vehicle, cellar tour, wine tasting, entrance to Cape of Good Hope Nature Reserve and chapmans peak toll

Rate excludes: Lunch, optional visit to Penguin Colony and funicular at Cape Point

THE WHALE ROUTE

Enjoy a scenic coastal drive and experience the majestic beauty of Southern Right whales basking in the warm waters off the Hermanus coastline.

HIGHLIGHTS
- Gordon's Bay, Pringle Bay and Betty's Bay
- The Harold Porter Botanical Gardens
- Drive through Hamilton Russell Wine Estate (closed on Sundays)
- Rotary drive
- Fernkloof Nature Reserve
- Hermanus
- Land based whale watching
- Elgin
- Sir Lowry's Pass

DAILY TOURS: 08:00 – ±17:30
PRICE: R550.00 PER PERSON

Rate includes: Registered tourist guide, transport in air-conditioned vehicle, entrance to Harold Porter Botanical Garden

Rate excludes: Lunch

HALF DAY TOURS

CITY TOUR

Join us for a morning or afternoon orientation tour of the Mother City as we venture through streets crowded with history. This tour includes an option to visit Table Mountain, or in the event of inclement weather, Table View.

HIGHLIGHTS
- South African Museum and the Company Gardens
- Parliament buildings
- City Hall and Castle of good Hope
- Malay Quarter/ Bo-Kaap
- Green Market Square
- Signal Hill
- Camps Bay and Clifton
- Short Diamond factory tour – optional

OPTION 1
Visit above highlights + Table Mountain (cable car fee not included and weather permitting)
or
OPTION 2
Visit above highlights + Table View for a "postcard

DAILY TOURS

view" of Table Mountain

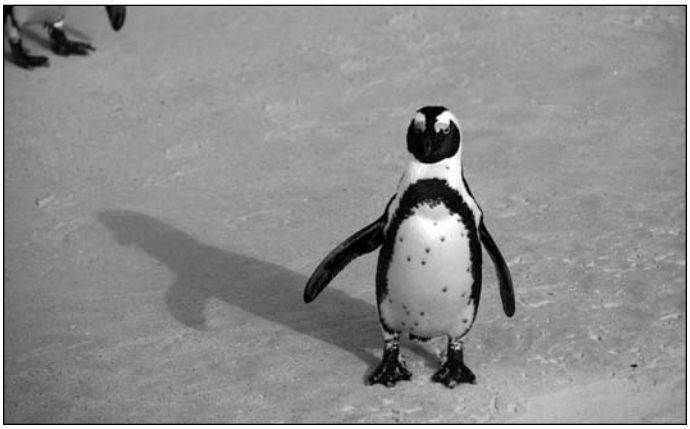
MORNING TOUR: 08:00 – 12:30
AFTERNOON TOUR: 13:00 – 17:30
PRICE: R295.00 PER PERSON

Rate includes: Registered tourist guide, transport in air-conditioned vehicle, and entrance fees to South African Museum.

Rate excludes: Cable car trip up Table Mountain and lunch

THE PENINSULA

Experience rugged coastlines and unspoiled beauty as you wind your way along the shores of the Cape Peninsula to the mythical meeting place of the two great oceans.



HIGHLIGHTS

- Clifton and Camps Bay
- Twelve Apostles
- Hout Bay
- Chapman's Peak Drive (if open)
- Noordhoek
- Ostrich viewing
- Cape of Good Hope Nature Reserve
- Cape Point
- False Bay
- Penguin colony (optional)
- Simon's Town
- Muizenberg
- Constantia

MORNING TOUR: 08:00 – 12:30
AFTERNOON TOUR: 13:00 – 17:30
PRICE: R390.00 PER PERSON

Rate includes: Registered tourist guide, transport in air-conditioned vehicle and entrance to Cape of Good Hope Nature Reserve

Rate excludes: Entrance fees to optional visits and funicular

THE WINE ROUTE

The protestant refugees from France brought with them their finely tuned, centuries–old viticultural skills, which they applied locally with immediate success. Their settlement in the 1680s around the newly established village of Stellenbosch gave birth to what we know today as the cradle of the South African wine industry.

HIGHLIGHTS

- Wine tasting on Stellenbosch Wine Estate
- Cheese tasting
- Stellenbosch orientation
- De Braak
- Dorp Street
- Cellar Tour
- Second wine tasting
- Opportunity to purchase wine

MORNING TOUR: 08:00 – 12:30
AFTERNOON TOUR: 13:00 – 17:30
PRICE: R390.00 PER PERSON

Rate includes: Registered tourist guide, transport in air-conditioned vehicle, wine tastings and Cellar Tour

Social Events

To facilitate the informal interaction of the participants, several social events have been scheduled during PICMET '08

WELCOMING RECEPTION/BUFFET

DATE: SUNDAY, 27 JULY

TIME: 19:00—22:00

LOCATION: WESTIN BALLROOM

DRESS: INFORMAL

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

MONDAY DINNER AT THE CAPE CASTLE

DATE: MONDAY, 28 JULY

TIME: 19:00—22:00

LOCATION: CASTLE OF GOOD HOPE

DRESS: CASUAL

Enjoy a variety of traditional South African dishes, typical of our rainbow nation at "Het Bakhuys," in the oldest building in South Africa built between 1666 and 1679 by the Dutch East India Company. Situated at the foot of Table Mountain, the pentagonal Castle of Good Hope remains the best fortification of its kind built by the Dutch East India Company and was declared a national monument in 1936. Busses will transfer delegates from the Westin Grand Arabella Quays to the Castle and back. Included in the registration fee.*

AWARDS BANQUET

DATE: TUESDAY, 29 JULY

TIME: 19:00—22:00

LOCATION: WESTIN BALLROOM

DRESS: BUSINESS ATTIRE

This is the premier social event of the conference. The PICMET '08 "Leadership in Technology Management," "Medal of Excellence" and "Outstanding Student Paper" awards will be presented at the banquet. Included in the registration fee.*

*The student and one-day registration fees do not cover evening events. Tickets for each of the Sunday – Tuesday events may be purchased on-line when registering for the conference or on-site at the registration desk.

TECHNICAL PROGRAM

PROGRAM OVERVIEW

The PICMET '08 technical program consists of 100 sessions including four plenaries, one tutorial, one panel discussion, two special sessions and 91 paper sessions

The plenaries are scheduled from 08:30 to 10:00 every morning, Monday, July 28 through Thursday, July 31, in the Ballroom on the Old Harbour Level. They are described in the "Plenaries" section of this Bulletin.

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 '08 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 67 percent are in the [R] category, and the rest are in the [A] category.

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

THE SCHEDULE

The plenary is the only session in the 08:30-10:00 time slot. After that, there are up to 10 break-out sessions throughout the day, Monday through Thursday.

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

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

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

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

We hope these will help you to take full advantage of the richness of the technical program at PICMET '08.

SHARE THE PICMET EXPERIENCE

We define "**PICMET Experience**" as

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

DAILY SCHEDULE

MONDAY, JULY 28, 2008

		01 Ballroom West	02 Ballroom East	03 Sir Francis Drake	04 Marco Polo	05 Bartholomew Diaz	06 Vasco da Gama	07 Prince Edward Island	08 Seal Island	09 Robben Island	10 Dassen Island
MA	08:30-10:00	Plenary Session-1									
MB	10:30-12:00	Meet the Editors	Radical Innovations-1	Strategic Management of Technology-1	Supply Chain Management-1	Knowledge Management-1	Technology Assessment and Evaluation-1	Competitiveness	Global Issues	Environmental Issues	Technology Transfer
MC	12:00-14:00										
MD	14:00-15:30	Technical Workforce	Innovation Management-1	Strategic Management of Technology-2	Technology Based Organizations-1	Technology Management in Biotechnology	Technology Forecasting	Project /Program Management-1		Technology Management in Services-1	Science and Technology Policy-1
ME	16:00-17:30	Business Game for Research	Innovation Management-2	Strategic Management of Technology-3	R&D Management-1	Information Management-1	Technology Assessment and Evaluation-2	Project /Program Management-2	Technology Management in the Defense Sector-1	Technology Management in Services-2	Science and Technology Policy-2
		01 Ballroom West	**02 Ballroom East**	**03 Sir Francis Drake**	**04 Marco Polo**	**05 Bartholomew Diaz**	**06 Vasco da Gama**	**07 Prince Edward Island**	**08 Seal Island**	**09 Robben Island**	**10 Dassen Island**

DAILY SCHEDULE

TUESDAY, JULY 29, 2008

		01 Ballroom West	02 Ballroom East	03 Sir Francis Drake	04 Marco Polo	05 Bartholomew Diaz	06 Vasco da Gama	07 Prince Edward Island	08 Seal Island	09 Robben Island	10 Dassen Island
TA	08:30-10:00	Plenary Session-2									
TB	10:30-12:00	Technology Roadmapping-1	Innovation Management-3	Technology Adoption-1	Technology Management Education-1	Technology Management in the Energy Sector	Technology Marketing	Project /Program Management-3	Technology Management in Semiconductor Industry	Technology Management in Services-3	Technology Management in Telecommunications-1
TC	12:00-14:00										
TD	14:00-15:30	Technology Roadmapping-2	Innovation Management-4	Strategic Management of Technology-4	Technology Management Education-2	Knowledge Management-2	Entrepreneurship / Intrapreneurship	Project /Program Management-4		Sustainability-1	Emerging Technologies
TE	16:00-17:30	Technology Planning-1	Innovation Management-5	Technology Adoption-2	Technology Management Education-3	Information Management-2	New Product Development-1	Project /Program Management-5		Sustainability-2	Decision Making-1
		01 Ballroom West	**02 Ballroom East**	**03 Sir Francis Drake**	**04 Marco Polo**	**05 Bartholomew Diaz**	**06 Vasco da Gama**	**07 Prince Edward Island**	**08 Seal Island**	**09 Robben Island**	**10 Dassen Island**

DAILY SCHEDULE

WEDNESDAY, JULY 30, 2008

		01 Ballroom West	02 Ballroom East	03 Sir Francis Drake	04 Marco Polo	05 Bartholomew Diaz	06 Vasco da Gama	07 Prince Edward Island	08 Seal Island	09 Robben Island	10 Dassen Island
WA	08:30-10:00	Plenary Session-3									
WB	10:30-12:00	Software Process Management	Innovation Management -6	Technology Based Organizations-2	Supply Chain Management-2	Information Management -3	New Product Development-2	Project /Program Management-6	Technology Management in the Health Sector	Science and Technology Policy-3	Decision Making-2
WC	12:00-14:00										
WD	14:00-15:30	Technology Diffusion-1	Innovation Management -7	Strategic Management of Technology-5	R&D Management-2	E-Business	New Product Development-3			Collaborations-1	Technology Management in Telecommunications-2
WE	16:00-17:30	Technology Diffusion-2	Innovation Management -8	Cultural Issues	R&D Management-3	Information Management -4	New Product Development-4	Project /Program Management-7		Collaborations-2	Technology Management in Telecommunications-3
		01 Ballroom West	**02 Ballroom East**	**03 Sir Francis Drake**	**04 Marco Polo**	**05 Bartholomew Diaz**	**06 Vasco da Gama**	**07 Prince Edward Island**	**08 Seal Island**	**09 Robben Island**	**10 Dassen Island**

DAILY SCHEDULE

THURSDAY, JULY 31, 2008

		01 Ballroom West	02 Ballroom East	03 Sir Francis Drake	04 Marco Polo	05 Bartholomew Diaz	06 Vasco da Gama	07 Prince Edward Island	08 Seal Island	09 Robben Island	10 Dassen Island
HA	08:30-10:00	Plenary Session-4									
HB	10:30-12:00	Supply Chain Management-3	Radical Innovations-2	Strategic Management of Technology-6	R&D Management -4	Knowledge Management -3	New Product Development-5	Manufacturing Management		Technology Management in Services-4	National Performance Evaluation of Research and Development Program in Korea
HC	12:00-14:00										
HD	14:00-15:30	PICMET '09 and '10 Planning Session									
		01 Ballroom West	**02 Ballroom East**	**03 Sir Francis Drake**	**04 Marco Polo**	**05 Bartholomew Diaz**	**06 Vasco da Gama**	**07 Prince Edward Island**	**08 Seal Island**	**09 Robben Island**	**10 Dassen Island**

SCHEDULE OF SESSIONS

SCHEDULE OF SESSIONS BY DATE
MONDAY, JULY 28, 2008

Session	Number	Date	Time	Room	Session Title
MA	01	Monday	08:30 - 10:00	Ballroom	PLENARY: "Plenary 1"
MB	01	Monday	10:30 - 12:00	Ballroom West	PANEL: "Meet the Editors"
MB	02	Monday	10:30 - 12:00	Ballroom East	"Radical Innovations-1"
MB	03	Monday	10:30 - 12:00	Sir Francis Drake	"Strategic Management of Technology-1"
MB	04	Monday	10:30 - 12:00	Marco Polo	"Supply Chain Management-1"
MB	05	Monday	10:30 - 12:00	Bartholomew Diaz	"Knowledge Management-1"
MB	06	Monday	10:30 - 12:00	Vasco da Gama	"Technology Assessment and Evaluation-1"
MB	07	Monday	10:30 - 12:00	Prince Edward Island	"Competitiveness"
MB	08	Monday	10:30 - 12:00	Seal Island	"Global Issues"
MB	09	Monday	10:30 - 12:00	Robben Island	"Environmental Issues"
MB	10	Monday	10:30 - 12:00	Dassen Island	"Technology Transfer"
MD	01	Monday	14:00 - 15:30	Ballroom West	"Technical Workforce"
MD	02	Monday	14:00 - 15:30	Ballroom East	"Innovation Management-1"
MD	03	Monday	14:00 - 15:30	Sir Francis Drake	"Strategic Management of Technology-2"
MD	04	Monday	14:00 - 15:30	Marco Polo	"Technology Based Organizations-1"
MD	05	Monday	14:00 - 15:30	Bartholomew Diaz	"Technology Management in Biotechnology"
MD	06	Monday	14:00 - 15:30	Vasco da Gama	"Technology Forecasting"
MD	07	Monday	14:00 - 15:30	Prince Edward Island	"Project/Program Management-1"
MD	09	Monday	14:00 - 15:30	Robben Island	"Technology Management in Services-1"
MD	10	Monday	14:00 - 15:30	Dassen Island	"Science and Technology Policy-1"
ME	01	Monday	16:00 - 17:30	Ballroom West	TUTORIAL: "Workshop on Business Game for Research"
ME	02	Monday	16:00 - 17:30	Ballroom East	"Innovation Management-2"
ME	03	Monday	16:00 - 17:30	Sir Francis Drake	"Strategic Management of Technology-3"
ME	04	Monday	16:00 - 17:30	Marco Polo	"R&D Management-1"
ME	05	Monday	16:00 - 17:30	Bartholomew Diaz	"Information Management-1"
ME	06	Monday	16:00 - 17:30	Vasco da Gama	"Technology Assessment and Evaluation-2"
ME	07	Monday	16:00 - 17:30	Prince Edward Island	"Project/Program Management-2"
ME	08	Monday	16:00 - 17:30	Seal Island	"Technology Management in the Defense Sector-1"
ME	09	Monday	16:00 - 17:30	Robben Island	"Technology Management in Services-2"
ME	10	Monday	16:00 - 17:30	Dassen Island	"Science and Technology Policy-2"

TUESDAY, JULY 29, 2008

TA	01	Tuesday	08:30 - 10:00	Ballroom	PLENARY: "Plenary 2"
TB	01	Tuesday	10:30 - 12:00	Ballroom West	"Technology Roadmapping-1"
TB	02	Tuesday	10:30 - 12:00	Ballroom East	"Innovation Management-3"

SCHEDULE OF SESSIONS

TB	03	Tuesday	10:30 - 12:00	Sir Francis Drake	"Technology Adoption-1"
TB	04	Tuesday	10:30 - 12:00	Marco Polo	"Technology Management Education-1"
TB	05	Tuesday	10:30 - 12:00	Bartholomew Diaz	"Technology Management in the Energy Sector"
TB	06	Tuesday	10:30 - 12:00	Vasco da Gama	"Technology Marketing"
TB	07	Tuesday	10:30 - 12:00	Prince Edward Island	"Project/Program Management-3"
TB	08	Tuesday	10:30 - 12:00	Seal Island	"Technology Management in Semiconductor Industry"
TB	09	Tuesday	10:30 - 12:00	Robben Island	"Technology Management in Services-3"
TB	10	Tuesday	10:30 - 12:00	Dassen Island	"Technology Management in Telecommunications-1"
TD	01	Tuesday	14:00 - 15:30	Ballroom West	"Technology Roadmapping-2"
TD	02	Tuesday	14:00 - 15:30	Ballroom East	"Innovation Management-4"
TD	03	Tuesday	14:00 - 15:30	Sir Francis Drake	"Strategic Management of Technology-4"
TD	04	Tuesday	14:00 - 15:30	Marco Polo	"Technology Management Education-2"
TD	05	Tuesday	14:00 - 15:30	Bartholomew Diaz	"Knowledge Management-2"
TD	06	Tuesday	14:00 - 15:30	Vasco da Gama	"Entrepreneurship / Intrapreneurship"
TD	07	Tuesday	14:00 - 15:30	Prince Edward Island	"Project/Program Management-4"
TD	09	Tuesday	14:00 - 15:30	Robben Island	"Sustainability-1"
TD	10	Tuesday	14:00 - 15:30	Dassen Island	"Emerging Technologies"
TE	01	Tuesday	16:00 - 17:30	Ballroom West	"Technology Planning-1"
TE	02	Tuesday	16:00 - 17:30	Ballroom East	"Innovation Management-5"
TE	03	Tuesday	16:00 - 17:30	Sir Francis Drake	"Technology Adoption-2"
TE	04	Tuesday	16:00 - 17:30	Marco Polo	"Technology Management Education-3"
TE	05	Tuesday	16:00 - 17:30	Bartholomew Diaz	"Information Management-2"
TE	06	Tuesday	16:00 - 17:30	Vasco da Gama	"New Product Development-1"
TE	07	Tuesday	16:00 - 17:30	Prince Edward Island	"Project/Program Management-5"
TE	09	Tuesday	16:00 - 17:30	Robben Island	"Sustainability-2"
TE	10	Tuesday	16:00 - 17:30	Dassen Island	"Decision Making-1"

WEDNESDAY, JULY 30, 2008

WA	01	Wednesday	08:30 - 10:00	Ballroom	PLENARY: "Plenary 3"
WB	01	Wednesday	10:30 - 12:00	Ballroom West	"Software Process Management"
WB	02	Wednesday	10:30 - 12:00	Ballroom East	"Innovation Management-6"
WB	03	Wednesday	10:30 - 12:00	Sir Francis Drake	"Technology Based Organizations-2"
WB	04	Wednesday	10:30 - 12:00	Marco Polo	"Supply Chain Management-2"
WB	05	Wednesday	10:30 - 12:00	Bartholomew Diaz	"Information Management-3"
WB	06	Wednesday	10:30 - 12:00	Vasco da Gama	"New Product Development-2"
WB	07	Wednesday	10:30 - 12:00	Prince Edward Island	"Project/Program Management-6"
WB	08	Wednesday	10:30 - 12:00	Seal Island	"Technology Management in the Health Sector"

SCHEDULE OF SESSIONS

WB	09	Wednesday	10:30 - 12:00	Robben Island	"Science and Technology Policy-3"
WB	10	Wednesday	10:30 - 12:00	Dassen Island	"Decision Making-2"
WD	01	Wednesday	14:00 - 15:30	Ballroom West	"Technology Diffusion-1"
WD	02	Wednesday	14:00 - 15:30	Ballroom East	"Innovation Management-7"
WD	03	Wednesday	14:00 - 15:30	Sir Francis Drake	"Strategic Management of Technology-5"
WD	04	Wednesday	14:00 - 15:30	Marco Polo	"R&D Management-2"
WD	05	Wednesday	14:00 - 15:30	Bartholomew Diaz	"E-Business"
WD	06	Wednesday	14:00 - 15:30	Vasco da Gama	"New Product Development-3"
WD	09	Wednesday	14:00 - 15:30	Robben Island	"Collaborations-1"
WD	10	Wednesday	14:00 - 15:30	Dassen Island	"Technology Management in Telecommunications-2"
WE	01	Wednesday	16:00 - 17:30	Ballroom West	"Technology Diffusion-2"
WE	02	Wednesday	16:00 - 17:30	Ballroom East	"Innovation Management-8"
WE	03	Wednesday	16:00 - 17:30	Sir Francis Drake	"Cultural Issues"
WE	04	Wednesday	16:00 - 17:30	Marco Polo	"R&D Management-3"
WE	05	Wednesday	16:00 - 17:30	Bartholomew Diaz	"Information Management-4"
WE	06	Wednesday	16:00 - 17:30	Vasco da Gama	"New Product Development-4"
WE	07	Wednesday	16:00 - 17:30	Prince Edward Island	"Project/Program Management-7"
WE	09	Wednesday	16:00 - 17:30	Robben Island	"Collaborations-2"
WE	10	Wednesday	16:00 - 17:30	Dassen Island	"Technology Management in Telecommunications-3"

THURSDAY, JULY 31, 2008

HA	01	Thursday	08:30 - 10:00	Ballroom	PLENARY: "Plenary 4"
HB	01	Thursday	10:30 - 12:00	Ballroom West	"Supply Chain Management-3"
HB	02	Thursday	10:30 - 12:00	Ballroom East	"Radical Innovations-2"
HB	03	Thursday	10:30 - 12:00	Sir Francis Drake	"Strategic Management of Technology-6"
HB	04	Thursday	10:30 - 12:00	Marco Polo	"R&D Management-4"
HB	05	Thursday	10:30 - 12:00	Bartholomew Diaz	"Knowledge Management-3"
HB	06	Thursday	10:30 - 12:00	Vasco da Gama	"New Product Development-5"
HB	07	Thursday	10:30 - 12:00	Prince Edward Island	"Manufacturing Management"
HB	09	Thursday	10:30 - 12:00	Robben Island	"Technology Management in Services-4"
HB	10	Thursday	10:30 - 12:00	Dassen Island	"National Performance Evaluation of Research and Development Program in Korea"
HD	01	Thursday	14:00 - 15:30	Ballroom West	SPECIAL SESSION: "PICMET '09 and '10 Planning Session"

Schedule of Sessions

SCHEDULE OF SESSIONS BY ROOM

MA	01	Monday	08:30 - 10:00	Ballroom	PLENARY: “Plenary 1”
MB	01	Monday	10:30 - 12:00	Ballroom West	PANEL: “Meet the Editors”
MD	01	Monday	14:00 - 15:30	Ballroom West	“Technical Workforce”
ME	01	Monday	16:00 - 17:30	Ballroom West	TUTORIAL: “Workshop on Business Game for Research”
TA	01	Tuesday	08:30 - 10:00	Ballroom	PLENARY: “Plenary 2”
TB	01	Tuesday	10:30 - 12:00	Ballroom West	“Technology Roadmapping-1”
TD	01	Tuesday	14:00 - 15:30	Ballroom West	“Technology Roadmapping-2”
TE	01	Tuesday	16:00 - 17:30	Ballroom West	“Technology Planning-1”
WA	01	Wednesday	08:30 - 10:00	Ballroom	PLENARY: “Plenary 3”
WB	01	Wednesday	10:30 - 12:00	Ballroom West	“Software Process Management”
WD	01	Wednesday	14:00 - 15:30	Ballroom West	“Technology Diffusion-1”
WE	01	Wednesday	16:00 - 17:30	Ballroom West	“Technology Diffusion-2”
HA	01	Thursday	08:30 - 10:00	Ballroom	PLENARY: “Plenary 4”
HB	01	Thursday	10:30 - 12:00	Ballroom West	“Supply Chain Management-3”
HD	01	Thursday	14:00 - 15:30	Ballroom West	SPECIAL SESSION: “PICMET '09 and '10 Planning Session”
MB	02	Monday	10:30 - 12:00	Ballroom East	“Radical Innovations-1”
MD	02	Monday	14:00 - 15:30	Ballroom East	“Innovation Management-1”
ME	02	Monday	16:00 - 17:30	Ballroom East	“Innovation Management-2”
TB	02	Tuesday	10:30 - 12:00	Ballroom East	“Innovation Management-3”
TD	02	Tuesday	14:00 - 15:30	Ballroom East	“Innovation Management-4”
TE	02	Tuesday	16:00 - 17:30	Ballroom East	“Innovation Management-5”
WB	02	Wednesday	10:30 - 12:00	Ballroom East	“Innovation Management-6”
WD	02	Wednesday	14:00 - 15:30	Ballroom East	“Innovation Management-7”
WE	02	Wednesday	16:00 - 17:30	Ballroom East	“Innovation Management-8”
HB	02	Thursday	10:30 - 12:00	Ballroom East	“Radical Innovations-2”
MB	03	Monday	10:30 - 12:00	Sir Francis Drake	“Strategic Management of Technology-1”
MD	03	Monday	14:00 - 15:30	Sir Francis Drake	“Strategic Management of Technology-2”
ME	03	Monday	16:00 - 17:30	Sir Francis Drake	“Strategic Management of Technology-3”
TB	03	Tuesday	10:30 - 12:00	Sir Francis Drake	“Technology Adoption-1”
TD	03	Tuesday	14:00 - 15:30	Sir Francis Drake	“Strategic Management of Technology-4”
TE	03	Tuesday	16:00 - 17:30	Sir Francis Drake	“Technology Adoption-2”
WB	03	Wednesday	10:30 - 12:00	Sir Francis Drake	“Technology Based Organizations-2”
WD	03	Wednesday	14:00 - 15:30	Sir Francis Drake	“Strategic Management of Technology-5”
WE	03	Wednesday	16:00 - 17:30	Sir Francis Drake	“Cultural Issues”

Schedule of Sessions

HB	03	Thursday	10:30 - 12:00	Sir Francis Drake	“Strategic Management of Technology-6”
MB	04	Monday	10:30 - 12:00	Marco Polo	“Supply Chain Management-1”
MD	04	Monday	14:00 - 15:30	Marco Polo	“Technology Based Organizations-1”
ME	04	Monday	16:00 - 17:30	Marco Polo	“R&D Management-1”
TB	04	Tuesday	10:30 - 12:00	Marco Polo	“Technology Management Education-1”
TD	04	Tuesday	14:00 - 15:30	Marco Polo	“Technology Management Education-2”
TE	04	Tuesday	16:00 - 17:30	Marco Polo	“Technology Management Education-3”
WB	04	Wednesday	10:30 - 12:00	Marco Polo	“Supply Chain Management-2”
WD	04	Wednesday	14:00 - 15:30	Marco Polo	“R&D Management-2”
WE	04	Wednesday	16:00 - 17:30	Marco Polo	“R&D Management-3”
HB	04	Thursday	10:30 - 12:00	Marco Polo	“R&D Management-4”
MB	05	Monday	10:30 - 12:00	Bartholomew Diaz	“Knowledge Management-1”
MD	05	Monday	14:00 - 15:30	Bartholomew Diaz	“Technology Management in Biotechnology”
ME	05	Monday	16:00 - 17:30	Bartholomew Diaz	“Information Management-1”
TB	05	Tuesday	10:30 - 12:00	Bartholomew Diaz	“Technology Management in the Energy Sector”
TD	05	Tuesday	14:00 - 15:30	Bartholomew Diaz	“Knowledge Management-2”
TE	05	Tuesday	16:00 - 17:30	Bartholomew Diaz	“Information Management-2”
WB	05	Wednesday	10:30 - 12:00	Bartholomew Diaz	“Information Management-3”
WD	05	Wednesday	14:00 - 15:30	Bartholomew Diaz	“E-Business”
WE	05	Wednesday	16:00 - 17:30	Bartholomew Diaz	“Information Management-4”
HB	05	Thursday	10:30 - 12:00	Bartholomew Diaz	“Knowledge Management-3”
MB	06	Monday	10:30 - 12:00	Vasco da Gama	“Technology Assessment and Evaluation-1”
MD	06	Monday	14:00 - 15:30	Vasco da Gama	“Technology Forecasting”
ME	06	Monday	16:00 - 17:30	Vasco da Gama	“Technology Assessment and Evaluation-2”
TB	06	Tuesday	10:30 - 12:00	Vasco da Gama	“Technology Marketing”
TD	06	Tuesday	14:00 - 15:30	Vasco da Gama	“Entrepreneurship / Intrapreneurship”
TE	06	Tuesday	16:00 - 17:30	Vasco da Gama	“New Product Development-1”
WB	06	Wednesday	10:30 - 12:00	Vasco da Gama	“New Product Development-2”
WD	06	Wednesday	14:00 - 15:30	Vasco da Gama	“New Product Development-3”
WE	06	Wednesday	16:00 - 17:30	Vasco da Gama	“New Product Development-4”
HB	06	Thursday	10:30 - 12:00	Vasco da Gama	“New Product Development-5”
MB	07	Monday	10:30 - 12:00	Prince Edward Island	“Competitiveness”
MD	07	Monday	14:00 - 15:30	Prince Edward Island	“Project/Program Management-1”
ME	07	Monday	16:00 - 17:30	Prince Edward Island	“Project/Program Management-2”
TB	07	Tuesday	10:30 - 12:00	Prince Edward Island	“Project/Program Management-3”
TD	07	Tuesday	14:00 - 15:30	Prince Edward Island	“Project/Program Management-4”
TE	07	Tuesday	16:00 - 17:30	Prince Edward Island	“Project/Program Management-5”
WB	07	Wednesday	10:30 - 12:00	Prince Edward Island	“Project/Program Management-6”

Schedule of Sessions

WE	07	Wednesday	16:00 - 17:30	Prince Edward Island	“Project/Program Management-7”
HB	07	Thursday	10:30 - 12:00	Prince Edward Island	“Manufacturing Management”
MB	08	Monday	10:30 - 12:00	Seal Island	“Global Issues”
ME	08	Monday	16:00 - 17:30	Seal Island	“Technology Management in the Defense Sector-1”
TB	08	Tuesday	10:30 - 12:00	Seal Island	“Technology Management in Semiconductor Industry”
WB	08	Wednesday	10:30 - 12:00	Seal Island	“Technology Management in the Health Sector”
MB	09	Monday	10:30 - 12:00	Robben Island	“Environmental Issues”
MD	09	Monday	14:00 - 15:30	Robben Island	“Technology Management in Services-1”
ME	09	Monday	16:00 - 17:30	Robben Island	“Technology Management in Services-2”
TB	09	Tuesday	10:30 - 12:00	Robben Island	“Technology Management in Services-3”
TD	09	Tuesday	14:00 - 15:30	Robben Island	“Sustainability-1”
TE	09	Tuesday	16:00 - 17:30	Robben Island	“Sustainability-2”
WB	09	Wednesday	10:30 - 12:00	Robben Island	“Science and Technology Policy-3”
WD	09	Wednesday	14:00 - 15:30	Robben Island	“Collaborations-1”
WE	09	Wednesday	16:00 - 17:30	Robben Island	“Collaborations-2”
HB	09	Thursday	10:30 - 12:00	Robben Island	“Technology Management in Services-4”
MB	10	Monday	10:30 - 12:00	Dassen Island	“Technology Transfer”
MD	10	Monday	14:00 - 15:30	Dassen Island	“Science and Technology Policy-1”
ME	10	Monday	16:00 - 17:30	Dassen Island	“Science and Technology Policy-2”
TB	10	Tuesday	10:30 - 12:00	Dassen Island	“Technology Management in Telecommunications-1”
TD	10	Tuesday	14:00 - 15:30	Dassen Island	“Emerging Technologies”
TE	10	Tuesday	16:00 - 17:30	Dassen Island	“Decision Making-1”
WB	10	Wednesday	10:30 - 12:00	Dassen Island	“Decision Making-2”
WD	10	Wednesday	14:00 - 15:30	Dassen Island	“Technology Management in Telecommunications-2”
WE	10	Wednesday	16:00 - 17:30	Dassen Island	“Technology Management in Telecommunications-3”
HB	10	Thursday	10:30 - 12:00	Dassen Island	“National Performance Evaluation of Research and Development Program in Korea”

PERSONAL SCHEDULE

	Sunday	Monday	Tuesday	Wednesday	Thursday
08:00 – 08:30 Bright Start					
8:30 – 10:00 (A)		Plenary (Westin Ballroom)	Plenary (Westin Ballroom)	Plenary (Westin Ballroom)	Plenary (Westin Ballroom)
10:00 – 10:30 Coffee Break					
10:30 – 12:00 (B)					
12:00 – 14:00 Lunch Break					
14:00 – 15:30 (D)					PICMET '09 and PICMET '10 Planning Session
15:30 – 16:00 Coffee Break					
16:00 – 17:30 (E)					
19:00 – 22:00	Welcome Reception (Westin Ballroom)	Dinner at the Cape Castle	Awards Banquet (Westin Ballroom)		

Notes:

PLENARIES

PLENARY SESSION – 1

DATE: MONDAY, JULY 28, 2008

TIME: 08:30-10:00

ROOM: BALLROOM, OLD HARBOUR LEVEL

Session Chair: Dr. Dundar F. Kocaoglu, CEO, PICMET - USA

KEYNOTE-1

The Hon. Mosibudi Mangena, Minister of Science and Technology, Republic of South Africa

The Hon. Mosibudi Mangena has been the Minister of Science and Technology of the Republic of South Africa since April 2004. He is also President of the Azanian People's Organisation (AZAPO) since 1994.

In 1971 he joined the South African Students Organisation (SASO) and was elected onto the Students Representative Council at the University of Zululand. The following year he moved back to Pretoria and joined the Pretoria branch of the SASO as Chairperson; he participated in the SASO literacy campaign in the Winterveld area; he became head of quality control laboratory in a brick-making factory at Olifantsfontein; and he was the convener of the interim structure of the Black People's Convention (BPC) in the Pretoria area until elected at its inaugural Congress as National Organiser. In 1972 he was imprisoned at Robben Island for five years for his political activities and on his release in 1978 was ordered to remain under house arrest in Mahwelereng for 5 years. After a period of exile in Botswana, where he became Chairperson of the Botswana region of the Black Conscious Movement of Azania (BCMA), followed by a move to Zimbabwe, he returned to South Africa and became the President of Azanian People's Organisation (AZAPO) in 1994.

Minister Mangena was elected as a Member of Parliament in 1999; he was Deputy Minister of Education of the Republic of South Africa from 2001 – 2004. He was the first Patron of Sowetan-Telkom Mathematics and Science Teacher of the Year awards, and the founding chairperson of the South African National Literacy Initiative (SANLI) and Masifundesonke Reading Campaign in 2001. He was conferred upon by the Vaal University of Technology an Honourary Doctorate (Technologiae Doctoris) in 2008 in the field of applied sciences in recognition of his service and invaluable contribution to the social upliftment of both the region and the country.

He received the BSc degree (Honours) from the University of South Africa, and the MSc degree in Applied Mathematics from the University of South Africa. He is the author of four books: On Your Own (September 1989), Quest for True Humanity (1996), A Twin World (1996), and My Grand Mother is Permanent (2004).

PLENARY SESSION – 2

DATE: TUESDAY, JULY 29, 2008

TIME: 08:30-10:00

ROOM: BALLROOM, OLD HARBOUR LEVEL

Session Chair: Dr. Roelf F. Sandenbergh, Dean: Engineering, Built Environment and Information Technology, University of Pretoria, South Africa

KEYNOTE-1

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

"Korean Innovation Model, Revisited"

Over the last decade, some Korean enterprises have emerged to become global players in their specialized products. How have they achieved such a tremendous technological progress in a short period of time? Dr. Choi explores this question by examining the characteristics of technological innovation activities at major Korean enterprises.

The presentation begins with a brief review of the stages of economic growth and of science and technology development in Korea. Then the existing literature, explaining the Korean innovation model, is dealt with to proceed to establishing a new framework in the Korean innovation model. Korean firms have experienced the following three sequential phases and thus the Korean model at the firm level can be coined into the "path-following," "path-managing," and "path-creating." Then, the stylized facts in the second phase

of "path-managing" are discussed, as the empirical evidence of the model, in the areas of memory chip, mobile phone, shipbuilding, automobile, and steel.

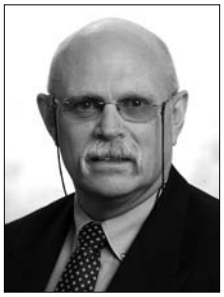
However, Korean firms now face a paradigm shift in the modes of technological innovation to efficiently implement the third phase. To achieve a remarkable progress once more as they did in the past and to sustain the growth momentum, Korean firms should challenge new dimensions such as distinctive architecture, creative manpower, and a unique R&D system among others. Dr. Choi also articulates the most critical issues in S&T policies such as the cultivation of world-class manpower, reform of policy measures, upgrade of infrastructure and so on under the policy framework of PPP (public-private partnership) within the Korean context. Finally, some lessons from the Korean experience in innovation studies are addressed.

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 1999-200 he was the Vice President of STEPI. From 1997-1998 he was the head of the Dept. of Policy and Planning at the Korea Institute of Science and Technology (KIST). Dr. Choi received a B.S. in Forestry from Seoul National University; an M.A. in Public Administration from Seoul National University; and a Ph.D. in Public Administration from Roskilde University in Denmark. He is the President of the Korean Society for Technology Management & Economics and a member of the Presidential Advisory Council for Science & Technology.

KEYNOTE-2

Mr. Willem Louw, Managing Director, Sasol Technology, South Africa

Mr. Willem Louw has worked at Sasol Technology in varying positions since 1985. From 1985 to 1989 he was Senior/Principal Cost Engineer responsible for the management of cost estimating, cost control, planning/scheduling and economic evaluations required for capital projects managed by the Secunda office of Sasol Technology. He was Manager of Project Services and New Venture Projects (1998 – 1994), responsible for the cost engineering function in the Secunda office of Sasol Technology as well as the development of major capital projects undertaken by the Secunda office. From 1994-200 he was Manager/General Manager, responsible for the engineering and project management office of the Sasol Technology Division located in Secunda, South Africa.



Mr. Louw was the Integration Program Manager for the Sasol Condea Integration Program resulting from the intent to and eventual acquisition of Condea from RWE/DEA in Germany (2000-2002). From 2002-2003 he was General Manager, Sasol Olefins & Surfactants, responsible for the functionalities of Technology, Information Management and Safety, Health & Environment in the newly formed chemical division in Sasol after the acquisition of Condea. In 2004 he was General Manager of Sasol Technology International/Managing Director Sasol Synfuels International, and in 2005 he was General Manager, Engineering and Project Management.

Since 2006 Mr. Louw has been Managing Director responsible for the whole of Sasol Technology, i.e. R&D, Technology Management, Process Commercialisation, Engineering and Project Management, and the enabling cluster supporting the above.

Mr. Louw received the B. Engineering (Civil) and the M. Engineering (Civil) from the University of Stellenbosch.

PLENARY SESSION – 3

DATE: WEDNESDAY, JULY 30, 2008

TIME: 8:30-10:00

ROOM: BALLROOM, OLD HARBOUR LEVEL

Session Chair: Dr. Van Zyl de Villiers, General Manager, Research and Development, NECSA, South Africa

PLENARIES

KEYNOTE-1

Dr. Adi Paterson, General Manager, Business Development and Operations, Pebble Bed Modular Reactor, South Africa

Dr. Adrian (Adi) Paterson is a graduate of the University of Cape Town with a BSc (Chemistry) and a PhD (Engineering). A post-doctoral fellowship at Leeds University with Prof. Ron Stevens led to his involvement research and development of engineering ceramics at the CSIR, starting as a senior scientist in 1984 and being promoted to specialist researcher in 1987. The focus of work was on zirconia and silicon nitride ceramics and their applications. In the following years he took on research management positions leading to his appointment to the CSIR Executive in 1994. During the mid 1990s he was involved in the development the Green Paper on science and technology and the implementation of the number of processes arising from the White Paper on Science and Technology. In 2000 he served on the Executive of both the CSIR and the University of Pretoria. In 2001 he was seconded to DACST (subsequently DST) and made significant contributions to the National R&D Strategy (2002) and subsequent initiatives to rebuild public science investment and infrastructure in South Africa. He was a Member of the National Advisory Council on Innovation (1998-2004) and is a Member of the South African Academy of Engineering. He is currently the General Manager of Business Development and Operations at the Pebble Bed Modular Reactor (PBMR).

KEYNOTE-2

Mr. Terry Oliver, Chief Technology Innovation Officer, Bonneville Power Administration, USA

"Electric Utilities Must Increase and Focus R&D to Meet Challenges"

Electric utilities face a daunting challenge in global warming. Yet utilities are particularly ill prepared to constructively participate in developing solutions. Utility research and development budgets, never strong, have been decimated in the last 15 years. Utility research and development capabilities have withered. And the challenges—carbon sequestration, non-carbon power sources, energy efficiency, and smart grid technologies—while never more clearly defined, remain unsolved, and loom larger given the emergent global consensus for climate change action.

Bonneville Power Administration—once a leader in the development of electric power technologies, system operations analytics, and energy efficiency research—abandoned all research in the 1990s. Since 2005 Bonneville has returned to a leadership role, establishing a public research direction through technology roadmaps, tripling its research budget, and adopting modern research portfolio management methods.

Terry Oliver will detail some of the key challenges facing the industry, discuss the changes needed in electric utility research engagement, and provide specific examples from Bonneville Power Administration's experiences. His talk will challenge the global electric utility industry to re-engage in a robust public research portfolio, designed to bring the industry into the forefront of solving utility related climate change challenges.

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

PLENARIES

PLENARY SESSION – 4

DATE: THURSDAY, JULY 31, 2008

TIME: 8:30-10:00

ROOM: BALLROOM, OLD HARBOUR LEVEL

Session Chair: Dr. Antonie de Klerk, Executive Director, University of Pretoria, South Africa

KEYNOTE-1

Dr. Richard Taylor, Principal Scientist, Services Sciences Research Group, HP Laboratories, United Kingdom

"Model Based Services Discovery and Management"

Service systems fail all too frequently. 'Overdue, over budget and disappointing' are the words frequently used by organisations to describe their experience in the development and commissioning of complex information systems enabled services. More considered analyses question anticipated productivity gains, and in the longer term, a failure of service provision to track the changing requirements of the organisation. As a major supplier of IT and IT-enabled services, Hewlett-Packard has invested heavily in developing and understanding of the reasons that services fail to delight, as well as developing technologies and management processes that mitigate against failure. This paper describes a (predictive) model-based approach to service-systems analysis that aids in understanding the goals, the specifications and dynamics of a service system. Our contribution is a model-based service discovery process and technology that can be used to dramatically improve inter-stakeholder communications, provide a design and management infrastructure that is robust to the inevitable changes that affect any commissioning organisation, and lay the grounds for more sophisticated cost-benefit analyses than are currently commonly used. We draw on a number of large-scale (multi-billion dollar) service projects to illustrate the application and benefits of this approach to service discovery and management.

Dr. Richard Taylor has worked for HP Laboratories for 11 years, covering a diverse range of research areas including embedded systems design automation, embedded operating systems, ink- and laserprinter design, and performability engineering for complex systems. For the last three years he has worked for and been a technical lead of the Services Sciences Research Group, based in the UK, developing technologies, processes and training materials that enable complex services to be analyzed and managed. Much of this work has been 'action research' in combination with HP business groups and their customers.

He is regularly invited to give keynotes to conferences and workshops in the area of services sciences, and he has represented HP within UK and European government organizations, studying how research in this area should be encouraged and funded. He acts as a visiting professor at the Universities of Manchester and Warwick, teaching graduate-level courses in the area of services analysis and design as well as supervising research students.

Along with Chris Tofts he is preparing a book commissioned by Springer Verlag, Managing Complex Service Systems, as part of their new Service Science: Research and Innovations in the Service Economy research series.

Dr. Taylor holds a Ph.D. in analytic sciences from the University of Manchester and an MBA from the University of Bath. With over 21 years of research experience in complex systems design and implementation, he has published more than 75 technical papers and 65 patents (granted/submitted) in the areas of complex systems design, services and business processes. He is a chartered engineer and a chartered mathematician.

SPECIAL SESSIONS

COUNTRY REPRESENTATIVES MEETING

DATE: WEDNESDAY, JULY 30, 2008

TIME: 12:00 – 14:00

LOCATION: THIRTY7 RESTAURANT

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

PICMET 's Director and co-Director of International Activities, Dr. Kiyoshi Niwa of the University of Tokyo and Dr. Dilek Cetindamar of Sabanci University, respectively, invite the Country Representatives and those who are interested in becoming Country Representatives to a meeting to discuss the roles of the Country Representatives, the procedure to start and organize PICMET Chapters, and the requirements for holding future PICMET conferences in their countries.

PICMET '09 AND '10 PLANNING SESSION

DATE: THURSDAY, JULY 31, 2008

TIME: 14:00–15:30

ROOM: BALLROOM WEST

Please join us in providing feedback on PICMET '08 and developing plans for future conferences, including PICMET '09 in Portland, Oregon, USA; and PICMET '10 in Hamburg, Germany. All PICMET attendees are invited to participate in helping make future PICMET meetings as productive as possible.

TUTORIAL

BUSINESS GAME FOR RESEARCH

MONDAY, JULY 28, 16:00–17:30, BALLROOM WEST

Speaker: Amnon Gonen, Holon Institute of Technology (HIT), Israel; Eyal Brill, Decision Makers Ltd., Israel

Business games are usually an improved way for participants to learn about the business world in an exciting, novel and competitive way. The participants can turn a business plan into real-time decisions, examine their decisions and learn from their own success or failures in a competitive environment. The tutorial will introduce the business game theory and methodology, using it for research about business decision making. The tutorial will use a website business game simulation called "Decision Makers"[1] to present the business decisions of high technology firms.

There are two main objectives to the tutorial: using an on-line business simulation to test a business plan and company strategy and exploring the possible improvement in business management.

