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PICMET '13



PICMET

Dear PICMET Guests:

We are pleased to welcome you to the PICMET '13 Conference.

Service industries are playing a dominating role as the engine of economic growth in both developed and developing countries, with technology being the driving force behind it. Energy, the health sector, manufacturing, financial institutions, governments, and educational institutions are increasingly more dependent on IT-driven services throughout the world.



PICMET defines the primary role of Technology Management as the management of technologies to assure that they work for the betterment of humankind. Using this definition, technology management has a critical role to play in the proper utilization of technology in services. It is the responsibility of the Technology Management community to guide technology effectively to provide the services that the world economy needs.

This is a big challenge for the leaders and future leaders in the Technology Management field. Recognizing this challenge, the PICMET '13 Conference explores the role of technology management in the IT-driven services.

PICMET conferences have always alternated between Portland and an international location until now. PICMET '13 is an exception to it. Because of the critical importance of Silicon Valley for IT-driven services, this year's conference is held in San Jose at the heart of Silicon Valley. San Jose State University is the host and primary sponsor, with IBM Research Center at Almaden providing major support.

More than 660 papers were submitted to PICMET '13. After they were subjected to a double-blind refereeing process, 285 were included in the conference. The referees were from universities, industrial organizations and government agencies from around the world. The authors represent more than 250 academic institutions, industrial corporations and government agencies in 37 countries.

The PICMET '13 Conference has two outputs:

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

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

- Technology Management Framework
- Strategic Management of Technology
- Science and Technology Policy
- Collaborations for Technology Management
- Competitiveness in Technology Management
- Decision Making
- Emerging Technologies
- E-Business
- Disruptive Technologies
- Innovation Management
- Commercialization of Technology
- Entrepreneurship/Intrapreneurship
- Intellectual Property
- Cultural Issues in Technology Management
- Environmental Issues
- Leadership
- Information Management
- Knowledge Management
- Management of Information/Communication Technology
- Enterprise Management
- New Product Development
- Manufacturing Management
- Management of Technical Workforce
- Project/Program Management
- R&D Management
- Resource Management
- Supply Chain Management
- Quality Management
- Sustainability

PICMET '13

- Technology Assessment and Evaluation
- Technology Forecasting
- Technology Roadmapping
- Technology Acquisition
- Technology Adoption
- Technology Diffusion
- Technology Marketing
- Technology Transfer
- Technology Management in the Service Sector
- Technology Management in Education
- Technology Management in the Health Sector
- Technology Management in the Financial Sector
- Technology Management in the Energy Sector
- Technology Management in Wireless Technology
- Technology Management in Biotechnology
- Technology Management in Electronics/Semiconductors
- Technology Management in Telecommunications

A large number of colleagues around the world contributed to the success of the PICMET '13 Conference.

Dean David Steele of the SJSU College of Business and Lucas Graduate School of Business provided leadership in bringing PICMET to San Jose and allocating resources for the success of the conference as the Co-chairman of the conference and Chairman of the Local Arrangements Committee (LAC). Iris Xiaohong Quan was the LAC Coordinator for Technical Activities; Sofia Faria Moede was the LAC Coordinator for Logistics; Taeho Park was the Director of Site Visits; Oliver Yu was the Liaison to IEEE; and Anuradha Basu, Natalya Delcours, Gita Mathur, Malu Roldan and Ming Zhou were the LAC members who helped with every aspect of local arrangements.

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

Ann White coordinated the overall planning for the conference; Liono Setiowijoso designed, maintained and managed the information systems, and he formatted the papers for the *Proceedings* and the *Bulletin*; Kenny Phan coordinated the program, scheduling of the sessions and the registration process; Songphon Munkongsujarit and Inthayuth Mahaphol coordinated the on-site activities; and Jeff Birndorf developed graphic arts for the conference. Antonie Jetter was the Director of Finances and Student Relations, Charles Weber was the Director of Awards.

Vince Reindl, Kai Oldenburg and John Hinch of Omnipress worked with PICMET from the beginning to the end of the conference planning effort. Their professionalism and superb expertise assured the high quality production of the PICMET *Proceedings* on schedule.

The Country Representatives, under the leadership of Kiyoshi Niwa of the University of Tokyo and Dilek Cetindamar Kozanoglu of Sabanci University, provided linkages between PICMET and the regions they represent.

As part of PICMET's philosophy for continuous improvements, an improved editorial structure was developed with five Associate Editors and a Panel of Reviewers this year. Papers submitted to the PICMET '13 conference were processed by the Associate Editors—Timothy Anderson, Tugrul Daim, Dilek Cetindamar Kozanoglu, Kiyoshi Niwa and Gary Perman—with double-blind reviews being conducted by 147 members of the reviewers panel, each reviewing up to 12 papers. Each paper was reviewed by two or more reviewers to assure the highest quality of presentations.

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

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

We believe the PICMET '13 *Bulletin* and *Proceedings* contain some of the best knowledge available on Technology Management for addressing the challenges and opportunities in a world becoming smarter in the development and utilization of IT-driven services. We hope they will contribute to the success of technology managers and emerging technology managers throughout the world.



Dundar F. Kocaoglu
President and CEO, PICMET



PICMET '13

EXECUTIVE COMMITTEE

President, CEO and Conference Chair

Dundar F. Kocaoglu
Portland State University

Conference Co-chair and Local Arrangements Committee (LAC) Chair

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Executive Director and Conference Coordinator

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Portland State University

Director of Operations

Liono Setiowijoso, Portland State University

Program Coordinator and Director of Registration

Kenny Phan, Portland State University

Director of On-site Coordination

Songphon Munkongsujarit, Portland State University

Director of Documentation and Signage

Inthrayuth Mahaphol, Portland State University

Associate Editor and Co-director of Technical Activities

Timothy R. Anderson, Portland State University

Associate Editor and Co-director of Technical Activities

Tugrul U. Daim, Portland State University

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Kiyoshi Niwa, University of Tokyo

Associate Editor and Co-director of International Activities

Dilek Cetindamar Kozanoglu, Sabanci University



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Director of Finances and Student Activities

Antonie Jetter, Portland State University

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Charles M. Weber, Portland State University

LAC Coordinator – Logistics

Sofia Faria Moede, San Jose State University

LAC Coordinator – Technical Activities

Iris Xiaohong Quan, San Jose State University

LAC Director – Site Visits

Taeho Park, San Jose State University

LAC Liason to IEEE

Oliver Yu, San Jose State University

LAC Member

Anuradha Basu, San Jose State University

LAC Member

Natalya Delcoure, San Jose State University

LAC Member

Gita Mathur, San Jose State University

LAC Member

Malu Roldan, San Jose State University

LAC Member

Ming Zhou, San Jose State University

DEDICATION

PICMET '13 is dedicated to all researchers, educators and practitioners of Technology Management who are contributing to the establishment and growth of this field throughout the world.

PICMET '13

SPONSORED BY

PORTLAND STATE UNIVERSITY

Department of Engineering and Technology Management

SAN JOSE STATE UNIVERSITY

College of Business

IBM

SUPPORTED BY

PORTLAND STATE UNIVERSITY *Maseeh College of*

Engineering & Computer Science

COOPERATING SOCIETIES

IEEE Oregon Technology Management Chapter

IEEE Santa Clara Valley / San Francisco Technology
Management Council

ADVISORY COUNCIL

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

Dr. Adnan Akay, V.P., Board of Trustees, Bilkent University, Turkey

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

Dr. Daniel Berg, Professor, University of Miami, USA

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

Dr. Walter Buchanan, Professor Texas A&M University, USA

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

Dr. Brent Chalmers, Ophthalmologist and Partner, Northwest Eye Health, USA

Mr. Jim Coonan, Chairman and CEO, Kentrox, Inc., USA

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

Dr. Pichet Durongkaveroj, Secretary Gen'l, Nat'l Science Technology and Innovation Policy Office, Thailand

Dr. Eliezer Geisler, Professor, Illinois Institute of Technology, USA

Dr. Hans G. Gemuenden, Professor, Berlin Technical University, Germany

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

Mr. Roy Hemmingway, Energy Consultant, USA



Dr. I. P. Jain, Director, Centre for Non-Conventional Energy Resources, University of Rajasthan, India

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Dr. Pansak Sirirachatapong, Executive Director, NECTEC, Thailand

Dr. James C. Spohrer, Director, University Programs World Wide, IBM, USA

Dr. David M. Steele, Dean San Jose State University College of Business, USA

Dr. Nam P. Suh, Professor, MIT, USA

Dr. Jim M. Utterback, Professor, MIT, USA

Dr. Nuket Yetis, Former President, TUBITAK, Turkey

PICMET '13

PANEL OF REVIEWERS

The Panel of Reviewers consisted of 147 researchers, educators and practitioners of Technology Management from around the world. The members of the Panel evaluated the abstracts, reviewed the papers, and made recommendations on the appropriateness of each presentation for inclusion in the conference.

Mike Adams
John Aje
Joe Amadi-Echendu
Timothy Anderson
Hacer Ansal
Jean-Pierre Auffret
Elif Baktir
Bridget Barnes
Nuri Basoglu
Nima Behkami
Rian Beise-Zee
Caroline Benton
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Jeffrey Butler
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Fethi Calisir
Ferhan Cebi
Kah Hin Chai
Shann-Bin Chang
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Jin Chen
Youngrak Choi
Mario Coccia
Brian Cozzarin
Scott Cunningham
Tugrul Daim
Antonie de Klerk
Ozgur Dedehayir
Haluk Demirkan
Glenn Dietrich
Robert Dryden
Alptekin Durmusoglu
William (Ike) Eisenhauer
Judith Estep
M. Hosein Fallah
Clare Farrukh
William Flannery
Janice Forrester
Richard Franza
Eliezer Geisler

Nathasit Gerd Sri
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Jonathan Ho
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Boonkiart Iewwongcharoen
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Yuya Kajikawa
Matti Karvonen
Gulgun Kayakutlu
Clive Kerr
Ron Khormaei
Chaiho Kim
Pang Ryong Kim
Alisa Kongthon
Dilek Cetindamar Kozanoglu
Gul Kremer
Tritos Laosirihongthong
Scott Leavengood
Thomas Lechler
Jaegul Lee
Jong-Taek Lee
Chung-Shing Lee
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Chien-Hsin Lin
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Karen Manley
Robert Martin
Gita Mathur
Daphney Mayindi
Iffet Iyigun Meydanli
Whasik Min
Tim Minshall
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Pattanun Nownaisin
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Leon Pretorius
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Vichita Ractham
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Rosine Salman
Leonardo Santiago
Halime Sarihan
Yuriko Sawatani
Michael Schmitz
Gunther Schuh
Stacey Schultz
Marko Seppanen
Siri-on Setamanit
Nasir Sheikh
Aaron Shenhar
Kunio Shirahada
Harm-Jan Steenhuis
Frank Steiner
Jasper Steyn
Fang-Pei Su
Ethne Swartz
Thorsten Teichert
Alfred Thal, Jr.
Hans Thamhain
Cherie Trumbach
Ad van de Gevel
Cornelis van Waveren
Ozalp Vayvay
Wayne Wakeland
Steve Walsh
Andrew Walters
Bing Wang
Charles Weber
Calvin Weng
David Wilemon
Gerry Williams
Dietmar Winzker
Benjamin Wu
Jian Zhang

PICMET '13

PICMET LEADERSHIP IN TECHNOLOGY MANAGEMENT (LTM) AWARD RECIPIENTS

The PICMET Leadership in Technology Management (LTM) Award recognizes and honors individuals who have provided leadership in managing technology by establishing a vision, providing a strategic direction, and facilitating the implementation strategies for that vision.

The Award was established in 1991. The recipients between 1991 and 2012 with their affiliations and positions at the time of the award are listed below.

1991

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

1997

Mr. Norman Augustine, Chairman of Lockheed Martin,
USA

1999

Mr. Jack Welch, CEO of General Electric, USA
Dr. Richard M. Cyert, President of Carnegie Mellon
University, USA

2001

Dr. Modesto A. Maidique, President of Florida
International University, USA
Ms. Carleton S. Fiorina, Chairman and CEO of Hewlett-
Packard Co., USA
Ms. Donna Shirley, Manager of the Mars Exploration
Program, USA

2003

Mr. Jong-Yong Yun, Vice Chairman and CEO of Samsung
Electronics, Inc., Korea
Dr. Joseph Bordogna, Deputy Director of the National
Science Foundation (NSF), USA
Dr. Chun-Yen Chang, President of National Chiao Tung
University, Taiwan

2004

Dr. Kwan Rim, Chairman of Samsung Advanced
Institute of Technology (SAIT), Korea
Dr. Gunnar Hambræus, member of the Swedish Royal
Academy of Science and former President and
Chairman, Royal Swedish Academy of Engineering
Sciences, Sweden

2005

Dr. Morris Chang, Founding Chairman, Taiwan
Semiconductor Manufacturing Company Ltd. (TSMC),
Taiwan
Dr. Pairash Thajchayapong, Permanent Secretary,
Ministry of Science and Technology, Thailand
Dr. Eric von Hippel, Professor and Head of the
Technological Innovation and Entrepreneurship
Group, Sloan School of Management, Massachusetts

Institute of Technology, USA

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

2006

Dr. Youngrak Choi, Chairman, Korea Research Council
of Public Science & Technology (KORP), Korea
Dr. Tsuneo Nakahara, Adviser to CEO (past Vice
Chairman) of Sumitomo Electric Industries, Ltd., Japan
Dr. Mehmet Nimet Ozdas, Dept. of Mechanical and
Control Engineering, Istanbul Technical University,
Turkey
Dr. Edward B. Roberts, David Sarnoff Professor of the
Management of Technology and Chair, Massachusetts
Institute of Technology (MIT) Entrepreneurship
Center, USA

2007

Dr. Harold A. Linstone, Editor-in-chief, Technological
Forecasting and Social Change, University Professor
Emeritus, Systems Science, Portland State University,
USA
Dr. Yoshio Nishi, Director of Research of the Stanford
Center for Integrated Systems, Director of the Stanford
Nanofabrication Facility, and Research Professor in
the Department of Electrical Engineering at Stanford
University, USA

2008

Mr. William P. Venter, Chairman, Allied Electronics
Corporation Limited, South Africa
Dr. Gideon de Wet, Professor Emeritus, University of
Pretoria, South Africa

2009

Dr. Klaus Brockhoff, Professor, Otto Beisheim School of
Management, Germany
Ms. Anne M. Mulcahy, Chairman and Former CEO,
Xerox Corporation, USA
Prof. Muhammad Yunus, Managing Director, Grameen
Bank, Bangladesh

2010

HRH Princess Maha Chakri Sirindhorn, Thailand

2011

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

2012

Dr. Daniel Berg, Distinguished Research Professor of
Engineering, the University of Miami, USA
Dr. Nam P. Suh, President, Korea Advanced Institute of
Science and Technology (KAIST), Korea

PICMET '13

PICMET MEDAL OF EXCELLENCE AWARD RECIPIENTS

PICMET's "Medal of Excellence" recognizes extraordinary achievements of individuals in any discipline for their outstanding contributions to science, engineering and technology management.

The award was instituted in 2004. The recipients between 2004 and 2011 with their affiliations and positions at the time of the award are listed below.

2004

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

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

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

2005

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

2006

Dr. Frederick Betz, Former Program Officer, NSF

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

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

2007

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

2009

Dr. Albert H. Rubenstein, Founder and President, International Applied Science and Technology Associates (IASTA); and Professor Emeritus, Industrial Engineering and Management Sciences, Northwestern University

2010

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

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

2011

Mr. Alejandro Cruz, Minister of Science and Technology, Costa Rica



STUDENT PAPER AWARD

PICMET NAMES ITS OUTSTANDING STUDENT PAPER AWARD

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

AWARD CRITERIA

The Brad W. Hosler PICMET Outstanding Student Paper Award is bestowed upon a paper based on the student's research toward a graduate degree in the area of Engineering and Technology Management. Eligibility is restricted to currently enrolled students and those who have received their master's or doctorate degrees after July 31, 2011. The paper is nominated by the advising professor and selected by the Awards Committee. The award consists of \$1,000, complimentary conference registration and a plaque for the student, as well as a plaque and complimentary registration for the nominating professor. The winner may not be nominated again for the same award in subsequent years.



ABOUT BRAD W. HOSLER

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

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

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

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

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



STUDENT PAPER AWARDS

BRAD W. HOSLER OUTSTANDING STUDENT PAPER AWARD

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



AUTHOR

Yu-Yu Chang

ADVISOR & CO-AUTHOR

Professor Ming-Huei Chen

UNIVERSITY

National Chung Hsing University,
Taiwan

PAPER TITLE

“Innovative Cognitive Style, Proactive Personality and Employee Creativity: The Moderating Effects of Work Discretion and Time Pressure”

ABSTRACT

This paper aims to examine the influence of innovative cognitive style, proactive personality and working conditions on employee creativity by taking an interactional perspective. Innovative cognitive style refers to an individual's idiosyncrasy of thinking about and dealing with an original idea, while proactive personality conceptualizes an individual's strategic opportunity-seeking behaviors toward exploring novelty. Work discretion and time pressure, two critical contextual factors suggested to impact employee creativity in organizational literature, may also influence how individuals convert their innovative cognitive style and proactive personality into creativity. In an attempt to extend current understanding of creativity in organizations, this study examines the relationship between individual characteristics (innovativeness and proactiveness) and employee creativity, and how the relationship is moderated by work discretion and time pressure. Hierarchical regression analysis was used to examine the proposed hypotheses for a sample of 344 middle-level managers in Taiwanese manufacturing companies, including R&D managers and marketing man-

agers. Results reveal that innovative cognitive style and proactive personality are positively related to employee creativity. Work discretion was found to enhance employee creativity while time pressure was found to constrain creativity. Our findings support the hypothesized moderating effects, indicating that employees will exhibit the highest level of creativity when they possess innovative cognitive style and proactive personality as well as performing tasks with high work discretion and less time pressure.