The "Decision Makers" is an Internet-based business learning simulator. It enables participants to practice their ability to make business, technology and management-related decisions in simulated real-life situations. "Decision makers" enables the instructor to individually monitor the progress of each group, to control the level of the simulation's complexity, and to intervene at crucial points in order to determine the study content. The simulation is held within the scope of "virtual" quarters. During each quarter, each group can conduct an unlimited number of simulations and obtain the results forecast for the quarter.

The results of each simulation are affected by the group's decisions and by decisions made by other groups simultaneously (groups do not need to be connected to the server at the same time). At the end of the quarter, the teacher (simulation manager) runs a "binding" simulation, which determines the quarter's results and forms the basis for the next quarter.

The firms compete in four different markets with distinct demographic and economic characteristics. Each firm has to plan its production method, invest in advertising and marketing, set up its transport and quality control systems, and invest in development and quality control. The firms can trade with each other; alternatively, they can make an investment in rival firms in order to create collaborative ventures. At the end of each quarter, each firm gets profit and loss statements as well as a periodic balance sheet. In addition to these goals, each firm gets a score according to the part it plays in pollution and its impact on macroeconomic variables (such as income distribution).

"Decision Makers" enables the instructor to simulate the technological "aging" of equipment as well as technology renewal as a result of investments and customer product satisfaction. The system automatically generates statistical reports and market surveys as information serving decision-making purposes. "Decision Makers" makes it possible to simulate "study events" according to a scenario predetermined by the instructor, such as supply chain management or strategic market planning in a growing firm.

The simulator is used for teaching and research. The following studies are running in parallel:

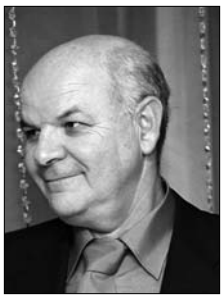
The contribution of running the simulator before making decisions. This study measured the difference between teams that had free runs of the simulator with other teams that were limited to a few simulator runs each quarter;

The convergence to Nash equilibrium point. This study explores the ways teams are making decisions until they feel they have nothing to improve; and

Sequential decisions vs. parallel decision making (making decisions with different information levels about the other team's decisions).

The participants need a computer (laptop) with an internet connection.

[1] For more details see "www.decisionmakers.biz"

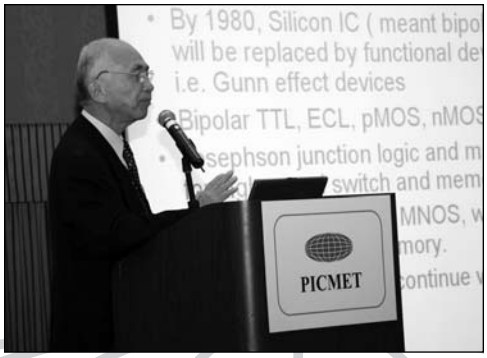


Dr. Amnon Gonen is currently the dean of the Management of Technology faculty at Holon Institute of Technology (HIT). His research areas include project management, risk management, applications of war games technologies to civilian training, business gaming and simulation. Dr. Gonen graduated with his D.Sc. degree in Operations Research at the Technion Haifa. He served 15 years as an operations research analyst at

TUTORIAL

the IAF and IDF, and later he served as CEO of an operations research consultancy company, and chief scientist of a simulator's company BVR systems. During the last 10 years he worked as a senior lecturer at Ruppin academic center and Holon Institute of Technology (HIT).

Dr. Eyal Brill is the founder of Decision Makers Ltd., a start-up company which develops the business simulation game "Decision Makers." Dr. Brill holds a Ph.D. in economics from the Hebrew University in Jerusalem. He teaches at the Management of Technology faculty at Holon Institute of Technology (HIT) both "business games" and "models of adaptive systems," and "public economics" at the Hebrew University. He also is active as an independent consultant for several Israeli companies in the field of machine learning.



PH.D. COLLOQUIUM

GETTING YOUR PH.D.…AND BEYOND

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

DATE: SUNDAY, JULY 27, 2008

TIME: 13:00 – 17:00

LOCATION: MARCO POLO

REGISTRATION: THE COLLOQUIUM IS INCLUDED IN THE REGISTRATION FOR PICMET

Through guest lectures and a workshop, we will share experiences in the following areas:

- The Ph.D. process and career paths in different countries
- Critical stages in the Ph.D. process and how to successfully master them
- Coping with possible personal problems while pursuing a Ph.D. (lack of time or motivation, problems with advisers, insufficient time for family and friends, etc.)
- What's next - academia or industry?
- Entering the academic job market as future junior faculty
- Landing your first industry job

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

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

GUEST LECTURES:

Dr. George F. Farris, Rutgers University, USA

George F. Farris is Professor of Management and Director of the Technology Management Research Center at Rutgers University. He is also Editor-in-Chief of the IEEE Transactions on Engineering Management, a Senior Member of the IEEE, and former Division Chair of the Technology and Innovation Management Division of the Academy of Management.

Professor Farris is a Fellow of the American Association for the Advancement of Science (AAAS), the world's largest general scientific society. He was cited "for seminal contributions to the understanding of organizations and personnel practices in the furtherance of technological innovation and the management of technology." His scholarly publications have appeared in journals such as Administrative Science Quarterly, Journal of Applied Psychology and IEEE Transactions on Engineering Management, and his work has been cited several times in the Wall Street Journal.

Previously Professor Farris was Acting Dean of the Graduate School of Management at Rutgers, Professor of Administrative Studies at York University in Canada, Ford Foundation Professor of Management at the European Institute for Advanced Studies in Management in Belgium, and Associate Professor of Organizational Psychology and Management at MIT. He has held part-time visiting appointments at Xi'an Jiaotong University, Xi'an, China and the National University of Singapore, and he has presented invited lectures at Sungkyunkwan University, Seoul, South Korea. He received his Ph. D. at the University of Michigan and his Bachelor's at Yale University.

Dr. Scott W. Cunningham, Delft University of Technology, The Netherlands

Scott Cunningham joined the faculty in 2004. Prior to joining TU Delft, he worked in the computer and software industry, creating analytical models for commercial clients. His work on national innovation indicators helps inform policy for the governments of the U.S., the U.K. and Malaysia.

Scott Cunningham is interested in operations research and decision sciences approaches for policy making. In particular he is interested in probabilistic models of social exchange. Other interests include building multi-actor systems theory through the economic sociology and innovation policy literature. A recent publication is Tech Mining (with Alan Porter), a book on assessing new technology developments.

SESSIONS

MA-01 PLENARY-1

DATE: MONDAY, 7/28/2008
TIME: 08:30 – 10:00
ROOM: BALLROOM, OLD HARBOUR LEVEL
CHAIR: DUNDAR F. KOCAOGLU, CEO, PICMET - US

KEYNOTE
The Hon. Mosibudi Mangena, Minister of Science and Technology, Republic of South Africa

MB-01 PANEL: Meet the Editors
Monday, 7/28/2008, 10:30 - 12:00 **Room: Ballroom West**
Chair(s): Timothy R. Anderson, Program Chair, PICMET 08
Panelist(s): George Farris, Editor-in-Chief, IEEE Transactions on Engineering Management

This panel session will discuss philosophies and practices of journals in the field of Technology Management along with strategies for pursuing publication.

MB-02 Radical Innovations-1
Monday, 7/28/2008, 10:30 - 12:00 **Room: Ballroom East**
Chair(s): David Probert; University of Cambridge

MB-02.1 [R] How to Create and Sustain an Open and Radical Innovation Capability? An Empirical Case Study Analysing Ongoing Radical Innovation Projects at Vodafone R&D

Christian Stuer; University of Regensburg, Germany
Stefan Husig; University of Regensburg, Germany
Stefanie Biala; Vodafone R&D Germany, Germany

Companies have learned that radical innovations are crucial to long term success. However, many companies struggle to introduce radical innovations, since many recommendations regarding incremental innovations do not apply. Increased research has addressed the question of which capabilities are required to manage radical innovation, but so far a common framework is missing. Our paper bridges this gap by developing an improved theoretical framework, enhancing the existing literature and integrating the concept of Open Innovation to support the processes by accelerated learning, accessing new capabilities, and creating new markets. In a case study approach we apply our framework to the research and development department of Vodafone R&D. Analysing their radical innovation capabilities, we identify a trans-disciplinary exchange, which integrates art and design, as a key driver in the radical innovation process. Through the cooperation with artists and designer, Vodafone R&D creates a trans-disciplinary environment, which influences the processes of idea creation and opportunity recognition as well as the approaches to reduce uncertainties. In conclusion the theoretical findings are translated into practical management implications.

MB-02.2 [A] Preparing for Takeoff: Breakthrough Process Innovation at Rolls Royce

Simon J Ford; University of Cambridge, United Kingdom
Lan Tao; University of Cambridge, United Kingdom
David Probert; University of Cambridge, United Kingdom

Since their first application in the 1980s, bladed disks (blisks) have become integral components in jet engines. In this case study we examine a technological advance in joining techniques by following the successful development of linear friction welded (LFW) blisks at Rolls Royce. Initiated in 1984 and spanning over 20 years of R&D activity, this advance represents a significant breakthrough in the blisk manufacturing process, as it provides further improvements to weight, aerodynamic efficiency and cost. Providing a historical account of this project, we describe how Rolls Royce drew on Government funds to engage in exploratory collaborative research with TWI and MTU before a workshare agreement on the Eurofighter Typhoon allowed for entrepreneurially opportunistic behaviour. Engagement with lead users when developing blisks for the Eurofighter provided Rolls Royce with niche commercialisation, learning opportunities and the platform to demonstrate the capability of LFW blisks for adoption in the Joint Strike Fighter (JSF). This episode highlights how successful breakthrough innovation in the aerospace industry derived from a long-term commitment to exploratory research and a strategic development focus prior to commercialisation.

MB-02.3 [R] A Case Study in Metals for Inventions and Innovations

Mike Connelly; University of Cincinnati, United States
Jai A Sekhar; University of Cincinnati, United States

An improved method for the measurement of innovation and innovative activity across long life cycles, especially where patentable technology plays a part in the innovation, is studied in this article. In a previous publication we were able to distinguish four stages of a long life cycle. In this article we examine whether the patent life cycle and the production activity life cycle are related. Two conventional schools of thought commonly exist in reference to measurement of technical innovation, one suggesting the use of patents as the best indicator of innovative activity, and the other recommending alternative means, not using patent data. This article proposes a novel method of measurement utilizing yearly patent counts. A model was developed using twelve metals whose yearly production activity was correlated with patent counts associated with the same materials. This correlated data was then entered into best-fit equations to obtain fitted patent and activity life cycle curves. Differences in the origins of these fitted curves were interpreted as lags of time in the life cycle of the patent or activity thus allowing for comparisons between patents and innovation activity. The behavior of the number of patents with time was found to be similar to production growth, making patents a measure and representation of technical innovation. In conclusion we were able to categorize the metals into three groups. Group 1, containing chromium, magnesium, nickel and zirconium are metals whose patent activity is driving their production. Group 2, containing aluminum, copper, titanium and zinc are metals in which production is driving the patenting. Group 3, which is composed of the Stage IV metals iron, manganese, molybdenum and tungsten, represents materials that have no current innovative activity that can be measured or correlated to the patent activity. The results suggest a fertile field of future research extending the initial pattern equation model to include R&D, patents, and performance.

MB-03 Strategic Management of Technology-1
Monday, 7/28/2008, 10:30 - 12:00 **Room: Sir Francis Drake**
Chair(s): G. Harindranath; University of London

MB-03.1 [R] Technology Alignment under Two Strategic Contexts

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

Technology alignment requires recognizing technology is as an enabler of the firm's business strategy and a source of value creation only when it is properly used to support the business goals. This work explores the degree of technology alignment under two strategic contexts: 1) small firms in a backwards integration setting where the firms are suppliers of large retailers, and 2) independent small retailers. Findings reveal small suppliers of large retailers align their technology infrastructure to the requirements of the dominant customers. Then they have implemented identification and communication electronic standards, are connected to customers Intranet or establish communication via Internet, and have the technical expertise to perform electronic transactions with their customers. In contrast, the independent small retailers exhibit low levels of technology alignment in the sense of using information systems mainly to control cash flows and make tax payments instead of using technology to support their strategies of differentiation on customers' service. The results provide evidence that participation in a supply chain accelerates technology adoption among small firms.

MB-03.2 [R] Intangible Asset Value Evaluation and MOT

Tadao Sumi; Shoin University, Japan

The Key Value Driver (KVD) of today's corporate management has been shifting from tangi-

ble asset calculated on the balance sheet to intangible asset such as intellectual asset, competitiveness of development, sales right, brand value, and human resource. Recently M&A becomes very popular in the grovel business; however, one of the most difficult issues at the beginning stage of M&A may be decision and acceptance of goodwill prices which represent intangible asset. The paper discusses basic concepts of intangible asset management, market evaluation of intangible asset of distinguished Japanese firms, reporting of intellectual property and intellectual asset management based on the guideline of METI and also gives some important proposals for progress of intangible asset management by collaboration with academia, industry and government.

MB-03.3 [A] Reviewing the Views of ICT in Development

Maung Sein; Agder University College, Norway
G. Harindranath; University of London, United Kingdom

The role of Information and Communication Technology (ICT) in national development is argued to depend on how ICT is viewed. Building on Orlikowski and Iacono's classification of IT views, we proposed in an earlier work that ICT can be conceptualized as: tool (means to achieve something), computational (the machine), ensemble (part of socio-economic context) and enabler (what ICT enables). We presented this as a hierarchy where the higher you go from the tool to the proxy view, the stronger ICT influences national development. In using our framework to evaluate ICT for development (ICT4D) projects, we realize that the notion of a hierarchy is untenable. Here, we argue that the relationship between ensemble and enabler views is complex as they do not share the same ontology. We propose that the enabler view addresses the impact while the ensemble view addresses the implementation of ICT in a development context. An ensemble view is an influencing factor, arguably the most critical, in achieving an enabler view. We use secondary data from published studies to illustrate and provide support for our thesis. Based on our analysis, we propose a revision of our ICT4D framework. How stakeholders conceptualize ICT4D is critical for its success and its sustainability. Our work is an attempt to provide much needed conceptual clarity in the ICT4D field.

MB-04 Supply Chain Management-1
Monday, 7/28/2008, 10:30 - 12:00 **Room: Marco Polo**
Chair(s): Antonie Jetter; Portland State University

MB-04.1 [R] Cooperative Advertising and Pricing in a Dynamic Stochastic Supply Chain: Feedback Stackelberg Strategies

Xiuli He; University of Texas at Dallas, United States
Ashutosh Prasad; University of Texas at Dallas, United States
Suresh P Sethi; University of Texas at Dallas, United States

Cooperative (co-op) advertising is an important instrument for aligning manufacturer and retailer decisions in supply chains. In this, the manufacturer announces a co-op advertising policy, i.e., a participation rate that specifies the percentage of the retailer's advertising expenditure that it will provide. In addition, it also announces the wholesale price. In response, the retailer chooses its optimal advertising and pricing policies. We model this supply chain problem as a stochastic Stackelberg differential game whose dynamics follows Sethi's stochastic sales-advertising model. We obtain the condition when offering co-op advertising is optimal for the manufacturer. We provide in feedback form the optimal advertising and pricing policies for the manufacturer and the retailer. We contrast the results with the advertising and price decisions of the vertically integrated channel, and suggest a method for coordinating the channel.

MB-04.2 [R] Historical, Entrepreneurial and Supply Chain Management Perspectives on the Semiconductor Industry

William Y Jiang; San Jose State University, United States
Xiaohong Quan; San Jose State University, United States
Shu Zhou; San Jose State University, United States

This paper traces the history and evolution of two earliest companies in the semiconductor industry: Shockley Semiconductor Laboratory and Fairchild Semiconductor. Starting from the invention of the transfer resistor (transistor) by three Nobel laureates (John Bardeen, Walter Houser Brattain and William Shockley), the founding of the most successful failure in Silicon Valley, Shockley Semiconductor Laboratory and the Shockley Eight (aka Traitorous Eight or Fairchild Eight), the paper details some earliest entrepreneurial attempts in the industry and how these attempts influenced over 70 semiconductor companies in Silicon Valley, including Intel Corporation, National Semiconductor, and Advanced Micro Devices. The paper then examines the industry's developing manufacturing models, including the emergence of the foundry model. Finally, the paper looks at the industry's growing trend of globalization together with its outsourcing/off-shoring and supply chain management issues. Taking advantage of the three authors' interdisciplinary expertise, the paper studies the semiconductor industry from three major perspectives: historical, entrepreneurial, and supply chain management.

MB-04.3 [R] A System Dynamics Modeling Approach for the Strategic Management of TFT-LCD Supply Chains

Ya-Sheng Cheng; National Taichung Institute of Technology, Taiwan
Chuang-Chun Chiou; Da-Yeh University, Taiwan
Cheng-Cheng Tai; Da-Yeh University, Taiwan

The outbreak of SARS, mad cow disease, Tsunami in Southern Asia, 921 Earthquake in Taiwan, and the hurricane recently in Bangladesh have significant impacts on supply and demand. These disruptions might cause tremendous loss to the supply chain system due to delivery delay or using alternative sources to eliminate capacity deficiency. While there has been a significant amount of research conducted in the area of supply chain systems, there has been relatively little reported in this important area of understanding the system-wide or global impact of supply chain disruptions. Therefore, the importance of effectively managing supply chain disruptions has drawn more attention in both academia and industry. In this study the analysis through system dynamics approach on the disruption in the supply chain system can be demonstrated as useful methods for investigating the strategic management problem. The results of this study will assist the high or middle-level management to cope with the supply chain disruption by providing systematic procedures for strategic analysis. We also conducted an empirical study by using the data collected from TFT LCD industry. The simulated results suggest guidelines and decision rules for improving the performance of the entire system with the disruption.

MB-05 Knowledge Management-1
Monday, 7/28/2008, 10:30 - 12:00 **Room: Bartholomew Diaz**
Chair(s) Mian M Ajmal; University of Vaasa

MB-05.1 [R] A Holistic Network Approach to Study the Structure of Technological Network by the Block Modeling of Social Network Analysis

Calvin S Weng; Takming University of Science and Technology, Taiwan
Wan-Yu Chen; Transworld Institute of Technology, Taiwan
Hui-Ying Hsu; Kun Shan University, Taiwan
Kuei-Kuei Lai; National Yunlin University of Science and Tech. , Taiwan
Shu-Jung Chen; National Yunlin University of Science & Technology, Taiwan

The purpose of this paper is to investigate the technological structure of business methods in insurance. Concepts and techniques used in social network analysis are applied to a network of patents based on citation. By means of procedures drawing on the notion of structural equivalence, a set of blocks and positions of insurance business methods are delineated. This paper has focused its discussion on patent data of classification UPC705/4 to explore possible technological structure in insurance. The result of this research found that there are four clusters in the structure of technological network.

MB-05.2 [R] Knowledge Building in Participative Projects

Jose C Alvarez; PUC-Peru, Peru
Kelly Vodden; Memorial University, Canada

The collaborative elaboration of a development project is an opportunity not only to pursue conventional objectives such as equipment and infrastructure construction but also for col-

laborative learning and knowledge building and more sustainable development. In this context this paper aims to present an analysis of the process of building knowledge during a project development. The research questions are: What was the knowledge inside the group before the project? What is the knowledge inside the group after the project? What knowledge gaps remain and how might a participatory, collaborative approach to research and development help address these gaps? Who has the necessary knowledge? How is this knowledge acquired? And does this knowledge help create development that is more sustainable? The methodology includes the development of a conceptual model based on participatory action research, knowledge management, and sustainable community and regional development literature; followed by a participatory research case study from which conclusions and recommendations are drawn. The paper describes and analyzes the participative construction of knowledge during the development of a project for new algae products, aquaculture and processing, with the participation of four algae associations and support of Pluspetrol and the Defensoria del Proyecto Camisea. This algae aquaculture and processing project has been developed in Pisco, Peru, where there is a community of 800 algae harvesting people.

MB-05.3 [A] Risk-Reduction Strategies for Internet Shopping of Search Goods and Experience Goods

Hui-Ying Hsu; Kun Shan University & NYUST, Taiwan
Wan-Yu Chen; Transworld Institute of Technology & NYUST, Taiwan
Calvin S Weng; Takming University of Science and Technology, Taiwan
Shang-Ping Lin; National Yunlin University of Science & Technology, Taiwan

In business-to-consumer electronic commerce, enterprises have to contact with the consumers directly. Understanding the consumers is one of the most important things to enterprises. The characteristic of internet shopping is that the purchase risk on the internet is larger than that in physical stores. According to the risk degree consumers have perceived, products can be divided into three patterns: search goods, experience goods and credence goods. However, while doing internet shopping, it is not easy for consumers to evaluate credence goods; the study, therefore, tries to investigate the risk-reduction strategies used by consumers in purchasing search goods and experience goods. This paper examines in-depth the risk-reduction strategies of consumers when they select and purchase search goods and experience goods and compares its finding with literature regarding risk-reduction strategies. It is hoped that this finding serves as a reference for the companies that sell search goods and experience goods in their formulation of marketing strategies.

MB-06 Technology Assessment and Evaluation-1
Monday, 7/28/2008, 10:30 - 12:00 Room: Vasco da Gama
Chair(s): Tugrul Daim; Portland State University

MB-06.1 [A] A Comparison of a Technology Development Methodology with a Strategy-Based Balanced Scorecard Normative Model

Minerva R. Garcia Delgado; University of Texas at San Antonio , United States
Cory Hallam; University of Texas at San Antonio, United States
William T Flannery; University of Texas at San Antonio, United States

Technology entrepreneurs facing the new product and technology development process must go through a number of stages of development before commercialization becomes a reality. Although new and innovative products, services and technologies are essential components of any strategy for competitiveness, the reality is that most ideas or inventions do not get successfully commercialized. Of the myriad of reasons for the failure of so many commercialization attempts, one is the lack of a well designed strategy to guide the development process. Our experience in assisting technology entrepreneurs has resulted in the development of a systematic methodology for evaluating and guiding the technology commercialization process. This experiential-based process focuses on the stages of development of the innovation, the identification of key problems forming barriers to development, and the application of actions designed to circumvent those problems and barriers. The objective of this paper is to present this methodology and compare its key features with a normative model suggested by concepts presented in the Balanced Scorecard and the Strategy-Focused Organization as developed by Kaplan and Norton. A Value Creation Model (VCM) and equation is proposed as a means for systematically allocating scarce resources to successfully implement a technology commercialization strategy.

MB-06.2 [R] A Taxonomy for Technology Adoption: A Human Computer Interaction Perspective

Cagla Ozen Seneler; Bogazici University, Turkey
Nuri Basoglu; Bogazici University, Turkey
Tugrul U Daim; Portland State University, United States

Computer-human interfaces have become critical in an era of services being rendered through internet and counting for a significant part of the economy. Given this fact, it is very critical to understand what is important in putting together such interfaces. One obvious target should be the usability and acceptability of such interfaces. So we had emphasized our analyses on those constructs and targeted to develop a framework which we can later target to quantify through a field analysis. In the development method of technology adoption taxonomy, research framework and experimental study, a chain of observations were administered: in-depth interviews, brainstorming session, and expert focus group. A taxonomy for the characteristics of technology adoption process through a human-computer interaction focus is generated. Our study is based on theoretical background review, prior empirical studies and previously defined technology acceptance and user satisfaction models. The details of a computer-human interface will be useful for those developing such interfaces. In this study, technology adoption taxonomy was proposed, which was developed through qualitative techniques: in-depth interviews, a brainstorming session and expert focus group studies. This framework can be adopted into any case providing insight into the development of a computer-human interface.

MB-06.3 [A] i-Manufacturing Project for Collaboration-Based Korean Manufacturing Innovation

Kwangyeol Ryu; Pusan National University, Korea, South
Jeonghoon Shin; Korea Institute of Industrial Technology(KITECH), Korea, South
Seokwoo Lee; Korea Institute of Industrial Technology(KITECH), Korea, South
Honzong Choi; Korea Institute of Industrial Technology(KITECH), Korea, South

Unpredictable customer needs strongly require for manufacturing enterprises to produce quality products satisfying cost and time constraints. To cope with such a dynamically changing manufacturing environment and to get higher competitiveness, the manufacturing industry needs to equip itself with advanced technologies including IT as well as substantial infrastructure. i-Manufacturing is the name of the project funded by the Korea government, but on the other it is the strategy for achieving manufacturing innovation in Korea. The most basic but important concept of the i-Manufacturing is collaboration. As a part of the project, we are developing various kinds of web-based collaboration systems. We applied IT into the conventional manufacturing industry by developing strategic business models and collaboration systems. As a consequence, more than 300 companies are currently using 7 different collaboration systems, and they are reducing manufacturing cost and delivery time while increasing product quality and profit. In this paper, therefore, we first introduce the i-Manufacturing and collaboration systems we have developed. The architecture and functions of systems will also be described in detail with case studies.

MB-07 Competitiveness
Monday, 7/28/2008, 10:30 - 12:00 Room: Prince Edward Island
Chair(s): Wladyslaw W Zarczynski; Eskom Enterprises Division Engineering

MB-07.1 [A] Modelling Effects of Incentives for Industry Competitiveness Using a System Dynamics Approach

Martin Kaggwa; AIDC/University of Pretoria , South Africa
Jasper L Steyn ; University of Pretoria, South Africa
Anastassios Pouris ; Univeristy of Pretoria, South Africa

Investment in the state of art machinery, tooling, and R&D is widely seen as a prerequisite for achieving industry competitiveness in the long term. Therefore, the provision for investment-based incentives by countries is perceived as a way of supporting industry competi-

tiveness. Despite this being a global phenomenon, there is no formal process to guide the offer of industry incentives. The process of designing such incentives is often based on intuition rather than on formal models, making it difficult to assess such industry interventions objectively and to improve on them. Specific to South Africa, the offer of incentives to the automotive industry to support its competitiveness has had mixed results. In particular, investment in R&D has remained minimal. The paper presents a system dynamics model as a proposed instrument in formalising the offer of incentives, applied to the South African government's offer of incentives to the automotive manufacturing sector. The model was developed from qualitative and quantitative information on how the incentive dispensation had been structured. Simulations with the incentive model reveal that the incentive dispensation, as a stand-alone intervention, has had a significant and positive effect on industry investment, but has had no specific policy lever to direct investment into R&D and consequent innovative activities. By this measure, the model has not been a strong policy instrument for supporting long-term industry competitiveness.

MB-07.2 [A] Enhancing A Country's Competitiveness through 'National Talent Management Framework'

Pattharaporn Suntharasaj; Portland State University/ NSTDA, United States
Dundar F Kocaoglu; Portland State University, United States

Unquestionably, in this era of globalization human capital is one of the most valuable assets of every nation. The migration of highly skilled professional (talent) around the world, namely Brain Drain, considerably affects the national competitiveness, especially in science and technology. Consequently, various programs have been implemented to reverse the Brain Drain into Brain Gain. This paper's purpose is to present the current Brain Drain situation and the Reverse Brain Drain mechanism of seven significant countries, which are Korea, China, India, Turkey, Africa, U.S. and Thailand, and to propose a framework to capture the benefit from the international mobility of highly skilled professionals, especially in research, innovation, and entrepreneurship, for their host country. Some significant findings are found from this study. First, Brain Drain has a global effect. It affects not only developing countries but also developed countries. The mobility of highly skilled professionals is asymmetrical, and it might move toward Asian countries in the near future. Second, strong programs to repatriate highly skilled professionals abroad have been implemented but their progress is in the different stages. Third, the three Key Success Factors (KSFs) that stimulate the Reverse Brain Drain mechanism can be identified, which are building national science and technology infrastucture, receiving strong support from government and private sectors, having national policy in human resource development. Last but not least, speaking of developing countries which is in the intermediate stage, Brain Circulation, strengthening their domestic human capital and trying to benefit from their highly skilled professionals overseas are extremely important. A National Talent Management Framework to manage Brain Drain can be one of the good solutions to cope with the Brain Drain situation.

MB-07.3 [A] Developing a Systems Engineering Management Model for Use by Eskom Enterprises In Order to Gain a Competitive Advantage

Wladyslaw W Zarczynski; Eskom Enterprises Division Engineering, South Africa

A case is presented as to why the Eskom Enterprises (EE) needs to undergo a major transformation in order to fit a systems engineering model into their business processes. An overview is given of the previous structure of the organization and the measures that have been taken so far to improve its competitive advantage in the face of globalization. According to a feasibility study, there is a general consensus for developing systems engineering (SE) of holistic approach. This was done as follows: by proposing a framework whereby systems engineering can be integrated into the business environment, strategy and processes of the enterprise; by analysing and understanding the different systems management approaches and systems thinking processes upon which an engineering-oriented enterprise depends; and by identifying the customer base, the competitive environment and the specific needs of the enterprise. There is an application of the concept of a business process view to evaluate and control an enterprise. This is done in order to harmonize the values of the customer with the values of the service provider and to ultimately establish an integrated value management framework. This is an effective way for transformation that EE finds itself in a change process from a traditional customer to an installed new customer capitalism base. A thorough market and technology analysis and knowledge of customer requirements are essential to meet required deliverables, and to generate value and therefore profit. At the heart of these changes is the realization by people of the enterprise that projects engineering strives for consistency and competitive advantages.

MB-07.4 [A] Merging the Porter's Diamond Model with SWOT Method in Order to Analyze the Iranian Technology Parks Competitiveness Level

Mohammad Naserbakht; University of Tehran, Iran
Ezzatollah Asgharizadeh; University of Tehran, Iran
Ali Mohaghar; University of Tehran, Iran
Javad Naserbakht; Sharif University of Technology, Iran

This research attempts to formulate an analytical model for the studying and assessment of necessary factors that have strong effects on the level of Iranian Technology Park competitiveness. The result of this model leads to increasing the effectiveness and efficiency of Technology Parks planning stage. The main framework of this research is based on studying the projects and research, which in their methods use Porter's diamond model or SWOT analytical method. On the other hand, this framework is customized for the future needs of Technology Parks and clarifies the kind of information that must be gathered. Identification of the core competencies and competitive advantages of the Iranian Technology Parks is the most important objective of this research. So by using this information, we can design more competitive plans for the sustainable development of technology parks. One of the innovative and new aspects of this research is formulating and combining an analytical model for assessing the technology parks' capabilities and competitiveness. Also, most of the existing knowledge and articles about technology parks are just limited to macro conditions and do not pay attention to detailed competitiveness issues and their total needs. So, the proposed model tried to produce detailed information about key success factors for technology parks. Using the interview method for gathering the information as the only method is one of the limitations of this research. In order for this research to be a high quality one, various information gathering methods must be used. Also, lack of detailed information and knowledge about technology parks, SWOT analytical method and Porter's diamond model are the greatest challenges of this research. Any way, it is preferred to apply proposition model in other technology parks to enhance the validity of the model. Applying the proposed model leads to identifying pre-conditions and factors to achieve Technology Park success and helps us to gain obvious sight for preparing the right plans. In fact, we can use this information to design promotion programs for primary needs in order to facilitate technological and industrial development in a Park region.

MB-08 Global Issues
Monday, 7/28/2008, 10:30 - 12:00 **Room: Seal Island**
Chair(s): Isak Kruglianskas; São Paulo University

MB-08.1 [R] Global Sourcing of Information Technology in the Middle East: The Case of Qatar

Selma Limam Mansar; Carnegie Mellon University in Qatar, Qatar
Randy Weinberg; Carnegie Mellon University - Pittsburgh, United States

In this paper we review the status of information technology development, deployment and management in Qatar. We discuss different types of activities, ownership models, management and opportunities in various sectors: private, e-government, and education. Qatar's recent experience in rapid development may serve as an example for other countries or regions on a rapid growth path. In particular, we examine the human capital needs of the IT sector and discuss various sourcing models for software systems development, integration and management, ranging from fully sourced from within to full outsourcing of information technology services and systems. On its rapid growth trajectory, Qatar's need for skilled personnel may outstrip the anticipated supply in the near future, making the case for global sourcing of IT services an imperative. While the implications and issues around global outsourcing involving North American or European firms are being addressed in the literature, little is available on the Middle East. In this paper we will attempt to explain the drivers of IT

outsourcing in the most rapidly developing economies in the region and discuss various risks, opportunities and expected success factors of outsourcing in those countries.

MB-08.2 [A] Engineering Management in Developing Economies: The EMIDE Strategies to Meet the New Challenges

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

Globalization is here to stay, as the United Nations predicts that by 2020 four of the five largest national economies will be located in Asia. Some developing countries in South America and Eastern Europe are also expected to advance their economies rapidly in the near future. It was forecast by Goldman Sachs that the GDP of BRIC nations (Brazil, Russia, India and China) will surpass that of G6 (United States, Japan, Germany, United Kingdom and Italy) in the year 2038. During this rapid advancement period, engineering managers in the West will play different roles than those in the East. Managers in the West will surely try to explore the high growth mid-tier market opportunities offered in the East. This paper offers a comparison between the economies of the West and East, discusses the different business models the West and East apply, and highlights the new challenges ahead. A set of new EMIDE strategies are then suggested for engineering managers in developing economies to meet the new challenges ahead. These strategies include: 1) Excel in internalizing conditions and acquiring unique insights related to local culture, custom and business practices (e.g., value of employees, nature of collectivist, power distance, practices of uncertainty avoidance, and femininity styles), 2) Manage local resources (e.g., assemble product with low cost labor, improve products by reverse engineering) and practice engineering management functions effectively, 3) Innovate differentiable capabilities by practicing creative thinking strategies, pursuing open innovation paradigm, assembling new knowledge bases, and applying expertise residing in regional supply chains, 4) Develop marketable product/service offerings well-suited to targeted market segments, considering the needs and affordability of local customers, and 5) Effectuate a fast response to marketplace challenges by taking advantage of acquired global market knowledge (e.g., internal globalization orientation and external globalization drivers) to achieve long-term profitability. Companies in the West will pursue the new growth markets in the East. The suggested EMIDE strategic model of acting locally and thinking globally assists engineering managers in the developing economies to successfully capture these new growth opportunities and expand beyond.

MB-08.3 [A] Technological Management for Sustainable Development and Competitiveness in the Internationalization Context

Clandia M Gomes; Santa Maria Federal University, Brazil
Isak Kruglianskas; São Paulo University, Brazil

The study seeks to understand how management practices of technological innovation that take social and environmental responsibility into account influence the internationalization process of Brazilian companies. The case study approach was chosen as our research method. The results of this study add important elements to an emerging knowledge area in the field of management sciences. Moreover, the implications of this study's thematic axis, comprising innovation management practices and the management of the internationalization process of Brazilian companies, contribute to the integration of these two themes, which are recognized as having high strategic importance in the current Brazilian economic and technological context.

MB-09 Environmental Issues
Monday, 7/28/2008, 10:30 - 12:00 **Room: Robben Island**
Chair(s): Bala Mulloth; Polytechnic University

MB-09.1 [R] The Interlinking of Entrepreneurs, Grassroots Movements, Public Policy and Hubs of Innovation: The Rise of Cleantech in New York City

Mel Horwitch; Polytechnic University, United States
Bala Mulloth; Polytechnic University, United States

Although increasingly complex, modern innovation is still largely viewed through distinct sectoral lenses, e.g. large corporate R&D and new product development, entrepreneurial small or new ventures, or public programs or projects. However, Cleantech innovation is different, more blended, networked and boundary spanning. To understand such innovation, the emerging cleantech industry in New York City-triggered by growing environmental concerns and opportunities due to rising energy costs-is studied. At a general level, Cleantech decision making is viewed as a collaborative, complex set of activities involving diverse social entrepreneurs, grassroots movements, public policy actions and hubs of innovationall encompassing varied sectors, institutions and individual backgrounds and motivations. After emerging patterns of innovation and other relevant factors are discussed, three grassroots NYC-based Cleantech endeavors are contrasted: vision42, a well-defined citizen-centric effort; Green Drinks NYC, a pure networking endeavor with no identifiable center (resembling a meet-up); and GREEEN.US, a fluid movement emanating from a university-based incubator and comprising diverse entrepreneurs, community activists, faculty, corporate executives and public officials. The lessons learned for Cleantech innovation and for modern innovation generally are then developed. Finally, Cleantech innovation is portrayed as a new form of innovation (emphasizing especially collaborative hubs of grassroots social entrepreneurship), and, thereby, ultimately providing a basis for conceptualizing important aspects of overall modern innovation.

MB-09.2 [R] Co-Evolution of Technology and Policies Study of Precedents of Clean Development Mechanism (CDM) Projects for the Prevention of Climate Change

Minori Takada; Japan Advanced Institute of Science and Technology, Japan

The developments of the environmental technology have been affected by policy and regulation. And those regulations have been aimed at local area and country based on each environmental issue. The Kyoto Protocol and Kyoto Mechanism for Climate Change issues target greenhouse gas (GHG) reduction and the technology transfer by international political commitment. This is the phenomenon in which an international policy directory affected the technology development and transfer. In this paper, the author will provide suggestions about setting policy for further development on environmental technology as a result of considerations about the process on the interaction between international policy and environmental technology in the case of the Clean Development Mechanism (CDM) project, which is one of the flexible measures of the Kyoto Mechanism.

MB-09.3 [R] An Indian Experience of Environmental Management System

Vinod K Khanna; Galgotia Institute of Management Technology, India

The last two decades have seen a remarkable increase in both interest and reactions to the concept of preserving the environment. This can be attributed to the increasing statutory and regulatory requirements of government and the pressure from consumers and the life-threatening of global ecosystem deterioration. Therefore, organizations are constantly under pressure to develop and implement an Environmental Management System (EMS). While some sincere efforts have been made by the Indian organizations to implement EMS and their performance has been very good, still countrywide efforts are not adequate. This paper presents the adoption of EMS in Indian organizations, extent of EMS elements used and the status of implementation of cleaner production activities by the industries. This paper also presents the benefits accrued by the Indian industries based on 56 industries' feedback who are either ISO 14001 certified companies or in the advance stage of ISO 14001 implementation. This has been supplemented by some case studies of the leading Indian organizations. Most of the Indian organizations feel that EMS has a positive effect in their performance. It is observed that Indian organizations are more inclined towards getting ISO 14001 certification rather than taking full advantage of EMS. However, it is evident from the analysis that overall adoption of cleaner production activities are at the low level. The majority of the organizations seem to be implementing EMS out of pressure from competition, customer, government, domestic and export market. The paper concludes that though environmental awareness is on the increase in India, and commitment as well as compliance levels are far higher than before, India still lags behind in the implementation and has to go a long way. The investigation and research findings are still exploratory. Future research can focus on the organizations that are at the initial stage of EMS implementation and comparison can be drawn. Future research can focus on sector-wise performance. A broadly based and larger sample size would provide a better picture of the EMS implementation status in Indian organizations. Originality/value Analysis is based on questionnaire based feedback. The study has

been able to identify the extent of the usage of key EMS elements/ implementation of cleaner production activities and drivers for the implementation of EMS. The findings have been supported by the select Indian case studies.

MB-10 Technology Transfer
Monday, 7/28/2008, 10:30 - 12:00 **Room: Dassen Island**
Chair(s): Andre J Buys; University of Pretoria

MB-10.1 [R] The Practise of Technology Transfer

Johannes N Mostert; University of Pretoria, South Africa
Andre J Buys; University of Pretoria, South Africa

Technology transfer can take place within an organisation or between organisations. For both the source of the technology as well as the adopter of the technology it is of importance that the transfer is successful. This paper reports on research that consisted of a case study of technology transfer between a public institution and a private company in the defence sector of South Africa. The paper addresses the practice of technology transfer, its application in the defence-related industry, the maturity of the role players involved in a typical technology transfer process, and recommendations for improving the practice of technology transfer.

MB-10.2 [R] Analyzing Influence Factors of Technology Transfer Using Fuzzy Set Theory

Wen-Hsiang Lai; Feng Chia University, Taiwan
Chien-Tzu Tsai; Feng Chia University, Taiwan

In the face of the era of speedy revolution of high technology, the advanced technology becomes one of the key drivers to enhance productivity in a firm or even in a country. In order to compete in the global environment, the ability and effectiveness of acquiring new technology are essential for firms, especially for the traditional machinery industry. In Taiwan, the societal structure is built on the foundation of small-medium enterprises (SMEs). Thus, most new technologies need and depend on the technology transfer (TT) from international firms and research institutes. Due to the complicity of influence factors of TT, such as features of industry, technology, organization, and talent, difficulties are encountered in evaluating the effectiveness of TT. This study develops a rule-based decision support mechanism using fuzzy set theory and the method of Analytic Hierarchy Process (AHP) to evaluate the effectiveness of TT. The characteristic of adopting fuzzy set theory is to construct the membership function for those features of influence factors and differentiate the indistinct linguistic terms in order to match true conditions. Finally, this study discusses the hierarchical influence factors of TT and provides suggestions for machinery firms with respect to TT effectiveness.

MB-10.3 [A] How do Chinese Enterprises Conduct Technology Innovation? Implications from Interviews to 25 Nation-Authorized Enterprise Technology Centers

Haoshu Peng; Chinese Academy of Sciences, China
Jianhua Yang; Chinese Academy of Sciences, China
Xiaoliang Ye; National Science Library,Chinese Academy of Scienc, China

The Chinese government, academia and industries have been paying attention to technology innovation these years, especially since the concept Innovation-oriented Country was proposed. The paper gives lessons from a study of the Nation-Authorized Enterprise Technology Center (NAETC) based on interviews with 25 Nation-Authorized Enterprise Technology Centers from 17 provinces of China mainly about their R&D management and technology transfer. Those Enterprise Technology Centers are authorized by the Ministry of Science and Technology, National Development and Reform Commission, Ministry of Finance, China Customs, and State Administration of Taxation. The findings help us to understand the rules of how Chinese enterprises, especially state-owned enterprises, conduct R&D and related innovation activities and to help the government in making innovation policies and decisions.

MB-10.4 [A] Success Factors In Technology Transfer to SMEs: Rundu Woodwork Common Facility Center

Hina Mu Ashekele; University of Namibia, MRC, Namibia
Kenneth Matengu; University of Joensuu, Finland

Recently, it has been argued that the diffusion of modern technology has far reaching impact on the economy, on quality of life and on the environment, particularly in developing countries. However, there has been little emphasis on the factors and systems that promote and/or impede technology transfer in terms of contributions to economic wealth creation through improved technical application. The objective of this paper is to examine and present empirical evidence on factors that contribute to the successes and/or failures in technology transfer using a case of wood work. The case study presents the empirical evidence of the impact of technology transfer framework on an SME manufacturing enterprise at the northern town of Rundu, Namibia. The paper further defines the concept of technology transfer and reviews the Namibian governments policy and strategic framework for SME technology transfer in the private sector. Overall, the results support the view that internal factors, such as personal commitments, willingness to learn and competency, as well as external factors, such as access to a variety of services, strongly influence the success of technology transfer.

MD-01 Technical Workforce
Monday, 7/28/2008, 14:00 - 15:30 **Room: Ballroom West**
Chair(s): Mel Horwitch; Polytechnic University

MD-01.1 [R] The Role and Contribution of the Chief Technology Officer (CTO): Perceptions of Core Purpose, Barriers and Enablers

Chris van der Hoven; Cranfield School of Management, United Kingdom
David Probert; Cambridge University, United Kingdom
Rob Phaal; Cambridge University, United Kingdom

This ongoing study considers the Chief Technology Officer (CTO) role as perceived by twenty technology executives in multi-unit firms based in Europe. Interim results add richness to various, ongoing technology management debates raised by the literature. However, results also show that technology executives are faced with other issues such as the tension between long and short-term investment attitudes. For example, in publicly listed companies, CEOs tend to focus on short-term results (dividends and growth) and CTOs on the longer term (i.e. the need for a pipeline). A portfolio approach and a clear innovation strategy become critical under these circumstances. We have used a cognitive mapping approach as a way for technology executives to explore their core purpose, challenges and opportunities. They then consider the implications of their mental models for technology management practice based on their own current or intended actions. The outcome of the research includes arguments for and against having a technology executive on the board of directors, and raises questions about succession planning. A picture is also forming regarding the aspects of technology management that are industry specific due to the need for specialist skills and experience. However, in certain contexts the technology executive is more of a generalist, differentiated by technology specific meta-abilities. This work is part of a wider study by the European Institute for Technology and Innovation Management (EITIM).

MD-01.2 [A] Doctoral Seminar to Introduce the Activity of Corporate R&D to Ph.D. Students

Isaburo Fukawa; Asahi-Kasei Corporation, Japan

Japanese Ph.D. courses face the issue of a decreasing number of superior master's students who go on to Ph.D. coursework. Some of them enter companies after graduating from a master's course. The reasons are poor government financial support to Ph.D. students, difficulties of finding academic posts, a large excess of post-doctoral researchers, and lower employment of Ph.D. students by companies in comparison with master's students. The Chemical Society of Japan held a two-day seminar (a short and intensive internship) for Ph.D. students in order to tell a message of actively employing Ph.D. students and to give more information on the corporation activities and how corporate R&D is being done through several examples of the success story of R&D. The final output of this study is to make a good presentation text for a seminar including clarifying the difference between academic research and corporate R&D and extracting the common feature from R&D stories in the Japanese

chemical industry, which will be a useful material not only for students of bachelor's, master's and Ph.D. courses but also young researchers in corporations.

MD-01.3 [A] Exploring the Characteristics and Impact of Information Technology Crisis on a Company

Ecehan Sofuoglu; Pepsico Russia, Russia
Nuri Basoglu; Bogazici University, Turkey

Many companies do not usually consider the impact that a crisis can have on their business and also their employees. However, a crisis can be evoked by any situation or event that has detrimental effect on the business ranging from fire, technology outage, product withdrawal, rumors and natural disasters, to terrorism. Most companies think that they are prepared for a crisis as they have a business continuity plan in place, but is this enough? Especially if a crisis related to the information technology infrastructure happens, how should the management act in order to prevent or minimize any damage to business continuity, its long term brand reputation and the negative impact on its employees? In this paper, a case study of an international company in a turbulent environment will be discussed. The goal is to conduct an impact analysis of the crisis in the information technology department and how it affected daily business, processes and employees. Which decisions were taken; what were the results? Possible alternative decisions and preventions for future similar situations will be also discussed.