AUTHOR

Xiao Zhou

ADVISOR

Professor Donghua Zhu

UNIVERSITY

Beijing Institute of Technology,
P.R. China

PAPER TITLE

“Analyzing Research Publication Patterns to Gauge Future Innovation Pathways for Nano-Enabled Drug Delivery”

ABSTRACT

With the global emphasis on the development of nanotechnology (“nano”), nano-enabled drug delivery (“NEDD”) systems are rapidly emerging as a key nano application area. NEDD offers promise in addressing pharmaceutical industry challenges concerning solubility, cost reduction, cell and sub-cellular targeting, and patent lifecycle extension. A combination of factors promotes nanoparticle-enhanced and other nano-facilitated drug and gene delivery systems. To get a grip on this vast, varied, and highly promising area of nano application, researchers devised a multi-component search strategy, detailed here, to generate a NEDD dataset from the Web of Science (WOS). They then analyzed these scientific and biomedical research publication records to profile R&D activity, gauge evolving research foci, and forecast NEDD research trends. Such “tech mining” can help to address a wide array of further technology management questions concerning this important biomedical arena. The aim of this research is to build a family of analytical tools to facilitate the forecasting of innovation pathways.

LTM AWARDS

The PICMET Leadership in Technology Management (LTM) Award recognizes and honors individuals who have provided leadership in managing technology by establishing a vision, providing a strategic direction, and facilitating the implementation strategies for that vision.

PICMET '13 AWARDEES

Dr. Robert JT Morris

VP Global Labs, IBM Research, USA



Dr. Robert JT Morris is Vice President, Global Labs, IBM Research, where he is responsible for IBM Research Laboratories in China, India, Japan, Brazil, Australia and Africa. He leads these labs from the IBM Growth Market headquarters in Shanghai. From 2006-2011 he led Services Research across IBM from the TJ Watson Research Center in

New York, and from 2004-2006 he led the transformation of IBM's services business to become technology-asset or IP-based.

From 1999-2004, he was the director of the IBM Almaden Research Center, a hub of applied research in computer, physical and behavioral sciences. Dr. Morris was also concurrently vice president for Personal Systems and Storage Research at IBM. During this period the field of "services science" was initiated by IBM Research and developed working closely with university, industry and government partners. Earlier, he was a director at the IBM TJ Watson Research lab in New York, where he led teams in systems research. Originally from Australia, he began his career at Bell Laboratories where he was involved in developing a number of networking and computing technologies.

Dr. Morris was chairman of the Bay Area Science and Innovation Consortium (BASIC) from 2002-2005, an organization consisting of the heads of major research institutions in Silicon Valley and the San Francisco Bay Area. He has been a member of the National Academies' Government University Industry Research Roundtable, an Editor of *IEEE Transactions on Computers*, he has published more than 50 articles on computer science, electrical engineering, and mathematics, and he has received 11 patents. He is a member of the IBM Academy of Technology, a Fellow of the IEEE, and is on a number of advisory boards for leading universities and governments labs.

Dr. James M. Utterback

David J. McGrath jr (1959) Professor of Management and Innovation, MIT Sloan School of Management; and Professor of Engineering Systems, School of Engineering, Massachusetts Institute of Technology, USA

Dr. James M. Utterback is David J. McGrath jr (1959) Professor of Management and Innovation at the MIT Sloan School of Management and Professor of Engineering Systems in the School of Engineering at the Massachusetts Institute of Technology. Since receiving the Ph.D. in 1968 from the MIT Sloan School of Management, Dr. Utterback has



held faculty positions at Indiana University, the Harvard Business School, and Chalmers Technical University as well as MIT. From 1983 through 1989, he served as Director of Industrial Liaison at MIT. He is author of *Mastering the Dynamics of Innovation*, published by Harvard Business School Press in 1994, and of *Design-Inspired Innovation*, published by World Scientific Press in 2006. His current research examines the sustained growth of newly formed technology-based firms worldwide at the confluence of bio and nanotechnology.

Dr. Utterback received the D.Sc. (Hon) from Chalmers University in Gothenburg, Sweden, in 1997, and was elected a foreign member of the Royal Swedish Academy of Engineering Sciences in 1999. He was elected a Life Fellow of Clare Hall at the University of Cambridge in 2006. Last year he received an honorary doctorate from Katholieke Universiteit Leuven in Belgium.



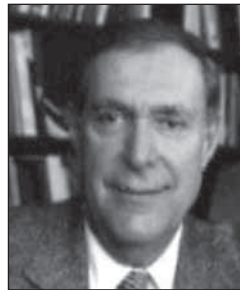
MEDAL OF EXCELLENCE

Initiated at PICMET '04 in Seoul, Korea, the Medal of Excellence award is given for extraordinary achievements of individuals in any discipline for their outstanding contributions to science, engineering and technology management.

Dr. Eliezer Geisler

Distinguished Professor, Stuart School of Business, Illinois Institute of Technology, USA

Dr. Eliezer (Elie) Geisler is a distinguished professor in the Stuart School of Business at the Illinois Institute of Technology. He holds a doctorate in organizational behavior from the Kellogg School at Northwestern University (1979). Dr. Geisler is the author and co-author of over 100 papers in the areas of the management, evaluation and metrics of R&D, innovation, science & technology, knowledge management and the management of medical technology. He is the author and co-author of 14 books, including: *Managing the Aftermath of Radical Corporate Change* (1997); *The Metrics of Science and Technology* (2000), also translated into Chinese; *Creating Value with Science and Technology* (2001); *Installing and Managing Workable Knowledge Management Systems* (2003, with Albert Rubenstein), *Knowledge and Knowledge Systems: Learning from the Marvels of the Mind* (2007), and *Change in Organizations* (2013). He was the founder and editor of the Department of Information Technology for the *IEEE Transactions on Engineering Management* and is the co-founder and associate editor of the *International Journal of Healthcare Technology and Management*.



He co-founded the international Health Care Technology Management Association and the series of conferences on the Hospital of the Future. Since 2001 these conferences were held in the Netherlands, U.S.A., United Kingdom, Denmark, Austria, and Italy. At the Illinois Institute of Technology, in 2003-2012, he founded and directed the IIT research Center for the Management of Medical Technology. Dr. Geisler consulted for major corporations and for many government departments and agencies. He served on over a dozen editorial boards for major journals in the fields of technology management and organizational behavior. He was chair of the College of Innovation Management and Entrepreneurship (COLIME) of the Institute of

Management Sciences (INFORMS). Dr. Geisler has served on the board of directors of Mount Sinai Medical Center in Chicago, Illinois. His research was funded by, among many others, NASA, NSF, and IBM. His current research, teaching, and consulting activities focus on the organization and commercialization of technology, and on the nature, progress and diffusion of human and organizational knowledge, and the management of knowledge systems.

Dr. Hans Georg Gemuenden

Professor, Berlin University of Technology, Germany

Prof. Dr. rer. oec. habil. Hans Georg Gemuenden is a full tenured Professor at the Berlin University of Technology (TU Berlin). He has the Chair for Technology and Innovation Management. He received his



"Diplomkaufmann" (equivalent to an MBA) and his Dr. rer. oec. at the University of Saarbrücken, and his habilitation degree at the University of Kiel.

He was chairman of the TIM Division of the Association of University Professors of Management from 2000-2002. He was representative-at-large of the TIM Division of the Academy of Management from 2009 until 2011 and responsible for the best dissertation award in 2011. In January 2013 he became the editor of the *Project Management Journal*.

He was a member of several supervisory boards (Thyssen-Krupp Technologies AG, Hauck & Aufhauser, InnoZ). He hosted several international conferences: the IMP conference in Karlsruhe (1996), the G-Forum in Berlin (2006), and the IRNOP (2009) in Berlin.

He has published in *Organization Science*, *Research Policy*, *Journal of Product Innovation Management*, *Creativity and Innovation Management*, *International Journal of Research in Marketing*, *Journal of Business Research*, *Management International Review*, *IEEE Transactions on Engineering Management*, *R&D Management*, *International Journal of Project Management*, and *Project Management Journal*.

PICMET FELLOWS

On its 20th Anniversary (2011), PICMET created a Fellow category as a new award to recognize outstanding contributions to the development and growth of the Engineering and Technology Management discipline. The first recipients of this new award were those who provided leadership in the establishment of PICMET and those who completed their six-year terms in serving the PICMET Advisory Council. The Fellows in subsequent years are being selected from nominees from around the world.

The 2011 Fellows are listed in alphabetical order:

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

The 2013 PICMET Fellows are listed in alphabetical order:

Dr. Klaus Brockhoff, WHU – Otto Beisheim School of Management, Germany
Dr. Antonie de Klerk, University of Pretoria, South Africa
Dr. Norman G. Einspruch, University of Miami, USA
Dr. Joseph P. Martino, Yorktown University, USA
Mr. Terry Oliver, Bonneville Power Administration, USA
Dr. Alan L. Porter, Search Technology, Inc., USA
Dr. Albert H. Rubenstein, Northwestern University, USA
Dr. James C. Spohrer, IBM, USA
Dr. David Steele, San Jose State University, USA



IN MEMORIAM

IN MEMORIAM: ALBERT RUBENSTEIN, PROFESSOR EMERITUS IN INDUSTRIAL ENGINEERING AND MANAGEMENT SCIENCES, NORTHWESTERN UNIVERSITY, USA

by Sarah Ostman, Northwestern University McCormick School of Engineering and Applied Science

Albert Harold Rubenstein, Walter P. Murphy Professor Emeritus of Industrial Engineering and Management Sciences at Northwestern University's McCormick School of Engineering, passed away April 13. He was 90.

A dedicated academic, adviser, and consultant who spent more than four decades at McCormick, Rubenstein was known for his pioneering work in engineering management, as well as a commitment to bring his field to the forefront at the University.

"Al was a giant in the field of engineering and technology management, and his legacy lives on at Northwestern through the very successful Master of Engineering Management program," said Barry Nelson, professor and chair of industrial engineering and management sciences at McCormick.

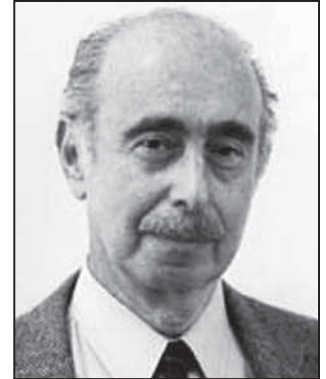
Understanding that companies need continuous technological innovation along with effective management to maintain a competitive edge, Rubenstein founded the Master in Engineering Management (MEM) program in 1976 to provide high-quality engineering management education for engineers and scientists in the Chicago area. Initiating the program was a challenge — at the time, many faculty members were skeptical of a part-time program to educate working professionals — but Rubenstein persisted, gaining support for one of the first master's programs in the country to offer collaboration between a management school and an engineering school.

Rubenstein directed the MEM program from 1977 until 1992. He also established two research centers at Northwestern, the program on Management of Research, Development, and Innovation (POMRAD) and the Center for Information and Telecommunication Technology.

Outside of his academic life, Rubenstein was founder and president of International Applied Science and Technology Associates (IASTA), a consultancy through which he advised industrial and government organizations in the United States and abroad.

Born in Philadelphia in 1923, Rubenstein described his first experience with engineering principles as a teenager

in the early years of World War II. He was working for a beverage and perfumes company when he was tasked with assembling a portable filtration system to be installed on the third floor of a customer's factory. After delivering the machine, he learned there was a problem.



"[I]t would not fit onto the elevator in the building!"

Rubenstein recalled in a 2009 article in *Engineering Management Journal*, adding that he had been forced to disassemble and reassemble the entire machine. "Thus, I received, at age 16, a valuable lesson in the need for careful system design, planning, and project management in even these simplest of projects."

Rubenstein's experience as a combat infantryman in the war further cemented his interests. After the war, he returned to his home state to attend Lehigh University, graduating in 1949 with a degree in industrial engineering. He went on to receive MS and PhD degrees in industrial engineering and management from Columbia University.

Rubenstein served on the faculty at MIT's School of Industrial Management before joining Northwestern's faculty in 1959. The same year, he was elected editor of the journal *Transactions on Engineering Management*, a position he would hold for more than 25 years.

Over the course of his career, Rubenstein co-edited *Some Theories of Organization*, edited *Coordination, Control and Financing Industrial Research*, and authored nearly 200 articles and books on R&D/technology management. He served as director of studies for the College of Research and Development, was vice-president for research and education of the Institute of Management Sciences, and from 1960 to 1983 was a director of the Narragansett Capital Corporation. He was also a member of the advisory committee on Economic and Manpower Studies of Science and Technology for the National Science Foundation.

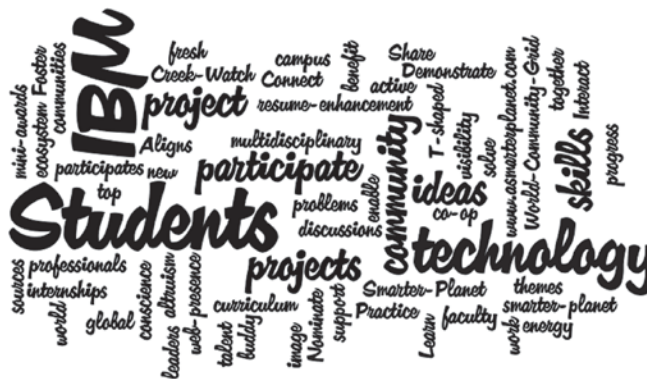
After retiring from Northwestern, Rubenstein moved to Washington, D.C. in 2004, where he stayed active in research and consulting.

**IN MEMORIAM: DR. ROBERT D. DRYDEN,
UNIVERSITY PROFESSOR IN THE DEPART-
MENT OF ENGINEERING AND TECHNOL-
OGY MANAGEMENT, PORTLAND STATE
UNIVERSITY**

It was during Dr. Dryden's deanship that the Portland State University School of Engineering and Applied Science became the Maseeh College of Engineering and Computer Science and moved into its brand new five-story building, and the Engineering Management Program



Dr. Dryden is survived by his wife Jean; his son Bobby in Lubbock, Texas; his daughter Julie in Blacksburg, Virginia; and grandchildren.



asmarterplanet.com/studentsfor/form

GENERAL INFORMATION

CONFERENCE FOCUS

In the technology era, driven by knowledge, the vast majority of people are knowledge workers contributing to the society by providing services. The IT industry is a leader in this service-centric, knowledge-based new economy. As computer technology reaches maturity, information technology is continuing to grow and dominate the technology landscape as a defining characteristic of the 21st century.

It is the responsibility of the Technology Management community to guide technologies effectively for the betterment of humankind. This is a big responsibility for the leaders and emerging leaders in the Technology Management field, but it is critical that they accept the responsibility and meet the challenges head on. The focus of the PICMET '13 Conference is on the management of technology in IT-driven services. It is highlighted throughout the conference.

WHO SHOULD ATTEND

Following the PICMET tradition, this high-impact symposium will set the stage for innovation management for decades to come. The world's leading experts from academic institutions, industrial corporations and government agencies will participate in the discussions. PICMET '13 is essential for:

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

PROGRAM

The PICMET '13 program consists of

- Ph.D. Colloquium, "Getting Your PhD....and Beyond," Sunday, July 28, 13:00 - 17:00, Guadalupe (Second Level)
- Plenary sessions by global leaders from industrial corporations, academic institutions and government agencies in the Ballroom Salons III and IV
- Two special meetings:
 1. Country Representatives Meeting, Wednesday, July 31, 12:00-14:00, Blossom Hill, 3rd Level
 2. PICMET '14 & '15 Planning Session, Thursday, August 1, 16:00-17:30, Salon III
- 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 '13:

- The "Bulletin" containing the conference schedule and abstracts of each presentation
- The "Proceedings" containing all of the papers on a flash drive

The publications will be available to PICMET '13 attendees at the registration desk.

REGISTRATION POLICY

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

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

**The one-day registration fee does not include the evening social events. The student registration fee does not include Sunday, Monday and Tuesday evening events. The PhD Colloquium and site visits are not included in the registration fee. Tickets for these events may be purchased at the registration desk.*

GENERAL INFORMATION

SESSION AND PAPER DESIGNATIONS

The 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	00: Salon III-IV 01: Salon I 02: Salon II 03: Salon III 04: Salon IV 05: Salon V 06: Salon VI 07: Guadalupe 08: San Carlos 09: Willow Glen I 10: Willow Glen II 11: Willow Glen III 12: Silicon Valley Boardroom

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 Salon V.

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 Think Tank near the elevators on the Second Level is designated as the Author's Room. If you need information about anything concerning the conference, volunteers in the registration area will try to help you.

WIRELESS ACCESS

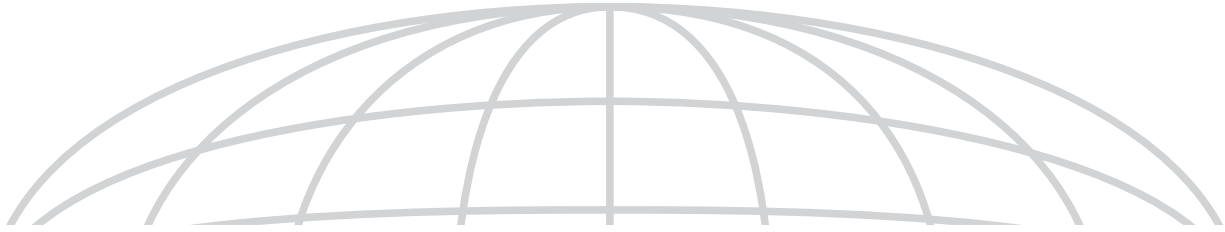
Wi-Fi for Internet connections will be provided in the foyer on the Second Level.

PICMET VOLUNTEERS

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



SHARE THE PICMET EXPERIENCE



THE PICMET EXPERIENCE

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



SAN JOSÉ

TRANSPORTATION INFORMATION

SHUTTLE SERVICE

If you are flying into the San Francisco International airport, a recommended shuttle service is SuperShuttle (www.supershuttle.com/). A one-way fare from the San Francisco International Airport to the San Jose Marriott (301 S Market St, San Jose, California, 95113) is approximately \$55.