MD-02 Innovation Management-1

Monday, 7/28/2008, 14:00 - 15:30 **Room: Ballroom East**
Chair(s): Scott Cunningham; Delft University of Technology

MD-02.1 [R] Mixed Representations of Science and Technology Data for Use in the Management of Technology

Scott Cunningham; Delft University of Technology, Netherlands
Jan Kwakkel; Delft University of Technology, Netherlands

In this paper we examine effective representations of knowledge for the purposes of management of engineering and technology. Specifically, given the immense volume of data available about scientific outputs, it is highly necessary to condense or abstract this information for management use. This paper considers the utility of such representations in the management of technology. We ask further whether a given representation accurately depicts the knowledge contained in the science and technology database. We argue that, in this regard, generative models are superior because they provide explicit hypotheses about the structuring of the data. The second is whether the representation is interpretable by management, and therefore directly actionable. We argue that the number of model parameters is an indirect measure of the degree of difficulty of using and interpreting the selected representation. Combining the two metrics suggests the use of Akaikes Information Criteria, a metric used for model selection purposes. The AIC is used to evaluate existing model representations used in tech mining, both positional and relational. After surveying the results, we recommend the use of a mixed representation. These more complex models appear to offer a more useful representation of science and technology datasets. Furthermore, there are multiple promising but previously unexplored representations of the data. The ramifications of further exploration within this range of possible new models are discussed.

MD-02.2 [R] The Nature of Engineering Work in Innovation Activities

Salih Cevikarslan; Istanbul Technical University, Turkey

This study is a research into firm level innovation activities and the role of the engineers in R&D work. The innovation processes is attempted to be explained as a mental labor process. With this aim, case studies are done within three companies in Turkey (one international and two local firms), which are professionally engaged in innovation activities in the automotive sector. A total of seven in-depth interviews are made with R&D engineers of the corporations. These interviews together with the participant observations constitute the empirical data. The analysis of research problematic is based upon these empirical findings.

MD-02.3 [R] A Dynamic Innovation Model for Managing Capabilities of Continuous Innovation

Shari S. C. Shang; National Chengchi University, Taiwan
Se-Hwa Wu; National Chengchi University, Taiwan
Chen Yen Yao; National Chengchi University, Taiwan

Businesses today, under the pressure of fierce market competition, demanding customers, and the advance of technology, are required to have the capability to continuously apply new methods and ideas in improving products, internal processes, technologies, and operations in satisfying current and future customers. To be able to capture and construct business opportunities and implement innovative plans, organizations need to dynamically align operational effectiveness with strategic flexibility. This involves a variety of capabilities for organizations to be able to sustain their competitiveness. The primary objective of this study is to investigate the required capabilities for continuous innovation through analysis of the existing literature and examination of empirical cases. A dynamic innovation model (DIM) is proposed with an expectation of accelerating enterprise capabilities in building continuous innovation into the dynamic business environment. The DIM combines the concept of entrepreneurship and resource management and highlights the importance of co-evolving relationships among these capabilities. Findings of a comparison analysis of the DIM for two PC manufacturers, DigiCom and GigaCom, illustrate how the business leaders combined foresight and insight with cyclical processes of resource integration, learning, and transformation in delivering innovations continuously. We argue that DIM offers an interesting and useful analytical framework for the explanation and management of business capabilities for continuous innovation.

MD-03 Strategic Management of Technology-2

Monday, 7/28/2008, 14:00 - 15:30 **Room: Sir Francis Drake**
Chair(s): Leon Pretorius ; University of Pretoria

MD-03.1 [R] Growth Strategy of Chinese Major Information Appliances Makers to Global Enterprises

Masanori Namba; Ritsumeikan Asia Pacific University, Japan

The rapid growth of Chinese major information appliances makers to the global enterprises is often explained as "Compression of Time" effect by enjoyment of latecomer advantages. On the other hand, as to core technologies, there are NEW TYPE of latecomer disadvantages coming from 1) complexity and acceleration of technology developments, 2) higher licensing fee, and 3) technology protection by strict IP (Intellectual Property) or Black Boxes which hide proprietary/ unique/specific technologies not to be copied. This paper analyzes how have the three major Chinese information appliances makers (Haier, Changhong and TCL) overcome the above mentioned NEW TYPE of latecomer disadvantages. Then, common factors will be extracted to clarify the innovation process to become the global enterprises.

MD-03.2 [R] The Clothing Industry for Growth in South Africa

Kem Ramdass; University of Johannesburg, South Africa
Leon Pretorius; University of Pretoria, South Africa

The South African clothing and textile industry has the potential to create jobs, but this potential has been steadily diminishing over the last ten years before 2007. In this context, the clothing industry is regarded as a powerful engine for economic and employment growth, the focus of the research in this paper. Nevertheless, the performance of the clothing industry, whether in terms of efficiency, working conditions or degree of social protection, is unstable. The industry's ability to generate sustainable and productive employment varies according to geographical locations. In general, wages, job security, health and safety, opportunities for skills training in the smaller enterprises (< 50) compare negatively with those offered by larger enterprises (> 100). As most new jobs are in the micro and small enterprises, addressing their poor working conditions and sometimes exploitative practices constituted a mammoth task for the bargaining council (BC). Moreover, evidence indicates that improvements in working conditions and social protection are key ingredients of business efficiency and competitiveness. Sound policy and regulatory environments, with the existence of collaborative structures, are crucial for achieving a fair balance between enterprise development and workers' well-being. Issues affecting the SA clothing industry are evaluated in some depth. Furthermore, a strategic framework and its implications for developing the

clothing and textile industry are addressed.

MD-03.3 [A] The Off-shoring Strategies Layout of Taiwan's ICT/IT Industry in China

Ting Lin Lee; National University of Kaohsiung, Taiwan

Despite a lack of political understanding, the economic relationship between Taiwan and mainland China is increasingly integrated and cooperative. Taiwan's information and electronic industries have been investing in China since 1990; the range of investment began with early production activities, marketing activities after 1995 and then the fields of R&D. Taiwan has already become the largest source of trade deficit for Mainland China. Taiwanese enterprises have been distributed all along the economic corridor from Shanghai to Nanjing. The electronic information industry has gradually formed the cities' pillar industries. By 2004, the cumulative contract value of Taiwan investments in Kunshan had reached $9 billion, while the actual investment exceeded $6 billion. The top 100 largest Taiwan enterprises have registered more than 150 companies in Kunshan, and 9 out of the top 10 Taiwanese computer manufacturers have established plants in Suzhou. The first objective of this paper is to give a description of the industrial background, investment model and motivation factors which Taiwan's IT/ICT manufacturers entered the Mainland market since 1990 with the viewpoint of evolution. The second objective of this study will expose how Taiwan raises its overall arrangement of off-shore strategies in China under the situation of co-opetition.

MD-03.4 [A] Ethanol from Sugar Cane: A Successful Alternative Energy Strategy for Brazil

Ericson de Paula; DCT Energia, Brazil

Pro-Alcool, the National Alcohol Program, began in 1975 and was a government financed program, developed on account of the petrol crisis of 1973, and fortified due to the second impact of 1979. This program aimed to substitute gasoline with ethanol from sugar cane on a grand scale, thereby reducing the dependence on imported petroleum. During the decades to follow, as the international price of petrol went down, the program entered a decline. With cheap petrol, alcohol fuel held little advantage either for the consumer or the producer. In the same period that petrol prices were lowering, the price of sugar began to rise on the international market, which made sugar production more profitable than alcohol. Technological developments in bi-fuelled cars, soon to be followed by world pressure for less polluting fuels, together with successive petrol price peaks, not only revitalized alcohol production but also led to a demand for its increase. Thirty years after the appearance of Pro-Alcool, Brazil is in a rhythm of expanding cane-fields and new technology aiming at better efficiency. All this is being performed on a grand scale, both for internal consumption and the international market, in order to present ethanol from sugar cane as alternative fuel.

MD-04 Technology Based Organizations-1
Monday, 7/28/2008, 14:00 - 15:30 **Room: Marco Polo**
Chair(s): Charles Weber; Portland State University

MD-04.1 [R] The Management of R&D Organizational Climate through Diagnosis of Individual Potentials

Kunio Shirahada; The University of Tokyo, Japan
Kiyoshi Niwa; The University of Tokyo, Japan

Managers in highly competitive R&D environments are increasingly required to provide leadership that increases the potential of their subordinates. This includes promoting psychological and behavioral changes in their subordinates and making the organizational climate more active. We focused on managerial actions for improving the climate and created a diagnosis tool that combines top-down (leadership) and bottom-up (worker) perspectives. Using this tool, managers can better understand the climate of their territory and improve it. Testing at a Japanese automotive company revealed that the communication resulting from the use of this tool can help improve the potential of subordinates as well as their professional behavior. It also provides managers with many opportunities to improve their coaching and leadership skills.

MD-04.2 [A] The Relationship between Supervisory Support and Work-Family Conflict: The Guanxi, LMX, and Emotional Intelligence Perspectives

Bi-Fen Hsu; National Yunlin University of Science & Technology, Taiwan
Wan-Yu Chen; Transworld Institute of Technology & NYUST, Taiwan
Mei-Ling Wang; Changhua Christian Hospital, Taiwan
Yen-Yu Lin; MingDao University, Taiwan

Previous studies of manufacturing management have ignored a critical theme: the relationship between supervisory support and work-family conflict. In this study, we explore the link between interpersonal relationships, guanxi, leader-member exchange theory, emotional intelligence, supervisory support, and work-family conflict. We gathered 244 valid questionnaires from workers in traditional industries in Taiwan and China. In the rapidly changing society of Taiwan, we found that supervisory support for work-family conflict had faded in traditional industries. Second, we found that leaders with a higher level of leader-member exchange and expressive ties to their subordinates tend to offer a higher level of supervisory support, but that leaders with a higher level of instrumental ties to their subordinates tend to offer lower levels of support. Finally, the survey results also showed that a leader's level of emotional intelligence is not related to supervisory support. We discuss our findings in terms of their implications for management practices and future research.

MD-04.3 [A] An Exploration of the Chinese Entrepreneur Aptitude Scale in a Sample of College Students in Taiwan

Wan-Yu Chen; Transworld Institute of Technology & NYUST, Taiwan
Calvin S. Weng; Takming University of Science and Technology, Taiwan
Hui-Ying Hsu; Kun Shan University & NYUST, Taiwan

Small and medium enterprises constitute the majority of Taiwans businesses, and entrepreneurship lies at the heart of these enterprises. A literature review shows that entrepreneurs' demographic characteristics and psychological traits have a crucial impact on entrepreneurial outcomes. Over the past few years, technological and vocational education in Taiwan has developed substantially, fostering many successful entrepreneurs. Completed questionnaires from 1,053 students from the Transworld Institute of Technology in Taiwan and the Chinese Entrepreneur Aptitude Scale (CEAS), constructed by Chen and Wu [11], formed the basis of our empirical analysis. Our research objectives are as follows. First, we aim to explore the reliability and validity of the CEAS and to establish a normative score among surveyed students. Second, we compare the scaling scores differences between the genders, departments, and classes in the sample. Finally, we compare the student samples CEAS results with models of Taiwanese entrepreneurial youth. We then discuss the findings in terms of their implications for entrepreneurial education and management and future research.

MD-04.4 [R] Structural Characteristics, Process and Effectiveness of Cross-Functional Teams Consisted of Specialists and Technicians in the Healthcare Industry

Mei-Ling Wang; National Yunlin University of Science & Technology, Taiwan
Bi-Fen Hsu; National Yunlin University of Science & Technology, Taiwan
Wan-Yu Chen; Transworld Institute of Technology & YunTech , Taiwan
Yen-Yu Lin; MingDao University, Hospitality Management Dept., Taiwan

The healthcare industry is served by various specialists and technicians, such as doctors, nurses, pharmacists, medical technicians, radiologists, etc. They form the major workforce in hospitals. In order to provide good healthcare services, teamwork among them is of great importance, and the management of cross-functional teams consisting of specialists and technicians is a significant issue. This study is mainly based on the Input-Process-Output team theoretical model from McGrath and explores some essential variables of teams, including team structural characteristics, team process and team effectiveness. Team structural characteristics are discussed in terms of the size, diversity, norm and cohesion of teams. Team process was divided into two factors: members' cooperation and bottom-up communication. Team effectiveness was measured in terms of performance and satisfaction. Samples of this study were taken from 20 hospitals in Taiwan. A total of 109 valid questionnaires were used in this survey. The results are as follows: 1) On team structural

characteristics, only team norm affects team effectiveness; 2) Team process affects team effectiveness; 3) Team norm and team cohesion affect team process; 4) Team process exerts full mediating effects between team structural characteristics and satisfaction, while team process mediates partially between team structural characteristics and performance.

MD-05 Technology Management in Biotechnology
Monday, 7/28/2008, 14:00 - 15:30 Room: Bartholomew Diaz
Chair(s): Takao Fujiwara; Toyohashi University of Technology

MD-05.1 [R] Study of the Time Lag Effect of Patent Impact on Profitability of U.S. Pharmaceutical Industry from Innovation to Profit

Yun Ken; National Yunlin University of Science & Technology, Taiwan
Tung-Yu Tsai; National Yunlin University of Science & Technology, Taiwan
Yang-Kuang Ou; National Yunlin University of Science & Technology, Taiwan

This study intends to stretch the extent of the successful innovation process from a novel conception not only to its adoption to the market, but also to its launch for profit from innovation, and focus on probing into the deferred results of patent impacts of the American pharmacy industry and their profitability at the firm level. We find there are obvious relationships between the indexes of patent impact and profitability such as ROE and EPS. Moreover, our empirical research finds there is a time lag of four years between the indexes of patent impact and ROE, and five years of time lag with EPS. We consider that the time lag in the pharmaceutical industry is longer than the results of other industries in the previous study, and suggest that investors regard scientific measures of the quality and quantity of inventive output as useful indicators of the economic profitability tied to patenting impact. The sample of firms for this study is drawn from Compustat database, from which we screened 255 listed companies and only had 72 to 80 complete samples left eventually. We searched every company of the USA's patent database and sum up the patent materials for nine years, from 1994 to 2002.

MD-05.2 [R] Applying the Real Options to Death-Valley Strategy of Biotech Start-ups

Takao Fujiwara; Toyohashi University of Technology, Japan

One of start-up functions is more rapid commercialization of technology than large corporations do. However, its innovation depends on the inefficiency as the fecundity and many deaths. In Japan, the number of academic spin-offs has recently exceeded 1,000 companies due to the national reform of the technology-transfer system from universities. And the major business is the biotech area. At the same time, the increase of M&A activities of domestic pharmaceutical corporations can increase the partnership opportunity with them. Then, for example, more than ten biotech start-ups achieved the IPOs so far. In this dawn period of Japan's biotech start-ups, this paper will specially examine a potential survival strategy of drug-discovery start-ups during the Death-valley as an initial negative cash flow period, from a viewpoint of real options analysis.

MD-06 Technology Forecasting
Monday, 7/28/2008, 14:00 - 15:30 Room: Vasco da Gama
Chair(s): Nathasit Gerdsri; Mahidol University

MD-06.1 [A] Foresight on the Effect of Technology Advancement on the Quality of Life by Developing Narrative Scenarios

Doyun Park; KAIST , Korea, South
Eun Oh; KAIST, Korea, South
Jaeseung Jung; KAIST, Korea, South

Making accurate long-term prediction of our future society is difficult but it is crucial to grasp future social circumstances and technology advancements to derive proper strategic policies on technology. The aim of this study is to predict how technology advancements will change the quality of life ten years from now in Korea by using the scenario technique. Another issue under investigation was the effectiveness of applying narrative plots in future scenarios for better readability. To overcome the difficulties that arise from the multidimensional characteristics and the complex nature of foresight studies, Delphi survey results were used and several key drivers were utilized. Two different narrative scenarios on the future society of Korea were written and went under evaluation by a group of experts and a survey on the general public. Results of the evaluation imply the importance of finding the balance between making an interesting plot and comprehensively depicting the future, while the survey results show how people think about the role of technology in the quality of life. We suggest some guidelines on developing narrative scenarios for an insightful look into the future.

MD-06.2 [A] A Diffusion Model to Growth Phase Forecasting of 3G Industry in Taiwan

Chen-Chun Lin; National Chiao Tung University, Taiwan
Ying-Hwa Tang; National Chiao Tung University, Taiwan
Joseph Z. Shyu; National Chiao Tung University, Taiwan
Yi-Ming Li; National Chiao Tung University, Taiwan

This study provides a system dynamics approach on the foundation of the BASS diffusion model and constructing model upon the 3G adoption critical factor in the viewpoint of new product development. This thesis is to predict the future demand for 3G mobile for diffusion of innovation, whose model is often used to predict the demand for new products and discuss the dynamic process of diffusion. Accordingly, this study can provide better efficient advice to the industry of the upcoming 3G environment. This research adopts the diffusion model, least squares analysis and logistic analysis to forecast the future demand. The data is taken from Telecommunications Carriers Association subscriber database in Taiwan in 2007. These analysis tools were MatLab, LogletLab and SPSS. Thus, the aims of the present research are: to investigate this innovation diffusion; to identify adoption by potential adopters with potential non-adopters of the innovation. The methodology was tested, compared and results revealed that the prediction capability of the proposed system dynamics methodology access to ODE-EULER is better than those methodologies of LogletLab and least squares analysis.

MD-06.3 [R] Empirical Research on the Technology Opportunities Analysis Based on Morphology Analysis and Conjoint Analysis

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

This paper presents an empirical study on the technology opportunities' potential analysis, with a case example of LED, by combining bibliometrics analysis, morphology analysis and conjoint analysis methods. At first, bibliometrics analysis and technology morphology matrix are used to establish all kinds of possible technology configurations; then, the technology unoccupied configurations are identified by the document's keywords vectors; at last, the priority of each technology configuration can be calculated by the conjoint analysis based on the citation of technology documents. The results reveal that this proposed method not only can solve the limitations of using a single method, but also can prioritize the unoccupied territory of technology configurations in order to identify and evaluate the technology opportunities more scientifically.

MD-07 Project/Program Management-1
Monday, 7/28/2008, 14:00 - 15:30 Room: Prince Edward Island
Chair(s): Jeffrey Busch; Jeffrey S. Busch PMP

MD-07.1 [R] Effective Leadership for Culturally Diverse Technology Projects

Nader Asgary; Bentley College, United States
Hans J Thamhain; Bentley College, United States

The challenges of managing culturally and globally dispersed teams are examined in a field study focusing on technology-intensive product developments. The results have implications for team organization, project execution and leadership, with special significance for the management of product and service developments involving multinational teams. The findings provide insight into the business processes, support functions and managerial lead-

ership style most conducive to high project performance in such culturally diverse team environments that typically involve support functions, suppliers, sponsors, partners, alliances and joint ventures across the globe, and require the integration of many disciplines that often range from R&D to manufacturing and marketing. The focus of this paper is on team leadership and organizational conditioning. Specific suggestions are being made as a framework for assessing team leadership effectiveness and barriers to multi-cultural team performance.

MD-07.2 [R] The Most Important Success Factors for Implementation of Government Projects in Developing Countries

Pedrito A Jo; National Directorate of Water, Mozambique
Marie-Louise Barry; University of Pretoria, South Africa

Projects are generally conducted to meet specific objectives. In the case of government projects, these objectives are normally to ensure economic growth or to meet social development goals. Project success has been the subject of research by researchers and practitioners throughout the world. Almost all research has been focused on the private sector, leaving a gap relating to project success factors in the public sector (projects carried out by governments) until now. This research study aimed at identifying the main factors that impact positively and negatively on projects undertaken by government institutions in Mozambique and to ascertain how project success is determined. Extensive related literature was reviewed and primary data gathered by designing a questionnaire and conducting a survey amongst project managers in government institutions. Current government structure is not perceived to be hampering project implementation. Customer/end user satisfaction was found to be the most important criterion of project success, followed by the availability of technical experts, political support and stakeholder involvement. These findings contribute to an understanding of the factors impacting project success for government institutions, specifically in Mozambique and, by extension, in other developing countries. Further research is required to determine the success factors for government projects worldwide.

MD-07.3 [R] The Sources of Success and Failure of Information Technology Projects: Project Managers Perspective

Oksan Imamoglu; Istanbul Technical University, Turkey
Sitki Gozlu; Istanbul Technical University, Turkey

Although the causes for information technology (IT) project success and failure have been the subject of many studies, there has been relatively little attention given to how individuals attribute IT project success and failure. The purpose of this research is to determine how project managers attribute IT project success and failure. A questionnaire was designed for study in this research and mailed to the 500 major manufacturing enterprises, ranked with respect to their sales from production in the year 2006, published by the Istanbul Chamber of Industry. The questionnaire consists of three sections. The background information section addresses issues such as respondents' gender, age band, main job responsibility, the length of employment time; and organization's type, estimated annual turnover, number of employees, etc. The project failure section addresses issues such as involvement of the respondent, size and importance of the project, project failure reasons such as going over budget, going over time allocated, having no great organizational benefits, having low user satisfaction, etc. The project success section addresses issues such as involvement of the respondent, size, and importance of the project. Project success reasons such as staying within budget, staying within time allocated, having great organizational benefits, and having high user satisfaction are studied.

MD-09 Technology Management in Services-1
Monday, 7/28/2008, 14:00 - 15:30 Room: Robben Island
Chair(s): Rene Pellissier; University of South Africa

MD-09.1 [R] Strategic Utilization of Information Technology within Retail Banking

Lesego M Chauke; University of Pretoria, South Africa
Andre J Buys; University of Pretoria, South Africa

The use of technology-based solutions is one of the key response mechanisms that retail banks utilize globally to address legislative and regulatory requirements, customer products and service requirements, as well as day-to-day operational effectiveness. In order to be effective, technology-based solutions have to be aligned with the prevailing business objectives, business models and competitive strategies. The strategic alignment of business objectives and IT functions entails several key elements, namely, an information technology strategy that is in synch with the business strategy; a governance structure that ensures the right decisions are made at the right time; IT architecture that is standardised and well-integrated; adequate management and support for the operational IT aspects; and continuous maintenance of the strategic alignment, through periodic reviews and updates. This paper reports the findings of a research project that was executed to test the applicability of the key elements of strategic alignment and management of information technology in a banking environment. The research was conducted in one of the largest retail banks in South Africa. The organizations current status was analysed in comparison with best practices. The results show that the research environment is at various levels of maturity in implementing the identified key elements of strategic alignment. Some elements are well established and show benefits, while others require more focus. The gap areas identified during the research are highlighted and recommendations are made as part of the research conclusion.

MD-09.2 [R] A Proposed Model for Mobile Commerce Applications in the Financial Services Industry: A Catalyst for the African Economic Renaissance

Leunis van Rooyen; CyberGroup of Companies Africa Ltd., South Africa

The paper is exploratory by nature as there has not been work done in terms the methodology presented here. The key focus of this paper is the consideration of the deployment of a post-modern commercial bartering mechanism (called Super Commerce). The model will exploit technological advances in systemic and non-systemic systems, which will result in the spontaneous liberation of money into the banking systems in countries across Africa and worldwide. From a macro-economic perspective, the anticipated African economic renaissance was delayed due to a lack of e-business innovation, no collaboration amongst the financial services industry, no entrepreneurial participation and no information technology diffusion and nor innovation, mostly due to trade risk aversion. This paper provides a conceptual framework and methodology for the understanding of the development and the application of the proposed Super Commerce methodology within an African setting. Furthermore, the methodology offers a uniquely defined environment, with an implementation range outlined. Within the above factors, the suggested methodology encompasses a new dynamic and complex economic e-business environment, manifesting fluid markets, policy rule information exchange, cultures and structures, inter-related stakeholders and new forms of strategising. A new set of knowledge based communities of practice will prevail. From a holistic perspective, this paper proposes a quantum shift towards multi-directional e-business collaboration, incremental supply chain efficiency, concise monetary transfer cycles and applied leadership thinking. The field is new and little theory or literature is available as yet.

MD-09.3 [A] How to Realize Service Management Innovation in the Banking Industry in China

Guojun Zhao; Beijing University of Posts & Telecommunications, China
Harry Perros; North Carolina State University, United States

There are many differences between China and developed countries, most of which are centered on spendable income and education. As a result of these differences, the consumptive notion and style are different, and the service methods and realization are different as well. The bank industry is special, because of its modern technology. This paper will focus on how to combine modern management and feasible services in order to provide a suitable bank service for people in China. We will analyze the discrepancy on service objects and service patterns between China and developed countries. We will also propose a new service management method for the Chinese bank industry, applicable also to other developing countries, which is customer-centered and conducted. This method will realize a service for impoverished people in developing countries via technology management. Banks and their customers will benefit from this new method.

SESSIONS

MD-10 Science and Technology Policy-1
Monday, 7/28/2008, 14:00 - 15:30 Room: Dassen Island
Chair(s): Akkanad M Isaac; Governors State University

MD-10.1 [R] A Performance and Monitoring Evaluation System & Its Applications for National R&D Programs: A Case of Industrial Application Technology in Korea

Moon-Soo Kim; Hankuk University of Foreign Studies, Korea, South
Sung Yong Lee; Hankuk University of Foreign Studies, Korea, South
Kyung Il Choi; Hankuk University of Foreign Studies , Korea, South
Byung Woon Kim; Electronics & Telecommunications Research Inst., Korea, South
Hak Yeon Lee; Seoul National Univ., Korea, South
Chang Woo Choi; Seoul National Univ., Korea, South

The Korean government established the Act on Performance Evaluation and Management for National R&D Programs in 2005, and one year later constructed a master plan, A Basic Plan for the Management and Utilization of R&D performance, that focused on better diffusing the public R&D outcomes. In this study, we propose a performance and monitoring evaluation system model for the national R&D program, which is based on a systematic approach and the logic model that has been prevalently used in planning and evaluating the public programs, to meet the purpose of the law and the master plan as well as to facilitate the diffusion of national R&D outcomes focused mainly on the industrial application technology. Furthermore, in order to use the model, the several applications, which include the quantitative methodologies such as DEA and AHP, are suggested in accordance with the existing system of the evaluation institution like Korea Research Council for Industrial Science and Technology (KOCI).

MD-10.2 [R] HDM for Developing National Emerging Technology Strategy and Policy Supporting Sustainable Economy: A Case Study of Nanotechnology for Thailand's Agriculture

Pisek Gerdsri; Portland State University, United States
Dundar Kocaoglu; Portland State University, United States

This paper presents on-going research on developing a systematic process to help national decision makers define the R&D strategy and policy of emerging technologies. To demonstrate the process, nanotechnology for supporting the development of the food and agriculture sector in Thailand will be applied. In the research, the analytic hierarchy process (AHP) is used as the main methodology. Then, a four-level hierarchical decision model (HDM) composed of the country's mission, objectives, technological goals, and research strategies is built. All elements in each decision level are developed based on the literature search and verified by experts.

MD-10.3 [R] The Innovation Communities and Their Ecological Mechanism in Creative Industry

Weihui Dai; Fudan University, China
Zhou Xuan; Shanghai University, China
Yu Yue; Fudan University, China

As a new service industry, the creative industry has special productive elements, unstable organization pattern, particular rules and specific environmental conditions on its innovation and development. Up to now, research in this field is in the exploring stage. With the theory of ecology, this paper first described the different patterns of innovation communities in creative industry based on multiple famous examples, and established an ecological chain model to explain the operating and developing mechanism for sustainable innovation in creative industry. At last, we gave some analyses of the current situation of Shanghai, one of the most developed cities with creative industry in China. .

ME-01 TUTORIAL: Business Game for Research
Monday, 7/28/2008, 16:00 - 17:30 Room: Ballroom West
Chair(s): Amnon Gonen; Holon Institute of Technology - HIT, Israel
Eyal Brill; Decision Makers Ltd., Israel

Business games are usually an improved way for participants to learn about the business world in an exciting, novel and competitive way. The participants can turn a business plan into real-time decisions, examine their decisions and learn from their own success or failures in a competitive environment. The tutorial will introduce the business game theory and methodology, using it for research about business decision making. The tutorial will use a website business game simulation called "Decision Makers"1 to present the business decisions of high technology firms.

There are two main objectives to the tutorial: using an on-line business simulation to test a business plan and company strategy and exploring the possible improvement in business management.

The "Decision Makers" is an Internet-based business learning simulator. It enables participants to practice their ability to make business, technology and management-related decisions in simulated real-life situations. "Decision makers" enables the instructor to individually monitor the progress of each group, to control the level of the simulation's complexity, and to intervene at crucial points in order to determine the study content. The simulation is held within the scope of "virtual" quarters. During each quarter, each group can conduct an unlimited number of simulations and obtain the results forecast for the quarter.

The results of each simulation are affected by the group's decisions and by decisions made by other groups simultaneously (groups do not need to be connected to the server at the same time). At the end of the quarter, the teacher (simulation manager) runs a "binding" simulation, which determines the quarter's results and forms the basis for the next quarter.

The firms compete in four different markets with distinct demographic and economic characteristics. Each firm has to plan its production method, invest in advertising and marketing, set up its transport and quality control systems, and invest in development and quality control. The firms can trade with each other; alternatively, they can make an investment in rival firms in order to create collaborative ventures. At the end of each quarter, each firm gets profit and loss statements as well as a periodic balance sheet. In addition to these goals, each firm gets a score according to the part it plays in pollution and its impact on macroeconomic variables (such as income distribution).

"Decision Makers" enables the instructor to simulate the technological "aging" of equipment as well as technology renewal as a result of investments and customer product satisfaction. The system automatically generates statistical reports and market surveys as information serving decision-making purposes. "Decision Makers" makes it possible to simulate "study events" according to a scenario predetermined by the instructor, such as supply chain management or strategic market planning in a growing firm.

The simulator is used for teaching and research. The following studies are running in parallel:

- The contribution of running the simulator before making decisions. This study measured the difference between teams that had free runs of the simulator with other teams that were limited to a few simulator runs each quarter;
- The convergence to Nash equilibrium point. This study explores the ways teams are making decisions until they feel they have nothing to improve; and
- Sequential decisions vs. parallel decision making (making decisions with different information levels about the other team's decisions).
- The participants need a computer (laptop) with an internet connection.

[1] For more details see "www.decisionmakers.biz"

ME-02 Innovation Management-2
Monday, 7/28/2008, 16:00 - 17:30 Room: Ballroom East
Chair(s): C. M Chang; State University of New York at Buffalo

ME-02.1 [A] Collaborative, Heuristic and Normatively Guided Techniques to Creativity

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

Societies and companies need innovations to advance and sustain long-term profitability. Innovations, on the other hand, need creativity, for which teams are typically utilized to take

advantage of the multiple perspectives and divergent experience it could offer. This paper suggests the Collaborative, Heuristic and Normatively Guided techniques, which could be used to promote creativity in teams. They consist of 1) Combining a multi-round Delphi technique with a series of thinking strategies (e.g., brain-storming, divide-and-conquer, deepsmart, etc.,) that are to be applied by team members, 2) Changing the level of abstractions to alter team members' perspectives, 3) Guiding the collaborative idea creation process with customized questions to retain focus, and 4) Pruning the multi-round outcomes to focus efforts on increasingly novel ideas. The principal advantages of these techniques lie in their capabilities of 1) processing a number of desirable rounds, 2) being self-directed and highly cost-effective, 3) invoking a multi-mode of thinking patterns, 4) assuring the outcomes being mutually exclusive and collectively exhaustive, 5) allowing busy knowledge workers to participate, 6) creating an internally competitive environment to induce creativity, and 7) applying readily in global settings absent of geographical and time-zone constraints. This set of techniques has seen limited testing in classroom settings so far. Preliminary results indicate that they appear to be quite useful in creating new ideas to improve existing products and services.

ME-02.2 [R] Virtual Customer Integration in the Innovation Process: Evaluation of the Web-Platforms of Multinational Enterprises (MNE)

René Rohrbeck; Berlin, University of Technology, Germany
Fee Steinhoff; Berlin, University of Technology, Germany
Felix Perder; Berlin, University of Technology, Germany

Integrating the customer in the innovation process is believed to be a powerful means to reduce failure rates and to increase the revenue from new products. Although many companies have launched programs to enable such integration, the understanding of the mechanisms behind successful programs remains limited. Furthermore, the benefit of integrating customers in the innovation process has to be weighed against the costs. Virtual customer integration has been discussed as a way to limit these costs and bring the benefits of potentially unlimited scalability. Using a sample of the Euro Stoxx 50 companies, we shed light on the various types of virtual customer integration platforms, their limitations, their benefits and the mechanisms that have to be put in place to make them succeed. Results indicate that only a limited number of platforms go beyond the sourcing of ideas. Especially, the integration of the customer in the execution phase of the innovation process remains largely limited to digital goods.

ME-03 Strategic Management of Technology-3
Monday, 7/28/2008, 16:00 - 17:30 Room: Sir Francis Drake
Chair(s): Pattharaporn Suntharasaj; Portland State University/ NSTDA

ME-03.1 [A] From Follower to Leader: Strategic Analysis of Thailand, the World's Largest Hard Disk Drive Manufacturer

Pattharaporn Suntharasaj; Portland State University/ NSTDA, United States
Kwan Sitathani; National Science Technology & Development Agency, Thailand

Undoubtedly, in today's competitive world hard disk drive (HDD) is regarded as one of the most significant data storage devices. The HDD industry has played a significant role as one of the major markets in the world. And according to the Hard Disk Drive Capital Equipment Market & Technology Report (June 2006), the HDD market is still growing continuously and rapidly. Meanwhile, Thailand has built up a global competitiveness in the electronics industry, especially in the HDD sector. After 25 years of having the first HDD manufacturer (Seagate Technology), Thailand has become a manufacturing location for the world's leading HDD manufacturers (Seagate, Western Digital, Hitachi GST, and Fujitsu). The HDD industry in Thailand has been growing strongly for the past decade. Since 2005, Thailand is first in the world ranking of hard disk exporters. Thailand's HDD industry is estimated to contribute 4-4.5 percent of Thailand's GDP. This research has been carried out with the purpose of understanding the reasons behind Thailand's success in attracting disk drive manufacturers by applying two strategic analyses, SWOT and Model of Societal Structure. The study found that Thailand has a lot of potential to continue to be the world's largest HDD manufacturer in the future because of the major key success factors, which are responsive and attentive government, strategic location, strong infrastructure, and excellent labor pool.

ME-03.2 [R] The Research of the RTIE Performance by Using the Projection Pursuit Model

Yafei Luo; Beijing University of Technology, China
Chunyan Guo; Beijing University of Technology, China

Since the regional technology innovation system is an open system that is away from equilibrium, nonlinear, layered and fluctuant, and has the characters of ecosystem, we will regard the technology innovation system as a technology innovation ecosystem. Based on the concept of regional technology innovation ecosystem (RTIE), we set up the evaluation indicator system to analysis the performance of input and output of technology innovation in 30 Chinese regions by using Projection-Pursuit model. As a result of the statistical technology's overcoming the impact of abnormal points, we get a better evaluation conclusion. So it is a reasonable method for Projection-Pursuit model to evaluate the regional technology innovation ecosystem performance.

ME-03.3 [R] Technology Gap among Suppliers and Pop & Mom Stores as a Key Distribution Cost Issue

Victoria E Erosa; Universidad Autonoma de Tamaulipas, Mexico, Mexico

A Pop & Mom Store segment of around 450,000 businesses is an important market for large multinational corporations and medium-size firms involved in the retail goods production business in Mexico. As large and medium-size suppliers are fully integrated to technology-based processes, and working under supply chain management practices, in the distribution side of the value chain are the Pop & Mom stores representing an important economic group of businesses with asymmetries in regard to the adoption of basic information technology to align with their business parties. Little is known about the challenges faced by Pop & Mom stores in developing countries to integrate information technology components to their business processes such as suppliers and inventory management. Results of a study conducted in a middle size city in the northeast region of Mexico suggest that due to the technology gap existing among them and their large suppliers, increasing distribution costs are threatening the survival of this business model while suppliers are focusing their attention on the convenience stores model operating upon technology based processes.

ME-03.4 [R] Applying Neural Network to Explore the Influences of the Patent Indicators upon the Market Value of the American Pharmaceutical Companies

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

This study applies the artificial neural network technique to explore the influence of the patent performance upon the market value of the pharmaceutical companies in the US. The result shows that Herfindahl-Hirschman Index of patents has a negative influence upon the market value of the pharmaceutical companies in the US, and the technological independence has a positive influence upon their market value. In addition, this study also finds that the patent citations have an inverse u-shaped influence upon the market value of the American pharmaceutical companies.

ME-04 R&D Management-1
Monday, 7/28/2008, 16:00 - 17:30 Room: Marco Polo
Chair(s): Antonie Jetter; Portland State University

ME-04.1 [A] A Case Study of Increasing Market Competitiveness through Shortening the Research and Development Cycle

Kuei-Kuei Lai; National Yunlin University of Science & Technology, Taiwan
Yang-Kuang Ou; National Yunlin University of Science & Technology, Taiwan
Tung-Yu Tsai; National Yunlin University of Science & Technology, Taiwan
Ta-Tung Chen; Hsing Wu College, Taiwan

The shorter the new product development cycle, the more rapidly the quality of the product

improves. This phenomenon is particularly pronounced in the auto industry, which requires an extended period for new product development. During the research and development of next generation automobiles, the final integration of testing and product validation is a crucial and time consuming process in the application of new technology to the stages in demonstration of a technology in products. Proper utilization of technology tools and management techniques to reduce the time needed during the testing and product validation phase allows an enterprise to quickly commercialize the results of research and development without compromising product quality. This study presents case studies of the successful reduction of time needed for research and development in the auto industry, drawing on a database created though actual and simulated road-chassis structural stress tests. The data is compared and analyzed to obtain the optimal signal combination target between the two, with the goal of approximating actual endurance testing through accelerated simulation, greatly reducing the time frame for testing and product validation, and increasing the marketability and economy of new products.

ME-04.2 [A] Technology Management Model Application in Concept Approval Decision - Case Study: Concept of Operations and Mission Need Assesment for a Defence System

Sezin Bizkevelci; TUBITAK-SAGE, Turkey
Arda M Cakmak; TUB‹TAK-SAGE, Turkey

Like Turkey, most of the countries admit defense industry which leads edge technologies as an economy driven area. Thus, technology management in the defense industry is a key factor for a sustainable economy. In this paper, as a continuation of the R&D Project Selection Model and Process Approach in Defense Industry Related Programs: First Phase Concept Approval Decision study, which was presented in PICMET '07, a defense industry application is realized. The application contains the first three steps of Concept Approval Decision Phase. First of all, concept of operations is formed, than mission need statements are defined, and finally, the first leg of Mission Need Analysis, which is called Functional Area Analysis, is realized for a generic defense system as an example. This is a part of a case study, and it is aimed to demonstrate the applicability of the theoretical study proposed in PICMET '07. All the assessments and analysis are handled by the authors. Such a study would be more efficient if the end users cooperated such as operations, logistics, and maintenance departments of related armed forces and system developers from the defense industry. If such a systematic decision making process can be formed and used for all parties in the defense industry, it will be an effective management method to develop edge technology for a sustainable defense economy.

ME-04.3 [R] Fuzzy MCDM Approach to R&D Project Evaluation in Taiwan's Public Sectors

Wen-Hsiang Lai; Feng Chia University, Taiwan
Pao-Long Chang; Feng Chia University, Taiwan
Ying-Chyi Chou; Tunghai University, Taiwan

In most industrialized countries, the role of public sectors has been undergoing massive changes in the past several decades. One of the major reformations in public sectors is the pursuit of the ability to distinguish between executive performances. Thus, establishing a performance-oriented evaluation in public sectors is the key to successful administrations. However, because of lacking relative comparable measuring standards, it is difficult to measure the relative performance of one unit while comparing to other units with regard to the multiple criteria decision making (MCDM) of performance evaluation. This study mainly focuses on the performance ranking of R&D projects in Taiwan's public sectors. The algorithm in this study is based on the concept of fuzzy set theory and the hierarchical structure analysis. The analyzing method adopts the methods of standard normal distribution, linear transformation and fuzzy MCDM, carrying on the analysis of multiple criteria of the performance evaluation. In order to differentiate the indistinct linguistic terms and make the performance evaluation be able to match true conditions, the characteristic of adopting fuzzy set theory in this study is to construct the membership function for those criteria of performance evaluation. In the meantime, this study constructs linguistic values to the subjective judgments and analyzes the ranking results of the performance evaluation with respect to 45 R&D projects of one of Taiwan's electric power companies.

ME-05 Information Management-1
Monday, 7/28/2008, 16:00 - 17:30 Room: Bartholomew Diaz
Chair(s): Jari Soini; Tampere University of Technology

ME-05.1 [R] Managing Information and Distributing Knowledge in a Knowledge-Intensive Business Environment

Jari Soini; Tampere University of technology, Finland

Both information and knowledge are huge resources in organizations, but only if they are utilized correctly. Appropriate information must be in the right place, at the right time and with the right person. Attempts should be made to capture, share and utilize existing critical knowledge for use by the entire organization as effectively as possible. Especially in knowledge-intensive organizations, such as software companies, this aspect is crucial. The availability of relevant information is one of the most important assets in this business environment. Primarily, management is responsible for organizing and managing this challenging and often complicated task. Achieving this will significantly enhance the organization's ability to succeed in today's rapidly changing knowledge-intensive business environment. The paper discusses the factors that are potential enablers for success in information sharing and knowledge management in the software engineering field. Additionally, a case study is presented, which demonstrates how information distribution was implemented in practice in certain software organizations.

ME-05.2 [R] Development of a Framework for Sub-Topic Discovery from the Web

Eray Uluhan; Bogaziçi University, Turkey
Bertan Badur; Bogazici University, Turkey

The motivation behind sub-topic or topic specific keyword discovery through Web pages is helping a user, who is insufficient in knowledge and experience about a topic, to find important concepts without much effort. Intuitively, a Web user would start searching the Web via querying search engines, visiting some pages, and spending a lot of time on deciding what is important about the topic and what is not. In this study, we try to mine important sub-topics or key concepts of a given topic automatically, through HTML based Web pages. Starting with a search query, the system gathers top-ranking pages returned from a search engine, and selects informative pages among them. These pages are processed further for extracting important phrases and then data mining techniques are applied on these phrases to find candidate sub-topics. Each candidate phrase is given scores based on its relevance with the search query over the Web space. Using the proposed technique, the user should be able to quickly learn sub-topics or key concepts about a topic without going through the ordeal of browsing a large number of non-informative pages returned by the search engine.

ME-05.3 [A] Transformational Capabilities of ICT: A Technology Management Perspective in Construction

Irtishad Ahmad; Florida International University, United States
Maung K Sein; University of Agder, Norway

The construction industry typically lags behind in adopting technology. It is apparent in the manner Information and Communication Technology (ICT) is deployed in the construction industry. Given the fact that the process of construction is critically dependent on relevant, accurate and timely information, ICT can play a very important role in the industry. Although it seems that the industry has embraced ICT, it is actually missing out on the crucial advantages offered by ICT. ICT is used by and large as mere enhancement tools, not as agents that can transform and thus revolutionize the process of construction. Construction companies, design firms and owner organizations are bound by age-old conventions, traditions, norms and rules set in the industry. A new approach based on the technology management principles will enable researchers to formulate new strategic directions. This paper will explore successful technology management strategies in the context of ICT implementation in construction.

ME-06 Technology Assessment and Evaluation-2

SESSIONS

Monday, 7/28/2008, 16:00 - 17:30 **Room: Vasco da Gama**
Chair(s): William T. Flannery; University of Texas at San Antonio

ME-06.1 [R] Determination of Performance Criteria for ERP Software Technology

Gul Tekin Temur; Istanbul Technical University, Turkey
Sitki Gozlu; Istanbul Technical University, Turkey

In this paper, the main goal is to determine the performance criteria for ERP software technology with respect to their sources. Today, the companies are in interaction with many internal and external partners and have to face many situations in various environments. Especially, many small- and medium-sized firms utilize ERP software technology to plan their business interactions in the chain. In this study, firstly a literature search is accomplished. Then, in order to reveal the performance criteria, a large-scale automotive company has been selected to conduct interviews with managers. Also, the meeting reports of a few small- and medium-sized companies have been analyzed. The similar and common agreements on ERP software technology performance criteria were listed and grouped. As a result of the analysis on the findings, the common views of the firms about performance criteria are classified into four groups according to their sources such as people, technical, managerial, and economical. The subfactors of these main criteria are also taken into account in order to point out the origins of the criteria. The results of the study will provide insight to researchers and as well as to professionals in the practice.

ME-06.2 [R] Investigation of Performance Criteria for Health Information Systems

Dilek Ozdemir; Istanbul Technical University, Turkey
Sitki Gozlu; Istanbul Technical University, Turkey

Expenditures of health care are increasing in every country, and studies about health care expenditures predict that this trend will not end very soon. The greatest proportion of health care investment made is health information systems (HIS). It is obvious that performance measurement criteria are needed to trace the improvement in this area. In this study, it is aimed to develop performance measurement criteria for organization-wide HIS. In the first step of the study, a literature survey is conducted to understand the requirements of the health care industry, the evolution of HIS, current usage area of information systems in the health care industry and its promises. The literature survey is also performed to find out the ways to evaluate performance of different technologies, especially information systems. In the next step in-depth interviews are conducted with IT experts in health care organizations and health care staff. New perspectives and their experiences with information systems are scrutinized. In the last step, HIS usages are classified according to operational levels such as clinical HIS, administrative HIS, and strategic HIS. Performance criteria of these three classes of HIS are derived. The financial criteria are extracted from the study to focus on HIS-specific criteria.