TAXIS

If you are flying into San Francisco International Airport, taxis depart from the designated taxi zones located at the roadway center islands, on the Arrivals/Baggage Claim Level of all terminals. A one-way fare from the San Francisco International Airport to the San Jose Marriott (301 S Market St, San Jose, California, 95113) is approximately \$130.

If you are flying into the San Jose International Airport, taxis are accessible from Terminal A and Terminal B. A one-way fare from the San Jose International Airport to the San Jose Marriott (301 S Market St, San Jose, California, 95113) is approximately \$20.

SAN JOSÉ GUIDE

The following information is from <http://www.sanjoseca.gov/>

As the hub of Silicon Valley, San José is a popular destination for tourists and business travelers. Visitors find many amenities in the City's revitalized downtown area including fine accommodations and world-class restaurants and shops.

ABOUT SAN JOSÉ

Founded on November 29, 1777, as El Pueblo de San Jose de Guadalupe, San José was California's first civilian settlement. San José was also the site of the first state capital. With the booming tech industry in the 1990s, San José earned its moniker as the Capital of Silicon Valley. With nearly one million residents, San José is the largest city in Northern California and the 10th largest city in the United States.

San José residents enjoy an unparalleled quality of life, with great weather year round to enjoy expansive open spaces, beautiful parks, trails, and local and regional attractions. It's an easy day trip to some of the best desti-

nations in northern California, including San Francisco (one hour), Santa Cruz and the Monterey Bay (45 minutes), Oakland / Berkeley (50 minutes), the renowned Napa Valley wine region (two hours), and Yosemite National Park (four hours). There is also plenty to enjoy right here in San José.

LOCATION

San José is located in Santa Clara County at the southern edge of the San Francisco Bay, about 50 miles south of San Francisco, 390 miles north of Los Angeles.

POPULATION

The current population is 984,299 persons. San José is the third largest city in California, following Los Angeles and San Diego. It is the tenth largest city in the U.S.

(Note: This current population figure comes from the California Department of Finance population estimate as of January 2013.)

CLIMATE

San José weather is hard to beat with moderate year-round temperatures. Residents enjoy 300 days of sunshine each year and an average annual temperature of 70°F (21°C). The average temperature is 84°F (29°C) in July. Average annual rainfall is 15 inches.

BUSINESS: #1 IN TECHNOLOGY EXPERTISE

The San José area is home to the largest concentration of technology expertise in the world with more than 6,600 technology companies employing more than 254,000 people.

SAN JOSÉ HISTORIC SITES

The City is home to several buildings and destinations with rich historical importance.

ALVISO HISTORIC DISTRICT

The Alviso Historic District, encompassing nine acres and a number of historic structures, is on the National Register of Historic Places. Alviso was first settled in the 18th century and, at one time, was the boating and shipping port of San José, when steamboats traveled regularly to and from San Francisco. The city was consolidated with the City of San José in 1968.



SAN JOSÉ

CATHEDRAL BASILICA OF ST. JOSEPH

The Cathedral Basilica of St. Joseph, a Roman Catholic Church in Downtown San José, was originally built in 1803. The original adobe structure was damaged by earthquakes in 1818 and 1822.

CIRCLE OF PALMS PLAZA

A group of palm trees encircling the California State Seal makes up the site of California's first state capitol (1849–1851). The Circle of Palms Plaza is located on Market Street near Plaza de César Chávez Park in Downtown San José.

HAYES MANSION

The Hayes Mansion, listed on the National Register of Historic Places, is a Spanish Colonial Revival-style manor. It was purchased by the City of San José during the 1990s and has been meticulously renovated and transformed into a luxurious hotel, conference center, resort, and spa.

NEW ALMADEN MINE

The New Almaden quicksilver mine is located in the Santa Teresa Hills just south of San José and is part of Almaden Quicksilver County Park. At one time, it was the most productive mercury mine in the United States.

SAN JOSÉ NEIGHBORHOODS & NOTABLE SITES

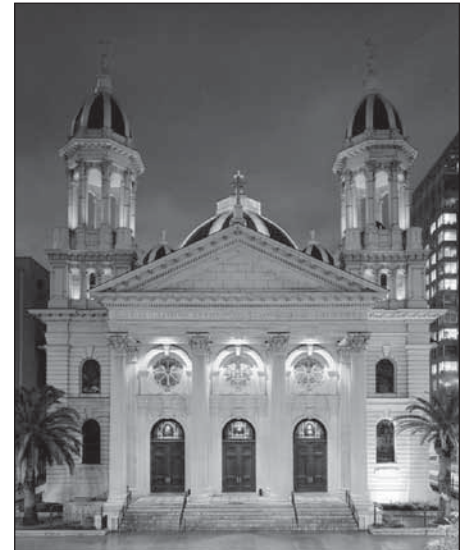
DOWNTOWN SAN JOSÉ

Thanks to savvy redevelopment and compact design, downtown San Jose has become the place where everyone comes to live and play, from the protégés hunting for urban nightlife adventures to empty nesters spending their children's inheritance on fine dining, opera and gallery art. As one of the safest big cities, San Jose invites parents to bring their children to play at two of the most renowned family friendly museums in Northern California – the Children's Discovery Museum and the Tech Museum of Innovation. Across the street children of all ages splash around in the famous fountains of Cesar Chavez Park, where during the summer crowds gather to sway to Music in the Park or munch on popcorn at outdoor movies.

On Fridays May through December you can spot professionals spending their lunch break in San Pedro Square to catch the Farmer's Market, returning for Happy Hour at the brew pubs and bars. Die-hards stay longer to catch gallery night on First Fridays or to take in a comedy club.

As one of the most walkable and bike friendly cities in California, lit with over 300 days of sunshine and great weather, San Jose is a haven for walking warriors, pedalphiles and jogging junkies – especially along Guadalupe River Park's many wild-life-filled trails or downtown's tree-lined streets. The urban center is

home to many unique festivals and events, such as the Amgen Tour of California, Rock n' Roll Half Marathon, Cinequest Film Festival, Vietnamese Spring Festival, Japanese Obon Festival, San Jose Mariachi and Mexican Heritage Festival, San Jose Jazz Festival and Zero One, where art meets technology. If you hate the idea of taking out a bank loan to pay for parking like in certain cities to the north, San Jose is dotted with free or low-cost parking downtown, and is easily accessible via lightrail.



JAPANTOWN

Kimonos, getas and manjus – oh my! Japantowns in the U.S. are an endangered species, but San Jose's is alive and kicking. Just north of downtown, this historic – and still authentic – neighborhood features outstanding Japanese restaurants, Asian performing arts, martial arts schools and places of worship such as the beautiful San Jose Buddhist Church Betsuin.

Hear the strains of bittersweet traditional Japanese music, or upbeat modern sounds as you walk around J-town, which features great gems like

SAN JOSÉ

Santo Market, a mom & pop joint filled with everything Japanese and Hawaiian, as well as florists, novelty shops, unique gift shops such as Nikaku (for all you anime fans out there) and a farmers market on Sunday mornings. Unlike L.A.'s and San Francisco's Japantowns, here you can still buy homemade tofu and manju (a Japanese pastry). The Japanese American Museum features 6,400 square feet of permanent and rotating exhibits and community activities. Japanese culture is also celebrated with live events, such as the Obon Festival in mid-July, featuring two days of game booths, food booths, cultural exhibits and demonstrations, and more than 1,000 dancers in full costume each evening, swaying under a canopy of colorful lanterns to live music from the Chidori Band and San Jose Taiko. Adventurous visitors can learn the dances ahead of time, with lessons beginning in late June at the San Jose Buddhist Church. During the festival visitors can find stores selling kimonos and geta slippers to blend in with the scene. If you're an ethnic culture vulture, J-town is an experience you won't want to miss!

LITTLE SAIGON

Home to the largest Vietnamese population of any city outside of Vietnam, San Jose is a great place to soak in the vibes of this special culture. Although the population is integrated throughout the city, the heart of the community is informally called Little Saigon – essentially Tully and Story Roads – just southeast of downtown. Several shopping malls on Tully Road feature Vietnamese gifts shops and food. The Grand Century Mall on Story Road is a popular place to shop and is home to the original and popular Lee's Sandwiches (a Vietnamese banh mi sandwich chain eatery) as well as the Vietnamese pho chain Pho Hoa Restaurant. Visitors to Kelley Park can check out the Viet Museum, next to History San Jose.

WEST SAN JOSÉ

When walking along Santana Row, the epicenter of style in West San Jose, it's easy to see why the area was ranked one of the top places in the U.S. to meet a mate. This upscale, Mediterranean retail and entertainment neighborhood is San Jose's answer for haute couture fashion shopping, fine dining, and is where the young and the prestigious come to flaunt their brains and buying power – potent stuff if you're hunting for an upwardly mobile

partner in crime. From live music, farmers markets and designer brands like Gucci, Burberry and Brooks Brothers, to trendy wine bars, lounges and eateries, this is definitely the place in Silicon Valley to see and be seen.

Across the street is San Jose's claim to worldwide fame, the Winchester Mystery House, the former home and gardens of the Winchester rifle heiress Sarah Winchester. Here

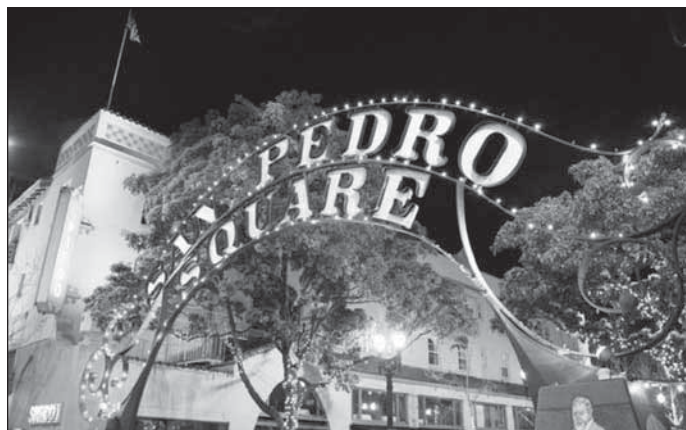


you will find the oddest mansion in existence, complete with architectural oddities – such as stairways to nowhere and windows opening to walls – designed by Sarah to confuse the spirits of Winchester rifle victims. If mysteries are your muse, don't miss this wonderfully wacky historic treasure, often featured on mystery and travel shows throughout the world.

If you're more into the sort of mystery involving what's in the next store, check out Westfield Valley Fair megamall just down the street, featuring 250 boutiques such as Louis Vuitton, Betsey Johnson, Stuart Weitzman, Tiffany & Co., BOSS Hugo Boss, Juicy Couture, and Apple.

WILLOW GLEN

If you want to see how the other half of Silicon Valley lives – meaning the Digerati who've decided to download a family – head south of downtown to historic Willow Glen. This picturesque, walkable community features charming residential streets and a well-planned downtown, featuring a variety of casual and outdoor restaurants, day spas and shops on Lincoln Avenue between Willow Street and Minnesota Avenue. Boutiques range from antiques and home décor to gifts and clothing. Children's



SAN JOSÉ

and teen's literature lovers must check out Hickleebee's, a local landmark bookstore. Favorite eateries include Opa!, Willow Street Pizza, Jake's and Siena Bistro. Petroglyph's ceramic lounge is a popular hangout for artists of all ages.

LOS GATOS

If you are enamored with the authentic California wine country lifestyle, it's hard to imagine a town more perfect than Los Gatos. Once an agricultural town, Los Gatos retains its 19th century charm with Victorian architecture and streets lined with quaint, upscale shops, wine bars and eateries. If you are an antiques addict, this is the perfect town to window shop and lunch before heading south on 17 to explore the humble but outstanding coastal wineries of the Santa Cruz Mountains. History buffs can check out the History Museum in the Forbes Mill



Annex, listed on the National Register of Historic Places and a State Historic Landmark. The museum is located at what remains of the town's Forbes Mill, a flour mill built in 1954, which played a major economic role in the town's eccentric history until 1887. On Sunday morning residents overflow into Town Plaza to check out the latest offerings of the farmer's market, set next to a park with a water fountain and colorful flowers. During the summer months, music lovers can check out Summer Sunday Concerts and Jazz in the Plazz. Each August visitors converge downtown to check out Fiesta de Artes, two days celebrating artisans of music, art, crafts and wine.

CAMPBELL

Campbell is another charming town where you can stop for shopping, clubbing and dining or pass by on your way

to the Santa Cruz mountain vineyards. Although not a major technology city like many of its neighbors, Campbell is the original home of eBay and of its creator, Pierre Omidyar.

Settled in 1851 by hay farmer Benjamin Campbell, whose original 160 acres of apricots and prunes today comprise Campbell's historic downtown, which offers pedestrian friendly streets with fun shops, cafes and pubs. Downtown Campbell has become one of the valley's emerging nightlife destinations, with DJ music and dancing at the Cardiff Lounge, revelry at Katie Bloom's, live music at the King's Head and the conver-

sion of the Gaslamp Theater into an ultralounge. There's also a wide range of restaurants from pubs to French cuisine. The historic Ainsley House, an English Tudor-style home built by local canning tycoon John Colpitts Ainsley in the late 1920s, is now called the Campbell Historical Museum, featuring period furnishings and docent-led tours. The adjacent carriage house is home to the Wyland R. Morgan Gallery, which hosts various exhibits, a video on Campbell's history and a gift shop. The surrounding gardens, based on the original 1926 sketches of San Francisco landscape architect Emerson Knight, are impressive for their color and variety. The Campbell Community Center, a converted high school now on the National Register of Historic Places, offers a skateboarding park, concerts, plays and sports facilities for locals and visitors.

ROSE GARDEN

A rose garden by any other name would not be as sweet as this surprising horticultural heaven just northwest of downtown. If you're allergic to roses, strolling the rolling green 5 ½ acres of the San Jose Municipal Rose Garden will be thorny because hardly a day passes when some species is not in full bloom. If roses are a passion, there's no better place to indulge, with more than 4,000 eye-popping rose shrubs and 189 varieties creating a colorful mosaic. Boasting an impressive garden of its own, the nearby Rosicrucian Egyptian Museum & Planetarium, architecturally inspired by the Temple of Amomg at Karnak, houses the largest collection of Egyptian artifacts on exhibit in the western United States – including objects from pre-dynastic times through Egypt's early Islamic era. Its educational Peace Garden is modeled after 18th dynasty of ancient Egypt.

SAN JOSÉ

SAN JOSÉ MUSEUM OF ART

(110 South Market Street, San Jose, CA 95113; www.sjmusart.org/)

The San José Museum of Art is a distinguished museum of modern and contemporary art and a lively center of arts activity in Silicon Valley. The leading institution in the area dedicated to the art of our time, SJMA is committed to providing access for its extraordinarily diverse populations and to pioneering new approaches to interpretation.

Established in 1969, SJMA presents art ranging from modern masterpieces to recent works by young, emerging artists. The Museum's permanent collection—1,400



varied artworks from the 20th and 21st centuries—has a special focus on West Coast art, seen in a national and international context.

THE TECH MUSEUM OF INNOVATION

(201 South Market Street, San Jose, CA 95113; www.thetech.org/)

The Tech Museum of Innovation is a hands-on technology and science museum for people of all ages and backgrounds. The museum, located in the Capital of Silicon Valley, is a non-profit learning resource established to inspire the innovator in everyone. Through programs such as The Tech Challenge, the annual team design competition for youth, and internationally renowned programs such as The Tech Awards, The Tech celebrates the present and encourages the development of innovative technology for a more promising future.

ARTS, ENTERTAINMENT & EVENTS

San José has all of the cultural amenities you would expect

to find in a modern urban city. It has a thriving arts community with professional opera, ballet, and theatre companies. The following websites offer up-to-date information and event calendars.



SAN JOSÉ CONVENTION & VISITORS BUREAU

(<http://www.teamsanjose.com/>)

This comprehensive destination website for San José is maintained by Team San Jose, the organization that manages the City of San José's Convention Center and entertainment venues including the Center for the Performing Arts, California Theatre, Montgomery Theater, San José Civic, Parkside Hall and South Hall. It includes information on hotels, dining and nightlife, arts and entertainment, sports, and events.

ARTSOPOLIS

(<http://www.livesv.com/>)

This event calendar is managed by the Arts Council Silicon Valley. Theatre, dance, music, comedy, family-friendly activities, and free events – if you are looking for something to do in San José, you will find it here.

DOWNTOWN EVENT CALENDAR

(<http://sjdowntown.com/events/downtown-events/>)

The San José Downtown Association provides information on events and attractions downtown. There is always something happening downtown and with this calendar, it's all at your fingertips.

EVENT CENTER AT SAN JOSÉ STATE UNIVERSITY

(<http://www.union.sjsu.edu/ec/>)

Search for concerts, lectures, and events coming up at the SJSU's event center.

SOCIAL EVENTS

To facilitate the informal interaction of the participants, several social events have been scheduled during PICMET '13.

RECEPTION/BUFFET

DATE: SUNDAY, JULY 28
TIME: 19:00—22:00
LOCATION: SALONS III & IV
DRESS: INFORMAL

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



AWARDS BANQUET

DATE: TUESDAY, JULY 30
CASH BAR: 18:30—19:00
IN THE BALLROOM FOYER
BANQUET: 19:00—22:00
LOCATION: SALONS III & IV
DRESS: BUSINESS ATTIRE

This is the premier social event of the conference. The PICMET '13 Leadership in Technology Management, Medal of Excellence, Outstanding Student Paper, and PICMET Fellow awards will be presented at the banquet. Included in the registration fee.*

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

DINNER AT SAN JOSÉ STATE UNIVERSITY'S "TOWER LAWN"

DATE: MONDAY, JULY 29
TIME: 19:00—21:30
LOCATION: SAN JOSE STATE UNIVERSITY
"TOWER LAWN"
DRESS: INFORMAL

Enjoy a sumptuous outdoor buffet on the San Jose State University campus while you mingle and network with colleagues and enjoy a performance by Trío Sol de America. PICMET volunteers in the hotel lobby will guide you to the bus that will take you to/from the event. They will also provide you with directions in case you would like to walk there (approximate 20 minute walk). The first bus will depart the hotel at 18:15. Included in the registration fee.*



SITE VISITS

Site visits to the following companies are offered during PICMET '13. Seating is limited, so sign up early (\$50).