ME-06.3 [R] From Gut Feel to Educated Approximations: Towards an Integrated Approach for Technology Valuation

Marcel Dissel; University of Cambridge, United Kingdom
David Probert; University of Cambridge, United Kingdom
Rick Mitchell ; University of Cambridge, United Kingdom

To understand the potential value of a technology, a wide range of techniques is available. Examples are quantitative techniques such as discounted cash-flow, real options and decision trees and qualitative techniques such as roadmaps and scoring cards. However, very little has been written about their integrated use and more particularly over the life cycle of a technology. Whereas many companies have their own processes in place often combining qualitative and quantitative techniques, very few empirical studies have been performed to learn from these industry practices and provide an overall view on the process of valuing technologies. In this paper we propose an integrated approach, combining both qualitative and quantitative techniques. Based on ongoing case study research, we will elaborate on the use of both qualitative and quantitative methods, and will provide a conceptual basis for integrating these techniques. By seamlessly integrating the qualitative foundations with quantitative projections, judgements can be turned into justification models (using, for example, decision trees and real options thinking), and scoring mechanisms can turn the collected gut feel into educated approximations for probabilities and financial projections. Although we do not assume a generic decision making process can be defined, the integrated logic provides a more consistent guide for R&D managers and adds to the body of literature, more particularly empirical studies, on the selection and use of a diverse set of valuation tools.

ME-07 Project/Program Management-2
Monday, 7/28/2008, 16:00 - 17:30 **Room: Prince Edward Island**
Chair(s): Herman Steyn; University of Pretoria

ME-07.1 [A] The Myth and Reality of Project Management

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

Many project teams today realize that they need to develop their own solutions on top of the standard techniques in order to cope with their projects dynamic changes, uncertainty, or complexity. In fact, research shows that the conventional approach to project management provides the basic, although necessary, guidelines for managing projects; yet they are not enough to guarantee a project's success. We will present the current myths, on which the traditional guidelines are based, and contrast them with the dynamic realities of today's projects. The traditional approach to project management is based on a predictable, fixed, relatively simple, and certain model. It is also often decoupled from changes in the market, technology, or business environment. However, only few projects today are fixed, certain, or simple. Rather, they are unpredictable, changing, and involve a great deal of uncertainty and complexity. We will offer a new model to deal with such projects in a highly flexible and adaptive way. We will also show that this model can be easily applied on top of the current organizational processes to increase the chances of project success. These ideas formed the motivation for the book Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation, by Aaron Shenhar and Dov Dvir, Harvard Business School Press, 2007.

ME-07.2 [R] Current Status of Project Management in South Africa

Leon Uys; University of Pretoria, South Africa
Marie-Louise Barry; University of Pretoria, South Africa

Project management has been in use worldwide for many thousands of years. This research paper attempts to document the state of project management in the South African context as a result of a study in which 81 respondents in the project management environment in South Africa participated. It was found that: internal stakeholders are more likely to have similar opinions on project success than external stakeholders, and project managers use optimistic reporting as they do not want to let the project stakeholders down. The top five factors for achieving project success are: teamwork, cost management, project planning, scope management and leadership. The six most important indicators of project success: client/customer satisfaction, by project team skill level, senior management buy-in, communication or project reporting, problem scope management and project delivery on time. As the majority of South African organisations do not use project management evaluation tools, there was no consensus on whether South African projects differ from international projects.

ME-07.3 [R] Communication Issues in Projects Management

Marly M Carvalho; Escola Politecnica da Universidade de Sao Paulo, Brazil

This paper aims to understand the communications process in information technology (IT) projects. Furthermore, this study investigated the influence of professional profile on the perception of project communication importance. The selected methodological approach uses a combination of qualitative and quantitative methods. Data were gathered from a questionnaire survey of 57 professionals of the studied company involved in IT projects. The results suggested that a formal communications plan is drawn up in only a small percentage of projects, and neither writing performance reports nor having a system of control over lessons learned are frequent practices at the organization studied.

ME-08 Technology Management in the Defense Sector-1

SESSIONS

Monday, 7/28/2008, 16:00 - 17:30 **Room: Seal Island**
Chair(s): Andre J Buys; University of Pretoria

ME-08.1 [A] Technology Valuation Model in Defense Offset Trade: Income Approach

Won Joon Jang; Defense Agency for Technology and Quality , Korea, South
Jin Young Ryu; Defense Agency for Technology and Quality , Korea, South

Defense offset has been implemented by a counter-trade obligation in defense acquisition contracts between purchasing countries and foreign selling companies in the global arms market. It gives the buyer a valuable opportunity to acquire not only defense R&D technologies, but also parts production and other advantages. Even though the importance of defense offset trade is greatly increasing today, purchasing countries still need more objective and credible valuation methods by mutual agreement in defense offset contracts. Whereas the income approach is widely used for commercial fields, it is rarely applied to defense acquisition projects. This paper presents the income approach-based technology valuation model in the defense offset program of the Republic of Korea. The contribution of this paper is in the application of the Defense Offset Valuation with INcome approach (DOVIN) model and its empirical implementations to defense offset contracts. It also shows several policy implications that could be applied to the defense offset program.

ME-08.2 [R] Simulation-Based Defense Acquisition in South Africa

Arnold J Swart; University of Pretoria, South Africa
Andre J Buys; University of Pretoria, South Africa

In this paper the scope and type of models and simulations used in defence system acquisition are reviewed. The principles of Simulation-Based Defence Acquisition are presented and discussed in the context of the changes and challenges of complex systems acquisition management. The paper also presents different case studies that illustrate to what extent modelling and simulation were used in major South African defence acquisition projects and how it was managed during the acquisition process. Some of the innovative ways the South African industry used to make defence modelling and simulation more affordable are described. The difficulties and challenges to implement Simulation Based Acquisition in a developing country such as South Africa are highlighted. The need for better modelling and simulation management and cooperation is identified and examined within an environment where a lack of resources limits the adoption of simulation-based acquisition in the early phases of defence projects. The paper concludes with suggestions for a different approach to effective defence modelling and simulation in a developing country.

ME-08.3 [A] Personnel Management Information System of the Brazilian Air Force

Manuel A Fagundes Perez; Instituto Tecnologico de Aeronautica, Brazil
Tharcila T Hyppolito; Instituto Tecnologico de Aeronautica, Brazil

In 2007, oriented by the Brazilian Air Force Command, the new institutional system of Personnel Management Information was implemented at the Aerial Space Control Institute (ICEA), in So Jose dos Campos, Sao Paulo, Brazil. The system, called SIGPES Personnel Management Information System, has as its purpose to centralize and integrate several subjects related to Brazilian Air Force personnel, through a centralized database and also by exchange and actualization among users, by corporative net, not only in So Jos dos Campos, but in the whole country. This paperwork's purpose is to analyze the implementation and utilization of the system, its discrimination of varieties related to the prior system decentralized and the difficulties of the migration from the prior to the new system. It is believed that this analysis as the presentation of defeated challenges and the system's possible improvement points, based on Management Information Systems knowledge, as in ERP (Enterprise Resource Planning) knowledge works as a reference to other organizations that search for optimization of the management information systems utilization through the integration of several sectors or branch offices.

ME-09 Technology Management in Services-2
Monday, 7/28/2008, 16:00 - 17:30 **Room: Robben Island**
Chair(s): Kiyoshi Niwa; The University of Tokyo

ME-09.1 [R] Services Research Model for Value Co-Creation

Yuriko Sawatani; IBM, Japan
Kiyoshi Niwa; University of Tokyo, Japan

The impact of R&D on service business is increasing rapidly by the movement to service economies. The shift to focus on the services businesses, which is happening in manufacturing industries, affects their internal business processes, which include research organizations. In this paper, we study service research activities in a manufacturing enterprise, focusing on the advanced service research initiative, which was initiated as On Demand Innovation Services (ODIS) in 2003, as an exploratory research experiment in IBM. We propose a services research model for value co-creation based on the ODIS experiment. We found that new knowledge is created through services activities, which are not created in a laboratory, traditional research activities. In addition, these are keys to the successful service projects. We focused on specific knowledge created during services research model for value co-creation; however, there are other kinds of knowledge also created. To understand and form the research base of service businesses and innovations, we should explore more on service innovation projects and understand critical factors, such as new knowledge created in a project, how they are created, and how the knowledge makes the service research base more fruitful.

ME-09.2 [R] Vision Sharing for New Service Development

Atsuko Koizumi; Hitachi, Ltd., Japan
Chiaki Hirai; Hitachi, Ltd., Japan
Shinsuke Takahashi; Hitachi, Ltd., Japan

Integration of technologies and customer value is a key issue for technology-based companies to achieve service innovation. We are developing a methodology for service concept creation focusing on customer value exploration to address this issue. Our primary goal is to deploy our methodology (process, methods, tools, and examples) to business planning sites in our company. Taking an action research approach consisting of four steps, observation (involved in pilot projects), conceptualization, modeling, and deployment, we have clarified the basic concept of our methodology and designed a process for service concept creation: 1) sharing a vision of new services, 2) exploring customer values, and 3) creating a service concept consisting of target users (WHO), customer values (WHAT), and key technologies (HOW). In this paper, we discuss the issues to be solved at the early stage of the project and illustrate our vision sharing workshop characterized by the following techniques: 1) interaction technique for empathetic understanding through storytelling and active listening, 2) visualization technique for sharing clarified vision, and 3) feedback technique for deep understanding. By applying the workshop to our pilot projects, we have confirmed the operability and effectiveness.

ME-09.3 [R] Managing the Implementation of Banking Systems for Repeatable Success

Andre Malan; Izazi, South Africa
Leon Pretorius; University of Pretoria, South Africa
Jan-Harm C Pretorius; University of Johannesburg, South Africa

The successful implementation of core banking systems is dependent on more than the comprehensive definition of the current and future business and technical requirements. Each implementation requires detailed planning and accurate delivery, coupled with a focus on meeting all project objectives in the most efficient manner, to the benefit of both the client and the implementation partner. The current research is primarily concerned with the identification of those necessary strategies, processes, tools, methods and other devices which contribute towards repeatable success in the implementation of core banking systems. The outcome of this research is seen to be an improved approach towards the project management of banking system implementation projects, based upon the lessons learnt in performing the implementation of banking systems across a number of platforms and clients. The product development and project implementation process of an innovative product in certain case studies, e.g. the bank environment, will be discussed.

SESSIONS

ME-10 Science and Technology Policy-2
Monday, 7/28/2008, 16:00 - 17:30 **Dassen Island**
Chair(s): Dilek Cetindamar; Sabanci University

ME-10.1 [R] Determining Research and Development Expenditure Targets Based on an Affordability Index

David R. Walwyn; Arvir Technologies, South Africa

Gross domestic expenditure on research and development (GERD), usually expressed as a percentage of gross domestic product (GDP), is a widely used indicator to reflect the research intensity within a national economy, and hence its capacity to develop new and innovative products or services. It is also used as a key target in the management of national innovation systems. For instance, the South African National Research and Development Strategy set a target of raising GERD/GDP to somewhat over 1 percent, and in 2002 the Barcelona European Council set an EU target of 3 percent. Despite its widespread usage, there is little discussion or agreement on how this target should be derived within a broad range of economic contexts and levels of affordability. In this paper, a composite indicator based on GERD/GDP, normalised for GDP per capita, is developed and its use in a number of countries explored and explained. As a result, a set of GERD/GDP targets for various categories of developing countries is proposed.

ME-10.2 [A] Transformation of India into a Knowledge Society

Akkanad M Isaac; Governors State University, United States

A new national initiative is underway in India for the transformation of India into a knowledge society. The government of India has set up a National Knowledge Commission with a mandate to serve as a high-level advisory body to the Prime Minister of India in sectors ranging from education to e-governance in the following five principal focus areas: Access; Concepts; Creation; Application; and Services. The Commission has set up nine working groups on libraries; languages; health information network; undergraduate education; medical education; legal education; management education; traditional knowledge; and open and distance education. It has organized a number of workshops and surveys and has published a comprehensive report called Commissions Report to the Nation 2006. The objective of this paper is to critically examine the work of this Commission and to assess the potential impact of this effort on the growth of the Indian economy. A technology-induced, knowledge network will form the backbone of the massive effort to build a knowledge society, and the paper will present a framework for structuring democratic values in governmental decision making.

ME-10.3 [R] Causal Relationship Analysis Based on DEMATEL Technique for Innovative Policies in SMEs

Chia-Han Yang; National Chiao Tung University, Taiwan
Jou-Chen Chen; Institute of Education/NCTU, Taiwan
Joseph Z. Shyu; National Chiao Tung University, Taiwan
Gwo-Hshiung Tzeng; National Chiao Tung University, Taiwan

This research aims to offer an overview of policy instruments identified within the small and medium enterprises' (SMEs) development. The Decision Making Trial and Evaluation Laboratory (DEMATEL) method is also used to draw a directed graph for better capturing the causal relationship visibly between multiple innovative policies. A structural graph will be devised to portray a contextual relationship among 12 policy instruments of policy system including supply, demand, and environmental side, in which the arrow direction of the graph represents the influence strength of different policy instrument. The research results reveal that education and public enterprise are both significant factors affecting other instruments and play main roles within policy application for SMEs. In the meanwhile, scientific and technical and information are the factors intensely affected by other policies.

TA-01 PLENARY-2

DATE: TUESDAY, 7/29/2008
TIME: 08:30 – 10:00
ROOM: BALLROOM, OLD HARBOUR LEVEL

CHAIR: ROELF F. SANDENBERGH, DEAN: ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY, UNIVERSITY OF PRETORIA, SOUTH AFRICA

KEYNOTE-1

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

"Korean Innovation Model, Revisited"

Over the last decade, some Korean enterprises have emerged to become global players in their specialized products. How have they achieved such a tremendous technological progress in a short period of time? Dr. Choi explores this question by examining the characteristics of technological innovation activities at major Korean enterprises.

The presentation begins with a brief review of the stages of economic growth and of science and technology development in Korea. Then the existing literature, explaining the Korean innovation model, is dealt with to proceed to establishing a new framework in the Korean innovation model. Korean firms have experienced the following three sequential phases and thus the Korean model at the firm level can be coined into the "path-following," "path-managing," and "path-creating." Then, the stylized facts in the second phase of "path-managing" are discussed, as the empirical evidence of the model, in the areas of memory chip, mobile phone, shipbuilding, automobile, and steel.

However, Korean firms now face a paradigm shift in the modes of technological innovation to efficiently implement the third phase. To achieve a remarkable progress once more as they did in the past and to sustain the growth momentum, Korean firms should challenge new dimensions such as distinctive architecture, creative manpower, and a unique R&D system among others. Dr. Choi also articulates the most critical issues in S&T policies such as the cultivation of world-class manpower, reform of policy measures, upgrade of infrastructure and so on under the policy framework of PPP (public-private partnership) within the Korean context. Finally, some lessons from the Korean experience in innovation studies are addressed

KEYNOTE-2

Willem Louw, Managing Director, Sasol Technology, South Africa

TB-01 Technology Roadmapping-1
Tuesday, 7/29/2008, 10:30 - 12:00 **Ballroom West**
Chair(s): David Probert; University of Cambridge

TB-01.1 [R] Computer-Assisted Roadmapping: A Case Study in Energy Research

Yuya Kajikawa; University of Tokyo, Japan
Yoshiyuki Takeda; University of Tokyo, Japan
Katsumori Matsushima; University of Tokyo, Japan

Science and technology (S&T) roadmaps are an attractive tool in R&D management, and have been widely used during the past decade. S&T roadmaps are typically constructed by gathering and stimulating expert's opinion. In these days, the planner of S&T research has to grasp the broader coverage of scientific and technological research, and make decisions on effective investment in promising and emerging technologies especially under circumstances of limited resources. In such a situation, roadmapping is time-consuming and subjective, and therefore computer-based approach is expected to supplement expert-based approach. In this paper, we proposed and demonstrated that the computer-based approach using citation network analysis can be used to depict technology trend, and build the first draft of S&T roadmaps. We perform a case study in energy research. We track emerging research domains in it by citation network analysis. Our analysis confirms that the fuel cell and solar cell are rapidly growing domains in energy research. We further investigate the detailed research structures by clustering. Each citation cluster has characteristic research topics, and there is a variety of growth trends among the clusters. By using citation network analysis, we can

track emerging research domains among a pile of publications efficiently and effectively.

TB-01.2 [R] Towards Systematic Innovation Methods: Innovation Support Technology that Integrates Business Modeling, Roadmapping and Innovation Architecture

Hitoshi Abe; Japan Techno-Economics Society, Japan
Akihiko Suzuki; Chubu Electric Power, Japan
Minoru Etoh; NTT DoCoMo, Japan
Shigeki Sibagaki; Nitta Corporation, Japan
Shunichi Koike; Tokyo Gas, Japan

This paper describes an enhanced version of innovation support technology (IST), which we have been proposing as a management of technology (MOT) framework, the IST that provides engineers a set of systematic tools for product/service innovation. The previous version of the IST mainly consists of two MOT tools: 1) a business modeling method that depicts business value and related operational plans, and 2) a strategic roadmapping method that verifies product development plans in view of resource management and social trends, and thus highlights various discrepancies among development time schedules. An implementation of the IST may contain iterative refinements between the business modeling and the strategic roadmapping so as to produce a complete plan of business and technology development. The enhanced version, which we propose here, incorporates with a formal method called innovation architecture proposed and developed by H. Tschirky's group of ETH Zurich, which has the key elements called functions. It can enhance the above-mentioned IST implementation to be more systematic and systemic. We also report several case studies with the enhanced version of the IST from our six-year long activities (since fall 2002) in JATES (Japan Techno-Economics Society).

TB-01.3 [A] Mapping the Knowledge Evolution and Network of Technology Roadmapping (TRM): Using Bibliometric Analysis

Nathasit Gerdsri; Mahidol University, Thailand
Alisa Kongthon; National Electronics & Computer Technology Center, Thailand
Ronald S Vatananan; Mahidol University, Thailand

As the concept of technology roadmapping (TRM) continues to gain more acceptances from practitioners, many researches are undertaking to improve the visualization of a roadmap as well as to operationalize the process so that a roadmap can be effectively kept alive. This research presents the evolution and the current profile of the body of knowledge in the Technology Roadmapping (TRM) field. The text-mining technique was applied to analyze journal and conference publications related to TRM subjects, which are listed in the electronic databases of Web of Science and IEEE Explore. The cross-interrelationship between authors and keywords used in the publications were analyzed to highlight the existing social networks of the TRM scholars. The result reveals the areas where the future research collaboration can be initiated as those areas present the possible connections among the authors who tend to use similar keywords in their publications. In this presentation, a brief literature review is provided to capture the concept of bibliometrics and text mining technique. Next, the presentation discusses how the TRM database was organized for this analysis. Finally, the analysis results are presented along with a discussion about the limitations and the plan for future works.

TB-02 Innovation Management-3

Tuesday, 7/29/2008, 10:30 - 12:00 **Room: Ballroom East**
Chair(s): Scott W Cunningham; Delft University of Technology

TB-02.1 [R] Henley SME Innovation Study 2007

George Tovstiga; Henley Management College, United Kingdom
David W Birchall; Henley Management College, United Kingdom

Innovation is high on every manager's agenda today. Innovation is seen as a key differentiator in markets that are increasingly hard-fought; it is destined to become ever more so as competitive pressures increase across all industry sectors. Innovation separates the winners from the also-rans. It manifests itself in a variety of forms. Innovation can drive new service and product offerings, but it can also be at the root of new business opportunity creation and the launch of entirely new business models. Managers across all industry sectors are asking how they can most effectively exploit innovation to improve the bottom-line business result of their enterprises. Managers of small- and medium-sized enterprises (SMEs) are not exempt from this challenge. Indeed, SMEs are inherently dependent on their innovation potential for competing successfully against large established enterprises. We asked ourselves, how are SMEs pursuing innovation? How are they approaching it, where are they placing the emphasis, and where do they perceive the greatest opportunity? Finally, what is working and what is not? To gain answers to these questions we went to the managers of SMEs. We posed a number of questions that fell broadly into the following categories: How important is innovation for the competitive well being of the SME? Where are they focusing their efforts on innovation? What are the important drivers of innovation for SMEs? How much are they spending on innovation and on what specifically? How are SMEs performing on innovation; where are they reaping the greatest benefits? What are the obstacles to innovation? Who are the competitive benchmarks with regard to innovation for SMEs? Among the key findings of this study: Innovation remains a high-priority strategic focus for the majority of SMEs, with 62 percent of respondents of our survey ranking it one of their top-three priorities. Consistent with that finding, 64 percent of respondents indicated that their firms will increase spending on innovation in 2007. However, over a third of the managers of SMEs percent surveyed remain unsatisfied with the financial returns on their SME's investments in innovation. The three greatest stumbling blocks to innovation identified are 1) prolonged development times, 2) a risk averse culture and 3) limitations on customer insight. Respondents ranked Apple, Google, and 3M as the most innovative companies. This paper presents the findings of this research, which are based on a qualitative and quantitative survey of 160 SMEs in Europe and discusses implications for organizations that emerge from these findings.

TB-02.2 [R] The Effects of Leadership on Technological Innovation Performance: A Comparison of R&D and P&D

Selva Kilic; Kocaeli Saraybahce Municipality, Turkey
Nazl›han Ugur; Istanbul Technical University, Turkey

There are many factors affecting the organizational success in technology management. The leadership is one of these influential variables. Leadership factors have a more important role in the TM practices failures when compared to the easily observable financial and engineering factors. The current study is aiming to explore the effects of leadership factors on innovation performance. Most empirical studies examining the success of organizational structure have focused on technological tools and financial performance. The present study seeks a different perspective by examining the effects of leadership style on the organizational success and innovation performance. This knowledge may assist managers to improve the performances of their organizations. Several studies support that there are clear and easily identifiable effects of leaders on organizations. The problem is complex and needs to be thoroughly understood, but the crux of this dissertation focuses on how technology leaders must behave and adapt to technological changes. The objective of this study is that it takes a qualitative view about the effects of leadership styles on innovation performance with a comparison of R&D and P&D. The theoretical framework for this study is developed upon several perspectives including leadership theory, innovation and TM literature.

TB-02.3 [R] The Ethnic Chinese Style of Corporate Innovation

Kuan-Cheng Chen; Shih Hsin University, Taiwan

Corporate innovation is a much researched topic. These studies have been separated into three groups: the innovation framework and process, key success factors, and the Western experience. Yet we know little about innovation theories in the Chinese context. To contribute to the development of a Chinese style of corporate innovation, the author presents a case study on one of the largest ethnic Chinese family controlled business groups in Southeast Asia. The paper extends the primacy of corporate innovation theory by exploring the experience of Chinese context. Strategies for implementing a more effective innovation strategy in a traditional Chinese family business are suggested.

TB-02.4 [R] A Study of the Relationship between Job Attribute and Employee

Workplace Friendship: Taiwan and Mainland China

Chun-Te Lin; Yu Da College of Business, Taiwan
An-Tien Hsieh; Dayeh University, Taiwan
Chun-Ling Lu; Yu Da College of business , Taiwan

Academic research has studied the employee workplace friendship in informal organizations for years. However, there is no clear verification for the relationship between job attributes and employee workplace friendship within formal organizations. The concept of this study is based on the cognition theory, and verifies the relationship between five job attributes (manufacture, marketing, finance, HR, and R&D) and employee workplace friendship in formal organizations. This study further compares differences of job attributes on employee workplace friendship between Taiwan and Mainland China. The purpose of this study is to expand previous research. This study is conducted by convenience sampling, and the respondents are full-time employees in Taiwan and Mainland China. There are 1,550 samples in total, and the return rate is 70 percent. According to the findings of this study, the five job attributes all have relationship on employee workplace friendship. However, different job attributes on employee workplace friendship has a different relationship. Additionally, this study compares samples from Taiwan and Mainland China, and finds out that the five job attribute impacts in Taiwan are stronger than those in Mainland China.

TB-03 Technology Adoption-1
Tuesday, 7/29/2008, 10:30 - 12:00 Room: Sir Francis Drake
Chair(s): Yukiko Nishimura; The University of Tokyo, Japan

TB-03.1 [R] The Uses and Gratifications of Mobile Internet among the South African Students

Wallace Chigona; University of Cape Town, South Africa
Guy Kankwenda; University of Cape Town, South Africa
Saffia Manjoo; University of Cape Town, South Africa

This paper investigates the factors that affect the use of mobile internet among the South African students. This is done by using the uses and gratifications (U&G) framework to understand the motivations and extract the intrinsic needs of mobile phone users. Drawing on previous studies on the mobile phone and traditional internet, a model has been developed highlighting the proposed U&Gs. This model was then validated with data gathered through interviews conducted with university students. Our findings are mostly in keeping with previous studies, showing that the U&Gs of mobile internet are an intersection of the UGs of the mobile phone and traditional internet. In addition, this study shows that (1) there is a strong social motivation for mobile internet use; (2) there are inhibiting factors which affect the use of mobile internet; (3) mobile internet may be the preferred and in some cases, the only, means of internet access.

TB-03.2 [R] Research on the Gap between Skillful/Non Skillful Users of a Cellular Phone, and Anticipation of the Risks Arising out of Lack of Information in Japan

Yukiko Nishimura; The University of Tokyo, Japan
Takeaki Sugimura; PRIP Tokyo, Japan
Masatoshi Iwasaki; PRIP Tokyo, Japan
Hiromichi Oikawa; PRIP Tokyo, Japan
Yuki Yonekawa; PRIP Tokyo, Japan
Takuro Itoh; PRIP Tokyo, Keio University, Japan
Kunihiro Nishimura; The University of Tokyo, Japan
Katsuya Tamai; The University of Tokyo, Japan

We are interested in the users' level of understanding of an innovative Japanese portable phone (KEITAI) unit with multiple functions. This research focuses on users' knowledge of cellular phone usage and design and practice of the information transfer method for users who need more information. In this article, we conducted several surveys and their data analysis to determine the necessary knowledge about KEITAI's potential and possible risks for the improvement of KEITAI's usability as well as the operation of successful workshop. We further focus on how KEITAI users gain the knowledge of cellular phones (as information tool), and which functions they have concerns about by comparing the results of a nationwide Internet survey and regional survey. Based on these results, we review the knowledge user's need, as well as the appropriate area and scale of a trial experiment of the workshop for the effective provision of KEITAI knowledge for "not advanced KEITAI user". We also found that users concerns are focused on security-related functions such as service suspension in case of theft and electric money, regardless of user type. As a solution to bridge such gap, we held a workshop for providing information on a cellular phone including a quiz game and one-on-one lecture, etc. The repetitive training effectively contributed to the users' satisfaction and the improvement of their understanding.

TB-03.3 [R] Channels and Ways for Chinese Public to Obtain Information about Science and Technology

Ren Fujun; China Research Institute for Science Popularizatio, China
Zhang Chao; China Research Institute for Science Popularizatio, China
He Wei; China Research Institute for Science Popularizatio, China

This paper gives an analysis of the results from Chinese National Survey of Public Scientific Literacy accomplished by China Research Institute for Science Popularization (CRISP) in the past years, with the view to know how the Chinese public gets the information of science and technology (S&T). Channels and ways, as well as interests of Chinese public to know the development of S&T, and conditions for Chinese public to attend the activities of science popularization and use the facilities of science popularization are examined. All this analysis helps to know channels and ways for Chinese public to get information of S&T, and then provides a scientific basis for China's government to make S&T policy.

TB-04 Technology Management Education-1
Tuesday, 7/29/2008, 10:30 - 12:00 Room: Marco Polo
Chair(s): Hans H. Gatzen; Institute for Microtechnology, Germany

TB-04.1 [A] Redesigning Technology Management Education: The New Managerial Imperatives

Nina Ziv; Institute for Technology and Enterprise, United States

This paper focuses on the need to redesign technology management education in order to prepare students for a new set of managerial challenges. Specifically, the paper deals with an analysis of individual and final projects completed in the Capstone courses by technology management students at an urban-based university. The course, which is the culmination of a 15-month Executive Master's program in the management of technology, requires students to participate in team-based projects on industry sectors as well as individual or small group projects on firms or issues of interest to technology management. An analysis of the projects revealed that along with enduring managerial imperatives such as having strong leadership, and creating a culture and organizational structure conducive to innovation, new managerial imperatives across all industries emerged including the need to develop a greening strategy; plan for a globalized organization; recalibrate business models; design a robust technology strategy aligned with product and service offerings; incorporate Web 2.0 technologies and concepts in the workplace; be customer centric; promote a culture of collaboration; and recognize the value of a networked business environment. In light of this analysis, redesigning technology management education is essential in order to reflect new trends and managerial imperatives.

TB-04.2 [R] Transforming Technology Management Education: Value Creation-Learning in the Early Twenty-First Century

Mel Horwitch; Polytechnic University, United States
Edward A Stohr; Stevens Institute of Technology, United States

General management education is often criticized as irrelevant, out of touch, too trade-school, too interested in training financial services professionals and consultants, and insufficiently focused on innovation, the major driver of the economy. Technology management (TM) education has always focused on practical and relevant management issues, and innovation has been a major theme. We believe, however, that rapid changes in the global environment of business demand changes in the underlying assumptions of TM. Starting with a

brief overview of the field, this paper examines the major environmental changes that must be addressed by TM and the skills that future graduates will require.

TB-05 Technology Management in the Energy Sector
Tuesday, 7/29/2008, 10:30 - 12:00 Room: Bartholomew Diaz
Chair(s): Gerald I. Susman; Pennsylvania State University

TB-05.1 [A] Case Study: Developing a Technology Innovation Investment Portfolio

Joseph F. Cade; Bonneville Power Administration, United States

This paper will present the steps taken, philosophy employed, internal collaborative process, pitfalls, and successes of how the Bonneville Power Administration (BPA) developed its 2008 Technology Portfolio. It will describe how critical this collaborative, open process is to managing technologies in a sustaining economy. BPA used an internal collaborative process to pursue, select, and implement its first Technology Innovation Investment Portfolio. This paper will describe BPA's Portfolio decision framework and philosophy as well as its philosophy for constructing and managing this Portfolio once it is in place. After identifying what it wanted to focus on, BPA used a public solicitation process to identify potential technology investment opportunities. A description of the selection and evaluation processes will include a list of the evaluation criteria, the weights applied, and the supplemental criteria used (including the technology investment risks) to determine the portfolio selection. BPA used several connective steps to develop the crucial collaborative link between the principal decision-makers and people implementing the portfolio. Sustaining economies will maximize their benefits through this linkage between collaborative and sometimes competing priorities. All influences must consider multiple perspectives and must be able and willing to work with each other.

TB-05.2 [R] Power Transmission Investments Analysis: A New Financial Evaluation Framework for South Africa

Silky Ntombifuthi Maboke; Technova Power Systems (Pty) Ltd, South Africa
Micheal Kachienga; University of Pretoria, South Africa

The paper discusses the study to develop a new financial evaluation framework for power transmission expansion projects in South Africa (SA) that can also be suitable for handling change and uncertainty in the electricity supply industry. The research design followed in the study is model building, testing and application empirical research. The development of the new financial evaluation framework is based on the literature study and the gaps identified in the current transmission expansion investment evaluation methods stipulated in the South African grid code. The proposed framework for financial evaluation of transmission expansion projects investments in South Africa incorporates the modelling of project options and uncertainties, Monte Carlo simulations, real option analysis and decision analysis. The supporting pillar of this framework is strategic analysis. A computer financial evaluation model based on the new framework was built to test the framework. A comparison of the test results to the model currently used to evaluate transmission line projects in South Africa is also presented.

TB-05.3 [A] Evolution of the Solar Energy Industry: Strategic Groups and Industry Structure

Gerald I Susman; Pennsylvania State University, United States

This paper discusses the structure of the worldwide solar energy industry. It focuses on sets of firms that follow similar competitive strategies (i.e., strategic groups). The dimensions of their competitive strategies include choice of market (residential, commercial, government, utilities), and type of application (on-grid /off-grid, centralized/decentralized location, retrofit/new construction); other dimensions are also relevant (e.g., cost, differentiation, technology choice, technology leadership). The evolution of this industry depends on projected demand, e.g., government mandates, feed-in tariffs, tax incentives, rebates, price of conventional energy) and supply (e.g., production capacity, availability of raw materials, process innovation, rate of learning, economies of scale). Some of these factors affect all firms in this industry equally, while others affect strategic groups differently, and thus their current and future market share and profitability. The performance of firms in the solar energy industry also depends on strategic choices (e.g., preemptive moves, vertical integration, rate of capacity expansion). This paper provides an overview of current and projected structure in the solar energy industry, and speculates on the direction in which this emerging industry might develop.

TB-05.4 [A] The Technological Innovation Process and the Main Institutions and Actors Involved in the Development of an Ethanol-fueled Airplane: The Case of Ipanema

Jose Henrique S Damiani; Institute of Aeronautical Technology, Brazil

Brazil has been playing, since the early '70s, a leading role in the development of renewable fuels for different purposes, ranging from automobiles, trucks, buses, and electricity generation to airplanes. The purpose of the paper is to describe the technological innovation process and its environment, institutions, and main actors, both developers and facilitators, which were involved in the development of a wide array of the new technologies required for the use of ethanol as a feasible alternative for fossil fuels consumed by airplanes. The development of an agricultural, alcohol-powered airplane - The Ipanema - by the CTA (General Command of Aerospace Technology) and Embraer (Brazilian Aeronautical Enterprise) will be described in order to highlight both the technical and managerial challenges. The paper will also address the challenges that the country, its institutions, scientists and entrepreneurs, will face as it intends to position itself as a worldwide supplier and technological leader in the use of the new fuel.

TB-06 Technology Marketing
Tuesday, 7/29/2008, 10:30 - 12:00 Room: Vasco da Gama
Chair(s): Jan-Harm Pretorius; University of Johannesburg

TB-06.1 [R] The Effects of Endorsers' Traits on Counterfeit Purchase

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

This study applies the Balance Theory and Elaboration Likelihood Model to explain consumers' counterfeit purchase behaviors. The results find that idols' exterior traits enhance not only consumers' worship levels, but also foster consumers' counterfeit purchase behaviors. Idols' interior traits enhance only worship levels, but not counterfeit purchase behaviors. In contrast, the role of worship level is to minimize the positive association between exterior traits and counterfeit purchase behaviors. Elder consumers display more counterfeit purchase behaviors than do younger consumers. This study suggests that emphasizing idols' interior traits is a helpful strategy for both marketing firms and consumers. Study implications and suggestions for future research are also discussed.

TB-06.2 [R] Assortment Planning Using Data Mining Algorithms

Ajlan Gün; Bogazici University, Turkey
Bertan Badur; Bogazici University, Turkey

Assortment Optimization is not just selecting the best products according to the sales performance under a certain category, but also an execution method to apply retailers commercial strategy into market considering all strategies which retailer want to play. Regarding millions of data saved in databases and explosive growth of data leads to a situation in which it is increasingly difficult for retailers to understand the right information. To cope with this problem, we are planning to use association algorithms to put in place data mining in product selection. It should also be considered that selecting the best and suitable products for an assortment of retailers need not only sophisticated algorithms to take decisions but also business perspective to embed into the decision system. In this study, we approach the assortment selection problem by improving the PROFSET model and GENERALIZED PROFSET model, which is based on a microeconomic framework. We improved the basic model by introducing an additional method of profit allocation over frequent item sets, constraints about categories and sold quantities. Finally, we empirically test our model with sample retailer data. While doing this we will also take into consideration the retail industry characteristics and consumer and customer perceptions.

TB-06.3 [R] Managing Distribution Channels in the Control and Instrumentation Product Market with Multi-Faceted Product Lines

Hentie G Dirker; University of Johannesburg, South Africa
Leon Pretorius; University of Pretoria, South Africa
Jan-Harm C Pretorius; University of Johannesburg, South Africa

The purpose of this paper is to explore ways in which to model and manage distribution channels in the Control and Instrumentation product market where multi-faceted product lines, technological know-how and the position of the product in its life-cycle play important roles in the manner in which these products are diffused into the market. The focus in this paper is more the South African market, although the global context for control and instrumentation products is also considered. The research is exploratory in nature addressing the complexity from a value chain point of view intertwined with product technology. Aims of the paper include the following: to asses the various distribution models available to the control and instrumentation market and to investigate by way of preliminary research case studies and inductive reasoning if these models are realistic and how these models may be adapted to include the value addition per distribution channel for the various types of product lines. These findings are reflected in a case study by assessing the various routes to the market for different type of technology products, e.g. IT (Software), low-technology and high-technology (Control and Instrumentation products).

TB-06.4 [R] Price Competition and Innovation Diffusion in an Oligopolistic Market

Daniel T Eloi Santos; Federal University of Minas Gerais, Brazil
Leonardo P Santiago; Federal University of Minas Gerais, Brazil

The present paper considers the problem of marketing payoff estimation for innovative products. An assessment of the literature shows that estimating future cash flows is an important issue for valuation. Although innovation diffusion models are useful to tackle this issue, the present research seems more proper for dealing with monopolistic markets or monopolistic competition as competitor actions have little influence on a company's market payoff. Motivated by the practical relevance and the gap in the current literature on innovation diffusion and future cash flows estimation, we developed a game theoretical model based on General Bass Model (GBM) for predicting an innovation's potential reward throughout its life cycle in oligopolistic markets. We focus our analysis on the case in which two technologies are launched into the market at the same time. First, we analyze price competition without considering potential advertizing decisions. Second, we analyze advertizing competition assuming constant profit margins. We discuss the impact of results obtained on management decisions and point out directions for future research.

TB-07 Project/Program Management-3

Tuesday, 7/29/2008, 10:30 - 12:00 **Room: Prince Edward Island**
Chair(s): Peerasit Patanakul; Stevens Institute of Technology

TB-07.1 [R] From Feasibility to Reality: A Predicament for the Mining Industry in South Africa

G. D. van Aswegen; University of Pretoria, South Africa
Manfried Köster; University of Pretoria, South Africa

Project performance in the mining industry suggests that there is a gap between feasibility studies and project execution. This gap is associated with unpredictable project results and project risks that could debilitate investments into South Africa. This paper proposes a Gap-model that illustrates the dynamics associated with a gap between feasibility studies and project execution with specific reference to the mining industry. Understanding the dynamics associated with the gap could assist the project team to be proactive in addressing the drivers to reduce the gap to meet project objectives. The study followed a theory-based empirical research approach and used existing theories, models and methods to build the Gap-model. The Gap-model is based on five propositions and the relevance of the Gap-model is derived from qualifying the propositions. Based on the questionnaire feedback from 69 individuals with a reputable knowledge and experience in mining projects, all five propositions are qualified and the Gap-model is considered to be relevant.

TB-07.2 [R] An Evaluation of the Adequacy of the Most Commonly used Pro forma Contracts within the South African Mining Construction Industry

Alwyn Smith; University of Pretoria, South Africa
Michiel C Bekker; University of Pretoria, South Africa

Since the year 2000 the South African mining industry has experienced enormous growth with the awarding of mining construction contracts amounting to billions of Rands. Despite the surge in the procurement of mining goods and services, no common or uniform pro forma contract is used by the mining sector. Thus far various pro forma contracts are utilised by the different South African mining houses for the procurement and execution of construction projects of which the International Federation of Consulting Engineers (FIDIC), the General (GCC) and (NEC) are the most notable. The adequacies of these pro forma contracts have been questioned in the past, but thus far no guideline or direction towards the most suitable pro forma contract has been suggested. The aim of the paper is to evaluate and make specific recommendations with regards to the adequacy of the most commonly used pro forma contracts within the South African mining construction industry. This research follows a comparative approach whereby the various contractual provisions contained in each pro forma contract are compared across the three pro forma contracts. Supporting the comparative study, a survey was done among four of the major mining houses in South Africa. The primary purpose of the survey was to assess the adequacy of each pro forma contract as viewed and experienced by the various mining houses. This ultimately contributed towards the aim of the research project, namely to investigate the differences between the FIDIC, GCC and NEC pro forma contracts with regard to the provided contractual provisions and also the adequacy of the three pro forma contracts with regard to mining construction projects. The results concluded that all three pro forma contracts are, in general, suitable to the mining construction industry with specific contractual provisions better defined in some than in other. However, the non-adherence to specific contractual provisions could have a negative impact on the project outcomes, and it remains the responsibility of senior management to ensure that sufficient internal capacity exist to manage the respective pro forma contracts.

TB-07.3 [R] The Impact of Project Governance Principles on Project Performance

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

Since the turn of the 20th century, the use of the concept project governance has gained popularity in both practical application and academic research. With the principles of corporate governance firmly and successfully established in the corporate environment, the diversification of these principles into other areas of organisational interaction, notably project management, was eminent. Given the cross-functional, cross-company and even cross-country nature of projects, the opportunity for failure, and even misconduct, is fertile. The poor performance of projects, especially large capital projects, is well-known and well researched [1], [2], [3], [4], [5] and [6]. Considering all types of projects from various industries, including information technology, health care, finance, petrochemical, aerospace, etc., the search for the main reasons contributing to project failure have been researched to exhaustion [7], [8], [9] and [10]. Extracting the common causes for the lack of project performance from the various research attempts, the most common theme appears to be the lack of information management, project monitoring and control. With the definition and formulation of corporate governance originating from corporate scandals [11], [12] where lack of transparency and proper financial control were exposed as the main contributor to failure, the application of corporate governance principles to projects for the same reasons seemed appropriate. Despite the financial controls, misconduct still prevailed until actions were taken at a strategic/corporate level in the form of corporate governance, creating an environment within which control could be executed more effectively. However, as with financial controls, multiple tools and techniques have been developed to control projects, including earned value, critical path analysis, PERT, etc. It is believed the same governing environment is required for project management within which project controls can be exercised more efficiently. Continuing on previous research on the topic of project governance [13], this paper provides a brief overview of how project governance was defined, how a Concept Project Governance Framework (CPGF) was derived, and how the principles were applied and evaluated against two primary case studies and 15 secondary case studies. The

primary case studies consisted of in-depth analysis of two large, cross-country projects and included broad literature studies, nominal group technique discussions and personal interviews with key role players. The secondary case studies were sourced from literature and their performance evaluated against the principles of the CPGF. This research confirmed the need for a formal definition of project governance and confirmed that the application or non-application of project governance principles could have a influence on project outcomes.

TB-08 Technology Management in Semiconductor Industry
Tuesday, 7/29/2008, 10:30 - 12:00 Room: Seal Island
Chair(s): Charles M Weber; Portland State University

TB-08.1 [A] A Study of Innovation with ASICs

Akihiko Nagai; Tokyo Institute of Technology, Japan
Koji Tanabe; Tokyo Institute of Technology, Japan

A drastic change in ASIC producers in the field of semiconductors occurred in the 1980s, 1990s, and 2000s. We clarify how two technology innovations contributed to this drastic change in ASIC producers. These technology innovations seem to have played a complimentary role in the productive activity of ASIC. However, the first technology innovation led to the appearance of foundries, by separating ASIC design and manufacture. Moreover, the second technology innovation led to the expansion of fabless industries by reducing the scale and time of manufacturing.

TB-08.2 [A] On the Value of Technological Knowledge in Semiconductor Manufacturing

Charles M Weber; Portland State University, United States
Asser Fayed; Portland State University, United States

A model of the operating curve of a semiconductor fabrication facility, which is sufficiently accurate to make capitalization decisions, has been developed. The model is used to simulate the performance of a hypothetical fab that operates under very realistic conditions. Results of the simulation show that the value of additional technological knowledge can be negative. Learning more of a good thing is not always a good idea!

TB-08.3 [A] Strategic Cluster Management for Technological Capability Building: A Case of Hard Disk Drive Cluster in Thailand

Chayakrit Charoensiriwath; National Electronics & Computer Tech. Center, Thailand

Several countries now have national programs to support cluster-based innovation in their key industries. They all realize that geographical clusters are significant drivers of innovations and competitiveness in today's fast-moving global economy. Clusters are formally planned and created with a concentration of targeted industry and support infrastructure such as university researchers, supporting government agencies, vocational training providers, financial institutions, etc. This study follows the development of the hard disk drive (HDD) industry in Thailand. Over the past 20 years, the HDD industry in Thailand has grown steadily. The inflows of foreign investment in HDD-related manufacturing to Thailand have made the country the world's largest exporter of hard disk drives and components in the past year. The Big 4 companies (Seagate Technology, Hitachi Global Storage Technology (HGST), Fujitsu and Western Digital) all have production bases in Thailand. With their presence, most of their suppliers have decided to have production bases or representatives in Thailand as well. This makes Thailand have an almost complete supply chain of the HDD industry. This study analyzes the strategy employed by the Thai government to build national technological capability in HDD technology through strategic cluster management. The government has established the Hard Disk Drive Institute (HDDI) as a center to develop infrastructure for research capability for the industry. This case study highlights the government's roles and its strategy to formally build national technological capability for a specific industry.

TB-09 Technology Management in Services-3
Tuesday, 7/29/2008, 10:30 - 12:00 Room: Robben Island
Chair(s): John McCreery; North Carolina State University

TB-09.1 [A] Organizational Boundary Spanners: Identifying Competencies and Gaps

John McCreery; North Carolina State University, United States
Lynda Aiman-Smith; North Carolina State University, United States

Many organizations are in the midst of a services transformation. Along with the ongoing need to provide differentiated products, firms are being asked to go to market with an increasing variety of customized service offerings. A key challenge in this new competitive environment is navigating through the complex dynamics of customer and stakeholder management from service definition through service delivery (Irons, 1994; Teboul, 2006). Success in this new services environment requires multi-talented individuals. They must be able to develop strong customer relationships and manage complex social networks, while also having a deep understanding of relevant service technologies and processes. These talented individuals are boundary spanners. Boundary spanners link their organizations with the outside world (Russ et al., 1998). An example of this boundary spanning role in high technology services is the customer-facing project manager. In this study we present the results of a set of interviews with such project managers. We compare and contrast our findings with general competencies identified in the project management literature, identify the differentiating competencies in this emerging and vital role, and make recommendations for closing the critical gaps.