The times below include travel time. A PICMET volunteer will be in the hotel lobby to guide you to the bus.

INTEL MUSEUM

MONDAY, JULY 29, 09:00–12:30

Go behind the scenes in the high-tech world of California's famed Silicon Valley. See what it is like inside an ultra-clean, highly automated silicon chip factory, and connect with technologies that give us new ways to work, learn,



play, and communicate. The Intel Museum showcases Intel's history and operations through unique exhibits and presentations designed to let you explore Intel® technology first hand. This will be a guided tour, and when it is finished, there will be time to check out the Intel Museum Store, which has a wide selection of merchandise including educational kits and Intel logo'd merchandise.

SAMSUNG SEMICONDUCTOR, INC.

TUESDAY, JULY 30, 08:30–10:30

During this visit to Samsung Semiconductor, Inc. you will be welcomed by Samsung representatives: Charlie Bae, President, American Headquarters; Jim Elliott, Vice President, Memory Marketing; Chris Goodhard, Direc-



tor, Marcom; and Kenny Han, Senior Director, Memory Product Planning. Jim Elliott will then give an overview of Samsung Electronics. An overview of Samsung's new building will be followed by a product demonstration of Samsung's solid state drive (SSD) by Stephen Weinger, Director, Memory Marketing. Display Lab Director Richard McCartney will demonstrate Samsung's Flexible Display. The Exynos Processor will be demonstrated by Director of S.LSI Marketing Richard Yeh; and Sylvie Kadivar, Director of Memory Marketing, will demonstrate Green DRAM. PICMET guests will have the opportunity to ask questions after the product demonstrations.



TECHNICAL PROGRAM

PROGRAM OVERVIEW

The PICMET '13 technical program consists of 111 sessions including 5 plenaries, 6 tutorials, 5 panel discussions, and 90 paper sessions.

The plenaries are scheduled from 08:30 to 10:00 every morning, Monday, July 29, through Thursday, August 1; and on Monday, July 29, from 14:00-15:30, in Salon III-IV. They are described in the "Plenaries" section of this Bulletin.

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

THE PAPERS

Research papers and applications-oriented papers are explicitly identified in this conference. Separate evaluation criteria were used, and different referees were selected for each category to make sure that appropriate papers were included in the conference for the "Research" and "Application" categories. We emphasized research methodology, the use of the research literature, the theory behind the paper, the sample size, and the impact on the research community for the "Research Papers." The important evaluation criteria for "Industry Applications" were the usefulness of the application, the importance of the case being discussed, the generalizability of the concepts presented, and the impact of the paper on the users of technology management. The "Research Papers" included in PICMET '13 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 75 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 12 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 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 '13.



DAILY SCHEDULE

MONDAY, JULY 29, 2013

	00 Salon III-IV	01 Salon I	02 Salon II	03 Salon III	04 Salon IV	05 Salon V	06 Salon VI	07 Guadalupe	08 San Carlos	09 Willow Glen I	10 Willow Glen II	11 Willow Glen III	12 Silicon Valley Boardroom
MA 08:30-10:00	Plenary - 1												
MB 10:30-12:00		NPD - 1	Decision Making - 1	Innovation Management - 1	Forecasting Innovation Pathways	Knowledge Management - 1	Project/Program Management - 1	Introducing the International Society of Service Innovation Professionals	Resource Management - 1	TM in Telecom - 1	TM in Semiconductor/ Electronics - 1	Commercial- ization of Technology - 1	UFO's
MC 12:00-14:00	Lunch Break												
MD 14:00-15:30	Plenary - 2												
ME 16:00-17:30		R&D Management - 1	Decision Making - 2	Innovation Management - 2	Technology Transfer - 1	Leadership - 1	Project/Program Management - 2	Supply Chain Management - 1	Technology Adoption - 1	Information Management - 1	TM in Semiconductor/ Electronics - 2	Commercial- ization of Technology - 2	

DAILY SCHEDULE

TUESDAY, JULY 30, 2013

	00 Salon III-IV	01 Salon I	02 Salon II	03 Salon III	04 Salon IV	05 Salon V	06 Salon VI	07 Guadalupe	08 San Carlos	09 Willow Glen I	10 Willow Glen II	11 Willow Glen III
TA 08:30-10:00	Plenary - 3											
TB 10:30-12:00		R&D Management - 2	Disruptive Technologies - 1	Innovation Management - 3	Technology Transfer - 2	Knowledge Management - 2	Project/Program Management - 3	Supply Chain Management - 2	Manufacturing Management - 1	Information Management - 2	Competitiveness in Technology Management - 1	Commercial- ization of Technology - 3
TC 12:00-14:00	Lunch Break											
TD 14:00-15:30		R&D Management - 3	Decision Making - 3	Innovation Management - 4	Technology Forecasting - 1	Knowledge Management - 3	Project/Program Management - 4	Technology Management Framework - 1	Tech Mining	TM in Biotech - 1	Intellectual Property - 1	Management of ICT - 1
TE 16:00-17:30		NPD - 2	Decision Making - 4	Innovation Management - 5	Technology Forecasting - 2	TM in Services - 1	Enterprise Management - 1	Technology Marketing - 1	Manufacturing Management - 2	Meet the Editors	Competitiveness in Technology Management - 2	Management of ICT - 2

DAILY SCHEDULE

WEDNESDAY, JULY 31, 2013

	00 Salon III-IV	01 Salon I	02 Salon II	03 Salon III	04 Salon IV	05 Salon V	06 Salon VI	07 Guadalupe	08 San Carlos	09 Willow Glen I	10 Willow Glen II	11 Willow Glen III
WA 08:30-10:00	Plenary - 4											
WB 10:30-12:00		Technology Roadmapping - 1	TM in Health - 1	Innovation Management - 6	Technology Forecasting - 3	Knowledge Management - 4	Aligning the Technology Business with a Quick-Hits Strategy	Technology Management Framework - 2	Science and Technology Policy - 1	TM in Wireless - 1	Intellectual Property - 2	Management of ICT - 3
WC 12:00-14:00	Lunch Break											
WD 14:00-15:30		Technology Roadmapping - 2	Technology Assessment and Evaluation - 1	Innovation Management - 7	Emerging Technologies - 1	Knowledge Management - 5	E-Business - 1	From User Experience to Benutzererlebnis – UX joins L10N to offer a better global user experience and change the world!	Science and Technology Policy - 2	TM in Energy - 1	Intellectual Property - 3	TM in Financial - 1
WE 16:00-17:30		NPD - 3	TM in Health - 2	Innovation Management - 8	Technology Forecasting - 4	TM in Services - 2	Technology Roadmapping for Efficient and Clean Power	Collaborations for Technology Management - 1	Science and Technology Policy - 3	Environmental Issues - 1	Management of Technical Workforce - 1	You're Entering the Analytics Zone...

DAILY SCHEDULE

THURSDAY, AUGUST 1, 2013

	00 Salon III-IV	01 Salon I	02 Salon II	03 Salon III	04 Salon IV	05 Salon V	06 Salon VI	07 Guadalupe	08 San Carlos	09 Willow Glen I	10 Willow Glen II	11 Willow Glen III
HA 08:30-10:00	Plenary - 5											
HB 10:30-12:00		Strategic Management of Technology - 1	TM in Health - 3	Innovation Management - 9	TM in Education - 1	Entre/ Intrapreneurship - 1		Collaborations for Technology Management - 2		Regions 2.0 - A Living-Lab For Management Engineering and Technology Progress	Intellectual Property - 4	
HC 12:00-14:00	Lunch Break											
HD 14:00-15:30		Cultural Issues in Technology Management - 1	Decision Making - 5	Tracking technological emergence: Nano-Enhanced Drug Delivery	Technology Acquisition - 1	Entre/ Intrapreneurship - 2		Immigrant Entrepreneurs in Silicon Valley		Sustainability - 1	Management of Technical Workforce - 2	
HE 16:00-17:30				PICMET '14 and '15 Planning Session								