TB-09.2 [R] Dynamic Service Framework Approach to Sustainable Service Value Shift Applied to Traditional Japanese Tea Ceremony

Kotaro Nakamura; Japan Advanced Institute of Science and Technology, Japan
Hugo Tschirky; Swiss Federal Institute of Technology (ETH), Switzerland
Yasuo Ikawa; Japan Advanced Institute of Science and Technology, Japan

In order to plan new services, one needs to understand not only the related technologies and products, but also the value sense and concepts of individual and institutional customers, their behavioral patterns, as well as the background social system. Especially with hospitality, entertainment and art services, the historical background, hospitality culture and regional traditions often sustain and enhance the value of service for the customer. This paper applies a modern dynamic multi-disciplinary framework to study the historical shift and present sustainability of traditional services. The framework facilitates the analysis of service value and service shift trends by placing and tracing individual services in a service domain space according to two major axes: classification in a needs level-service using place hierarchy proposed earlier by the author, and the degree of customer participation. The dynamic framework is applied, in the context of recent achievements of structural anthropology, to the historical shift around the 16th century of Japanese traditional tea ceremony, attempting to gain insight applicable to the sustainable innovation of modern hospitality, entertainment and art services.

TB-09.3 [A] Research for Experiential Value Design Method in Team Knowledge Creation

Akira Kondo; JAIST-Tokyo MOT / Hitachi Intermedix Co., Ltd., Japan
Naoko Kondo; Carebrains, Inc., Japan

In this century, the main concern of business development is changing from product design to service development. However, the development methodology has not been established in the practical economic world. Because the worth of service is judged by user experience, we think the process of Human Centered Design (HCD) is useful for creating the methodology. People do not have a clear idea about what kind of merits and values to include in new services. So, the service developer and designer should consider this with the user, and a new service will be developed in a dialog with service providers and service users. In this presentation, we consider the service development process through the case study about development of the educational contents for information network vulnerabilities. In this case, we held meetings at the stage of planning, scenario making, and prototype evaluation with professional advisers. This process was based on the HCD process, and professional advisers gave us comments from the viewpoints of the user, specialist and manager. We examined the potency of this service development process based on HCD and worked with professional advisers.

TB-10 Technology Management in Telecommunications-1

SESSIONS

Tuesday, 7/29/2008, 10:30 - 12:00 **Room: Dassen Island**
Chair(s): Sitki Gozlu, Istanbul Technical University

TB-10.1 [R] General Packet Radio Service (GPRS) Technology Transfer: A Case Study to Evaluate Transferors

Berna Tektas; Istanbul Technical University, Turkey
Sitki Gozlu; Istanbul Technical University, Turkey

The arrival of mobile phone also known as Global System for Mobile Communications (original acronym: Groupe Spcial Mobile GSM) operators and their rapid growth may well be seen as one of the most significant developments in the field of communication and information technology over the last two decades. The aim of this study is to investigate the international transfer process of general packet radio service (GPRS) technologies, which supports the wireless access to external Internet protocol-based networks, and to propose a multi-criteria decision making (MCDM) approach to evaluate the alternative transferor companies. In order to achieve these purposes, firstly an in-depth interview was conducted with a purchasing manager of the third largest GSM operator in Turkey. Then, the major factors, which directly affect the success of a technology transfer (TT) project, are identified from the literature in order to determine the transferor selection criteria for a transferee company. The next step was to find out the relative importance of these criteria by asking the purchasing manager who was also a member of the GPRS project team. Finally, Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), which is a MCDM method, is applied to rank the alternative transferor companies.

TB-10.2 [R] The Role of Information and Communication Technologies (ICT) in Improving Microcredit: The Case of Correspondent Banking in Brazil

Eduardo H Diniz; Fundacao Getulio Vargas, Brazil
Marlei Pozzebon; HEC MOntreal, Canada
Martin Jayo; FGV, Brazil
Ewandro Araujo; HEC MOntreal, Canada

Finding ways to efficiently downscale microfinance services is one of the current challenges of Brazilian commercial banks. As commercial banks do not have strong tradition or know-how in this market, the expansion of such operations still depends on the building of specific capabilities and creation of business and technological architectures. This paper discusses how the use of correspondent banking (CB) arrangements can help Brazilian banks to face this challenge and increase their microcredit operations in an efficient way. The particular model of CB adopted in Brazil since 2000 has created an ICT-based business structure for banks' downscale financial services out of traditional branches, typically in retail stores such as supermarkets, drugstores, lottery shops, post offices, and so on. The discussion is on how this ICT-based channel can be adapted to scale microcredit delivery. To address the discussion, we focus on one particular case, involving a CB arrangement between Banco do Brasil, one of the most important Brazilian banking institutions, and Banco Palmas, an accredited microfinance institution. This specific case provides an elucidating example of how the Brazilian ICT-based CB model can be used to help scaling up microfinance services, especially microcredit.

TD-01 Technology Roadmapping-2
Tuesday, 7/29/2008, 14:00 - 15:30 **Room: Ballroom West**
Chair(s): Scott W Cunningham; Delft University of Technology

TD-01.1 [A] The Progress of the Strategic Technology Roadmap of METI (Ministry of Economy, Trade and Industry of Japan): Practical Business Cases and Sustainable Manufacturing Perspective

Kenichi Fukuda; Ministry of Economy, Trade and Industry of Japan, Japan
Masayoshi Watanabe; Ministry of Economy, Trade and Industry of Japan, Japan
Motoki Korenaga; Ministry of Economy, Trade and Industry of Japan, Japan
Katsumasa Seimaru; Ministry of Economy, Trade and Industry of Japan, Japan

Japan's Ministry of Economy, Trade and Industry (hereafter, METI) has formulated and revised the Strategic Technology Roadmap (hereafter, the STR) to provide the up-to-date national infrastructure for strategic R&D management. Both the STR and METI's technology roadmapping effectiveness have been widely valued in R&D society. In addition, Japan could be a world leading country on eco-innovation because of its historical experience in the environment and energy saving. METI developed a new area of sustainable manufacturing technology in the STR and will present it to the global basis.

TD-01.2 [A] The Development of Simplified Technology Roadmapping for Use by Japanese Chemical Companies

Masakatsu Fujii; JAIST, Japan
Yasuo Ikawa; JAIST, Japan

The creation of new businesses is crucial for an enterprise's sustainable growth. An improvement in management methods for reinforcing R&D capabilities is an urgent concern for any technology-based enterprise. Among many studies of new management theories and methodologies, technology roadmapping, for consideration of future prospects, has come into the spotlight. The Japanese Government released a report entitled Strategic Technology Roadmap in 2005, and has been attempting to diffuse roadmapping by reviewing roadmaps annually in collaboration with academia and industry. However, responses by major Japanese chemical companies to our inquiries indicated that they are reluctant to adopt technology roadmapping, although they are interested in the concept. The reasons for this hesitation are: doubts about the results, complicated explanations about the procedures to be employed, and lots of time required to come up with effective plans. Thus, referring to Rogers' theory of Diffusion of Innovation, we have proposed a simplified half-day course as a customized roadmapping method, by combining the conventional roadmapping method with the KJ method, which is already popular among researchers in Japanese companies as an idea creation method. Some workshops, with around 100 researchers involved, have been conducted in the corporate laboratories of a major Japanese chemical company to confirm the effectiveness of the proposed method. It has been confirmed that the new method is a useful tool for strategic mid-term R&D planning.

TD-02 Innovation Management-4
Tuesday, 7/29/2008, 14:00 - 15:30 **Room: Ballroom East**
Chair(s): Rene Pellissier; University of South Africa

TD-02.1 [R] A Conceptual Framework for the Alignment of Innovation and Research Using Technology

Rene Pellissier; University of South Africa, South Africa

Historically, business institutions base their growth strategies on their research and development (R&D) function. This function is fairly established and sets out to acquire new knowledge in a systematic process of research in order to produce or improve products, services or processes. In fact, innovation and research are two of the main thrusts for economic growth. Research is planned, assessed, managed and rewarded, innovation is not. However, without acknowledging and aiding the growing importance of innovation for growth in a rapidly more chaotic environment, this function is set for failure. Where research is valued, innovation is feared as radical and disruptive. There is little evidence to link them and show how they, jointly, can add more value than separately. They remain independent entities in separate clusters of the economy. The paper explores the convergence of innovation and research from a previous paper, focusing on the development of a conceptual model in terms of the technology system required for the accomplishment of convergence. In this sense, technology is defined as knowledge, tacit or explicit, in human, document or electronic format. The proposed convergence requires the use of knowledge systems to drive the innovation and research. The contribution of the paper lies in the knowledge developmental aspects of research and innovation convergence. An existing model to achieve knowledge systems development will be reviewed and a modified version presented on knowledge and innovation systems. This model incorporates aspects of knowledge management as well as innovation and research management.

TD-02.2 [R] Toward the Development of Multi-Dimensional Index for Creative Management

Suhyun Hwang; Yonsei University, Korea, South
Suyeon Kim; Yonsei University, Korea, South
Jinwoo Kim; Yonsei University, Korea, South

Creative management, as the new paradigm of business innovation for achieving sustainable competitive advantages, is a management discipline that focuses on the provision of new values to customers by creating new products, services and business models. Despite the emerging importance of creative management, few studies have investigated how to measure the quality of creative management. This study proposes a theoretical framework for Creative Management Index (CMI) that is designed to measure the degree of creativity of management. The unit of analysis is a company or independent business unit that attempts to develop new products, services and business models. Two theoretical backgrounds have been employed to develop our framework. One is the Balanced Score Card (BSC), which provides the conceptual background of management index. The other is psychological theories of creativity, which provides theoretical backgrounds of cognitive and affective creativity. As a management index, the CMI framework consists of four components: person, process, place, and product. Through the synergetic combination of the four components we expect to be able to measure the multidimensional characteristics of creative management faithfully.

TD-02.3 [R] A Study on the Relationship between Organizational Slack and Technology Innovation

Weifeng Yao; Tsinghua University, China
Xunmin Qiu; Guizhon College of Finance and Economics, China
Bin Chang; Guizhou College of Finance and Economics, China

Since the 1980s, most research regarding firm competitive advantage strategy focuses on the relationship between organizational factors and firm performance, either using a resource-based view or capability-based view. The findings with the resource-based view and capability-based view cannot illustrate the essential characteristics of forming and maintaining firm competitive advantages when the environment is changing greatly. The present dissertation proposes an integrated resource and capability-based view, which expounds the basic principles and forming paths to achieve firm competitive advantage under a super-competitive environment. In order to expound the rationality and effectiveness of the integrated resource and capability-based view, this dissertation proposes a structural equation model, which consists of organizational slack, absorptive capabilities and technology innovation factors, and empirically tests the model with data from a questionnaire. Eight hundred firms in Gangdong, Sandong, Sichuan, Liaoning, Shaanxi, Shanxi, Henan and Shanghai participated in this questionnaire, the study of which leads to such a conclusion: the exploitation of the slack assimilated into a firm's productive system not only produces certain product innovation, which enhances differential competitive advantage, but also produces process innovation to enhance cost advantage for firms.

TD-03 Strategic Management of Technology-4

Tuesday, 7/29/2008, 14:00 - 15:30 **Room: Sir Francis Drake**
Chair(s): Laura E Martinez-Solano; University of Warwick

TD-03.1 [A] System Management: Mapping Tool for Complex Systems

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

The paper reports a tool which was originally developed to assist managers to easily visualise, analyse and manage complex innovation systems. Strategy management literature appears to be somehow functionally myopic (Hines et al., 2006). A gap is common between ambitious strategies and operational-level processes. For this purpose, as a bridge, the tool gives holistic (as-is and should-be) views of the essential activities conducted by the main actors, across-functions and across-organisations, to effectively and sustainably complete every innovation process in alignment with the strategies. Since these main actors form a complex system per-se, the tool is useful to analyse and manage their strategic activities prior to defining the operational-level activities of the other (subaltern) actors committed to specific process. The first analysed companies reported 7m value-added from the project. Since then, the Premium Automotive Research Centre and the National Skills Academy for Manufacturing have taken over the tool to implement it in other manufacturing companies. Meanwhile, the Warwick Innovative Manufacturing Research Centre and the National Health Service have also been adapting and using the tool, combined with other manufacturing tools, to analyse and manage complex systems in healthcare organisations. The paper will illustrate the lessons learned through some case studies.

TD-03.2 [R] Global Strategy for the Solar Cell Industry Using Integral Core Knowledge Management: Comparative Research with Liquid Crystal Displays and the Semiconductor Industry

Yukihiko Nakata; Ritsumeikan Asia Pacific University, Japan

Japan began R&D on the solar cell in 1955, and this research was enhanced by the national "Sunshine Project," which started in 1974. As a result, the Japanese solar cell industry achieved the highest production share in the world. However, many European governments recently established incentive systems to increase their production of solar cells. Germany's accumulated amount of solar cell systems increased rapidly and passed Japan in 2005. Chinese companies entered this business in 2006. The paradigm of the global competition in the solar cell industry shifted. At the new paradigm, each country's global strategies were analyzed. In Germany, Q-Cells focused on the cell process using a stable supply of poly-Si wafers and government incentives, and become the world's bigger producer of solar cells. Chinese companies aggressively increased their production capacity and claimed 1st place, but their technical level has to improve. A global strategy for Japanese companies is suggested. Two future directions can be taken to create the core knowledge for future growth in the industry using an "integral business architecture." The first involves vertical integration of crystal Si ingots into a crystal solar cell system. The second involves researching and developing new thin film solar cells.

TD-03.3 [R] Virtual Community and Customer Participations in User Centric Internet Service Ventures

Tzyy Jane Lai; Yuan Ze University, Taiwan
Chih Yung Chen; Yuan Ze University, Taiwan

The purpose of the study is to construct a cognition, behavior and performance structure to investigate how users perceived website value, their familiarity of utilizing internet services, and their sense of virtual community (SOVC) relate to resulting participation behaviors and performance of a user centric internet service website. To explore the benefits of user participations, this study follows the literature to classify user participations into citizenship behavior, co-production and member interaction. The taxonomy of user participation can have profound implications on website strategy and development. The focus is on the function and effect of the virtual community on user behaviors, which can shed some light on how to stimulate user citizenship behavior and result in lock-in and satisfaction in the real practice.

TD-04 Technology Management Education-2

Tuesday, 7/29/2008, 14:00 - 15:30 **Room: Marco Polo**
Chair(s): Edward A Stohr; Stevens Institute of Technology

TD-04.1 [A] Developing Systems Engineers

Duarte P Goncalves; CSIR, South Africa

Systems engineering (SE) is a critical capability for our organisations business following good growth in business but also because of risks in certain areas. Indeed, SE is of national importance if we are to sustain growth in the face of complex technologies. Ironically, there is a global shortage of these skills. This paper briefly reviews why it is difficult to develop SE skills and the current approaches used in industry considering their advantages and disadvantages. While the current approaches have proved useful, these are not producing enough systems engineers. Methods used in developing specialists in medicine at the University of Pretoria suggest a model for engineering faculties in developing systems engineers. Drawing on theories of cognitive and experiential learning, and learning from a social perspective, an attempt is made to understand alternative methods for developing systems engineers. Against this backdrop, efforts implemented at the CSIR are described and preliminary findings reported. The key conclusion is that a balance between theory and practice is a vital accelerator in the

development of systems engineers. Knowledge becomes knowing when it becomes the tool of action. This paper makes a number of important recommendations relevant to companies and universities.

TD-04.2 [A] A Knowledge Management System for Disseminating Semi-Structured Information in a Worldwide University

Peter E Maher; Webster University, United States
Janet L Kourik; Webster University, United States

Clearly setting and communicating educational expectations among a group of faculty members is a highly challenging task. Given a worldwide university environment this task is significantly more challenging than in a single campus institution. We report on a knowledge management system to capture and convey course and program details, as well as human expertise based on many years of instructor experience. This system significantly aids the educational process and enables consistent material to be delivered throughout the world. Moreover, the system enables faculty members to be given clear expectations, thus permitting instructors to set personal and collective goals. The paper describes documents contained in the knowledge management system including a syllabus prototype and a faculty course guide in which instructor expertise is captured. Through this system, all documents can be readily disseminated worldwide. The system also provides a syllabus collector, and assessment tool designed to record information regarding a specific course offering. This technology enables a feedback loop for gathering and analyzing data, and incorporating findings back into the program. Regular audits can also be conducted, further ensuring the consistency and standards of our programs. The contribution that the system has made to the success of our programs is discussed.

TD-04.3 [A] Developing Curriculum for Professionals of Intellectual Property

JungWook Byun; Sungkyunkwan University, Korea, South
ByungChol Lee; Sungkyunkwan University, Korea, South
YunBae Kim; Sungkyunkwan University, Korea, South
HeeSang Lee; Sungkyunkwan University, Korea, South

The technology hegemonism of science technology superiority about technology and information has coming because the economic environment of the world is changed from industrial society of 20 century to informatization society of 21 century. The importance of intellectual property is enlarged much because the strengthen about internal technology protection and using intellectual property as weapon of advanced countries has been the dominant situation internationally. Currently, the training and the expansion about professional human resource is needed urgently because the increase of importance about intellectual property had companies recognize the necessity of efficiently managing industrial property. However, despite the increase of demand about the related professional human resource with intellectual property in the public institution, the research institute and the private company, the educational institution that train the professional human resource is lacking and there is not the standardized training program. In this paper, we suggest the standardized manual like as follows for the training about the related professional human resources with the intellectual property.

TD-04.4 [R] A Management Concept of Competencies Improvement for Students with Prior Vocational, Advanced Education, and Work Experience in Technical Fields

Florian Pape; Institute for Microtechnology, Germany
Hans H. Gatzen; Institute for Microtechnology, Germany

To overcome a severe shortage of university graduates working in the German industry, the universities plan to tap into the reservoir of skilled vocational workers for recruiting them as students. To shorten the time required for finishing an academic degree, but also as an incentive, the candidates shall receive credit for matching vocational knowledge. One of the preconditions for establishing such a new access route is to implement clear criteria for acknowledging vocational talents. This paper presents the approach taken by the Leibniz Universitaet Hannovers Institute for Microtechnology (imt) for accrediting vocational knowledge in the areas of micro and nano technology (MNT) and mechatronics and compares it to alternatives pursued taken by information technologies as well as health and life sciences and economics. The approach taken by the imt uses the system of Moon, comparing vocational knowledge and required learning outcomes on six levels. Information technology plans to apply the European Qualification Framework that depends on external experts for establishing competencies classified into formal, non-formal, and informal ones. The approach taken by economics is based on the concept of Anderson and Krathwohl following the taxonomy of Bloom. It compares formal competences within a six-level system.

TD-05 Knowledge Management-2
Tuesday, 7/29/2008, 14:00 - 15:30 Room: Bartholomew Diaz
Chair(s): James M Ritchie; Heriot-Watt University

TD-05.1 [R] The Use of Non-intrusive User Logging to Capture Engineering Rationale, Knowledge and Intent during the Product Life Cycle

James M Ritchie; Heriot-Watt University, United Kingdom
Raymond Sung; Heriot-Watt UNiversity, United Kingdom
Heather Rea; Heriot-Watt University, United Kingdom
Theodore Lim; Heriot-Watt University, United Kingdom
Jonathan Corney; University of Strathclyde, United Kingdom
Iris Howley; Drexel University, United States

Within the context of Life Cycle Engineering it is important that structured engineering information and knowledge are captured at all phases of the product life cycle for future reference. This is especially the case for long life cycle projects which see a large number of engineering decisions made at the early to mid-stages of a products life cycle that are needed to inform engineering decisions later on in the process. A key aspect of technology management will be the capturing of knowledge throughout the product life cycle. Numerous attempts have been made to apply knowledge capture techniques to formalise engineering decision rationale and processes; however, these tend to be associated with substantial overheads on the engineer and the company through cognitive process interruptions and additional costs/time. Indeed, when life-cycle deadlines come closer, these capturing techniques are abandoned due to the need to produce a final solution. This paper describes work carried out for non-intrusively capturing and formalising product life cycle knowledge by demonstrating the automated capture of engineering processes/rationale using user logging via an immersive virtual reality system for cable harness design and assembly planning. Associated post-experimental analyses are described, which demonstrate the formalisation of structured design processes and decision representations in the form of IDEF diagrams and structured engineering change information. Potential future research directions involving more thorough logging of users are also outlined.

TD-05.2 [R] Leveraging Unstructured Information Using Topic Modelling

Wilhelm Uys; Stellenbosch University/Indutech (Pty) Ltd, South Africa
Niek du Preez; Stellenbosch University, South Africa
Ernst W Uys; Indutech (Pty) Ltd, South Africa

Unstructured information in the form of natural language text is abundant in various kinds of organisations. To increase information sharing, organisational learning, decision-making and productivity, large amounts of unstructured text need to be analysed on a daily basis. Full text searching alone is not sufficient as a first approach to help users understand what a collection of electronic documents is about, since it does not provide the user with an overview of the underlying concepts in the document collection. A topic model is a useful mechanism for identifying and characterising various concepts embedded in a document collection allowing the user to navigate the collection in a topic-guided manner. Topics, made up of significant words, provide the user with an overview of the content of the document collection. Each document is represented as a mixture of automatically constructed topics, and the user may select documents related to a specific topic of interest and vice versa. Similarities between documents may be found by looking at what documents are assigned to a specific topic, enabling the user to find other documents related to a given document. This methodology enables users to digest a larger number of documents, assisting them in spending more of their time in actually reading than finding relevant information.

TD-05.3 [R] Role of Organizational Culture for Knowledge Sharing in Projects

Mian M Ajmal; University of Vaasa, Finland
Josu Takala; University of Vaasa, Finland
Tauno Kekäle; University of Vaasa, Finland

Knowledge sharing is recognized as a crucial issue for organizations. This theoretical paper aims to investigate the knowledge sharing process in project environments with the perspective of organizational culture and to find out the most efficient and effective approaches to support it. Firstly, the paper will highlight the knowledge sharing, particularly in project organizations, and pinpoint some possible impediments in sharing of knowledge. Secondly, the paper will throw light on the importance of organizational culture in this process. Finally the paper will describe some implications for project management.

TD-06 Entrepreneurship / Intrapreneurship

Tuesday, 7/29/2008, 14:00 - 15:30 **Room: Vasco da Gama**
Chair(s): Dov Dvir; Ben Gurion University of the Negev

TD-06.1 [R] The Fit between Entrepreneurs' Personality (ENTP) and the Profile of the Venture (VP) They Manage and Business Success: An Exploratory Study

Dov Dvir; Ben Gurion University of the Negev, Israel
Arik Sadeh; Holon Institute of Technology, Israel
Ayala Malach-Pines; Ben Gurion University of the Negev, Israel

Person-Organization Fit, the match between individuals and the organizations in which they work, has been extended to the fit between entrepreneurs' personality (ENTP) and the profiles of ventures (VP) they manage, and its relationship to the venture's success. Sixty three Israeli entrepreneurs working in new ventures responded to a specially designed questionnaire that included the following parts: (A) provided general data on the new venture; (B) assessed the venture type along two dimensions: novelty and technological uncertainty; (C) assessed the entrepreneurs' personality that seemed relevant to these two dimensions and (D) assessed the venture's success. Findings revealed that entrepreneurs in high novelty and high technological uncertainty ventures had higher education and were more investigative, entrepreneurial, secure, curious and adventurous and less abiding of rules than those in low novelty and technological uncertainty ventures. These findings were interpreted as suggesting that entrepreneurs are more attracted to ventures that fit their personality. In addition, high novelty high technological uncertainty ventures were found to be significantly more successful (on 7 out of 10 success measures used) when compared to the low novelty and low technological uncertainty ventures.

TD-06.2 [R] Entrepreneurial Journey: Emergence from Entrepreneurial Intent to Opportunity Realization

Min-Seok Cha; KAIST Graduate School of Management, Korea, South
Zong-Tae Bae; KAIST Graduate School of Management , Korea, South

The entrepreneurial journey of new business creation starts when a business opportunity is discovered by nascent entrepreneurs. There are many obstacles along the journey, and it must be an internal driving force to create entrepreneurial actions for problem solving. This paper develops a new concept of entrepreneurial intent as an internal driving force of opportunity realization with drive (sense of crisis) and directivity (sense of opportunity). Furthermore, it presents a theory of the underlying entrepreneurial process with entrepreneurial intent. Case study methods and grounded theory building are utilized. The results, based on cases from high-tech venture firms in Korea, show that entrepreneurial intent toward a new opportunity is emerged to collective actions for combining new resources to create new values. The entrepreneurial intent is the extreme level of achievement motivation which is comprised of arousal, direction, and duration (reducing the cognition gap), and drives 3C effects such as channeling, concentrating and continuing of entrepreneurial actions. The entrepreneurial actions, in turn, make more chances of serendipity in the external process of networking and gaining resources (reducing the resource gap), and the internal process of value creation. Value creation finally converts discovered opportunities into realized opportunities to complete the entrepreneurial journey.

TD-06.3 [R] Influencing Entrepreneurial Intent for New Technology Intrapreneurs and Entrepreneurs in a University Environment

Cory Hallam; University of Texas at San Antonio , United States
Anita Leffel; University of Texas at San Antonio, United States
David Womack; University of Texas at San Antonio, United States

Experiential learning is considered paramount to entrepreneurial education. For the U.S. the creation of technology entrepreneurs is an essential element of economic growth, job creation and global competitiveness. This study describes an intercollegiate entrepreneurial experience aimed at unlocking the inner technology entrepreneur in students. A model for Accelerating Collegiate Entrepreneurship (ACE) is proposed, linking theories of technology entrepreneurship creation with linkages to curricular and pedagogical inputs. A survey instrument is used to ascertain the level of entrepreneurial intent as well as a cluster personality assessment and an educational preparedness assessment. A biased sample of entrepreneurship in the College of Business students is introduced as a comparative measure for students in the College of Engineering. The preliminary data suggests that engineering students tend towards long-term entrepreneurial intent, yet traditionally the education system does little to encourage these tendencies, nor prepare them for the management of these technologies. A longitudinal study will follow this work to affect changes to the curriculum and pedagogy in a manner that helps accelerate the creation of successful technology entrepreneurs.

TD-07 Project/Program Management-4

Tuesday, 7/29/2008, 14:00 - 15:30 **Room: Prince Edward Island**
Chair(s): Michiel C Bekker; University of Pretoria

TD-07.1 [R] Simulation Results on Project Completion Time

Amnon Gonen; Holon Institute of Technology - HIT, Israel

According to the PERT method, a project length is normally distributed with a mean equal to the mean of the critical path. The expected length of the critical path is the sum of the expected activities' durations of that path. Risks, as a result of project delays, are calculated based on the normal approximation to the project length. During the course of our research, we realized that in many cases the conditions of the Central Limit Theorem are not satisfied; hence, the project completion time is often not normally distributed. In other words, the expected project completion time is greater than the sum of the activities' duration along the critical path. We analyzed project completion time using both the analytic approach and simulation. Our results show that in many cases it is biased to use the critical path length when attempting to estimate project completion time. The results of the current study provide users with better estimates and upper bound to the project completion time. These results can be used to improve risk management programs.

TD-07.2 [R] Risk Assessment Modelling for the South African Construction Industry

Krige Visser; University of Pretoria, South Africa
Pierre Joubert; University of Pretoria, South Africa

The construction project environment is fraught with risks of every conceivable nature and high levels of uncertainty. A research project was therefore initiated to define the most important construction risks from the insurance stakeholder's point of view. The risk management functionality in terms of the formal risk culture, risk framework and risk practices within the participating construction organisations was tested through a comprehensive questionnaire. Analysis of the completed questionnaires indicated that the results were consistent and repeatable. It was found that construction companies generally have weak risk management cultures, frameworks and practices, even though risk management awareness was relatively high at the construction project level. This seemed to emanate from the separation of project- and enterprise-related risks. The most important risks in the new proposed model are (1) the loss of key employees and business intelligence, (2) contractual related failure, (3) unfavourable financial market conditions and (4) failures of key contractors and clients.

TD-07.3 [R] Manufacturing Role in Simple Product Development at a Multi-

Project Environment

Ana G Wechsler; University of Sao Paulo, Brazil
Paulo T Nascimento; University of Sao Paulo, Brazil

The paper is about the manufacturing role within the innovation process of companies in a multiproject and simple product development environment. The aim is to understand the management practices used by manufacturing in the product and process development. It is a multiple case study, conducted in Brazil, wherein three companies from different business sectors - cosmetics, candies and shoes - were studied. Derivative projects are the main concern of the innovation process in these companies. But there are also some platform and breakthrough projects in each company at every period. As the result of the research, it is shown that, in these companies, manufacturing plays an important role in the innovation process, at the strategic and implementation levels. An important finding is that co-location of R&D, marketing, and manufacturing staffs may substitute for co-location of project teams. Another is that manufacturing may have a leading role in project selection and management whenever it has been a dominant function at the company, defining the common language concerning products. When production is not the leading function in company parlance, R&D may take the role of translator, facilitating the required communication between manufacturing and other areas in the innovation process.

TD-09 Sustainability-1
Tuesday, 7/29/2008, 14:00 - 15:30 **Room: Robben Island**
Chair(s): Alan Brent; University of Pretoria

TD-09.1 [R] Determining the Most Important Factors for Sustainable Energy Technology Selection in Africa: Application of the Focus Group Technique

Marie-Louise Barry; University of Pretoria, South Africa
Herman Steyn; University of Pretoria, South Africa
Alan Brent; University of Pretoria, South Africa

The supply of sustainable energy is a crucial factor for development in Africa. This is important both for business development and for the supply of energy to households in order to save time and thus enable members of households to be economically active. Without sustainable energy, poverty reduction and economic development in Africa are not achievable. Africa has limited skilled human resources and thus the selection of successful, integrated technological systems is imperative. This study focuses on the identification of factors to be taken into account when identifying the most sustainable technological systems for Africa. Focus groups, using the nominal group technique, can be used successfully in problem definition and first order identification. The purpose of this focus group was to identify the first order factors for the study, which were then used to inform the Delphi study that followed. A pre-existing group of specialists in the energy field was used. During this process, thirty eight factors deemed to be important were identified. The factors were categorized into six clusters, namely: technology factors, social factors, institutional or regulatory factors, site selection factors, economical or financial factors, and achievability by the specific organisation.

TD-09.2 [R] The Leverage Effect of Holistic Engineering and Technology Management to Sustain a Developing Economy

Dietmar H Winzker; University of Pretoria, South Africa
Leon Pretorius; University of Pretoria, South Africa

High technology companies in developing countries are sometimes suspiciously viewed as expensive endeavors of doubtful benefit when these developing countries struggle with serious social problems such as poverty, unemployment and poor infrastructure. The argument being that the effort in high technology only benefits an elitist few and that the country has to put its resources to solving the social problems rather than dabble in high technology projects. To let developing economies benefit sustainably from high technology organizations requires many factors being in place: an appropriate technology base and related products that will continue to be sought after in the local and global market in the future, a trustworthy political system, and an effective integration of systems and processes, leveraging the advantages to the problems of the community and the holistic, effective and efficient management of such organizations to mention but a few. This paper will focus on the management aspects of large-scale high technology and engineering efforts. The paper identifies and discusses the key success parameters for such a scenario and will focus on the benefits of managing an organization holistically so as to be globally competitive, which in turn results in sustainable contributions to the community and the national economy of developing countries. The paper introduces a holistic management model which has been applied successfully in a country such as South Africa and also implemented in international companies in a number of developed countries. The suggested methodology/model lends itself to understand and judiciously manipulate the dynamics of the high tech global business environment for sustained competitive advantage in a framework of a sustainable economy. The management model recognizes and enables the manager to address the many issues confronting them daily by giving a new strategic perspective with the help of sub-models. These sub-models form the anchors of the strategic intent whereby the fluid and complex situation can be managed reasonably, effectively, sustainably and hopefully, wisely, too. It is the contention of this paper that a mature, analytical and intuitive management approach which considers all stakeholders, based on the holistic management model introduced, and which is properly and consistently applied, will lead to a significant contribution to a sustainable economy. The research methodology employed is mainly exploratory in nature.

TD-09.3 [R] Patterns of Collaboration in Emerging Fields of Trans-Disciplinary Science: The Case of Sustainability Science

Masaru Yarime; University of Tokyo, Japan
Yoshiyuki Takeda; University of Tokyo, Japan
Yuya Kajikawa; University of Tokyo, Japan

This paper examines the patterns of collaboration over national and disciplinary boundaries in emerging fields of trans-disciplinary science, taking the case of sustainability science as an example. Bibliometric data is used for empirical analysis. The patterns of collaboration on sustainability science show that research collaboration tends to be conducted between countries which are geographically located closely. That suggests that communication and information exchange could be limited within regional clusters. As the focused fields of research in sustainability science are different in each country, the formation of regional clusters could be a serious obstacle to collecting, exchanging, and integrating diverse types of knowledge, which is of critical importance in establishing the trans-disciplinary field of sustainability science. To address the challenge of knowledge integration, new types of organizational and institutional arrangements are emerging for research collaboration. Implications for organizational and institutional arrangements are discussed. The extent of knowledge integration between different disciplines in sustainability science is investigated.

TD-10 Emerging Technologies
Tuesday, 7/29/2008, 14:00 - 15:30 **Room: Dassen Island**
Chair(s): Süleyman Semiz; Pamukkale University

TD-10.1 [R] Using of the Advanced Technologies in Turkish Automotive Industry

Süleyman Semiz; Pamukkale University, Turkey
Mustafa Gölcü; Pamukkale University, Turkey
Ceren Göde; Pamukkale University, Turkey

Nowadays, technological change exists as the most important organization dynamic. It is possible that the organizations may make the development and benefit strategies insurable in the global competition circumstance by keeping a harmony with this technological change. The organizations, therefore, need to use very different management and production technologies. One of the sectors in which these technologies are mostly used is the automotive industry. In the world, it is estimated as the development rate coming from the past is observed that it will continue its development rate in the future. The existence of this industry becomes as an important economical power for the countries as it is considered with the main production industry and supply industries that it affects. The automotive industry is a sector that is developing each year with increasing importance in the Turkish economy. The country is preferred by a lot of global firms as a production and a marketing base for reasons such as its cheaper manpower, being close location, the encouraging, and the eco-

nomical stabilization in recent years. In this study, the present usage levels and the estimated levels of the technologies of the organizations operating in the automotive production industry in Turkey are considered and realized. The effects of the management and the production technologies on the business criteria are also investigated. And the relation between these criteria and the estimated levels that the organizations want to reach is studied.

TD-10.2 [A] BT R&D and Innovation in Korea: Status and Features

Hyun-Dae Cho; STEPI, Korea, South

This study examines the status and features of R&D and innovation of bio-technology (hereafter BT) in Korea, and discusses some implications. In order to do so, it looks into the R&D investment and human capital in BT as well as BT industry and government policy for BT in Korea. In addition, it identifies the Korean players' R&D activities such as R&D objective, R&D stage, internal/external/collaborative R&D and technology acquisition channels through a web-based large-scale questionnaire survey conducted for a wide range of BT experts in companies, universities and public research institutes. According to the findings, in Korea the R&D investment and human capital in BT and the number of BT companies have rapidly increased during the last decade. Especially, the Korean government R&D investment has drastically increased in the public sector. But, in the private sector, BT companies have struggled in raising funds, and also there has been a lack of bio-infrastructure such as cGMP. In addition, there are many BT companies in the Korean BT industry. However, most of them are small- and medium-sized companies and less capable of creating new drugs and materials and focus mainly on mass-production and improvement of generic products developed in advanced countries. Moreover, through the survey, the following has been found. There is a lack of local collaboration among local R&D trial as well as lack of international collaboration. Public BT R&D players are less capable of making technology transfer to local BT companies. In addition, in order to acquire necessary technologies, the Korean BT companies have relied mainly on in-house R&D, rarely on importing foreign technologies. It is a different pattern from ordinary industries in developing or catching-up countries. Therefore, for the purpose of rapid development of BT and the BT industry in Korea, although the Korean government's strong push is still necessary to promote BT R&D, it is very important to vitalize the R&D and business of the Korean BT companies and to fertilize bio-infrastructure. Also, it is necessary to promote local and international collaboration in developing and acquiring necessary technologies, and push public R&D players to increase the activity of technology diffusion for local BT companies. The understanding of these Korean circumstances and implications would be useful for other developing and catching-up countries.

TD-10.3 [A] Engineering the Soul of Management in the Nano Era

Vijay K Arora; Wilkes University & University Teknologi Malaysia, Malaysia

A goal-driven engineering process?an engine of invention, innovation, and growth?is described to be the soul of management. As this synergy is implemented and lessons learned in the management training, the outcomes are expected to be higher than the individual aspirations of people comprising an organization. In the nano era, the integration of the artificial (human-initiated engineering) and natural (divine engineering) is shown to be of paramount importance in enhancing productivity and in improving the standard of life. Biomedical engineering, nanotechnology, megacomputing and nano-robots will dominate the future of the human race and hence an anticipated need for effective management of emerging technologies and related human resources. In support of the synthesis of management and engineering, outcome-based education (OBE) in the Washington Accord criteria are shown to integrate development of management and entrepreneurial skills as part of the engineering training in desiging a product and marketing it. An algortihm of these deliverable attributes by considering the university as an organization dedicated to enhancing the industrial competitiveness is given.

TD-10.4 [A] Policy Making Diagnostics of Iran's Fuel Cell Technology

Houshang Aliverdilou; Iran University of Sceince and Technology, Iran
Mohammad Saeed Jabalameli; Iran University of Science and Technology, Iran
Naser Bagheri Moghaddam; Allameh Tabataba'i University, Iran

Today, fossil energy sources are strongly substituted by new and renewable energies. Hydrogen is now known as one of the most sustainable energies, so that the next century has been named as hydrogen era. Hydrogen is used as the fuel of fuel cell. Development of new technologies, like fuel cell, needs a special planning and policy making according to the situation of each country. As policy making of fuel cell's technology has been recently planned in Iran, the approach of this study is diagnostics of the policy making. In this study, assessment and finally diagnostics of Iran's fuel cell technology was done according to the approach of National Innovation System identified by OECD and through interview method. Questionnaire of interview was designed according to the functions of National Innovation System, and interviews were done with experts who had experience in this field. Gathered information was analyzed by Excel software and finally diagnostics got in this way. The main diagnostics identified in this study include some issues on management capabilities, research centers, IT network, human capabilities and using some tools for policy making in fuel cell technology in Iran.

TE-01 Technology Planning-1
Tuesday, 7/29/2008, 16:00 - 17:30 **Room: Ballroom West**
Chair(s): Nathasit Gerdsri; Mahidol University

TE-01.1 [A] Technology Strategy for a Strategic Planning Tool in a Multinational Company: Case of Dynamic Strategic Planning System

Alper Celebi; Istanbul Technical University, Turkey
Sitki Gozlu; Istanbul Technical University, Turkey

Sustained competitive advantages require continuous improvement for a company to maintain its strength or weakness in the marketplace. Information technologies play a crucial role for a competitive future. To create sustainable growth, role and performance measurement of information technologies in management processes such as strategic planning, audit, etc. steadily increases in today's highly competitive business world. The purpose of this paper is to focus on technology strategy of a strategic planning tool and case of Siemens AG. The initiator of the technology was Siemens Turkey, where the tool of regional strategic planning (Dynamic Strategic Planning System (DSPS)) was also developed for the first time among the regional companies of Siemens AG. Siemens Turkey has been responsible for the development since 2001 and decided on an aggressive technology strategy to make a radical innovation after the criteria are evaluated. Technology strategy is questioned during two in-depth interviews with a manager and a technical system administrator, and the technology strategy of DSPS is mapped with S-curve according to inputs from in-depth interviews.

TE-01.2 [R] The Semantics of the Uncertainty Literature

Jan Kwakkel; Delft University of Technology, Netherlands
Scott Cunningham; Delft University of Technology, Netherlands

Uncertainty is an important topic for the management of technology. A clear and comprehensive framework of uncertainty is needed. The problem is not just a matter of consistency. Researchers in different disciplines often mean very different things when they speak of uncertainty. One way of systematically reviewing and analyzing the meanings of the word uncertainty is to comprehensively survey usage of uncertainty concepts across the disciplines of science and engineering. The strong semantic hypothesis leads us to argue that a consistently different usage of the word must indicate meaningful differences in definition. In this paper we use a tech mining approach to analyze the uncertainty literature. We evaluate multiple distinct meanings of the word uncertainty, and track these meanings to the nature of uncertainty as encountered across a range of scientific disciplines. The results can be used to extend existing frameworks of uncertainty. Moreover, the results may be used in the management of technology to bridge the gap between disparate understandings of uncertainty within multidisciplinary teams.

TE-02 Innovation Management-5
Tuesday, 7/29/2008, 16:00 - 17:30 **Room: Ballroom East**
Chair(s): Leon Pretorius; University of Pretoria

TE-02.1 [R] Intellectual Property Scorecard: Strategically Capitalising on Value Created by Innovation and R&D

Irfaan Khota; University of Johannesburg, South Africa

Leon Pretorius; University of Pretoria, South Africa

South Africa is currently losing ground in the international technology race. The decline in capitalization of intellectual property (IP) is staggering, and levels of investment in R&D are short. Industrial growth is Africa's new development strategy, driven by the emergence of new markets. This necessitates the management of multiple competencies that exploit resources, knowledge and management ability to adapt better and faster than the competition; this also requires investment in transport, technology and communications infrastructure through technological innovation and application, coupled with a customer centric, process driven, bottom-up and transformational management stance. Within the realm of effective knowledge management, strategically developing and taking ownership of knowledge and then capitalizing on that knowledge should now be a key focus of top management. The research focuses on inductive development of Kaplan and Norton's Balanced Scorecard that identifies areas for development in knowledge management, and specifically the required strategic management stance demanded from product developers and innovators with respect to IP, to achieve the competitive high-ground. The research offers useful insights on how product developers should carve out competitive turf, particularly from a knowledge and IP value creation perspective, seeking ultimately to enhance corporate/shareholder and product-life-cycle value.

TE-02.2 [R] An Exploration on Community-Based Innovation: Indaba Music as a Case in Point

Nina Ziv; Institute for Technology and Enterprise, United States

This paper focuses on how virtual communities have become a new locus of innovation and have been instrumental in defining a new type of company, the user-centric company, in which members of these communities not only use the services of the company to communicate with one another but also drive many of the key aspects of innovation occurring in the company. Formed to service communities, user-centric companies represent a significant change from traditional companies in terms of how they innovate, interact with their customers, develop products and organize themselves. They have a minimalist organizational structure, and a rich technological environment. In order to determine the salient characteristics of such user-centric companies, field research was conducted on Indaba Music, a New York City based company which has developed a global technological platform which enables musicians to collaborate and create musical compositions as well as socially network with one another. Based on this case study, conclusions are drawn about what constitutes successful value creation in this user-centric business environment and the possible implications of this kind of innovation for managers of technology.

TE-02.3 [A] Leveraging Competitiveness and Economic Growth through Linking Innovation Systems to Wealth Creation in Emerging Countries

Carlos Scheel; Monterrey Institute of Technology, Mexico
Jaime Parada; Innovation and Technology Transference Institute, Mexico

Most industrialized countries have been able to insert innovation into their national agendas, leveraging competitiveness, economic growth and social development. Well structured national innovation systems run across all the innovation value chain: from the transfer of ideas or inventions, to their commercialization as high value and differentiated products or services, producing high economic and social impacts. In developing countries, the circumstances are quite different. There are weak liaisons, low trust and poor association between economic generators (companies) and their supporting institutions (government, federations, banks and academies). Regions are not electronically prepared (e-readiness) to support the infrastructure required for the effective formation of clusters (c-readiness). Innovation is not perceived as an asset, and high value entrepreneurship is not a common finding in the entrepreneurial profiles of most professionals. There are no world-class industrial enabling conditions, nor high value core capabilities, and the digital economies are creating large digital development divides instead of business opportunities. In general, the economic gap between rich countries and poor ones widens every day. To help alleviate this situation, we have developed the WIT Model (Wealth creation through Innovation and enabling Technologies). This model has been designed to create the necessary and sufficient enabling conditions and core capabilities to empower developing regions to transform their scarce resources and hostile conditions into attractive regions with competitive industries and innovative companies, capable of producing great added and differential values, strongly interrelated with their regional social capital, so that they can compete globally as extended networks of value, and share their economic value among their local communities. Several cases of application of the model are shown, specially the current project of the Institute for Innovation and Technology Transfer (IITT) planned to position the city of Monterrey, Mexico, as an international Pole of Innovation and Competitiveness.

TE-03 Technology Adoption-2

Tuesday, 7/29/2008, 16:00 - 17:30 **Room: Sir Francis Drake**
Chair(s): Wallace Chigona; University of Cape Town

TE-03.1 [R] Investigating the Impact of Internet in Eliminating Social Exclusion: The Case of South Africa

Wallace Chigona; University of Cape Town, South Africa
Fidel Mbhele; University of Cape Town, South Africa
Salah Kabanda; University of Cape Town, South Africa

In many other developing countries Information and Communication Technology (ICT) is seen as a means for tackling the problem of social exclusion. This perspective of ICTs has translated into governments and donor agencies spending on establishing Internet access points (e.g. telecentres) in socially excluded communities. Yet, beyond the belief of inherently beneficial ICTs there has been little empirical work done to evaluate the impact of ICTs, notably the Internet, in helping address social exclusion. This paper investigates whether the Internet does contribute to the elimination of social exclusion. The cross-sectional study uses a qualitative research approach on four communities in the Western Cape, South Africa. The major finding of the paper is that the Internet does play a very minimal role in eliminating social exclusion, with very few beneficiaries. The implication of the findings is that governments in developing countries may need to downsize their expectations of the Internet in addressing social exclusion. The relative investment on bringing the Internet against other necessary infrastructure spends (such as healthcare, education and economic resuscitation) may need to be revisited.

TE-03.2 [R] The Technology Assessment Implementation at Science and Technology Research Institute in Defense, Malaysia (STRIDE)

Siti N. Othman; Universiti Utara Malaysia, Malaysia
Mastora Mustafar; Universiti Utara Malaysia, Malaysia
Nor kamariah Kamaruddin; Universiti Utara Malaysia, Malaysia
ShamsolNizam Karman; Universiti Utara Malaysia, Malaysia

The roles of the technology assessment are to give inputs in terms of not only technical efficiency and economic rationality but also social and ecological consequences of the introduction of a specific technology. The aim of the technology assessment is to determine the risk as early as possible before any decision making in technology purchased is made. Despite the technology assessment basic concept evolution, technology assessment can be applied in various sectors but it is most prevalent in the health, environmental if compared to the defense sector. This is because the defense sector is country specific, whereby security is the main concern of a nation and the information regarding the technology assessment practices is not published for public knowledge. The purpose of the study was to investigate the extent of STRIDE technology assessment roles in assisting the defense ministry in relation to technology acquisition decisions. This study employs a case study approach to acquire in-depth information on the STRIDE roles in technology assessment using a structured interview to collect the data. The findings indicated that the scope of assessment done was more on the development aspect. In addition, STRIDE employed two types of methodologies in determining the priority areas in R&D: brainstorming and Delphi analysis. The implication of the finding will provide clear definitions, scope and guidelines for future technology assessment tasks.

TE-04 Technology Management Education-3

Tuesday, 7/29/2008, 16:00 - 17:30 **Room: Marco Polo**
Chair(s): Mel Horwitch; Polytechnic University

SESSIONS

TE-04.1 [A] The Right Attitude to Rain

David R Walwyn; Arvir Technologies, South Africa

Isabel Dalhousie is the heroine of the new Alexander McCall Smith series, The Sunday Philosophy Club. She is an editor, a philosopher, an ethicist, and an astute observer, all of which mean that she is well qualified to reflect on the social world of Edinburgh with its slow-paced charm and beneficence. Isabel declares in her debut novel The Right Attitude to Rain that the key to contentment in the Scottish climate is the right attitude to rain, just as the key to happiness is making the best of what you have. This advice reminds one of the arguments now being presented for the problems within South African universities, which state that university management is the cause of much of the present problems. Declining outputs, poor staff morale, inadequate funding: these issues are all the fault of those on the 11th floor at the University of Witwatersrand, in Bremner Block at the University of Cape Town, and similar offices at all the other institutions. But the authors of these articles and those that support them need to look more widely than the confines of their own institutions. The source of the problem is not the university management, but the Department of Education and its policies towards the tertiary education sector. In this paper, the department's funding formula is analysed, and it is shown how this framework fails to conform to some of the basic principles of performance management.

TE-04.2 [A] Engineering Education in Orissa: Is It Sustainable?

Pranabesh Dash; Intel Corporation, United States
Mitali Monalisa; Intel Corporation, United States

Technological education needs along with education policies are essential for the socio-economic development of any nation. However, it needs to be managed properly. This paper presents a study done on how technical education changed course in Bhubaneswar, the capital city of Orissa, a state on the east coast of India. The change was a reaction to the Information Technology boom in India combined with the modification of education policies by the All India Council for Technical Education (AICTE), which oversees the accreditation process of engineering colleges in India. The numerous engineering colleges and institutions that have mushroomed over the past five to seven years in the greater city of Bhubaneswar are proof to this. But the question is, have they met the needs of the industry now? Does this new education system have the right ingredients for economic success? More importantly, can it be sustained long-term? This case study takes an exploratory approach to look at how engineering education has grown in Bhubaneswar and attempts to identify gaps in this specific instance which illustrates that technological education needs management.

TE-04.3 [R] Research Characteristics and Agenda of Technology Management Discipline in Turkey

Hacer Ansal; Isik University, Turkey
Huriye Aygoren; Middle East Technical University, Turkey
Umut Ekmekçi; Istanbul Technical University, Turkey

Despite the growing importance of the Technology Management (TM) field in advanced countries since the 1990s, it is rather new for developing countries such as Turkey. Considering the diversity of needs and concerns in different countries, the evolution of the TM discipline can be expected to follow different paths to include different national experiences and to consider unique national needs and concerns in relation with TM. Therefore, to what extent this diversity is reflected in the mainstream TM research agenda is an important issue. Thus, the aim of this study is two-fold: first, to examine how the general research characteristics and agenda of the TM discipline have evolved in the academic research in Turkey, and next, to what extent they have converged or diverged with the patterns of mainstream TM research in international journals, by analyzing the TM articles published by Turkish academics both in the national and international scientific journals. The findings of this research reveal that the TM discipline in Turkey indicate both divergent and convergent characteristics when compared with the results of recent studies about developed and developing countries. In addition, a significant difference is observed about how these characteristics are reflected in national and international journals.

TE-05 Information Management-2

Tuesday, 7/29/2008, 16:00 - 17:30 Room: Bartholomew Diaz
Chair(s): Wajee Chookittikul; Webster University Thailand

TE-05.1 [A] Information Technology Strategy for Six Sigma Projects in a Thai University

Jaruek Chookittikul; Phetchburi Rajabhat University, Thailand
Wajee Chookittikul; Webster University Thailand, Thailand

Being one of newest schools in a Thai state university, we face many challenges in terms of limited budget, academic resources, support staff and classroom space when compared to more well-established schools. However, since 2003 these challenges have provided opportunities to produce a competitive and successful strategic plan for our school's growth. We have incorporated a concept of virtual organisations and the Six Sigma methodology into the school's strategy, mission, and goals which has resulted in many changes in the school. Those changes have been well accepted primarily due to the use of information technology to enable tasks to be completed more effectively. We report on how information technology has been fully utilised in the school's strategic planning, in reducing resistance to changes occurring after several projects' implementations, and supporting our Six Sigma quality improvement and control projects. Details of the analysis and design of our information system to meet these requirements are also described in the paper.

TE-05.2 [R] A Real-Time Database Management System for Logistics Systems: A Case Study

K.L. Choy; Hong Kong Polytechnic University, Hong Kong
Edmond L.H. Choy; Hong Kong Polytechnic University, Hong Kong
T.C. Poon; Hong Kong Polytechnic University, Hong Kong

Due to the effect of globalization, the supply chain network has become more complex than before. In order to provide seamless integration among different supply chain parties within the network, and achieve high rewards in business activities, real-time information sharing is an essential element. Thus, numerous research studies focus on instant data capturing techniques and effective data management tools separately for enhancing the performance of logistics operations, such as order picking, storage operation, etc. However, the attention paid by researchers to the integration of logistics operations, real-time information collection techniques and database management is relatively limited. In this paper, a Warehouse Resources Management System, an interactive database management system for logistics operations, will be introduced in order to optimize the action of information retrieval performed by front-end users using Structured Query Language within the system. Real-time warehouse resources status will be captured by Radio Frequency Identification. Thus, interactive instant responses will be shown in the system for assisting users in making real-time decisions. The query optimization technique has been applied to the system for minimizing the expected cost of retrieving the required information.

TE-05.3 [R] Information Technology Interoperability Awareness: A Taxonomy Model Based on Information Requirements and Business Needs

Sinan Cayir; Istanbul Technical University, Turkey
Nuri Basoglu; Bogazici University, Turkey

The successful business has to manage its operations based on seamlessly integrated information systems. In practice, no single solution fits all, so most of the companies are to implement more than one information system based on business needs and availability. What makes the difference is how interoperable are the deployed systems between each other. In this study the importance of critical information to be exchanged is examined. A taxonomy model for a successful application of interoperable Enterprise Information System is proposed. The findings include users' information requirements, business needs, and interoperable systems information requirements.

TE-06 New Product Development-1

Tuesday, 7/29/2008, 16:00 - 17:30 Room: Vasco da Gama
Chair(s): Peerasit Patanakul; Stevens Institute of Technology

TE-06.1 [R] The Impact of Top Management Team Conflict on New Product

Development: The Case of Taiwan and the United States

Tsun-Jui Hsieh; Asia University, Taiwan
Hsien-Jui Chung; National Chung Cheng University, Taiwan

This study demonstrates how top management team (TMT) conflict impacts new product development (NPD) under cultural differences between Taiwan and the United States. Based on cultural differences, we compare Taiwan and the United States to explore how the heterogeneity of TMT composition leads to team conflict and how TMT conflict affects NPD outcomes in different stages. Several research propositions are presented and indicate that the higher TMT heterogeneity results in a higher degree of team conflict. Furthermore, cognitive conflict positively affects NPD initiation stage, but negative in the implementation stage. From a perspective of cultural differences, managers in Taiwan, compared with those in the United States, tend to sustain organizational cohesion and harmony, emphasize personal relationships, and sidestep direct conflict as much as possible. This cultural characteristic negatively affects NPD initiation, and also wears away the competitive advantages for Taiwanese companies.

TE-06.2 [R] Autonomous Teams and New Product Development

Peerasit Patanakul; Stevens Institute of Technology, United States
Jiyao Chen; Northwestern University, United States
Gary S Lynn; Spencer Trask and Company, United States

How should a company organize a project team to develop new products? This study examined the relative effectiveness of four types of team structures by comparing the performance of 559 development projects in terms of development cost, new product development speed, and product commercial success. The results indicate that in general, autonomous team structure is superior to other team structures, especially in dealing with high technology projects or developing radical innovation products.

TE-06.3 [R] Promoting the Early-Adopter Feedback Process Using a Firm-Initiated Online Community

Joong Hyun Kim; KAIST Graduate School of Management, Korea, South
Shin Hyung Kang; LG Electronics, Korea, South
Zong-Tae Bae; KAIST Graduate School of Management, Korea, South

There are many online communities in Korea. An online community is a group of people that primarily interact via the Internet rather than face-to-face. Many firms are using online communities for communicating with users. The research question we attempt to answer is how online communities can be utilized throughout the NPD process, especially by using an early adopter feedback system. We investigate three leading MP3 player manufacturers in Korea. The number of people in these communities is over 100,000. They use various methods of promoting communication with users. This community can help retrieve valuable insight on customer needs, effective characteristics for new products, and trends for future development. These communities can also provide an effective method of communicating with early adopters. Using an online community is the most effective and efficient way of hearing customers' voices, thereby elucidating the strong and weak points of new products. In addition, communication activities could instill brand loyalty between firm and customers. Making an online community more active is the main challenge of firms that intend to use one. High-quality products, an effective strategy for attracting early adopters, and top management support for online communities are factors that determine the success of growing online communities. We also suggest a theoretical framework for online community development and an early-adopter feedback facilitation process.

TE-07 Project/Program Management-5
Tuesday, 7/29/2008, 16:00 - 17:30 **Room: Prince Edward Island**
Chair(s): Jeffrey Busch; Jeffrey S. Busch PMP

TE-07.1 [A] Implementing a Project Office and Phase Model for Biotechnology Capital Projects

John McCreery; North Carolina State University, United States
Lanny Bown; Bayer Biological Products, United States
Stephen Eubanks; Mohawk Industries, United States

Bringing biotechnology products to market is a challenging endeavor. Relative to other industries, investment in R&D is quite high in the biotech industry [Technology Review, 2005]. In addition, the biotech industry is critically dependent on manufacturing process innovation [Pisano, 1997; Lim et al., 2006]. The manufacturing processes used to produce these complex medicines must satisfy stringent regulatory and quality requirements. These manufacturing processes are developed through the execution of large capital investment projects. The projects are characterized by long lead times, high levels of complexity and coordination, intensive use of resources, and sizable technical, financial, and regulatory risks. With all these challenges, it is clear that concentrated management attention and excellent project practices are critical to success. This study will describe the efforts of a biotech firm to create a project office center of excellence. We will examine how the project office implemented a comprehensive capital project phase model, as well as providing details on the phase model itself. A range of organizational, technical, and behavioral obstacles will be discussed, along with the approaches used to overcome these obstacles. We will offer lessons learned on how to implement change and improve project performance.

TE-07.2 [R] An Investigation into the Benefits of the Implementation of an Enterprise Project Management System in Large Organisations in Developing Economies

Ketshidile Tlhomelang; University of Pretoria, South Africa
Marie-Louise Barry; University of Pretoria, South Africa

Large companies in developed economies have been applying enterprise project management (EPM) since the late 1990s. However, in developing countries, large organisations are only now starting to realise that EPM exists and can benefit them. This paper presents the results of a study that was undertaken to investigate the potential benefits of implementing EPM in medium to large organisations in Botswana, as a new framework to address the needs of varied and multiple projects. The general impression is that most organisations in Botswana, and by extension in other developing countries, should start to understand the intricacies of managing multiple projects. This would require an accelerated programme of building the workforce's capabilities and the organisational competence required to manage business. This study comprised a two-round Delphi study, with 14 and six participants respectively, from nine medium to large organisations across all economically active regions in Botswana. The study identified the eight contributions that the adoption of enterprise project management can make in Botswana, and by extension, in other developing economies.

TE-07.3 [R] Using the Project Integrated Management Methodology to Enhance the Development, Viability and Sustainability of the SA PBMR and PWR Component Manufacturing Sector

Manfried Koster; University of Pretoria, South Africa
Jabulani Mangena; Pebble Bed Modular Reactor (Pty) Ltd, South Africa

The South African (SA) utility company Eskom is planning to install additional 20 GWe of nuclear power plant (NPP) capacity i.e. between 2008 and 2025. Of the aforementioned installed capacity, 4 GWe will be from the PBMR generation IV high temperature gas reactors and 16 GWe will be from the advanced generation III+ pressurized water reactors (PWR) supplied by AREVA or Westinghouse. The SA government requires that the aforementioned nuclear projects must include knowledge and technology transfer which will be used to develop viable and sustainable SA nuclear industry. This research paper explores and demonstrates how the PMBOK project integration management methodology can be utilized to enhance the viability and sustainability of the localized technologies. Various technology localization or indigenization aspects such as R&D, engineering, operation and maintenance are considered in supporting the sustainability of the manufacturing sector. The project integration management model developed and presented in this research paper is used to integrate the aforementioned project life cycle phases to enable the development of a globally competitive nuclear component manufacturing sector.

TE-09 Sustainability-2
Tuesday, 7/29/2008, 16:00 - 17:30 **Room: Robben Island**

Chair(s): Masaru Yarime; University of Tokyo

TE-09.1 [R] Towards Modelling Macro Influencing Factors to Address South African Energy Challenges: A Focus on Electricity Demand and Climate Change

Clemens Engelbrecht; University of Pretoria, South Africa
Alan C Brent; University of Pretoria, South Africa

Energy technology implementation or policy projects (TI/PPs) have a large macro-level impact on a country, and it is imperative that decisions at this level reflect sustainability. South Africa is already experiencing an energy supply and demand challenge. Inexpensive coal-fired energy options and the international focus on alternative energy technologies, to combat climate change, exacerbate this challenge. The question is then whether there is sufficient incentive for South Africa to consider other non-coal energy technologies if a broader sustainable macro-level decision making process is adopted. This paper answers this question based on the modelling of energy systems by firstly combining a set of macro-level indicators from various sustainability and energy studies. The model then incorporates the indicators and applies the multi-attributive utility theory (MAUT) to determine utilities for economic, social, institutional and environmental macro-influencing factors (MIFs). Each macro-influencing factor's utility is weighted according to specific scenarios; for this study, climate change and energy challenge scenarios were specifically investigated. The individual macro-factor utilities are then combined to provide an overall macro-influencing factor landscape (MIFL) utility. The achieved overall utility is an indication of the energy technology's macro-level fit for South Africa, given the scenario constraints. The macro-influencing factor landscape (MIFL) model lays the foundation for sustainable energy system decision-making for policy makers and technology managers in the future.

TE-09.2 [A] How Does Reengineering Sustain Economy?: The Case of a Paper Industry in a Developing Country

Francois A Ravalison; University of Antananarivo, Madagascar
Patrick Rajaonary; PAPMAD-OI, Madagascar
Elise A Raveloson; University of Antananarivo, Madagascar
Etienne Rakotomaria; University of Antananarivo, Madagascar
Joëlle Gazerian; Ecole Centrale de Marseille-Marseille, France
Cécile Loubet; Ecole Centrale de Marseille-Marseille, France
Jean M Ruiz; Ecole Centrale de Marseille-Marseille, France

Madagascar has a paper mill industry that is not competitive with regional paper industries which sell on the Malagasy market. Lack of quality process and product quality disadvantages the paper mill industry's products. Non reliability of production capacity and under utilization are factors that decrease the speed of delivery. Its varieties of product are very limited compared to the local market needs. The objectives of the study are to improve dramatically the paper industry's performance in production and competitiveness. The reengineering methodology will be utilized. Reengineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed. The study takes place in the Paper Transformation Unit or PTU process of a paper mill industry. Outputs of the PTU are observed and analyzed. The process is then reengineered, and a new design based on a new organization of the process is obtained. When applying reengineering, some dramatic improvement in the speed of delivery, quality, flexibility and dependability are obtained. Reengineering sustains the paper industry by restarting its competitiveness in the paper industry sector, helping to sustain the economy.

TE-09.3 [A] Sustainable 3D Mould Design and Manufacturing

Janez Kopac ; University of Ljubljana, Slovenia
Joze Balic; University of Maribor, Slovenia
Franc Cus; University of Maribor, Slovenia

Development and implementation of scientific tools and principles for designing and manufacturing of sustainable products such as 3D moulds for glass bottles blowing are very important. 3D modelling will be described in the cases of glass products. The mass production industry of glass blowing will be described. CAD and CAM programmes will be used for technical documentation drawings and also for cutting technology planning in moulds machining. CAM (Computer Aided Manufacturing) programme for mould machining will be prepared for application on 3-axial milling CNC machine tool. Specialities such as drilling of long bores (vacuum bores) will be explained. Dry and near dry cutting will be included in machining processes as elements of sustainable manufacturing. When all machining operations are done, moulds are checked (dimensions, surface quality, fitting on other tool parts), and when the production of the bottles start, each manufactured product is thoroughly examined.

TE-10 Decision Making-1

Tuesday, 7/29/2008, 16:00 - 17:30 **Room: Dassen Island**
Chair(s): Pisek Gerdsri; Portland State University

TE-10.1 [A] A Decision Support Model for Location Selection: Bank Branch Case

Ferhan Cebi; Istanbul Technical University, Turkey
Zeynel Zeren; Istanbul Technical University, Turkey

Branch location selection is one of the most important and strategic decision making processes requiring one to asses carefully several criteria based on the mission and strategy. The study aims to provide a decision support model in order to help bank managers evaluate and select the most appropriate location for a bank branch on the basis of a case study in a banking institution in Turkey. The objective of the bank is to select the most appropriate city for opening a branch among the six alternatives in the Eastern part of Turkey. Because of the multi-criteria nature of the problem and the fuzziness in the comparisons of the criteria and the alternatives, the Fuzzy Analytic Hierarchy Process was used to address the problem of location selection in the study. The model consisted of five main criteria (demographic, socio-economic, banking indicators, sectoral distribution of employment, and regional trade potential) and 17 sub-criteria representing the utmost attention of management based on the bank's vision, mission, and strategy.

TE-10.2 [R] The Selection of Investment Criteria for Taiwanese High-Tech Firms in China: Study of Grey Relation Analysis

Chia-Han Yang; National Chiao Tung University, Taiwan
Joseph Z. Shyu; National Chiao Tung University, Taiwan
Gwo-Hshiung Tzeng; National Chiao Tung University, Taiwan

This paper aims to provide an analysis derived by the grey relation approach in which investment criteria for geographical location are selected by foreign firms among ten industrial zones in China. Attempts are made to provide suggestions to the government for improvement of investment areas in terms of environmental factors. This research adopts the statistical data investigated by Taiwan Electric and Electronic Manufacturers Association (TEEMA) in 2006 to make an empirical case analysis, using the grey relation approach to evaluate the most critical factor of investment criteria for Taiwanese high-tech firms, while selecting ten major industrial zones in China. Several investment indicators such as city competitiveness, environmental factors, risk factors, and future development are used as selected criteria in this method. The results reveal that the essential investment criteria for foreign firms in turn are investment environment, city competitiveness, and environment risk, according to the calculation of the grey relation coefficient.

TE-10.3 [R] A Decision Framework for the Evaluation of the Knowledge Management Tools

Gulcin Buyukozkan; Galatasaray University, Turkey
Orhan Feyzioglu; Galatasaray University, Turkey

The increase in the number of companies seeking knowledge management (KM) solutions, in order to gain significant business advantages, has created the need for a decision-aid approach in choosing appropriate KM tools. The objective of this paper is then to aid decision makers to identify the most appropriate KM tool to improve the effectiveness of their organization. To achieve this, several evaluation criteria have been identified and existing leading KM tools have been investigated. In order to rate competing systems of different ven-

dors, we use a decision framework based on the Choquet integral aggregation, that takes into account interaction among evaluation criteria, which is generally less involved issue in other multicriteria decision making methods. Finally, a case study is given to demonstrate the potential of the methodology.

TE-10.4 [R] Technological Decision Process at Lean Production System

Alvair Silveira Torres Jr.; University of Sao Paulo, Brazil
Ana Wechsler; University of Sao Paulo, Brazil

The research is a qualitative study about some typical technological decision that is made in the manufacturing environment using lean production principles, for example, changes in production line, replacement of a machine or choice of a new machine. The method was an in-depth interview with three former executives from a Brazilian subsidiary of Toyota. In the investigation was found some steps of the decision process of Toyota's production system established in the literature as such nemawashi (building consensus during discussion of idea) and genchi genbutsu (to get data directly to the shop floor). It was evaluated as these decision tools are practiced in company. In conclusion one structure of metadecision in a specific system of lean decision was identified, called by the author as lean decision way.

WA-01 PLENARY-3

DATE: WEDNESDAY, 7/30/2008
TIME: 14:00-15:30
ROOM: BALLROOM, OLD HARBOUR LEVEL
CHAIR: VAN ZYL DE VILLIERS, GENERAL MANAGER, RESEARCH AND DEVELOPMENT, NECSA, SOUTH AFRICA

KEYNOTE-1
Adi Paterson, General Manager, Business Development and Operations, Pebble Bed Modular Reactor, South Africa

KEYNOTE-2
Terry Oliver, Chief Technology Innovation Officer, Bonneville Power Administration, USA

WB-01 Software Process Management
Wednesday, 7/30/2008, 10:30 - 12:00 **Room: Ballroom West**
Chair(s): Wallace Chigona; University of Cape Town

WB-01.1 [R] Assessment Driven Process Modeling for Software Process Improvement

Timo K Makinen; Tampere University of Technology, Finland
Timo K Varkoi; Tampere University of Technology, Finland

Software process improvement (SPI) is used to develop processes to meet more effectively the software organization's business goals. Improvement opportunities can be exposed by conducting an assessment. A disciplined process assessment evaluates an organization's processes against a process assessment model, which usually includes good software practices as indicators. Many benefits of SPI initiatives have been reported, but some improvement efforts have also failed. Our aim is to increase the probability of success by integrating software process modeling with assessments. A combined approach is known to provide more accurate process ratings and higher quality process models. In this study we have revised the approach by extending the scope of modeling further. Assessment Driven Process Modeling for SPI uses assessment evidence to create a descriptive process model of the assessed processes. The descriptive model is revised into a prescriptive process model, which illustrates an organization's processes after the improvements. The prescriptive model is created using a process library that is based on the indicators of the assessment model. Modeling during assessment is driven by both process performance and process capability indicators.

WB-01.2 [R] Pair Programming for Information Systems Students New to Programming: Students' Experiences and Teachers' Challenges

Wallace Chigona; University of Cape Town, South Africa
Michael Pollock; University of Cape Town, South Africa

Pair programming is a programming technique where two programmers work on one programming task simultaneously. One programmer is designated as the driver while the other one is a navigator. In this paper we report of an experiment to gauge experiences and attitudes towards pair programming of information systems students new to programming. The paper also reports on the challenges educators may face in incorporating pair programming in their teaching. The findings of this paper will be useful to educators who are considering incorporating pair programming in their teaching.

WB-01.3 [R] Using Methods and IT Tools Innovatively for the Management of International IS Development Projects

Tommi Katainen; Microsoft, Finland
Nazmun Nahar; University of Jyvaskyla, Finland

Increasingly, information systems (IS) development is done internationally. International IS development is very complex. Some of the factors that lead to this high complexity include geographically dispersed teams, time-zone differences, cultural differences, language problem, and communication challenges. All these affect coordination and collaboration significantly. Therefore, the project management activities have to be executed via different methods and information technology (IT) tools. There is a significant lack of studies dealing with the management of international IS development using methods and IT tools innovatively. Therefore, this study has been undertaken to fill in this research gap. It investigates the management of international IS development using methods and IT tools innovatively. It develops an all-encompassing conceptual model on the basis of an in-depth literature review and our long practical experience in managing of international IS development projects. The conceptual model covers various elements that should be taken into account for managing an international IS development project. It also exhibits how companies can manage international IS development using various methods and IT tools innovatively and efficiently. The conceptual model can be useful for both practice and further research in international IS development project management.

WB-01.4 [R] Developing Methods for the Identification of Competences Needed for Software Production and Utilization in Industry

Andre L Fleury; Universidade de Sao Paulo, Brazil
Afonso Fleury; Universidade de Sao Paulo, Brazil

Software plays an increasingly relevant role in modern life. Particularly, software enables most features of innovative goods and services. However, the way in which software production should be organized is still open to discussion. Although software development has been extensively researched by software engineering theorists and practitioners, there is an increasing concern that the linkages between software suppliers and software users should be clarified, bringing new research possibilities for the Technology Management discipline. The purpose of this paper is the presentation of a new framework for an improved understanding of the existing relationships between software users and suppliers. Software users were characterized by using insights originated from a research in the telecommunication industry. To characterize software suppliers, two distinct surveys were realized. Finally, to clarify the different relationships that exist between software users and suppliers, we analyzed which competences are required from the supplier company in order to understand the specific needs of each group of user companies and to develop and deliver the most appropriate software system.

WB-02 Innovation Management-6
Wednesday, 7/30/2008, 10:30 - 12:00 **Room: Ballroom East**
Chair(s): George Tovstiga; Arthur D. Little

WB-02.1 [R] Creating Open Source Innovation: Outside the Software Industry

Christina Raasch; Hamburg University of Technology, Germany

Cornelius Herstatt; Hamburg University of Technology , Germany
Nizar Abdelkafi; Hamburg University of Technology, Germany

Motivation of this paper is to discuss that the open source model of innovation does not only seem practical in the software industry, but also in various other industrial contexts. We develop the concept of Open Source Innovation (OSI) as a generalisation of the open source model of software development (OSS). Our definition centers on the collaboration of volunteers and the free revelation of knowledge between actors. Since OSI exhibits important differences to several related concepts in the literature, we conclude that it is an innovation model in its own right, deserving more attention and research. We further proceed to identify aspects affecting the application of the OSI model in industry practices, grouping them into economic, technical, legal, and social factors. Based on these results as well as expert interviews, we find that the applicability of OSI is primarily determined by the characteristics of, first, the innovation object and, second, the group of contributors, rather than the industrial sector. Finally, we advance propositions on the employment of OSI in industrial practice, relating its feasibility to the innovation object and the group of contributors.

WB-02.2 [R] Open Innovation in the Energy Sector

Rishad P Hakkim; University of Alberta, Canada
Ted R Heidrick; University of Alberta, Canada

The main focus of the research program discussed in this article is to develop a technological innovation method by combining internal and external sources of technology. Open Innovation generates new technology by combining technology developed internally by internal R&D within an organization, and technology developed externally by sources outside the organization. This research program studied the use of Open Innovation to generate and apply technologies to solve the kind of major problems that an organization cannot resolve on its own. A case study was conducted on the Canadian agencies promoting collaborative R&D efforts in the energy sector. The case study identified the energy sectors technology-sharing and collaboration using Open Innovation. A study of The Alberta Oil Sands Technology and Research Authority (AOSTRA) Underground Test Facility (UTF) Steam Assisted Gravity Drainage (SAGD) Project concluded that the Open Innovation concept adopted by AOSTRA had played a major role in the development of UTF SAGD Technology. The research program also studied the issues of why an organization becomes interested in Open Innovation and whether Open Innovation demands any changes in an organization's intellectual property management policies.

WB-03 Technology Based Organizations-2

Wednesday, 7/30/2008, 10:30 - 12:00 **Room: Sir Francis Drake**
Chair(s): Antonie Jetter; Portland State University

WB-03.1 [R] The Effect of Multiple Organizational Interventions on Suicidal Behavior

Renier Steyn; University of South Africa, South Africa

The South African Police Service (SAPS) employs approximately 150,000 people. One of the problems facing the organization is high levels of suicide, and since the late 1990s several measures were taken to address this issue. These measures include compulsory post-critical incident debriefing, suicide prevention workshops, and changing the psychometric assessment toolkit to select newcomers to the organization. Since then the suicide rate decreased dramatically. However, because the SAPS is a complex organization set in an ever-changing post-apartheid society, it is not possible to deduct that the measures taken indeed had the desired effect. In this paper three questions are posed and addressed: Do the present psychometric assessment tools used by the organization during recruitment influence suicidal behavior; are suicide rates per annum influenced by the number of suicide prevention workshops presented; and are all employee groupings equally in need of services related to suicide prevention? The results indicate that those applicants selected for enlistment in the SAPS differ significantly ($t=18.75$; $p<0.001$; $d=0.344$ and $?2=149$; $p<0.001$) from those not selected; that suicide rates and the number of suicide prevention workshops correlate ($r=0.48$; $p<0.01$); and that employee groupings differ in the amount of support they require ($F=4.30$; $p=0.02$). These results are discussed and recommendations are made.

WB-03.2 [R] Managing Individual Autonomy to Increase Intrinsic Motivation within a New Product Development Organization in Japan

Tsunetoshi Horie; Japan Advanced Institute of Science and Technology, Japan
Atsushi Inuzuka; University of Tokyo, Japan
Yasuo Ikawa; Japan Advanced Institute of Science and Technology, Japan

Intrinsic motivation is one of the most important individual factors to enhance the team's creativity in new product development (NPD). Many social psychological studies have pointed out that intrinsic motivation is heightened through enhancing individual autonomy. However, managing individual autonomy in a work situation has not yet been adequately addressed nor discussed in detail. In this research, we investigated how to improve individual autonomy focusing on NPD personnel, such as those in design, development, manufacturing and quality-control, as well as in marketing departments. From questionnaire data collected from 242 NPD members within a Japanese industrial machine manufacturing company, we quantitatively analyzed the effects of various ways of giving autonomy to individuals. The results of this statistical analysis showed that individual autonomy was enhanced only when individuals could decide what they should accomplish in their work and how they should do their work. We revealed the importance of autonomy in motivating working professionals intrinsically, and how autonomy could be effectively given to individuals in a work situation. Also, we found that autonomy given to individuals had no direct effect on intrinsic motivation.

WB-04 Supply Chain Management-2

Wednesday, 7/30/2008, 10:30 - 12:00 **Room: Marco Polo**
Chair(s): Suresh P Sethi; University of Texas at Dallas

WB-04.1 [A] The Business Value of Mobile RFID Services in Korea

Dae Seung Park; Korea University of Science and Technology(KUST), Korea, South
Pil-Sun Heo ; ETRI, Korea, South
Myung-hwan Rim; ETRI, Korea, South
Yong-jae Park; ETRI, Korea, South

Korea has studied convergence technology to mount the miniature RFID reader on cellular phone through the mobile RFID forum established in February, 2005 by MIC (Ministry of Information and Communication Republic of Korea) and the relevant organizations. Mobile RFID services will make us recognize the identification code of all kinds of items in which people are interested with the RFID reader built into a cellular phone. They will also allow us to search for more detailed information through the mobile internet network. Recently, the leading providers of mobile telecommunications in Korea, SKT and KTF, have been providing this as a trial service, and as a result, the commercialization of mobile RFID services will soon be launched. The purpose of this paper is to evaluate the business value for the mobile telecommunications service providers by measuring and forecasting the market value of mobile RFID services with CVM (Contingent Valuation Method), which uses the WTP (Willingness to Pay) of the customer. In Korea, the trial services are as follows: genuine ginseng verification, U-portal service, genuine drug verification, safe taxi service, food history service, Korean premium beef verification, touch book service, McDonald's touch order service, U-museum service and so on.

WB-04.2 [R] Structure of Interfirm Networks in Regional Clusters

Yuya Kajikawa; University of Tokyo, Japan
Yoshiyuki Takeda; University of Tokyo, Japan
Ichiro Sakata; University of Tokyo, Japan
Katsumori Matsushima; University of Tokyo, Japan

There has been a widespread resurgence of interest in regional clusters as well as related regional innovation concepts. A network is expected to work as a conduit of resources and knowledge within the region and its structure affects its performance. In this paper, we originally construct a large database of interfirm networks in selected regional clusters in Japan, and investigate their multiscale structures combining existing organizational and network theories. In order to investigate the inner structures determining the macroscopic network performance, we elucidated the mesoscopic and microscopic structures of the networks, i.e. the modular structures and the position of individual firms in such modular networks. Our

analysis successfully extracted "hub firms" orchestrating their own supplier modules and "connector firms" bridging different modules. Then, we investigated the interfirm network structures and the relationships between their economic performance and topological positions in the networks. We discuss how "hub firms" and "connector firms" can contribute to the regional economic performance.

WB-05 Information Management-3
Wednesday, 7/30/2008, 10:30 - 12:00 Room: Bartholomew Diaz
Chair(s): Svante Lifvergren; Hospital Goup of Skaraborg

WB-05.1 [R] A RFID-Based Location Tracking Scheme for Inbound Operations in Warehouse Environment

Kenneth T. C. Poon; Hong Kong Polytechnic University, Hong Kong
K. L. Choy; Hong Kong Polytechnic University, Hong Kong
Henry C. W. Lau; Hong Kong Polytechnic University, Hong Kong

Recently, enterprises are experiencing a strategic evolution toward the globalization of product market in which customers request better quality of product and faster response time. Thus, good resource management for fulfilling customers' requests is one of the key elements for enterprises to survive in this competitive market. Numerous researchers proposed different approaches for handling information and material flows within a supply chain network. Application of emerging technologies, such as global positioning systems, cell of origin architecture, infrared, ultrasonic and Active Radio Frequency Identification, for locating and managing resources is one of the approaches. However, the existing technologies are either low accuracy of locating objects or high cost of implementation. It may result in diminishing the competitive power against the competitors. As a result, it is crucial to develop a cost effective scheme to integrate the resource and information flow in the supply chain network in which the visibility can be improved in order to help in the making of real-time decisions. Therefore, an efficient localization scheme for resource management (ELS) is proposed. With the help of passive RFID technology, the warehouse resources can be easily located. Management is able to obtain a real-time and accurate update of the resources status anywhere at anytime.

WB-05.2 [A] Online Statistical Monitoring of Critical Patient Data Increases Patient Safety

Svante Lifvergren; Hospital Goup of Skaraborg, Sweden
Alexander Chakunashvili; Hospital Group of Skaraborg, Sweden
Bo Bergman; Chalmers University of Technology, Sweden
Peter Docherty; Chalmers University of Technology, Sweden

In this paper we present an improvement project conducted at a unit responsible for blood thinning treatment at Lidkping hospital in Sweden. The unit coordinates and monitors the treatment of 1200 patients and consists of a heart specialist and five specially trained nurses. Warfarin is an oral anticoagulant (blood thinning) treatment effective for the prevention and treatment of thromboembolic events in various clinical contexts. The project started in the autumn of 2005 as an effort to improve the safety of patients receiving blood thinning therapy. The aim was to reduce morbidity and mortality of patients undergoing warfarin treatment. Since there is a strong association between individual variation in the International Normalized Ratio (INR) and patient morbidity/mortality in warfarin treatment, the focus of the project was to reduce variation in the INR value of patients undergoing warfarin treatment as a way to eventually decrease mortality and morbidity. In this application, an IT-solution was developed in 2006, where process INR-values are monitored online and visualized in a control chart, available to all co-workers in the process. The IT-solution proved to be critical in order to encourage continuous improvement in the process. The data are updated on a daily basis, stimulating reflection and daily improvement. Analyzing and learning from the data, special causes of variation in INR-values have been identified and removed from the process. The treatment process is now stable, in statistical control, and patient safety has increased. As a result, the number of INR values within therapeutic range (values between 2.0-3.0) per week increased from 63 percent (autumn 2005) to 66 percent (May 2006) to 70 percent (December 2007) (latest data).

WB-05.3 [A] A Real-time Data Monitoring and Management System for Thailand's First National Sizing Survey

Supiya Charoensiriwath; National Electronics & Computer Tech. Center, Thailand

Following the success of SizeUK and SizeUSA, Thailand has embarked on its first National Sizing Survey (SizeThailand), to construct a major anthropometrics database of over 12,500 people. Using a 3D body scanning technology that takes less than 10 seconds per scan to capture a highly accurate 3D body image, from which hundreds of body measurements can be extracted, the survey was able to be conducted rapidly and accurately. As it was not possible to measure everyone in the country, a statistically significant sample of subjects needed to be recruited. Throughout the 14-month data collection period in 13 locations around the country, information on the subjects such as age, region of residence, socio-economic data, as well as size and body mass index data had to be continuously monitored in real-time so that those eligible would be chosen to take part. This paper describes a complete web-based data management system which was implemented to dynamically monitor the 5-stage subject recruitment process and perform integrity checking on the data being collected for the SizeThailand database.

WB-06 New Product Development-2
Wednesday, 7/30/2008, 10:30 - 12:00 Room: Vasco da Gama
Chair(s): Stefan Johnsson; Mälardalen University

WB-06.1 [R] Structuring the Development Process According to the Project Context: Two Case Studies

Niek Du Preez; University of Stellenbosch, South Africa
Anton Basson; University of Stellenbosch, South Africa
Eric Lutters; University of Twente, Netherlands
Hagen Nieberding; University of Stellenbosch, South Africa

A framework is presented to assist in the tailoring of the development process according to the context of the development project. Aspects such as novelty and complexity of the project and the product to be developed have a major effect of the development process. Starting with a brief description of the framework, the paper discusses case studies which illustrate the application of the framework in practice. The paper concludes with a view into the future, illustrating how the framework, as part of a software tool, can assist the management and generation of technology and know-how, particularly in the development of products.

WB-06.2 [R] PMEX - A Performance Measurement Evaluating Matrix for the Development of Complex Products and Systems

Stefan Johnsson; Mälardalen University, Sweden
Christer Norström; Mälardalen University, Sweden
Anders Wall; ABB Corporate Research, Sweden

A key aspect in a sustainable economy is to be able to do more with less by making better use of resources. Within the development of complex products and systems, a continuous need to improve performance exists, i.e., making better use of a company's resources. In this improvement process it is important to measure the performance of the product development process. Previous research mainly focuses on the design and implementation of new performance measurement systems, not on evaluating the measures currently used. The research question in this paper is how to evaluate a company's performance measurement systems from a manager's perspective. To answer this question, a performance measurement evaluation matrix (PMEX) is developed. The PMEX has the different phases of the Stage-Gate process as one dimension and important success factors in the development of complex products and systems as the other dimension. Furthermore, a multiple case study has been conducted as a first verification of the PMEX. The first results of the study indicate that the PMEX enables managers to overview what is and what is not measured. The PMEX can therefore function as a conceptual tool in the discussions for setting the scope of the performance measurement system.

WB-06.3 [R] Transferring Value-Added Activities in New Product Development: A Multiple Case Study in the Automotive Sector within

Modular Strategy Context

Paulo C Miguel; USP, Brazil
Evandro Prieto; USP, Brazil

Automobile companies have used modularity as a strategy applied to new product development along with the outsourcing of production. To develop products using the modular strategy, activities inherent to production are redistributed, based on a division of work among assemblers and their suppliers. In this context, this study investigates the implications of modular strategies for the process of transferring value-added activities in new product development to first and second-tier suppliers. The research relies on a multiple case study approach. The companies studied were positioned in distinct levels of modular competencies (embryonic, under development, and mature), according to the empirical evidence. The relationships between the stage of maturity and major new product development practices were also identified.

WB-07 Project/Program Management-6
Wednesday, 7/30/2008, 10:30 - 12:00 **Room: Prince Edward Island**
Chair(s): Hans J Thamhain; Bentley College

WB-07.1 [A] A Framework for Managing Quality on System Development Projects

Herman Steyn; University of Pretoria, South Africa

While project performance is generally evaluated in terms of the iron triangle of schedule, cost and quality performance, guidelines for project quality management are lacking. Practitioners developing complex engineering systems employ several techniques to manage quality, but project management literature merely emphasizes quality management processes and provides few guidelines regarding appropriate techniques. Where techniques are addressed, subject matter tends to be borrowed from high-volume production and techniques related to statistical quality control are emphasized while few guidelines are provided regarding techniques for the management of quality on non-repetitive project endeavors such as system development. In this paper a framework for managing quality on system development projects is proposed. The relationship between risk management techniques and quality management techniques is also highlighted.

WB-07.2 [A] Incorporating the Cost of Quality in Supply Chain Design

Akif A Bulgak; Concordia University, Canada
Chaher Alzaman; Concordia University, Canada
Amar Ramudhin; École de Technologie Supérieure, Canada

Due to the complexity of the supply chain, sourcing and distribution activities within the supply chain require a fair deal of orchestrating in order to eliminate delays and other inefficiencies. For this reason, researchers have worked effortlessly to incorporate a wide range of parameters as to model the supply chain. Issues pertaining to quality are of great importance in organizations. Some literature has discussed quality from the perspective of the supply chain and acknowledged the lack of a consistent vision pertaining to quality throughout the supply chain. In this paper we consider the practical implication of integrating Cost of Quality (COQ) into supply chain modeling. Further, this paper introduces two different models. Each model remedies the limitations encountered when modeling COQ into the supply chain and tailors to a different possible scenario within the frame of the supply chain.

WB-07.3 [A] Project Delivery Problems: Why Can't We Make Them Go Away?

Jeffrey Busch; Jeffrey S. Busch PMP, United States

This application paper is based on a collection of 1200 responses regarding the critical project problems facing team members in the delivery of business and technology projects. Industry examples and applications from several Fortune 100 companies are discussed along with the author's project experience reflecting various efforts to overcome perpetual project problems. Business economies must keep up with technology and technology development if they have hopes of sustaining themselves. The need for the next new thing coupled with high speed demand to deliver with strained resources is a perpetual challenge. Developing enterprises build new facilities, add new staff and ride the wave of market demand. And, in almost all instances these efforts must navigate and overcome project delivery problems. As the project or product manager, it all comes down to you and how well that is achieved. This paper explores the most prevalent problems facing project delivery today. Categories have been established which reflect the most common project problems. What are they, in what ways do they most often affect teams and how can they be mitigated are just a few of the questions to be addressed. Project problems exist within all enterprises, even those with strong project management foundations and disciplines. What businesses are doing about it will be explored along with applications as viable solutions for mitigating these project problems.

WB-08 Technology Management in the Health Sector
Wednesday, 7/30/2008, 10:30 - 12:00 **Room: Seal Island**
Chair(s): Brian Lehaney; Coventry University, UK

WB-08.1 [R] Exploring the Success Factors of Health Information Service Adoption

Umit Topacan; Bogazici University, Turkey
A. Nuri Basoglu; Bogazici University, Turkey
Tugrul Daim; Portland State University, United States

Diffusion of electronic services in the medical industry has gathered speed with the help of recent developments in the information and communication technologies. Health Information Service is one of these services that deals with repository and retrieval, and makes use of medical information in order to improve service quality and reduce cost. Users - including medical staff, administrative staff and patients - of these systems cannot benefit from them in a full capacity unless using them comfortably. Behavior of these adopters is affected by various factors related to both of the technology characteristics, user characteristics, social environment and organizational environment in the adoption process. This research will evaluate determinants of Health Information Service adoption among users and analyze the relationship of these determinants with the behavior of the user. Moreover, taxonomy about factors that affect technology usage in the medical industry will be developed at the end of the study.

WB-08.2 [R] Towards a Knowledge Management Framework for Assisting Organisations to Evaluate Their Own (Non-Clinical) Approaches to the Dissemination of Knowledge about HIV/AIDS Intervention Programmes in South A

Rochelle Sassman; Coventry University, UK, United Kingdom
Brian Lehaney; Coventry University, UK, United Kingdom
Ian Marshall; Coventry University, UK, United Kingdom

Nearly 40 million people worldwide are living with Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS), with just 12 percent of those who urgently need treatment receiving it. South Africa (SA) has one of the highest cases of HIV infections in the world. Intervention efforts have not kept pace with the spread of HIV/AIDS, and a knowledge divide has been identified as a major factor in this. Within healthcare, knowledge management has been applied to a number of areas. These include methods and systems that reduce daily routine work and calculation errors, methods and systems for evaluation of cost and quality scenarios, systems and infrastructure for the collaboration of health professionals, and systems and infrastructure that deal with patient management and patient care. The managerial issues of development and implementation using knowledge management have not been addressed in the literature in a way that results in a framework that can use knowledge management to help evaluate the intervention programmes in regard to the identified knowledge divide. This paper reports on progress to date on the development of a knowledge management evaluation framework that can assist in more successful management of HIV/AIDS intervention programmes in South Africa.

WB-08.3 [R] Moderating Effect of Individual Differences on the Adoption of U-Healthcare Service

Jung-Hae Seo; ETRI, Korea, South

Sun-Jin Kim; ETRI, Korea, South
Sun-Joong Kim; ETRI, Korea, South

Since many countries are fast aging, the needs for caring for the aging population are increasing. As the ubiquitous sensor network (USN) technologies have shown their potential in nursing routine care of the aging population or the people who are suffering from chronic diseases, many firms and medical centers want to enter this enormous and unexplored market with u-healthcare service. In order for a new service to succeed in the market, it is important to understand the factors affecting people's behavioral intention to use. Thus, we empirically investigated which factors have an influence on the adoption of u-healthcare service. The findings indicate that potential users' intention to adopt u-healthcare service is determined by their perception on usefulness and ubiquitous availability. In addition, it was found that the influence of some predictors on intention to use is moderated by personal innovativeness. Meanwhile, contrary to our expectation, it is revealed that perceived ease of use has no influence on the adoption intention.

WB-09 Science and Technology Policy-3
Wednesday, 7/30/2008, 10:30 - 12:00 **Room: Robben Island**
Chair(s): Andre J Buys; University of Pretoria

WB-09.1 [R] R&D as a Source of Innovation in South Africa

Beeuwen A Gerryts; University of Pretoria, South Africa
Andre J Buys; University of Pretoria, South Africa

In investigating the link between R&D and innovation, data was used from the South African Innovation Survey of 2001 (SAIS2001). The SAIS2001 results showed that South African enterprises had a relatively high level of innovation with a low level of R&D related innovation costs. A cross tabulation was performed and a statistically significant link between innovation and R&D was found. The group of firms who innovated had a higher tendency to conduct R&D. Universities or Public Research Organisations (PROs) - the conventional sources of R&D - were rated mostly as unimportant external sources of innovation. This is ascribed to the fact that most R&D that is conducted internally is at the experimental development level and requires little basic or applied research. Sectors also differ in their use of R&D as a source of innovation. Based on the abovementioned data, a positive correlation between R&D and innovation was found in the SAIS2001 data. However, the majority of R&D reported in SAIS2001 is in-house R&D. In contrast, national R&D programmes focus on science intensive industries where R&D (basic and applied) is an important source of innovation. These can be easily quantified by the annual R&D surveys. However, at the national industry level, the link between R&D and innovation requires more frequent quantification as an input into STI policy. It is therefore recommended that in a developing country such as South Africa, R&D should be closer aligned to enable innovation at industry level.

WB-09.2 [A] Evolution of the Korea's STI Policy Framework

Jang Jae Lee; KISTEP, Korea, South
Doohee Hwang; KISTEP, Korea, South
Jong Yoon Baeg; KISTEP, Korea, South
Hae Young Oh; KISTEP, Korea, South

This paper describes a concept of the coordination for science, technology and innovation (STI) policy which is currently performed in Korea. The STI policy comprehends science policy and/or technology policy, which are focusing on overall performances upon the innovation in governance. The process on STI policy in Korea raises a new issue of the need for the coordination of among the policy. The current STI policy in Korea is unprecedented, which demands a new approach to manage it, with regard to the appearances of the related complex cases and issues with the concerned agencies on the process of related policy. In this paper, we suggest why the coordination of STI policy is needed and how to analyze the pattern of coordination of STI policy, and its applicants to the case of OSTI (Office of Science and Technology Innovation) in Korea.

WB-09.3 [R] Effect of Function and Role of Research Council on the Performance of Government Research Institutes: Focusing on Economic and Human Society Research Council in Korea

Soon Cheon Byeon; KISTEP, Korea, South
Byung Yong Hwang; KISTEP, Korea, South

There have been increased requirements for the accountability and efficiency of GRIs(government research institutes) in accordance with the increased investment within the limited national resources. To address these issues, each government is introducing the performance evaluation system, and Korea is also trying to upgrade its evaluation system under the guidance of NSTC (National Science and Technology Committee). This study analyzes how the function and role of Economic and Human Society Research Council in terms of supporting and promoting GRIs have affected their performance. In specific, it considers five factors regarding the function and role of the Research Council described in related laws, enforcement decrees and Articles of Association, and four performance factors based on BSC(balanced sorecard). Furthermore, the study considers the effects of control factors on the performance, including research area, size and established year of GRIs. The analysis on 95 executives and employees from 23 GRIs shows that the function and role of the Economic and Human Society Research Council has exerted significant influence on the performance of GRIs. In detail, among the characteristics of GRIs, research area and the size of GRIs have control effects on the customer performance and the performance in terms of internal process and learning efficiency, while the established year of GRIs has an impact on the internal process performance. Therefore, the results suggest that the Research Council should conduct its function and role in a tailored manner, considering the research area and established year of GRIs. In conclusion, this study points out political suggestions, and discusses the direction of future studies and the limit of the study.

WB-10 Decision Making-2
Wednesday, 7/30/2008, 10:30 - 12:00 **Room: Dassen Island**
Chair(s): Ferhan Cebi; Istanbul Technical University

WB-10.1 [R] Techniques and Methods for Uncertainty Management

Jan Kwakkel; Delft University of Technology, Netherlands
Scott Cunningham; Delft University of Technology, Netherlands

Uncertainty is inherent in modern day strategic planning. However, there is little consensus in how to define uncertainty, what its characteristics are, and how we should relate these characteristics to the appropriate treatment or management of uncertainty. One way of identifying the different meanings of uncertainty and the techniques used for treating it is to survey the usage of the term uncertainty and identify the techniques that are used in the context of this usage. Underlying this are two hypotheses. First, the semantic hypothesis: a consistently different usage of words must indicate meaningful differences in definition. Second, names of methods, tools, and techniques normally consist of more than one word. Using a tech mining approach, this paper analyzes methods, tools, and techniques discussed by scientists in the context of different usages of the word uncertainty. Several distinct meanings of uncertainty, as encountered in the scientific literature, are identified and explored in more depth in order to identify the associated methods, tools and techniques. We identify the leading methods for the analysis and management of uncertainty. We examine the relationship between the nature of uncertainty and the types of methods selected by scientists. Our results can be used by practitioners in selecting appropriate methods given the nature of the uncertainties encountered.

WB-10.2 [R] A Future-Based Risk Assessment for the Survivability of Long-Range Strike Systems

Alfred E Thal, Jr.; Air Force Institute of Technology, United States
William D Heuck, Jr.; Space and Missile Center, United States
Gary W Kinney; Air Force Institute of Technology, United States

The United States Air Force has a goal of being able to quickly and successfully deliver combat effects anywhere in the world through long-range strike systems. To examine the survivability of these systems in the future, we began by reviewing broad political and economic trends presented in relevant studies to characterize the technological capabilities of future adversaries. From these studies, we used technical assessments of emerging technologies to generate various threat scenarios; these scenarios were then evaluated using the Risk

Filtering, Ranking, and Management (RFRM) technique to identify the most severe threats to a future long-range strike air vehicle. The application of RFRM to the problem created a coherent threat hierarchy that enables decision-makers to examine anticipated hostile systems. The results can be subsequently refined through the use of enhanced intelligence data and updated technology projections regarding future threats.

WB-10.3 [R] Scenario Planning for Climate Strategies Development by Integrating Group Delphi, AHP and Dynamic Fuzzy Cognitive Maps

Roberto Biloslavo; University of Primorska, Slovenia
Slavko Dolinsek; University of Primorska, Slovenia

A hybrid approach to scenario planning by integrating group Delphi method, AHP (Analytic Hierarchy Process) and dynamic fuzzy cognitive maps is proposed in the paper. The group Delphi method is employed to help a group of experts to identify which worldwide forces have a major impact on climate related issues and how they interact together. In the second phase is assessed the value range that different variables of the proposed system can achieve and the impact that they have on each other. Assessment of the impact is done by use of the multiplicative AHP. During this phase the expert group also identifies which mathematical function (e.g. linear, sigmoid, concave, convex etc.) most properly describes the relation between different forces. Based on this data, a fuzzy cognitive map is developed as a base for a dynamic simulation of the world climate development. The simulation aims to serve as a source of guidelines about future organisational and technological changes, which can deliver a superior competitive position based on a sustainable development strategy.

WD-01 Technology Diffusion-1
Wednesday, 7/30/2008, 14:00 - 15:30 **Room: Ballroom West**
Chair(s): David Phaho; Tshumisano Trust

WD-01.1 [R] Is Technology Diffusion from Universities to SMEs Gaining Currency among South African Innovation Actors? The Current State of Play

David Phaho; Tshumisano Trust, South Africa

The growing role of universities in regional innovation and industrial development is well documented. Key to this evolving role of universities in regional economic development is buy-in from policy makers and university authorities. There is, however, a rigorous debate in both advanced and developing countries concerning this positioning of universities in regional and national economic imperatives where the emphasis is on the growth and sustainability of small- to medium-sized enterprises (SMEs), which are seen as key to job creation. Although there is an active government led programme to facilitate technology diffusion, this is restricted to universities of technology with little or no involvement by the nation's other larger and internationally renowned comprehensive universities. This paper will report on a climate survey of the opinions and views of key actors and decision makers within the innovation milieu on the importance of universities as conduits for technology diffusion to enhance SME innovative capabilities and competitiveness in areas of national priority. Empirical results conducted via this survey will be presented, and possible implications will be discussed.

WD-01.2 [R] Future Perspectives on Nanotechnology/Material Development: Delphi Studies and Sci-Tech Policies in Japan, Mainland China and Taiwan

Hsin-Ning Su; Science and Technology Policy Research Center, Taiwan
Pei-Chun Lee; TIM, National ChengChi University, Taiwan

Nanotechnology, which is a cross-border technology transforming the world's economy, plays a crucial role in recent science and technology developments. Japan and Taiwan, which have paid a lot of attention to material research and development, together with the emerging mainland China, have been the three key players in nanotechnology and material developments in East Asia. This study is to compare Delphi studies on material and nanotechnology fields for the three countries which share the similarities in the aspects of language, culture and geography. In addition, the linkage between Delphi study and Sci-Tech policy will also be discussed in this study in order to approach the social contexts of national Sci-Tech developments in the three countries.

WD-01.3 [R] Diffusion of Technology in the South African Private Healthcare Market

Adriaan J Van der Watt; University of Pretoria, South Africa
Marthinus W Pretorius; University of Pretoria, South Africa

Diffusion of Health Technology describes the process through which an innovation moves from development and manufacturing into being commercially available and put in use at the intended clinical intervention. The aim of the study was to determine the key elements in driving the success of diffusion of a healthcare innovation into the South African Private Hospital market. The study used multiple case study methodology to collect and evaluate data. Four cases were carefully selected using a two-dimensional selection grid. Eight focused interviews were conducted and formed the core of the gathered data. The evidence suggests that the relative advantage of the risks and benefits contained in the introduction of a new innovation into the market is the key element. The other four attributes of the Rodgers model all play a role. It is further noted that the dynamic properties of the model by Denis et al. introduce very valuable analysis which often helps to clarify the balance of power related to the relative advantage. The patient's perspective and whether or not the specific innovation allows for patient advocacy to have an effect on the treatment decision had an influence on the success of diffusion.

WD-02 Innovation Management-7
Wednesday, 7/30/2008, 14:00 - 15:30 **Room: Ballroom East**
Chair(s): Antonie Jetter; Portland State University

WD-02.1 [R] Innovative Performance in African Technical Projects: A Multi-Level Theory

H. Titilayo Seriki; Freelance Consultant, South Africa
Martin Hoegl; WHU - Otto Beisheim School of Management, Germany
K. Praveen Parboteeah; University of Wisconsin – Whitewater, United States

Teamwork is recognized as a prerequisite for innovative performance, especially in complex technical endeavors. But what are the effects of the environment surrounding a team? In this paper, we discuss how the societal context of sub-Saharan Africa is related to the innovative performance of project teams. Our focus lies on large technical projects, the outcome of which significantly contributes to the economic development of entire regions. A literature study reveals the following as prevalent societal characteristics across sub-Saharan Africa: 1) diversity amongst members of society, 2) acceptance and maintenance of power differences, 3) definition of self through other human beings. The integration of previous literature with insights from three real-life technical project teams in sub-Saharan Africa (two in Nigeria, one in South Africa) leads us to a new theory concerning the consequences of African societal characteristics for the innovative performance of teams. In essence, our theory suggests that in order to positively contribute to the economy, managers of African technical projects need to adapt their methods 1) to incorporate and utilize the diversity inherent in society, 2) to maintain acceptable and security-giving hierarchies, and 3) to (re)direct the focus of entire projects towards creating value for human beings.

WD-02.2 [A] A Framework for Managing the Innovation Process

Niek Du Preez; University of Stellenbosch, South Africa
Louis Louw; Indutech (Pty) Ltd, South Africa

Successful innovation requires an integrated design process, i.e. integration in the design of the enterprise, the design of the product, as well as the design and implementation of new technologies. Such an integrated design effort requires good collaboration and management of the designs, and should be supported by efficient knowledge management techniques and tools. If innovation is to help a business grow and improve its competitiveness, it is also important to plan the innovation carefully. Though some ideas may just fall from the sky or come out of the blue, an organisation should also have a strategic vision of how the business and the enterprise should develop. The enterprise should not wait for the innovation to arrive arbitrarily, but rather proactively plan for innovation incorporating market trends, the competitive landscape, new technology availability, and changes in customer preferences and trends in order to create fruitful terroir conducive for innovative thinking. Such an enterprise will also pro-actively manage the knowledge supply chain that supports innovation. This

paper presents a combined convergent and divergent approach for managing innovation within an innovation landscape that contextualise domains, role-players, decision points and knowledge network components. The innovation management model specifically focuses on the use of roadmapping for planning and deploying innovation within a collaborative deployment environment. A case study illustrating the use of parts of the framework within the insurance industry is also presented.

WD-02.3 [R] Enhancing Military Rapid Product Delivery Capabilities

Charles D Solomon; Air Force Institute of Technology, United States
Alfred E Thal, Jr.; Air Force Institute of Technology, United States

The rapidly changing global security environment that today's military operates within requires an ever increasing ability to quickly adapt to non-traditional threats. This has forced the U.S. to re-examine the traditional means of equipping its forces to ensure more agile acquisition practices are available to the science and technology (S&T) and acquisition communities. While there have been significant efforts to look towards industry for potential solutions, the heavily bureaucratic and restrictive government environment has made this difficult. To effectively implement rapid reaction approaches within the government context, research into organizations facing similar constraints must be conducted. This research focused on interviewing innovative pockets across the government with proven track records for rapidly acquiring new technologies to cross-pollinate measures for success. Through the use of various qualitative measures, innovative practices and methodologies were identified that keep these organizations on the cutting edge of rapid product delivery. The recommendations of this research can be broadly applied to organizations chartered with rapidly responding to customer needs.

WD-03 Strategic Management of Technology-5
Wednesday, 7/30/2008, 14:00 - 15:30 **Room: Sir Francis Drake**
Chair(s): Antonie de Klerk; University of Pretoria

WD-03.1 [R] Analysis of National Technological Competitiveness: South Africa's Civil Aircraft Industry

Daphney H Mayindi; University of Pretoria, South Africa
Michael O Kachienga; University of Pretoria, South Africa

The objective of the paper is to provide investigative analysis of technological competitiveness in the South African (SA) civil aircraft industry. It discusses business trends and markets, technological competencies, capabilities and impediments. The paper is biased towards analyzing the technological base of the civil aircraft industry with the aim to recommend strategies for enhancing national competitiveness leading to accessibility of the global markets. It proposes that public and private sector institutions partner to develop appropriate strategies for exploiting existing industrial competencies and positioning the said industry towards increased national growth. It also proposes that SA firms focus on building technological capabilities to supply second and third tiers of the civil aircraft industry structure, based on the existing competencies and capabilities.

WD-03.2 [R] Strategic Planning for Management of Technology of China's High-tech Enterprises

Weiwei Wu; Harbin Institute of Technology, China
Bo Yu; Harbin Institute of Technology, China

This paper contends that strategic planning for management of technology is necessary and important for China's high-tech enterprises. The objective of this paper is to explore, describe, and explicate the processes relating to the strategic planning for technology management, and to provide beneficial suggestions for China's high-tech enterprises to promote technology management capability. In this paper, a model for strategic planning for MoT is developed, which is expected to be used to provide effective processes of articulating strategic planning. The model involves several key points including defining the current situations of MoT, determining the objectives of managing technology, and designing the approaches for the promotion of technology management capability. The capability maturity model (CMM) and fitness landscape theory are applied in this model to construct useful analysis tools. The model is used to make the strategic planning for MoT of China's high-tech enterprises. A survey of 43 high-tech companies in China is conducted, and according to the data, technology management maturity model (TMMM) is used to assess the technology management level, and the fitness landscape of technology management is developed to explore the routines of promoting technology management capability. The paper culminates with a discussion of implications.

WD-04 R&D Management-2
Wednesday, 7/30/2008, 14:00 - 15:30 **Room: Marco Polo**
Chair(s): Sezin Bizkevelci; TUBITAK-SAGE

WD-04.1 [R] Training Program for R&D Staff

Chen-Mei Li; MingDao University, Taiwan
Tien-Lung Yang; National Changhua University of Education, Taiwan
Po-Chang Lin; National Yunlin University of Science and Technolo, Taiwan

Innovation is the core competitive advantage of business administration, and the competency of R&D staff will influence the business development in the future. In this research, we worked with a private non-profit organization and attempted to develop training program of R&D staffs competency for them. Based upon the research purpose, we designed the research for three parts including document reviews, in-depth interviews and focus group methods to find out the training needs analysis about R&D staff. First of all, we reviewed 75 documents of business plans, internal strategy cahiers of this organization from 2004 to 2007, and 7 documents of R&D annul plans of technology in 2007, in order to identify the organization and jobs training needs. Secondly, we used in-depth interviews with 14 R&D project managers to collect the jobs training needs. Finally, in the present study we applied creative problem solving (CPS) technique on Group Decision Supporting System (GDSS) with 99 R&D staff to identify the employees' training needs. In the results, we developed innovation-oriented training program for R&D staff from 2007 to 2009, which conducted cross-industry learning community to develop new production. Furthermore, we set up the related strategy for transfer of training.

WD-04.2 [A] A Study for MNCs Internship-Type R&D in China

Kenji Nagasato; Tokyo Institute of Technology, Japan
Koji Tanabe; Tokyo Institute of Technology, Japan

Research and development is essential to an enterprise's growth, and how to manage R&D from a global perspective is an important issue faced by multinational companies (MNCs). The mainstream of R&D activities in China is said to consist of industry-academy partnerships. This paper introduces the case study of a unique industry-academy R&D partnership initiated by an MNC and proposes a new model of industry-academy partnership. Since the case of Company is not a simple industry-academy partnership but has unique characteristics in its methods of selecting and managing R&D subcontractors, we have called it an "internship-type industry-academy partnership." As a result of this approach, three traditional missions of the university education, research, and guidance are handled by the MNC. We called this "project-based education." Truly, under this approach the MNC contributes to human-resources development on behalf of the Chinese university. In addition, since the MNC also can obtain new knowledge and technologies through utilization and development of superior human resources, this form of industry-academy partnership can be said to have successfully achieved a true win-win relationship.

WD-05 E-Business
Wednesday, 7/30/2008, 14:00 - 15:30 **Room: Bartholomew Diaz**
Chair(s): Willard F Stratton; Intel

WD-05.1 [A] The Application Reduction Challenge: Intel Journey to 'End of Life' Software Applications

Willard F Stratton; Intel, United States

Like many large corporations, Intel is concerned with the cost of IT operations and its contribution to the corporation's bottom line. In 2006, Intel began a top to bottom review of the cost of IT operations and established that there were opportunities to significantly reduce the

number of applications residing within Intel's infrastructure. To address this issue, Intel chartered a small team to lead the charge to reduce the quantity of applications. The team was chartered to exist for two years. During that time, the team was charged to eliminate a significant number of applications and place the corporation on a glide path to eliminate 50 percent of the applications by the end of four years. Thee team was also asked to infuse in the corporate DNA the processes to assure that a glut of applications would not reoccur. Over the course of the past year, the team was able to establish a comprehensive list of applications and developed methodologies and frameworks to drive a 20 percent reduction in applications with attendant savings. This presentation addresses the challenges faced by the team, the approaches taken, tools developed and lessons learned in obtaining the desired results.

WD-05.2 [R] How SMEs in Western Cape of South Africa Use ICT

Kevin Johnston; University of Capetown, South Africa
Salah K Kabanda; University of Capetown, South Africa
Sameer Adams ; University of Capetown, South Africa
Ezzat Davids ; University of Capetown, South Africa

Information and communication technologies (ICT) have the potential to change the way organizations do business in either a positive or negative way. ICT's benefits, however, usually supersede its negatives, hence business owners both large and small are moving to the digital world. Although there have been studies on ICT's effect on business organizations, little has been done on the small and medium enterprises (SME) in developing countries. The research was conducted to identify how SMEs in the Western Cape of South Africa use ICT. Issues examined included currently employed ICT, person to computer ratios, spending and acquisition of ICT, and adoption of new ICT. The research found that SMEs in the Western Cape are using a wide range of ICT, with 88 percent using networks, and 70 percent using some form of customer relationship management software. The person to computer ratio was computed and 78 percent of SMEs in the Western Cape showed a 1:1 (person:computer) ratio. Spending habits with regards to three ICT sectors (hardware, software and services) were analysed, and although the majority of SMEs showed no adjustment in their spending habits, 30 percent did claim an increase is expected for both software and hardware spending. SMEs are intending to adopt more ICT in the future. The majority of SMEs claim to have achieved significant amounts of value from the use of ICT

WD-05.3 [A] Managing Engineering and Technology with Better Interoperability in Smart Organizations

Ricardo Goncalves; New Univ Lisbon, UNINOVA, Portugal
Maria Jose Nunez; AIDIMA, Spain
Amparo Roca-Togores; AIDIMA, Spain
A. Steiger-Garcao; New Univ Lisbon, UNINOVA, Portugal

The furniture sector in Europe involves mainly small and medium enterprises that try to succeed day by day in a market that is becoming more and more competitive every day. The needs of the global economy have encouraged the furniture industry sector to use secure electronic commerce services. However, typically each of these companies uses different software to design, produce and sell their final product. A more competitive method of exchanging product data with higher quality and with low cost is foreseen, and has been proposed inside IMS SMART-fm project (www.ims.org, www.smart-fm.funstep.org), leading to the need for adoption of data standards. Involving partners from the USA, Europe, Canada and Australia, this project develops and demonstrates in industrial environments an interoperable open standards-based framework that supports smart environments through the complete product life cycle in the furniture manufacturing industry. This framework supports a two-level approach to business-to-business electronic commerce: 1) interoperability among user applications, and 2) interoperability among electronic commerce platforms. The paper presents the strategic objectives and results as a case study to stimulate and accelerate enterprises to adopt technologies and practices in the emerging networked digital economy. It concludes anticipating the strategic results that it will deliver for the next decade.

WD-06 New Product Development-3

Wednesday, 7/30/2008, 14:00 - 15:30 **Room: Vasco da Gama**

Chair(s): Solveigh J Hieber; WZL, RWTH Aachen University

WD-06.1 [R] Lean Innovation: Introducing Value Systems to Product Development

Guenther Schuh; WZL, RWTH Aachen University, Germany
Solveigh J Hieber; WZL, RWTH Aachen University, , Germany
Lenders Michael; WZL, RWTH Aachen University, Germany

The implementation of Lean Thinking in innovation management has not been executed systematically yet. For instance, high uncertainties of processes or limited possibilities for automation in R&D indicate special requirements for the implementation of Lean Thinking. A competitive R&D requires a holistic rethinking for the implementation of Lean Thinking. The Lean Innovation System represents the systematic interpretation of Lean Thinking principles regarding product or process innovation and development. One core element of Lean Innovation is the Value System which is the basis for the value stream design in innovation and development projects. The Value System defines, structures and prioritizes values adaptively for one specific innovation project. The values are defined by all relevant stakeholders in the innovation and development process, like external and internal customers, considering a company's strategy and culture. It represents the basis for a consequent value oriented alignment of project and processes in R&D. This paper introduces Lean Innovation and the core findings of the recent survey Lean Innovation of the Laboratory for Machine Tools and Production Engineering WZL at RWTH Aachen University. In a next step the paper focuses on the Value System, describes its elements and shows how to use and benefit from the Value System towards a powerful Lean Innovation.

WD-06.2 [R] Strateg›c Analys›s of Mass Custom›zat›on Strateg›es in Product Development

Gulcin Buyukozkan; Galatasaray University, Turkey

The need for product customization during the product development processes will continue to increase. Mass customization (MC) relates to the ability to provide customized products or services through flexible processes in high volumes and at reasonably low costs. There exist different strategies for the degree of customization in product development. Determining the right strategy of customization is essential to the competitiveness of a company. For this reason, to support managerial decision making, this paper proposes a strategic evaluation framework based on the analytic network process to assess effectively MC strategies in the product development process. Finally, a case study is given to illustrate the proposed approach.

WD-06.3 [A] Assessment of Innovation Risk Factors in New Product Development

Gulcin Buyukozkan; Galatasaray University, Turkey

Faced with intense market competition, enterprises need to pay increasing attention to innovation and new product development. However, innovation in new product development is a kind of highly risky exploration. Once the new product fails, enterprises will suffer enormously. Recognizing the growing importance of the innovation in new product development and the necessity of a better management process for its success, this paper proposes an assesment model to determine and analyze the innovation risks factors in the new product development process. Based on a case study, the paper concludes with strategic recommendations for managers and some propositions for future academic research.

WD-06.4 [R] The Influence of Lean Concepts on the Product Innovation Process of a Brazilian Shoe Manufacturer

Ana G Wechsler; University of Sao Paulo, Brazil
Alvair S Torres Junior; University of Sao Paulo, Brazil

Our study concerns product innovation in a shoe manufacturer featuring a multi-project environment with simple products. Due to the wide range of new products implemented, manufacturing plays a key role in the innovation process. The main study objective involves understanding how lean concepts are applied to the study environment and employed in this particular production system, since lean production is usually applied to complex environ-

ments such as those typical of the auto sector, in which few new projects are started in a given timeframe. This simple case study looks at how businesses in a sector as diverse as shoe manufacturing, which have different target markets and product structures, can benefit from lean practices as boosters of innovation. Process and personnel development, project transfer from R&D to production, factory layout design, and product development practices are among the topics explored.

WD-09 Collaborations-1
Wednesday, 7/30/2008, 14:00 - 15:30 **Room: Robben Island**
Chair(s): Y.K. Leung; The Hong Kong Polytechnic University

WD-09.1 [A] Clusters in the EU Member Countries: National and Regional Case Stories with Aalborg University as Partner

Sven Hvid Nielsen; Aalborg University, Denmark
Karl Brian Nielsen; Aalborg University, Denmark

Cluster inspired regional development inside EU are a result of the work of three European regions, North Jutland (DK), Blekinge (S) and West Midlands (UK), The Innovative Regions project has had the objective of identifying and collecting experiences with different regional development tools. The collection of these experiences provided input to different pilot activities in each partner region and functioned as the starting point for thematic discussions at trans-national seminars. Regional clusters, the geographic concentration of economic activities in a specific field connected through different types of linkages, from knowledge spillovers to the use of a common labour market, are increasingly viewed as an interesting conceptual tool to understand the economic strength or competitiveness of a region. The Innovative Regions project has given the partners an opportunity to learn from the good and bad experiences of others, and collect reflections and recommended methods, which can be passed on to other regions. So other regions do not have to make the same mistakes. The North Jutland region and the Aalborg University participating are used as a case example with its unique use of problem-based education methods in connection with project and group-organised studies for strengthening the link between research, education and practice. Cluster initiated SME students projects are shown in appendix.

WD-09.2 [A] Role of Formal Boundary Spanning Structure and Changing Pattern of University-Industry Collaborative Research in University of Tokyo

Tomohiro Ohta; University of Tokyo, Japan
Kyoung-Joo Lee; Tokyo Institute of Technology, Japan
Kazuhiko Kakehi; University of Tokyo, Japan

University-industry linkages (UIL) provide firms with creative ideas and solutions to their problems and universities with critical research funds. In Japan, a series of institutional and policy reform has been made to promote UIL since the end of the 1990s, including the historical incorporation of national universities in 2004. Traditionally, a UI collaborative research in Japan has been formed by faculty's informal, personal relationships with firms. To overcome the limitations of the traditional approach, a formal, specialized boundary spanning structure, such as the UI liaison office, was established in major research universities to effectively bridge a university's knowledge seeds with industrial needs. The goal of this research is to show how the formal boundary spanning structure has changed the patterns of UI collaborative research based on the data of 3,041 UI collaborative studies between 2003 and 2006 at the University of Tokyo. Especially, we analyze how the Proprius 21, which is a boundary spanning program focused on intensifying prior feasibility study, searching for the best researcher, matching the best partners, and strengthening research planning between UI, has increased the number and size of collaborative research projects.

WD-10 Technology Management in Telecommunications-2
Wednesday, 7/30/2008, 14:00 - 15:30 **Room: Dassen Island**
Chair(s): Tugrul Daim; Portland State University

WD-10.1 [R] Exploring Mobile Service Adoption: A Conjoint Model

Banu Kargin; Bogazici University, Turkey
Nuri Basoglu; Bogazici University, Turkey
Tugrul Daim; Portland State University, United States

Mobile technologies are gaining more popularity and diffusing into every aspect of our life. Value added services (VAS) has a huge impact on consumers' usage patterns and has become a significant differentiator across the operators. These led to new opportunities in innovation of differentiating services. Better services will be best developed by understanding the requirements and needs of the users. In this study, our intention is to shed some light on the process of mobile service adoption and preference by investigating value added services, especially for informative services. The study started with background research to identify factors determining the adoption of mobile services, and then continued with qualitative studies. After these studies, an experimental study was conducted. During the experimental study, a conjoint analysis was conducted. During conjoint analysis, product preference factors were explored. Service cost and service speed were seen as the most critical factors. During the introduction part, the study and its relevance are presented with industry and literature facts. The literature survey part provides a conceptual background, including a brief review of the literature about mobile technologies, value-added services, the acceptance models, diffusion of innovations, adoption research models and conjoint analysis.

WD-10.2 [R] Wireless Sensor Network based Asset Tracking Service

Sun-Jin Kim; ETRI, Korea, South
Junghae Seo; ETRI, Korea, South
Jonnalagadda Krishna; Motorola, United States
Sun-Joong Kim; ETRI, Korea, South

An asset tracking service based on low power wireless sensor networks is proposed and methods to effectively deploy the service are discussed. Asset tracking enables asset managers to track asset location and to indirectly monitor the asset usage status in real time by using mobile wireless sensor nodes attached to each asset. The suggested solution will reduce costs associated with asset tracking and management and improve asset utilization and operational efficiency. The core asset tracking technology can be applied to various applications spaces such as manufacturing, logistics, and healthcare. In this paper, we focus on asset tracking within hospitals and present the tracking system, customer value propositions and service methodologies. A financial analysis showing the benefits from system deployment is also presented.

WD-10.3 [R] Four-Scenario Analysis for Mobile Banking Development Contextualized to Taiwan

Dian Yan Liou; Yu Da College of Business, Taiwan

Given the convenience of mobile services and Taiwan's high mobile phone penetration, mobile banking looks set to become a wave in the near future, with the possibility to develop much faster than PC Internet banking. Mobile banking can contribute to the banking industry by serving as a source of revenue, an additional distribution channel, and as an image-enhancing product. Mobile banking is complex and dynamic because there are many role-players (e.g. providers, content partners, customers, and investors) in the development process. This study proposes a four-role model to identify the structure of the mobile banking system using the system dynamics methodology. The study finds that consumers play an important though subtle part in developing mobile banking. Implications for mobile phone partners, business strategies of banks, and finance ministry policies are also discussed.

WE-01 Technology Diffusion-2
Wednesday, 7/30/2008, 16:00 - 17:30 **Room: Ballroom West**
Chair(s): David Castle; University of Ottawa

WE-01.1 [R] A Model of Regulatory Burden in Technology Diffusion: The Case of Plant-Derived Vaccines

David Castle; University of Ottawa, Canada
Kira Kumagai; University of Ottawa, Canada
Martin Cloutier; UQAM, Canada
Richard Gold; McGill University, Canada

Plant-derived vaccines may soon displace conventional vaccines. Assuming there are no

major technological barriers undermining the feasibility of this innovative technology, it is worthwhile to generate quantitative models of regulatory burden of producing and diffusing plant-derived vaccines in industrialized and developing countries. A dynamic simulation model of technology diffusion, and the data to populate it, has been generated for studying regulatory barriers in the diffusion of plant-derived vaccines. The role of regulatory burden is evaluated for a variety of scenarios in which plant-derived vaccines are produced and diffused. This model relates the innovative and conventional vaccine technologies and the effects of the impact of the uptake of the innovative technology on mortality and morbidity. This case study demonstrates how dynamic simulation models can be used to assess the long-term potential impact of novel technologies in terms of a variety of socio-economic indicators.

WE-01.2 [A] How a Brazilian Firm, Characterized by an Innovator Profile, Seeks to Construct Competitive Advantage and How It Impacts at General Economy Growth

Willian Limonge; Instituto Tecnologico de Aeronautica - ITA, Brazil
Arnoldo S Cabral; Instituto Tecnologico de Aeronautica – ITA , Brazil
Manuel A Fagundes Perez; Instituto Tecnologico de Aeronautica - ITA, Brazil

This work focuses on verifying at AVIBRAS INDSTRIA AEROESPACIAL S/A, a firm from Brazilian aerospace cluster, practices related to competitive advantage construction, particularly those ones applied on the product called ASTROS II (Artillery SaTuration ROcket System), a ballistic rocket launcher, in which the firm performs an innovation process. This work also seeks to evaluate, by an economic point of view, the relation among this product innovation process and its impacts on the general economic growth of the sectors where firm actuates. Initially, an academic literature revision is performed about technology and innovation management, as well as economics of innovation. Then, the firm is analyzed considering its practices in competitive advantage construction, technology and innovation management, and economics of innovation. The next step is a field research, in which an aerospace themes specialist consultant expresses his feeling about the grade of impact of ASTROS II system innovation process on the firm's specific economic growth and on the general one, considering the sectors where the firm actuates. The conclusions of this work suggest how strongly the ASTROS II system innovation process impacts on the firm's specific economic growth and on the general one, considering the sectors where the firm actuates.

WE-02 Innovation Management-8
Wednesday, 7/30/2008, 16:00 - 17:30 **Room: Ballroom East**
Chair(s): Tinus M.W. Pretorius; University of Pretoria

WE-02.1 [R] Knowledge Networks for Managing Innovation Projects

Cornelius S Schutte; University of Stellenbosch, South Africa
Niek D Du Preez; University of Stellenbosch, South Africa

Innovation is important for competitiveness. It thrives on the availability of new public and private domain knowledge. Thus, the ability to access, analyze, synthesize, share, and reuse knowledge is important. These activities grow the available pool of knowledge. It also facilitates learning from mistakes, capturing and enhancing opportunities for future innovation. Formally, networking resources improves the ability of any participating enterprise to use/re-use knowledge, in a growing knowledge base. Such a "knowledge network (KN)" enhances knowledge sharing between individuals, groups, and organizations in informal and formal ways. How to successfully design and deploy a successful KN is a challenge and has been researched in the past decade. It requires understanding of social processes and how people learn and share knowledge. KN management requires a proactive, systematic approach to the planning and deployment of formalized networks for knowledge creation and transfer. It includes promoting and improving conditions to cultivate informal and formal networking within a larger network of enterprises. This paper presents a refined methodology for initiating, deploying, managing and operating an Innovation Project KN within the Global Competitiveness Centre in Engineering of the Stellenbosch University. The network involves about 300 users, some 180 projects, and 50 odd generic roadmaps and resides collectively on six servers in four countries. It incorporates concepts of generic, partial and specific roadmaps, best practice, templates and examples and allows individual teams to capture knowledge about specific projects and expertise in context for later re-use.

WE-02.2 [R] A Conceptual Model of the Impacts of Networking on Innovative Performance of New Technology-Based Firms

Kai-Ying Chan; University of Pretoria, South Africa
Leon A.G. Oerlemans; University of Pretoria, South Africa
Tinus M.W. Pretorius; University of Pretoria, South Africa

In the recent past, several researchers explored the added-values of science parks. On the basis of empirical research, some questioned the assumed benefits of the science park model, whereas others reported positive outcomes. As a result, mixed findings regarding the benefits of science parks for firms can be observed. An important criterion in analyzing the effects of science parks is the level of networking as science parks often are regarded as a perfect location for inter-organizational knowledge exchange and collaboration. Different levels and types of networking could be one of the explanations for these mixed findings. The literature on networks mainly stresses the benefits of networking in general, and networking between firms located on science parks in particular. This paper proposes that networks can have both positive and negative effects for firms located on science parks. The aim of this study is to theoretically explore the impacts of networking on innovative performace of on-park and off-park firms. A conceptual model is developed including the main and interaction effects of various aspects of inter-organizational networks on innovative performance. Absorptive capacity is also included in the model to account for firm-specific abilities.

WE-02.3 [R] A Reflective Review of Disruptive Innovation Theory

Dan Yu; National University of Singapore, Singapore
Chang-Chieh Hang; National University of Singapore, Singapore

This paper is devoted to integrating and discussing the latest arguments on the Disruptive Innovation theory, and to provoking questions for further research. The key issues have been summarized into three major perspectives: 1) What are disruptive technology and disruptive innovation, including the evolution, description, and the actual definition of disruptive innovation. 2) The predictive use of the theory and 3) How to enable a potential disruptive innovation. After an extensive and reflective review, we have found that the research focus to date has well studied the business model and organizational challenges of exploiting disruptive innovation. There is a trend to tailor abundant knowledge and tools of marketing literature to study identification of emerging markets and customer's latent needs. The technology perspective received very limited coverage and a significant amount of research is recommended on the purposeful creation of candidate technologies for disruptive innovation. A series of potential inhibitors and enablers of Disruptive Innovation are also identified as managerial take-away.

WE-03 Cultural Issues
Wednesday, 7/30/2008, 16:00 - 17:30 **Room: Sir Francis Drake**
Chair(s): Cornelis C van Waveren; University of Pretoria

WE-03.1 [R] An Improved Model for Quantifying an Organisational Quality Culture

Stephanus J Viljoen; University of Pretoria, South Africa
Cornelis C van Waveren; University of Pretoria, South Africa

Implementing a successful quality management system demands a paradigm shift from the traditional management practices (planning, organising, leading and controlling) to a focus on continual improvement. A specific challenge for organisations is to adapt their organisational culture to a quality culture. However, it would appear that cultural issues are vaguely defined, if at all, and that little attention is afforded by organisations when implementing a quality system. A literature review provided only one quality culture model consisting of five critical success factors. This study explored the concept of culture, organisational culture and quality culture. Forty-two elements of a quality culture were identified and incorporated into a modified model. The model developed as a result of this study can be used to identify opportunities for management intervention, ultimately building a stronger culture supporting the never-ending goal of continual improvement. Future research could focus on validating the model through comparative studies in organisations in the form of survey questionnaires or structured (or semi-structured) interviews and expanding the model to include a focus on

specific organisational values.

WE-03.2 [R] National and Cultural Diversity in Global Innovation Teams' Creativity and Innovation as a Function of Cultural Team Composition

Ricarda B Bouncken; University of Greifswald, Germany
Viviane A Winkler; University of Greifswald, Germany

As global companies use teams to pursue innovations, research has paid increasing attention to team functioning. For global innovations firms often rely on Multi-Cultural Innovation Teams (MCITs) with members from different national backgrounds to gain easy and fast access to consumer and market knowledge. We conducted a two-year longitudinal study on five MCITs at a large consumer goods company, BLUE. In 105 interviews we found cultural differences and the cultural composition of the team to be the source of 36 percent of the reported difficulties. We focus on diversity of communication styles and values as well as their effect on team work quality dimensions which are linked to the innovativeness of teams. We derive a model stressing differences between diversity in communication styles and cultural values.

WE-04 R&D Management-3
Wednesday, 7/30/2008, 16:00 - 17:30 Room: Marco Polo
Chair(s): Kenji Nagasato; Tokyo Institute of Technology, Japan

WE-04.1 [R] Proactive Elicitation of Software Process Improvements

Timo K Varkoi; Tampere University of Technology, Finland
Timo K Makinen; Tampere University of Technology, Finland

Software process improvement (SPI) is a means to change software organizations' processes to better meet the business objectives. Process assessments reveal opportunities for process improvements. An assessment typically utilizes a model, which includes a set of good practices as assessment indicators. The potential for improvements is derived by comparing the indicators with the actual processes. We have developed an assessment-based framework for software process improvement initiation (SPINI). The framework has recently been enhanced with activities for software process modeling. Same information of the process is needed for both assessment and modeling; a descriptive process model can be produced simultaneously as we analyze the capability of the process. Assessment results can be transformed into proposals for improvements. Respectively, a descriptive process model can be converted into a prescriptive process model, which takes into account the proposals. In this research we develop the SPINI framework further. The extended framework will include knowledge bases and simulation, and it combines experience-based and theoretical solutions to support implementation of the process improvements. The research aims to resolve how to relate the existing process improvement knowledge to the actual situation of the software organization, i.e. what specific elements should be supplemented to the current processes to improve the organization's performance.

WE-04.2 [A] Scenario Based Priority Setting of R&D Issues: A Case Study of Membrane Technology in National Iranian Gas Industry

Naser Bagheri Moghaddam; Allame Tabatabaee University, Iran
Mahdi Sahafzadeh; Iran University of Science & Technology, Iran
Seyyed MohammadSadegh Emamian; Sharif University of Technology, Iran
Abdullah Irankhah; Tarbiat Modarres University, Iran

In this paper, to set R&D priorities at the sector level, a developed method is proposed which is combined of scenario planning and the critical technologies method and then applied for prioritizing R&D issues of membrane technology in National Iranian Gas Company (NIGC). In the first phase (through 3 steps), the scope of NIGC is mapped using national documents and viewpoints of experts and managers. This map includes the main process of gas processing and gas conversions. Then strategic goals of the gas industry, including gas exports, conversions, injection and internal use, are developed. Also, Strategic Technology Units (STUs) are identified and twenty distinct membrane technologies, including technologies of main process, are recognized. In the second phase through questionnaires and weighted criteria, feasibility and attractiveness of each STU are evaluated and shown in the Feasibility-Attractiveness matrix. This matrix is divided into 3 sections, based on the critical technologies method. So 4 technologies placed in the high attractiveness and feasibility area, 12 technologies in the middle area and 4 technologies placed in the low feasibility and attractiveness area. Four key technologies placed in the first area were H2S/NG, H2O/NG, CO2/NG, C3+/NG separations. Finally (third phase), according to identified driving forces, four scenarios are built and in each scenario, the membrane R&D portfolio is selected.

WE-05 Information Management-4
Wednesday, 7/30/2008, 16:00 - 17:30 Room: Bartholomew Diaz
Chair(s): Charles Weber; Portland State University

WE-05.1 [R] IT Governance Decision Support Using the IT Organization Modeling and Assessment Tool

Marten Simonsson; KTH, Royal Institute of Technology, Sweden
Pontus Johnson; KTH, Royal Institute of Technology, Sweden
Mathias Ekstedt; KTH, Royal Institute of Technology, Sweden

It is important to ensure that the IT governance is not only designed to achieve internal efficiency in the IT organization, such as deploying good IT processes and making sure that the means and goals are documented. The final goal of good IT governance is rather to provide the business with the support needed in order to conduct business in a good manner. This paper describes the IT Organization Modeling and Assessment Tool (ITOMAT) and how it can be used for IT governance decision making. ITOMAT consists of an enterprise architecture metamodel that describes IT organizations. ITOMAT further contains a Bayesian network for making predictions on how changes to IT organization models will affect the IT governance performance as perceived by business stakeholders. In order to make such predictions accurately, the network learns from data on previous experience. Thorough case studies at 20 different companies have been conducted in order to calibrate the network. Finally, the paper describes a case study where ITOMAT was used to analyze the future impact of two IT organization change scenarios in a medium-sized engineering company.

WE-05.2 [R] Customer Lock-In in ICT Services Business: Designing and Managing Customer Driven Business Model

Mikko Pynnonen; Lappeenranta University of Technology, Finland

The growing demand for ICT (information and communications technology) services is often taken for granted in the industry. This is partially due to the good years of growth in terms of expanding customer base and industry size. However, the industry is reaching a point of saturation in growth. The customers have lots of options to choose from and firms have to compete for customers harder and harder. Normally, the good services generate loyalty among customers. This paper presents a framework for understanding how the changing customer preferences should be taken into account when planning business in an organic and rapidly changing network environment. The framework of the customer driven business model is illustrated with relevant case examples of ICT services and is based on resent studies of customer value preferences and business models in ICT business. The theoretical foundation of the framework is in value network and resource based approaches. The paper presents both academic and managerial conclusions about aligning and developing a firm's business model for providing superior customer value.

WE-05.3 [R] Benefits Realisation Management in Information Technology Projects

Derek C Smith; University of Cape Town, South Africa
Humbulani Dombo ; University of Cape Town, South Africa
Ntathakusa Nkehli; University of Cape Town, South Africa

This study evaluates the use of benefits realisation management (BRM) in information technology (IT) projects. Past research concludes that realising the tangible and intangible benefits from IT projects is not easy and is often not carried out at all. Fifty-four IT project managers in South Africa successfully completed an online questionnaire. An analysis of the data showed that, whilst BRM processes exist in some IT projects, benefits monitoring during the project is rarely applied even though planned benefits can change dramatically. It was

also found that IT project managers are keen to improve BRM processes so that benefits are more clearly defined and realised. They identify the project owner as the person accountable for benefits realisation as the business benefits normally occur long after the project is complete, but they argue that this is not happening. They also conclude that because their performance is measured using project efficiency metrics (on time, on budget and on specification), they are not required to focus on the project effectiveness (the longer term benefits from the IT investment).

WE-06 New Product Development-4
Wednesday, 7/30/2008, 16:00 - 17:30 Room: Vasco da Gama
Chair(s): Nazmun Nahar; University of Jyväskylä

WE-06.1 [R] Enhancing Product and Service Development: A Training Program for Small ICT Companies

Jari Leppaniemi; Tampere University of Technology, Finland

In order to support local information and communication technology (ICT) companies in western Finland, a three-year program - ICT WEST - was established by the Pori unit of the Tampere University of Technology in 2004. The aim was to provide new methods for developing the business environment, competencies and mutual cooperation of local ICT companies. The main focus of the ICT West program was the development of methods that support the achievement of sustainable and long-term benefits across the local ICT sector. One of the goals of the program was to develop an adaptive training program for developing the abilities of the local software companies to commercialize and productize their product and service ideas. This paper describes the properties of the target group, i.e. software companies, the main information sources, the research and development methodology, the research project phases and the initial composition and framework of the training program.

WE-06.2 [R] Concurrent Engineering and the Automotive Supplier Industry in South Africa

Mwendwa K Mutisya; University of Pretoria / Accenture South Africa, South Africa
Jasper L Steyn; University of Pretoria, South Africa
Jaqui Sommerville; University of Pretoria / STATOMET, South Africa

The prevalence and primary characteristics of concurrent engineering between clients and suppliers in the South African automotive component manufacturing industry were investigated. The global trend towards Follow Source and Follow Design has had a detrimental effect on locally owned automotive supplier companies in developing countries such as South Africa. It was proposed that the effective use of concurrent engineering would facilitate the integration of locally owned automotive component suppliers in developing countries into the global supply chain. A literature survey into the automotive component supplier industry in both developed and developing countries showed that an understanding of the requirements and challenges facing the industry was essential for the successful implementation of concurrent engineering. A research questionnaire was developed and targeted at automotive component suppliers in the Eastern Cape province of South Africa. The questionnaire was focused on the key areas determined in the literature survey. These were: people and structure, tools for implementing concurrent engineering, and the relationship between OEMs and suppliers. The research indicated that there was an association or tendency towards an association between company size and the prevalence of e-procurement within organisations (this was assumed to be due to the fact that larger companies formed part of bigger supply chains) and company size and companies which actively participated in R&D.

WE-06.3 [R] Risk Management in Offshore Outsourcing of Software Production Using the ICT-Supported Unified Process Model: A Cross-case Study

Anicet Yalaho; University of Jyväskylä, Finland
Nazmun Nahar; University of Jyvaskyla, Finland

Successful execution of ICT-supported unified process of offshore outsourcing (ICT-SUPOO) of software development can offer various important benefits. However, ICT-SUPOO of software development is very complex and risky, and often fails. Almost no empirical studies are available on the risk factors that affect the ICT-SUPOO. The objective of this study is to investigate the key risk factors associated with ICT-SUPOO, understand how they create risks, and how the risks can be alleviated. We carry out a multiple case study from both of the vendors and clients sites, where professionals with extensive experience in managing offshore outsourcing of software development were interviewed. Through an in-depth empirical research, we identify a list of risks that affect the success of such projects, analyze how they create risks, and which strategies were implemented by our case companies to alleviate these risks. By using the research results, companies can facilitate successful completion of the ICT-supported offshore outsourcing of software development projects while avoiding the key risks.

WE-07 Project/Program Management-7
Wednesday, 7/30/2008, 16:00 - 17:30 Room: Prince Edward Island
Chair(s): Peerasit Patanakul; Stevens Institute of Technology

WE-07.1 [R] Placing Project Partakers' Emotions, Attitudes and Norms in the Context of Project Vision, Artifacts, Leader Values, Contextual Performance and Success

Zvi H Aronson; Stevens Institute of Technology, United States
Aaron J Shenhar; Stevens Institute of Technology, United States
Richard R Reilly; Stevens Institute of Technology, United States

The authors propose a model suggesting that project leader building activities which support instilling a project vision, artifacts and are guided by this individuals values, affect partakers' emotions, attitudes and behavioral norms that are focused on expected project outcomes, termed project spirit. Furthermore, spirit is proposed to affect partakers' contextual performance and, through contextual performance, to affect project success. The proposed mediational model is supported with empirical results from 200 partakers in 63 projects sampled across a variety of organizations. Project leader building activities affected partakers' spirit, and contextual performance mediated this relationship with project success. Our empirical findings suggest that leaders can be trained to execute behaviors that generate a project's spirit, which in turn boosts contextual performance and enhances project outcomes.

WE-07.2 [R] Project Manager Personality as a Factor for Success

John D Bedingfield; Air Force Institute of Technology, United States
Alfred E Thal, Jr.; Air Force Institute of Technology, United States

Much has been written regarding project success, and one of the factors contributing to project success is the role of the project manager. Since project success can be enhanced by selecting the most appropriate project manager, we investigated the role of the Big Five personality traits on project success by surveying United States Department of Defense project managers. The findings indicate that conscientiousness and openness were both good predictors of successful project managers. The results may be useful as one consideration when hiring and selecting project managers.

WE-07.3 [R] How the Metacognition Skills Work in Decision Making Processes of the Project

Ko Ito; Tokyo Institute of Technology, Japan

A project is the continuous effort of various decision makings such as objective setting, WBS creation, resource acquisition, human resource allocation, and countermeasure against risk. This paper focuses how we use metacognition, which is a knowing about knowing skill, in such decision making of the project and how we can improve it based on the previous study of cognitive science and the interviews of the field project managers.

WE-09 Collaborations-2
Wednesday, 7/30/2008, 16:00 - 17:30 Room: Robben Island
Chair(s): Sang-Youb Lee; KISTEP

WE-09.1 [A] Network Analysis on the Collaborative Research of Research Institutions

Heyoung Yang; Korea Institute of S&T Evaluation and Planning, Korea, South

Sangki Jeong; Korea Institute of S&T Evaluation and Planning, Korea, South
Hyuck Jai Lee; Korea Intitute of S&T Information, Korea, South

The R&D expenditure in Korea has increased in the past decade. We have also tried to foster the institutions including universities and research institutes in order to strengthen the innovation capability. The present study was undertaken to investigate the centralities of the universities and the research institutes in Korea by analyzing the networks of the domestic/international collaborative research in 1996 and 2006. In this study, the implications will be presented about the change of the centralities of research institutions in the decade as well as the R&D policy in Korea.

WE-09.2 [A] Development of a Real-Time Collaborative Process Planning Management System for the Mould Industry

Y.K. Leung; The Hong Kong Polytechnic University, Hong Kong
K.L. Choy; The Hong Kong Polytechnic University, Hong Kong
C.K. Kwong; The Hong Kong Polytechnic University, Hong Kong

Mould manufacturing is a complicated process which involves the collaboration of various parties such as different internal functions, subcontractors and customers. Since the mould industry is operated in a Made-to-Order (MTO) manner, planning is important throughout the manufacturing process. In order to plan and manage the whole process that fits customers' requirements with a short lead time, mould manufacturers need to gather different production information from all the parties concerned. Also, other internal and external parties need to obtain information from each other. However, a long time is needed to obtain such information and in some cases it is not available. This paper proposes a real-time collaborative process planning management system (RCPMS) to facilitate the information sharing among parties. Radio Frequency Identification (RFID) is used to capture real-time production data and project status from internal and remote sites. Information captured by RFID and other data such as product specifications and production schedules is shared among different parties. Planners of mould manufacturing could make use of this system for instant decision making. Using it, mould manufacturers are able to plan, manage and monitor the production of moulds, including outsourced processes, more efficiently.

WE-10 Technology Management in Telecommunications-3
Wednesday, 7/30/2008, 16:00 - 17:30 Room: Dassen Island
Chair(s): Jong Yong Lee; ETRI

WE-10.1 [A] Possibility of Bill & Keep in the Mobile Termination Market of Korea

Jong Yong Lee; ETRI, Korea, South

Bill & keep or sender keep all is a particularly simple approach that network costs are recovered from end users without any billing process between telecom providers. Currently, most mobile operators use it for exchange of mobile traffic between them in the US. It is also commonly adopted in the exchange of internet traffics between internet backbone operators. However, it requires prior conditions such as the balance of traffic and the consensus among mobile network providers in order for it to be used commercially. This paper summarizes a few literature reviews on bill & keep and the case study regarding the interconnection system of the US, and then shows that supporting conditions and objecting environments coexist together from the analysis regarding the possibility of adopting bill and keep in mobile-mobile termination of Korea focusing on considering five sides such as mobile traffic flows, the level of mobile termination charges, the situation of market competition, the policy direction of the government, and opinions of mobile operators.

WE-10.2 [A] Telecom Sector Deregulation, Business Growth and Economic Development

Muhammad A Choudhary; National University of Science and Technology, Pakistan
Nawar Khan; National University of Science & Technology, Pakistan
Aisha Abbas; GIK Institute of Engineering Science &Technology, Pakistan
Ali Salman; National University of Science & Technology, Pakistan

Pakistan is amongst one of the leading nations in the region where the telecom sector reforms were well conceived, properly planned and skillfully executed resulting in measurable growth, and its impact on all spheres of public and private lives is felt and seen. The telecommunication sector in Pakistan has shown significant growth since the promulgation of Pakistan Telecommunication (Reorganization) Act of 1996. Over 76.6 million cellular mobile users and 4.8 million landline connections provide a teledensity of 52.8 percent to the nation. The mobile networks provide coverage to 90 percent of the population. Total telecom investment during the year 2006-07 was US $4.12 billion, while the share of the telecommunication sector in GDP was 2.0 percent. Telecom companies invested over US $8 billion during the last four years, and the mobile sector investment share accounted for 66 percent of the total investment. China Mobile alone invested US $704 million during 2006-07 for expansion of its CMPak networks. The mobile sector paid over a billion dollars in taxes to the National Exchequer during the year 2006-07. The telecom sector received above US $1.8 billion FDI, i.e., 35 percent of the total FDI, and helped create over one million jobs since the deregulation of the telecom sector began. Despite very convincing results, the reform process was not free of errors and omissions. The paper highlights the successes and points out the areas that require readjustments.

WE-10.3 [R] The Linkage Analysis of Innovation Systems about Development of the 3G International Technology Standards

Jizhong Zhou; Graduate Univ of the Chinese Academy of Science, China
Xiangqi Liu; Graduate Univ. of the Chinese Academy of Sciences, China
Liang Hou; Graduate Univ. of the Chinese Academy of Sciences, China

The International Telecommunication Union (ITU) has identified the four technology standards as international technology standards respectively with development of R&D in the telecommunications industry. With the cases of CDMA (Code-Division Multiple Access), TD-SCDMA (Time Division-Synchronous Code Division Multiple Access) and WiMAX (Worldwide Interoperability for Microwave Access), this paper thinks that there are the innovation systems in development of the 3G (3 generation) international standards, in which interaction between the R&D and the service activities is a way of inspiring innovation. For this, the paper set up a framework-Linkage among factors in the innovation systems. Here, the term linkage refers to the sustainable interaction among the actors in the system, and the linkage method makes just conceptual link between factors of the innovation systems and is a qualitative analysis way.

HA-01 PLENARY-4

DATE: THURSDAY, 7/31/2008
TIME: 08:30 – 10:00
ROOM: BALLROOM, OLD HARBOUR LEVEL
CHAIR: ANTONIE DE KLERK; UNIVERSITY OF PRETORIA

KEYNOTE

Richard Taylor, Principal Scientist, Services Sciences Research Group, HP Laboratories, United Kingdom

"Model Based Services Discovery and Management"

Service systems fail all too frequently. `Overdue, over budget and disappointing' are the words frequently used by organisations to describe their experience in the development and commissioning of complex information systems enabled services. More considered analyses question anticipated productivity gains, and in the longer term, a failure of service provision to track the changing requirements of the organisation. As a major supplier of IT and IT-enabled services, Hewlett-Packard has invested heavily in developing and understanding of the reasons that services fail to delight, as well as developing technologies and management processes that mitigate against failure. This paper describes a (predictive) model-based approach to service-systems analysis that aids in understanding the goals, the specifications and dynamics of a service system. Our contribution is a model-based service discovery process and technology that can be used to dramatically improve inter-stakeholder communications, provide a design and management infrastructure that is robust to the

inevitable changes that affect any commissioning organisation, and lay the grounds for more sophisticated cost-benefit analyses than are currently commonly used. We draw on a number of large-scale (multi-billion dollar) service projects to illustrate the application and benefits of this approach to service discovery and management.

HB-01 Supply Chain Management-3
Thursday, 7/31/2008, 10:30 - 12:00 Room: Ballroom West
Chair(s): Suresh P Sethi; University of Texas at Dallas

HB-01.1 [A] Management Truck Tire Information in Logistic Industry Using RFID Technology

La-or Kovavisaruch; NECTEC, Thailand
Pichit Lertudomtana; Eurotyre Limited, Thailand
Sakol Horungruang; Eurotyre Limited, Thailand

Logistics plays a pivotal role in the supply chain as well as in a developing country's competitive edge. According to the Thailand Department of Land Transportation report in 2006, there were 848,843 registered trucks, which are key drivers of cargo transportation. It is apparent that the business sector becomes very competitive, and thus, fleet operators have to minimize their operating cost in order to edge at its competitor. Other things being equal, two variables affect operating costs. First is fuel expenses, which is a world commodity, and market fluctuation is inevitable. Truck tires are another contribution to the operating cost. Unlike the fuel, the truck tires can be re-treaded and, hence, the operating cost can be reduced. Effective tire management can prolong its life span significantly before renewal. Software, addressing tire pressure, temperature and tire types, would provide a tire management solution. In this paper, we present the effectiveness of deploying the RFID system in acquiring information for tire management via testing RFID systems in one tire re-treading company. We analyze the trade off between operating time and system implementation cost. The performance of RFID on the different tire types is also studied. Last but not least, we propose a RFID system configuration to minimize data acquisition time.

HB-01.2 [R] The Impact of RFID Technology on the Formulation of Logistics Strategy

Mandy Cheung; Hong Kong Polytechnic University, Hong Kong
K L Choy; Hong Kong Polytechnic University, Hong Kong
C.W. Lau; Hong Kong polyutechnic University, Hong Kong
Y.K. Leung; Hong Kong Polytechnic University, Hong Kong

RFID is a rapidly emerging technology that can be applied to enhance supply chain management. Previous researchers have sought maximum potential applicability of RFID in various modules of the supply chain, such as inventory management, asset management, warehouse operation, manufacturing process and retail marketing. While automated RFID systems have been examined for achieving a high level of information transparency, inventory visibility, product availability, and system responsiveness and agility; however, discussion on the potential advantages and the effects of RFID technology on the decision making of logistics operations and on the formulation of logistics strategies is partial. This article focuses on investigating the impact of RFID adaptation on logistics business strategy and operating model. A strategy analysis is developed by employing the resource-based view (RBV) to examine the linkage between RFID systems and logistics strategy. This article contributes to the research gap of RFID as a strategic resource and provides insight into the strategic value of RFID in managing supply chain and logistics.

HB-01.3 [R] Level of Knowledge and Formalization of Logistics and SCM in the Brazilian Automakers Suppliers

Kazuo Hatakeyama; Federal University of Technology – Parana, Brazil
Patrícia Guarnieri; State University of Ponta Grossa, Brazil

The logistics and supply chain managemet (SCM) concepts in Brazil are not well developed yet; in many companies these concepts are frequently confused. The automotive sector, even though it presents considerable initiatives in logistics and SCM, deserves to be noticed. The main objective of this research was to verify the level of knowledge and formalization of logistics of the Brazilian automakers and their suppliers. In order to reach this objective, it was accomplished an applied, exploratory, descriptive and not only quantitative but also qualitative research, through the inductive approach. The technical procedure used to collect the data was a survey. The data collection was carried out through questionnaires sent by the post office mail and e-mail to 50 suppliers and 23 automakers of the automotive industry. It was noticed that among several factors considered, the difficulty of implementation of the SCM concept is detached as the incoherence in the culture of the companies researched, concerning the partnerships and the information exchanging among the involved members. Furthermore, it was also noticed the evidence of the need to spread SCM concepts throughout the value chain in the business concerned are the key factors for the competitiveness.

HB-02 Radical Innovations-2
Thursday, 7/31/2008, 10:30 - 12:00 Room: Ballroom East
Chair(s): Leon Oerlemans; Tilburg University/University of Pretoria

HB-02.1 [R] On the Relationship between Organizational Slack and the Level of Innovation of Firms

Leon Oerlemans; Tilburg University/University of Pretoria, Netherlands
Marthinus Pretorius; University of Pretoria, South Africa

The concepts of organizational slack and innovation are central elements in the literature. Innovation is of central importance as it is vital for organizational renewal and survival. The literature stands divided on the effect of organizational slack, which can be defined as the pool of resources in organizations that is in excess of the minimum necessary to produce a given level of output, on innovation. Three conflicting views can be distinguished. Proponents of slack argue that slack allows organizations to experiment and that it is a necessary condition for fostering innovation. Agency theory turns this perspective upside down. In this view, slack may be a source of agency problems, which breeds inefficiency. Therefore, it considers slack to be negatively related to innovation. Besides these two views there is also a group that takes a middle position: too little slack and too much slack are both bad for innovation, which leads to the prediction that there is a curvilinear relationship between slack and innovation. The study uses an existing dataset, which contains information about 300 innovating South African organizations. Results show that higher levels of slack lead to higher levels of innovation. No evidence is found for either a negative or curvilinear relationship.

HB-02.2 [R] Understanding the Emergence of Disruptive Innovation in Air Force Science and Technology Organizations

David E Shahady; Air Force Institute of Technology, United States
Alfred E Thal, Jr.; Air Force Institute of Technology, United States
Alok Das; Air Force Research Laboratory, United States
Alan R Heminger; Air Force Institute of Technology, United States
Kent Halverson; Air Force Institute of Technology, United States

Although innovation is widely discussed in both military and industrial venues, many organizations continue to struggle with what it means to be creative while simultaneously maintaining a competitive advantage. The United States Air Force has specifically struggled with the balance between improving existing technologies and employing revolutionary ones. To better understand the complexities affecting this balance, the purpose of our research was to study the motivation, focus, barriers, and culture needed to foster disruptive innovation in the Air Force. We also investigated whether innovation strategies used by industry could be used to improve breakthrough technology emergence. The Air Force Research Laboratory (AFRL), the primary organization responsible for planning and executing all aspects of the Air Force science and technology program, was considered the ideal study subject to represent the Air Force research and development (R&D) community at large. Two previous research studies aimed at industry were consolidated and adapted before being administered in the AFRL organizational environment. The intent was to provide quantitative and qualitative comparisons between industry and the Air Force R&D communities. The research provided an increased understanding of the principles of disruptive innovation, characteristics of innovative culture, and the similarities/differences between industry and military breakthrough innovation.

HB-02.3 [R] Innovation Capability and Competitive Advantage: A Case Study of Two Brazilian Firms

Adriana M de Mello; University of Sao Paulo, Brazil
Wander Demonel; University of Sao Paulo, Brazil
Eduardo Villas Boas; University of Sao Paulo, Brazil
Roberto Sbragia; University of Sao Paulo, Brazil
Roberto Marx; University of Sao Paulo, Brazil

This study investigates practices used by firms to link their innovative capability to competitive advantage. The basic assumption is that innovative capability is conditioned by a series of factors regarding cultural, resources, competences and external connections that promote competitive advantage through creation and introduction of new/improved products to the market. An exploratory and case study are used, based on two Brazilian firms in different industries. The results indicated that the innovative capability assumes different meanings in different settings, thus resulting in different impacts on a firm's competitive advantage.

HB-03 Strategic Management of Technology-6
Thursday, 7/31/2008, 10:30 - 12:00 Room: Sir Francis Drake
Chair(s): Dilek Cetindamar; Sabanci University

HB-03.1 [R] The Relationship between CTO and Perforamnce

Dilek Cetindamar; Sabanci University, Turkey
Okan Pala; Sabanci University, Turkey

Upper-echelon theory has identified a top manager's influence on organizational outcomes, but no study has assessed the impact of a chief technology officer (CTO) on firm performance. This study deals with two integrated questions: do CTO roles affect firms performance, and which factors enhance the effectiveness of CTO roles? Based on a survey of 49 electronic and machinery firms in Turkey, the study finds that even though the CTO position does not prevail, CTO roles are performed in varying degrees. The findings confirm the upper-echelon theory that performing decisional CTO roles increases profitability of firms, and the educational background of a manager carrying out CTO roles strengthens this positive impact. Further, the study clearly shows the role of social capital theory in explaining how the effectiveness of a CTO increases when he/she is embedded in the top management relations. The hierarchical level of a CTO thus directly increases the impact of both decisional and informational roles on performance. The informational roles of a CTO result in a positive impact on profitability when a CTO has frequent communication with a CEO. In other words, the higher the extent of networking, the higher profits achieved from the realization of informational roles. As a final observation, the size of the company affects profitability: the bigger the firm the better the performance.

HB-03.2 [A] IBM's Strategic Direction as Global Player

Raymond H Jordan; Capella University, United States

This paper aims to identify the internal and external factors driving industry changes worldwide that would impact IBM's strategic direction and strategy making. The purpose of this paper is to explain the company's vision, objectives, and strategy to change from producer of products and services to provider of consulting services that deliver business solutions. The approach in this paper is to describe the corporate level strategy used to establish a business position in the market or industry. Findings in this paper are the strategy and tactics created from the corporate strategy for the functional departments within the business level function. Implications are that management must recognize and respond to changes in the macro-environment to sustain competitive advantage. The paper benefits practitioners to understand the markets, industry, competitors, and customers in the quest for competitive advantage, profitability, and market leadership.

HB-04 R&D Management-4
Thursday, 7/31/2008, 10:30 - 12:00 Room: Marco Polo
Chair(s): Joe Amadi-Echendu; University of Pretoria

HB-04.1 [R] On the Commercialisation of 'Trailing' Knowledge and Intellectual Property

Joe Amadi-Echendu; University of Pretoria, South Africa
Alan John; GSTM, University of Pretoria, South Africa

Within any company that conducts significant R&D to support its business operations, a significant amount of knowledge and intellectual property (IP) is also generated. The purpose of R&D within such organisations is typically to create new knowledge, products and services which can be commercialised by the business to gain competitive advantage. While most of the knowledge and IP that arise from R&D may be leveraged and exploited to support and enhance core business, however, some of the knowledge and IP that are perceived as not directly related to core business are typically not commercialised. The key question is often what to do with existing knowledge and IP that cannot be directly absorbed and exploited for the core business activities and market(s) of the firm. The conundrum is why the seemingly obvious choice of commercialisation of such trailing knowledge and IP does not always materialise. Using an existing company as its subject, this paper examines the perplexities regarding the commercialisation of trailing knowledge and IP arising from main stream R&D for established business purposes. Inferences have been drawn from a limited review of case studies, and the impact of unintended bias due to embedded company culture is remarkable.

HB-04.2 [R] A Strategic Framework for Attracting R&D Center of Foreign Companies and Its Application in the IT Industry

Kwanyoung Drucker Kim; Korea Education & Research Information Service, Korea, South
Chanhoo Song; Information and Communications University(ICU), Korea, South
Jungmann Lee; Hoseo University, Korea, South
Ki-Yong Om; Korea University of Technology and Education, Korea, South

As of April 2006, Korea had successfully invited 12 global IT R&D centers to help implement the u-IT839 strategy of Ministry of Information and Communication, but there have also been some doubts about their research and collaboration performance in Korea. Although it is too early to evaluate the outcomes of inviting global IT R&D centers only after two years or less of their working, the Korean government is being advised to employ a more customized invitation strategy. In this paper, an analytic framework for the attraction of global R&D centers is developed based on the attractiveness-competitiveness matrix, and is applied empirically to the IT industry. Fourteen major IT technology categories and their sub-technological fields are classified into four strategic groups (priority group, wish group, consideration group, and hold group) along the framework via expert surveys and the Analytic Hierarchy Process (AHP) technique. This study is expected to help the government to implement the select and concentrate strategy in inviting global R&D centers and creating synergies among them by providing basic data on global R&D partnership priorities.

HB-04.3 [R] A Framework for Managing R&D for Thai Research Community Using Text Information Exploitation

Alisa Kongthon; National Electronics & Computer Technology Center, Thailand
Choochart Haruechaiyasak; National Electronics & Computer Technology Center, Thailand
Marut Buranarach; National Electronics & Computer Technology Center, Thailand
Santipong Thaiprayoon; National Electronics & Computer Technology Center, Thailand
Niran Angkawattanawit; National Electronics & Computer Technology Center, Thailand

Science and Technology (S&T) information presents a rich resource, vital for managing R&D programs. Modern S&T electronic abstract databases such as Science Citation Index and INSPEC provide comprehensive information on research activities in many different domains. These databases mostly include English language publications. However, for a country such as Thailand, which does not use English as the primary language, some S&T information is represented in Thai language as well. Hence, to reflect the whole R&D activities in the country, there is a need to extract intelligence from both English and Thai language research publications. In this paper, we describe our ongoing project to consolidate research content focusing on the Thai language. We present a framework called Thailand's Research Information Portal and Search Engine (ThaiReSearch), which integrates research information from various databases such as researchers, research projects, patent records, and publications. The framework also provides an intelligent information analysis module which incorporates the following functions: statistical analysis, natural language processing (NLP), and text mining. By using this system, Thai R&D managers and policy planners could improve

their strategic decision-making processes towards a sustainable economy.

HB-05 Knowledge Management-3
Thursday, 7/31/2008, 10:30 - 12:00 Room: Bartholomew Diaz
Chair(s): Siebert J Benade; GSTM, University of Pretoria

HB-05.1 [A] Last-Mile Knowledge Engineering: A Quest for the Holy Grail?

Robert Benjamin; Masana Technologies, South Africa

The problem of reliably structuring unseen knowledge, at scale, persists within systems engineering. An emergence-based method was developed to test the theory of applying de-abstraction reasoning to tacit-knowledge engineering. Informal, field testing was conducted on real-time, IT-related projects. Useful results were obtained within a fraction of the time it took comparative engineering with reductionist approaches, such as data and functional analysis. The resultant knowledge structure could be understood as a structure, which satisfied the generally-accepted definition of a system. Structural anomalies were resolved via the application of a normalization rationale. During construction, content semantics were competently resolved. The following system properties could be derived from the normalized structure: knowledge validity, system policy, core system with sub-systems, and a dual-layered, hierarchical control system. The hierarchical control system ensured system integrity during change events. Further, the hierarchical system enabled a 2nd level integration of multiple structures. The 2nd-level integration yielded a reliable core-system optimization of 45 per cent (estimated). The de-abstraction approach, as a content-independent approach, yielded no apparent dysfunction with mainstream, and/or traditional engineering approaches. Therefore, it could probably be integrated with existing system-engineering approaches. The results showed that tacit knowledge could be reliably engineered in diverse environments.

HB-05.2 [A] Partnering on Information Management Projects in South Africa

Herman Bisschoff; Symbico Project Management Services, South Africa
Siebert J Benade; GSTM, University of Pretoria, South Africa

Previous studies regarding partnering on projects in the construction sector proved the value of approaching projects in this way. This paper aims to set a baseline for measurements on partnering on information management projects in South Africa. It documents the results from a survey amongst large South African companies regarding partnering on information management projects. The applicability of partnering is first explored by looking at the project types that it can be best applied to in terms of the complexity of these projects and the risk that the types of projects pose to business. The potential benefits resulting from a partnering approach to information management projects are rated to expose the most-, and least-important contributors. Critical success factors and inhibitors to effective project partnering are also rated. The paper concludes with recommended actions to implement a partnering approach to business.

HB-05.3 [R] Looking for a Symbiosis between Organizational Memory and Social Networks

Jose Cardenas; University of Sao Paulo, Brazil
Ana Villanueva; University of Sao Paulo, Brazil
Mauro M Spinola; Universidade de Sao Paulo, Brazil

The organizational memory constructed inside organizations should take multiple utilities, focused in search of efficiency. And with adequate data, the capacity of being reused should be intended to desired benefits. That organizational memory is a product of interaction what people keep on conforming social networks that generate streams of information to store into the memory. In this paper we suggest that Social Networks in conjunction with the generated social capital construct isolated organizational memories within distinct levels. To discover if this symbiosis between organizational memory and social networks exists, a conceptual review was made and analyzed from research cases that show how this linking is given. Finally we formulated four generic levels (of Organizational Memory and Social Networks) that would be founded within any organization. Then, we conclude that the ties integrating these four types are the generators of an obligatory coexistence by knowledge developing and sharing.

HB-06 New Product Development-5
Thursday, 7/31/2008, 10:30 - 12:00 Room: Vasco da Gama
Chair(s): Nathasit Gerdsri; Mahidol University

HB-06.1 [R] Strategic Renewal and Management Control in the Front-End of Innovation: The Importance of Input Control Mechanisms

Jarno J Poskela; Helsinki University of Technology, Finland

Should management control the front-end phase of the innovation process, and if so, how? This paper examines the use of management control in the front-end phase, and how the different mechanisms of control are associated with generating strategic renewal in the form of new product concepts. Input control mechanisms, more precisely goal setting and human resource allocation, are taken into closer investigation. This paper develops a framework on management control in the front-end phase. Seven management control constructs are created: input control, front-end process formalization, output-based rewarding, influence of strategic vision, informal communication, involvement in goal setting, and influence of intrinsic task motivation. This paper focuses on testing hypothesis on the relationship between input control and achievement of strategic renewal. Also, the role of technology and market uncertainty as potential moderators of this relationship is investigated. Strategic renewal is used as a front-end performance indicator. Data from the front-end phase of 133 new product development projects from different large- and medium-sized Finnish companies were collected and analyzed. A factor model was used to test the validity of the management control framework, and a moderated regression analysis was used for hypothesis testing. The results show that input control is positively associated with achieving strategic renewal in the form of new product concepts. Implications of results from theoretical and practical point of views are discussed.

HB-06.2 [R] Measurement of the Innovation Front End: Viewpoint of Process, Social Environment and Physical Environment

Pekka Berg; Helsinki University of Technology, Finland
Jussi Pihlajamaa; Helsinki University of Technology, Finland
Jarno Poskela; Helsinki University of Technology, Finland
Tea Lempiälä; Helsinki University of Technology, Finland
Udo-Ernst Haner; University of Stuttgart, Germany
Ade Mabogunje; Stanford University, United States

The front-end phase in the literature is generally regarded as the most critical phase of the innovation process. This is due to its inherent uncertain and ambiguous nature and its significant potential to improve overall innovation capability in industrial firms. The front-end phase precedes and feeds the new product development project phase by creating a continuous stream of new incremental and radical product concepts. Such a comprehensive measurement system dealing with the front-end phase of the innovation process makes it possible for the people responsible for the innovation activities to get a picture of the efficiency of the innovation process front-end and effectiveness of outcomes and impacts. This paper describes conceptually the theoretical backgrounds, a tentative idea and first managerial implications of a method, Balanced Innovation Front-End Measurement (BIFEM), we are going to develop and test in 30 Finnish, German and USA companies during the next two years. The framework of the model for measuring the innovation activities' front end contains at the first draft five assessment viewpoints as follows: input, process, outcome, social environment and physical environment. A connection with these elements in the measurement of innovation activities as a whole has been weak, but now these will be covered by the new approach. In this paper we concentrate on three out of five assessment areas: 1) process, 2) social environment and 3) physical environment. In this paper the theoretical background of the innovation process front-end itself is described first. Second, the viewpoint of social environment is discussed. Third, this is followed by a description of a physical environment of innovation process front-end. Fourth, the earlier developed and tested Programmes Assessment Method (PAM) and Quality Maturity Method (QMM) by the writers are illustrated. Fifth, the most crucial points from the viewpoint of measurement in the front-end stage of the innovation process are discussed. Sixth, the conclusions and structure of the new measurement method Balanced Innovation Front-End Measurement (BIFEM) are

described.

HB-06.3 [A] Applying Change Management Approach to Guide the Implementation of Technology Roadmapping (TRM)

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

To strive for sustainability under todays intense business competition, organizations apply technology roadmapping (TRM) as a strategic planning tool to integrate their business and technology strategies. Many organizations implement TRM as an ongoing effort. In that case, organizations need to assure that all activities related to TRM implementation are seamlessly integrated with other existing business processes. The consequences of TRM implementation can possibly lead to some changes in the business process, organization structure, or even working culture. Applying change management approach will help organizations to understand the basic elements which an individual needs so that some challenges can be addressed in advance before adopting the technology roadmapping process. This paper proposes a practical guideline to implement technology roadmapping by applying the concept of change management approach. A case example is also included in this paper to present how the subject organization applied change management approach to overcome challenges and limitations occurring during TRM implementation process. The contribution of this paper is to enrich the existing body of knowledge of technology roadmapping with a practical framework to guide practitioners, who plan to implement TRM processes in their organizations.

HB-07 Manufacturing Management
Thursday, 7/31/2008, 10:30 - 12:00 Room: Prince Edward Island
Chair(s): Saku J Makinen; Tampere University of Technology

HB-07.1 [R] Empirical Study of the Evolving PC Technology System and the Measurement of Its Performance Divide

Ozgur Dedehayir; Tampere University of Technology, Finland
Saku J Makinen; Tampere University of Technology, Finland

Maximizing the performance evolution of a technology system relies on optimizing investments in the appropriate sub-systems. This approach subsequently minimizes the impact of a sub-system that trails in technological performance and hinders systemic development, referred to as the reverse salient. In this paper, we developed a performance gap and a time gap measure to analyze reverse salience and applied this measurement technique to an empirical study of the personal computer (PC) technology systems graphics processing unit (GPU) and PC game sub-systems with special focus on the system's overall computational performance in game play. Our measurements of the temporal behavior of reverse salience with the above measures indicate that the PC game sub-system is the reverse salient, continuously trailing behind the technological performance of the GPU sub-system from 1996 through 2006. Additionally, our results highlight the fact that whereas the time gap measure reveals a fairly consistent three-year period of the PC game sub-system closing the performance differential to the GPU sub-system, the performance gap measure shows an increasing disparity between the sub-systems over the same period. We discuss our empirical findings by elaborating on possible underlying causes and by providing managerial implications.

HB-07.2 [R] Literature Overview of Modularity in World Automotive Industries

AHM Shamsuzzoha; University of Vaasa, Finland
Petri Helo; University of Vaasa, Finland
Tauno Kekäle; University of Vaasa, Finland

Nowadays, global auto industries are going through considerable changes in their production lines, which lead to increased competition and shorter product life cycles. Producing a variety of products with higher quality and less cost could ensure more customers' satisfaction. All automotive industries, especially car manufacturers, are required to increase their market segment with corporate profit to ensure cost-related objectives and success over competitors. It is, therefore, essential for auto firms to reconsider their product development methodology in order to fulfill the objectives. The focus of this paper is to investigate the pros and cons of the concept of modularity that can be applied in auto industries in order to improve the product development processes. Modularity is gaining increasing importance in manufacturing firms recently, especially in auto industries. Modular product structures ensure real improvements and provide considerable benefits such as reduced time to market, increased product variants, improved product quality, reduced bill-of-material code, etc. for the business firms. However, the concept of modularity has some limitations too. In this paper, a general overview of modularity, its application and prospects in auto industries, along with its limitations are also discussed.

HB-07.3 [R] Technology Diffusion Planning for ERP in Aircraft Manufacturing Industry

Asif M Rashid; PAF, AHQ , Support Branch, Pakistan , Pakistan
Uzma R Mahmud; Innovapost Canada , Canada

The enterprise resource planning (ERP) and material requirement planning (MRP/MRP-II) are few of the key considerations in any complex manufacturing industry. The requirement of ERP and MRP for the aircraft industry is growing at a phenomenal rate. The advancement in material and manufacturing management systems has changed the dynamics of the shop-floor scene. The induction of smart materials and nano-technology, ultra-high speed machining technologies and psychometric testing of highly skilled labor in a target focused team environment has tremendously enhanced the performance expectation from Man, Machine and Resources. The resource management and supply chain management are becoming extremely complex and require dedicated ERP modules for better management and effective control over the industrial and financial activities through integrated business intelligence((BI) software. The implementation of ERP in industry is a cumbersome process and takes years before it yields and reveals its effectiveness. Research in all these areas is making a phenomenal addition to the volume of knowledge in limited time. The concept of competitiveness demands that the integrated framework for ERP adoption be planned for the aircraft industry prior to its deployment so as to minimize its deployment span in terms of time and to curtail financial overheads. A number of working principles and guidelines have already been developed in other industries and can be employed in a variety of ways in the aircraft industry for optimum performance and to earn competitiveness through ERP suites. This paper provides guidelines for planning ERP and detailed mapping of all activities for ERP in the aerospace industry for effective production planning and control.

HB-09 Technology Management in Services-4
Thursday, 7/31/2008, 10:30 - 12:00 Room: Robben Island
Chair(s): Jakita O Thomas; IBM

HB-09.1 [A] Management of Technology Deployed in Service Innovations

Desai A Narasimhalu; Singapore Management University, Singapore

Services form a major portion of the GDP of several nations, especially that of the first world nations. These nations also experience the high cost of providing services of different kinds. This has resulted in the displacement of non-customer facing services to countries that can offer them at lower prices. Nations have to be concerned about sustaining their economies even as such off-shoring of services continues to grow. It is therefore important to understand how countries can create those service innovations that will help them retain the growth trajectory of their economies. We believe that the different types of service innovations need different approaches to the use of technologies. This paper will review related work, introduce a new perspective on service innovation and identify how technologies can be managed to create optimal value from service innovations.

HB-09.2 [A] Asset Reuse and Service Science: The Delicate Balance

Tyrone Grandison; IBM, United States
Jakita O Thomas; IBM, United States

The need to increase efficiency and productivity is driving an increase in the creation of service assets, which embody the essence of service functionality and can be used across engagements. This move towards reusable service assets reduces some of the cost of ser-

vice solution design, is less labor-intensive, and reduces the need for particular service professionals. However, service and the study of service innovation called Service Science, is inherently people-based. People, interactions, and relationships are at the core of the discipline and technology plays a pivotal role in supporting these entities. The tension between the emphasis on people, which implies customization and differentiation, and service asset reuse, which implies standardization and commoditization, may pose a problem for the service industry in the long term. Replacing the people component in the production equation with service assets may significantly reduce the drivers for the field of service science to continue in the future. This paper presents a cautionary tale of reusable service assets, where the balance between the knowledge and skills embodied in the asset and the utility of having expertise embodied in people is examined. Suggestions for bridging this divide and easing the tension are discussed.

HB-10 National Performance Evaluation of Research and Development Program in Korea
Thursday, 7/31/2008, 10:30 - 12:00 Room: Dassen Island
Chair(s): Young-Hwa Cho; Korea Institute of S&T Evaluation and Planning

HB-10.1 [A] Assessment System for Feasibility Analysis of National R&D Programs

Yoon Been Lee; KISTEP, Korea, South
Jiyoung Park; KISTEP, Korea, South

Most assessments for R&D programs are conducted for on-going or finished programs. In order to streamline national R&D programs, the Korean government is making a challenging attempt. It enacted a law for ex ante evaluation for national R&D programs and KISTEP, which specializes in evaluation and planning for R&D programs, took charge of the important role. KISTEP created and developed guidelines for a feasibility study on each R&D program category. Many kinds of R&D programs, such as constructing facilities for nuclear fusion and developing IT components by organizing consortiums, were analyzed from the viewpoint of technology experts and policy makers. Various impacts expected to be made by R&D programs were crucial elements for the analysis too. This paper presents processes for the feasibility analysis of R&D programs, cruces of the processes, and how we have improved the assessment system. It also provides how the assessment system contributed to the innovation of national R&D programs.

HB-10.2 [R] Entrepreneurial Orientation of Spin-offs Created by University Faculties and Institute Researchers in Korea

HaengAh Seo; Korea Institute of S&T Evaluation and Planning, Korea, South
Jung-hua Han; Hanyang University, Korea, South
Namjae Cho; Hanyang University, Korea, South

This research focuses on entrepreneurial orientation (EO) of technology spin-offs as they are expected to reduce the gap between their technology and the market. Entrepreneurial orientation is an organizational activity or process that redistributes or combines resources in an innovative way and takes risk to create new values. It helps improve the level of organizational innovation to deal with uncertainty. An empirical study was performed to analyze EO of spin-offs established by university faculty and institute researchers in Korea. Antecedent variables to EO are hypothesized to include public policy for university faculty and institute researchers, the relationship with the incubating organization, and the level of social network with other firms. The relationship between EO and technological performance is also hypothesized. Data from the total of 121 spin-off organizations were collected, and a series of multiple regressions were performed. The performance variable included both technological performance such as the number of newly marketed products and new technology and subjective performance such as the level of satisfaction with sales amount and profitability. Several important conclusions were drawn from this study. First, the university and institute's policy has a significant effect on the level of innovativeness, while government policy is not related to EO. Second, a high percentage of man power from the incubating organization has a negative effect on risk taking. The level of cooperation with the incubating organization also is not related to EO. Third, the intensity of the cooperative network with other firms has a significant effect on risk-taking. The network relationship with government-related organizations is not related to EO. This study analyzed the importance and role of the university and institute's policy and network with other firms to improve EO. It also suggested that a high composition of man power from the incubating organization has a negative relationship with EO

HB-10.3 [R] Comparative Study of Government R&D Investment by Research Activities: Cases of Korea, U.S, and U.K.

Herin Ahn; Korea Institute of S&T Evaluation and Planning , Korea, South
Kil-Woo Lee; Korea Institute of S&T Evaluation and Planning, Korea, South
Hyejung Joo; Korea Institute of S&T Evaluation and Planning, Korea, South
Mijeong Kim; Korea Institute of S&T Evaluation and Planning, Korea, South

Survey and analysis of national R&D programs(S&A) in Korea show how the government R&D investment is distributed throughout the year. With the S&A data, it is possible to analyze the government's R&D investment by the classifications of socio-economic objectives, research activities, research performing sectors, locations, technology classifications, technology life-cycle, and cooperative research, etc. In this paper, using the 2002-2006 S&A data, Korean government R&D investment by research activities is presented. Through the cross analyses with other survey items, government R&D investment in each research activity is introduced. Later, taking the importance of basic research in account in the knowledge based society, Korean government R&D investment in the basic research is compared to those in the U.S. and the U.K. Excluding the defense-related R&D, Korea's investment in basic research is insignificant compared to others. In 2006, the proportion of basic research in the total government R&D investment is 24.2 percent, and it is relatively lower compared to the U.S. (45.9 percent in 2005) and U.K. (42.5 percent in 2005). In conclusion, policy directions for the future government R&D investment in Korea are proposed.

HB-10.4 [A] Linking the Performance Evaluation Result and Budgeting of National R&D Program in Korea

In ja Kim; KISTEP, Korea, South

This study empirically analyzes the influencing factors of GR&DB (Government R&D Budget) coordination using the results data of R&D budget and evaluation. Moreover, we review the performance management system of other countries and study the relation to the results of performance evaluation and GR&DB (Government R&D Budget). Finally this study shows the methods for strengthening the connection between performance evaluation and GR&DB.

HD-01 SPECIAL SESSION: PICMET '09 and '10 Planning Session
Thursday, 7/31/2008, 14:00 - 15:30 Room: Ballroom West
Speaker(s): Timothy R. Anderson; Portland State University
Dilek Cetindamar; Sabanci University
Antonie Jetter; Portland State University
Dundar F. Kocaoglu; Portland State University
Kiyoshi Niwa; University of Tokyo
Liono Setiowijoso; Portland State University
Charles M. Weber; Portland State University
Ann White; Portland State University

Please join us in providing feedback on PICMET '08 and developing 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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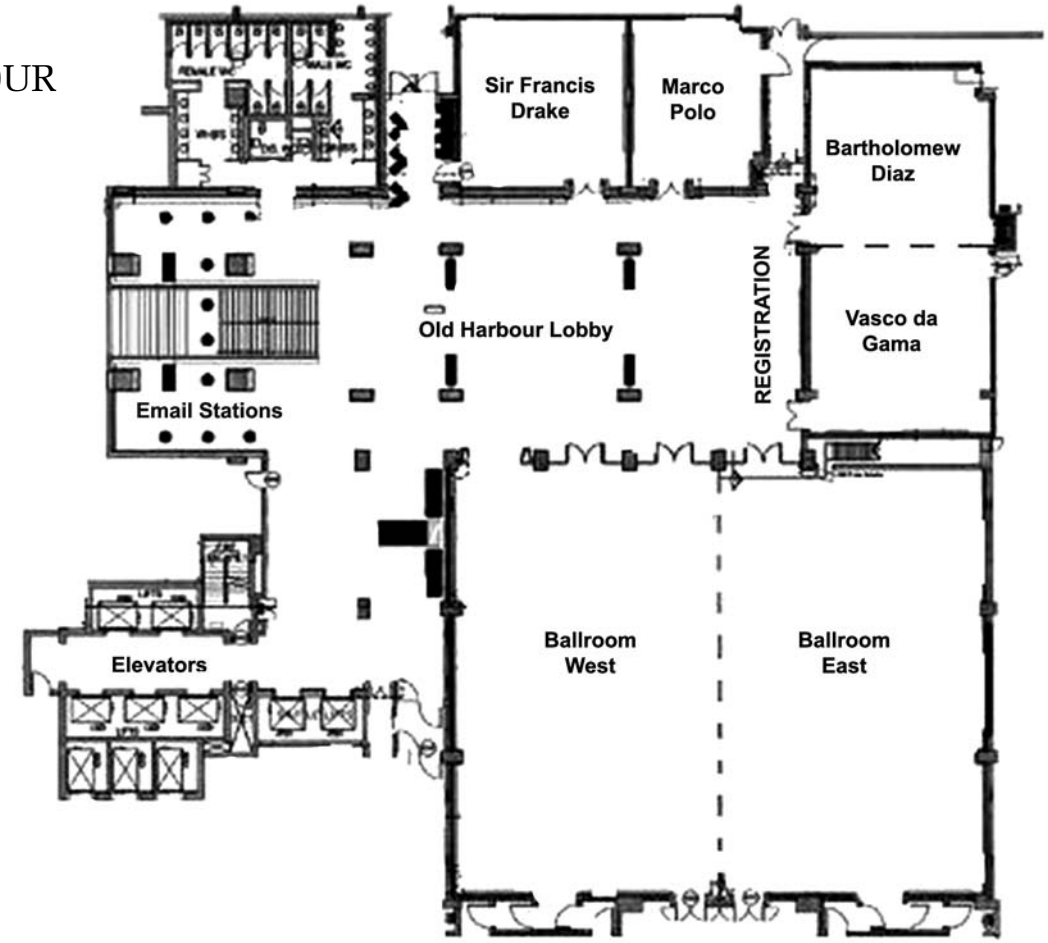
HOTEL FLOOR LAYOUT

OLD HARBOUR LEVEL



BRIDGE LEVEL