SCHEDULE OF SESSIONS

SCHEDULE OF SESSIONS BY DATE

MONDAY, JULY 29, 2013

Session	Number	Day	Time	Room	Session Title
MA	00	Monday	08:30 - 10:00	Salon III-IV	PLENARY: "Plenary - 1"
MB	01	Monday	10:30 - 12:00	Salon I	"NPD - 1"
MB	02	Monday	10:30 - 12:00	Salon II	"Decision Making - 1"
MB	03	Monday	10:30 - 12:00	Salon III	"Innovation Management - 1"
MB	04	Monday	10:30 - 12:00	Salon IV	"Forecasting Innovation Pathways"
MB	05	Monday	10:30 - 12:00	Salon V	"Knowledge Management - 1"
MB	06	Monday	10:30 - 12:00	Salon VI	"Project/Program Management - 1"
MB	07	Monday	10:30 - 12:00	Guadalupe	PANEL: "Introducing the International Society of Service Innovation Professionals"
MB	08	Monday	10:30 - 12:00	San Carlos	"Resource Management - 1"
MB	09	Monday	10:30 - 12:00	Willow Glen I	"TM in Telecom - 1"
MB	10	Monday	10:30 - 12:00	Willow Glen II	"TM in Semiconductor/Electronics - 1"
MB	11	Monday	10:30 - 12:00	Willow Glen III	"Commercialization of Technology - 1"
MB	12	Monday	10:30 - 12:00	Silicon Valley Boardroom	PANEL: "UFO'S"
MD	00	Monday	14:00 - 15:30	Salon III-IV	PLENARY: "Plenary - 2"
ME	01	Monday	16:00 - 17:30	Salon I	"R&D Management - 1"
ME	02	Monday	16:00 - 17:30	Salon II	"Decision Making - 2"
ME	03	Monday	16:00 - 17:30	Salon III	"Innovation Management - 2"
ME	04	Monday	16:00 - 17:30	Salon IV	"Technology Transfer - 1"
ME	05	Monday	16:00 - 17:30	Salon V	"Leadership - 1"
ME	06	Monday	16:00 - 17:30	Salon VI	"Project/Program Management - 2"
ME	07	Monday	16:00 - 17:30	Guadalupe	"Supply Chain Management - 1"
ME	08	Monday	16:00 - 17:30	San Carlos	"Technology Adoption - 1"
ME	09	Monday	16:00 - 17:30	Willow Glen I	"Information Management - 1"
ME	10	Monday	16:00 - 17:30	Willow Glen II	"TM in Semiconductor/Electronics - 2"
ME	11	Monday	16:00 - 17:30	Willow Glen III	"Commercialization of Technology - 2"

TUESDAY, JULY 30, 2013

TA	00	Tuesday	08:30 - 10:00	Salon III-IV	PLENARY: "Plenary - 3"
TB	01	Tuesday	10:30 - 12:00	Salon I	"R&D Management - 2"
TB	02	Tuesday	10:30 - 12:00	Salon II	"Disruptive Technologies - 1"
TB	03	Tuesday	10:30 - 12:00	Salon III	"Innovation Management - 3"
TB	04	Tuesday	10:30 - 12:00	Salon IV	"Technology Transfer - 2"

SCHEDULE OF SESSIONS

TB	05	Tuesday	10:30 - 12:00	Salon V	“Knowledge Management - 2”
TB	06	Tuesday	10:30 - 12:00	Salon VI	“Project/Program Management - 3”
TB	07	Tuesday	10:30 - 12:00	Guadalupe	“Supply Chain Management - 2”
TB	08	Tuesday	10:30 - 12:00	San Carlos	“Manufacturing Management - 1”
TB	09	Tuesday	10:30 - 12:00	Willow Glen I	“Information Management - 2”
TB	10	Tuesday	10:30 - 12:00	Willow Glen II	“Competitiveness in Technology Management - 1”
TB	11	Tuesday	10:30 - 12:00	Willow Glen III	“Commercialization of Technology - 3”
TD	01	Tuesday	14:00 - 15:30	Salon I	“R&D Management - 3”
TD	02	Tuesday	14:00 - 15:30	Salon II	“Decision Making - 3”
TD	03	Tuesday	14:00 - 15:30	Salon III	“Innovation Management - 4”
TD	04	Tuesday	14:00 - 15:30	Salon IV	“Technology Forecasting - 1”
TD	05	Tuesday	14:00 - 15:30	Salon V	“Knowledge Management - 3”
TD	06	Tuesday	14:00 - 15:30	Salon VI	“Project/Program Management - 4”
TD	07	Tuesday	14:00 - 15:30	Guadalupe	“Technology Management Framework - 1”
TD	08	Tuesday	14:00 - 15:30	San Carlos	TUTORIAL: “Tech Mining”
TD	09	Tuesday	14:00 - 15:30	Willow Glen I	“TM in Biotech - 1”
TD	10	Tuesday	14:00 - 15:30	Willow Glen II	“Intellectual Property - 1”
TD	11	Tuesday	14:00 - 15:30	Willow Glen III	“Management of ICT - 1”
TE	01	Tuesday	16:00 - 17:30	Salon I	“NPD - 2”
TE	02	Tuesday	16:00 - 17:30	Salon II	“Decision Making - 4”
TE	03	Tuesday	16:00 - 17:30	Salon III	“Innovation Management - 5”
TE	04	Tuesday	16:00 - 17:30	Salon IV	“Technology Forecasting - 2”
TE	05	Tuesday	16:00 - 17:30	Salon V	“TM in Services - 1”
TE	06	Tuesday	16:00 - 17:30	Salon VI	“Enterprise Management - 1”
TE	07	Tuesday	16:00 - 17:30	Guadalupe	“Technology Marketing - 1”
TE	08	Tuesday	16:00 - 17:30	San Carlos	“Manufacturing Management - 2”
TE	09	Tuesday	16:00 - 17:30	Willow Glen I	PANEL: “Meet the Editors”
TE	10	Tuesday	16:00 - 17:30	Willow Glen II	“Competitiveness in Technology Management - 2”
TE	11	Tuesday	16:00 - 17:30	Willow Glen III	“Management of ICT - 2”

WEDNESDAY, JULY 31, 2013

WA	00	Wednesday	08:30 - 10:00	Salon III-IV	PLENARY: “Plenary - 4”
WB	01	Wednesday	10:30 - 12:00	Salon I	“Technology Roadmapping - 1”
WB	02	Wednesday	10:30 - 12:00	Salon II	“TM in Health - 1”
WB	03	Wednesday	10:30 - 12:00	Salon III	“Innovation Management - 6”
WB	04	Wednesday	10:30 - 12:00	Salon IV	“Technology Forecasting - 3”
WB	05	Wednesday	10:30 - 12:00	Salon V	“Knowledge Management - 4”
WB	06	Wednesday	10:30 - 12:00	Salon VI	TUTORIAL: “Aligning the Technology Business with a Quick-Hits Strategy”

SCHEDULE OF SESSIONS

WB	07	Wednesday	10:30 - 12:00	Guadalupe	“Technology Management Framework - 2”
WB	08	Wednesday	10:30 - 12:00	San Carlos	“Science and Technology Policy - 1”
WB	09	Wednesday	10:30 - 12:00	Willow Glen I	“TM in Wireless - 1”
WB	10	Wednesday	10:30 - 12:00	Willow Glen II	“Intellectual Property - 2”
WB	11	Wednesday	10:30 - 12:00	Willow Glen III	“Management of ICT - 3”
WD	01	Wednesday	14:00 - 15:30	Salon I	“Technology Roadmapping - 2”
WD	02	Wednesday	14:00 - 15:30	Salon II	“Technology Assessment and Evaluation - 1”
WD	03	Wednesday	14:00 - 15:30	Salon III	“Innovation Management - 7”
WD	04	Wednesday	14:00 - 15:30	Salon IV	“Emerging Technologies - 1”
WD	05	Wednesday	14:00 - 15:30	Salon V	“Knowledge Management - 5”
WD	06	Wednesday	14:00 - 15:30	Salon VI	“E-Business - 1”
WD	07	Wednesday	14:00 - 15:30	Guadalupe	TUTORIAL: “From User Experience to Benutzererlebnis – UX joins L10N to offer a better global user experience and change the world!”
WD	08	Wednesday	14:00 - 15:30	San Carlos	“Science and Technology Policy - 2”
WD	09	Wednesday	14:00 - 15:30	Willow Glen I	“TM in Energy - 1”
WD	10	Wednesday	14:00 - 15:30	Willow Glen II	“Intellectual Property - 3”
WD	11	Wednesday	14:00 - 15:30	Willow Glen III	“TM in Financial - 1”
WE	01	Wednesday	16:00 - 17:30	Salon I	“NPD - 3”
WE	02	Wednesday	16:00 - 17:30	Salon II	“TM in Health - 2”
WE	03	Wednesday	16:00 - 17:30	Salon III	“Innovation Management - 8”
WE	04	Wednesday	16:00 - 17:30	Salon IV	“Technology Forecasting - 4”
WE	05	Wednesday	16:00 - 17:30	Salon V	“TM in Services - 2”
WE	06	Wednesday	16:00 - 17:30	Salon VI	TUTORIAL: “Technology Roadmapping for Efficient and Clean Power”
WE	07	Wednesday	16:00 - 17:30	Guadalupe	“Collaborations for Technology Management - 1”
WE	08	Wednesday	16:00 - 17:30	San Carlos	“Science and Technology Policy - 3”
WE	09	Wednesday	16:00 - 17:30	Willow Glen I	“Environmental Issues - 1”
WE	10	Wednesday	16:00 - 17:30	Willow Glen II	“Management of Technical Workforce - 1”
WE	11	Wednesday	16:00 - 17:30	Willow Glen III	TUTORIAL: “You’re Entering the Analytics Zone..”

THURSDAY, AUGUST 1, 2013

HA	00	Thursday	08:30 - 10:00	Salon III-IV	PLENARY: “Plenary - 5”
HB	01	Thursday	10:30 - 12:00	Salon I	“Strategic Management of Technology - 1”
HB	02	Thursday	10:30 - 12:00	Salon II	“TM in Health - 3”
HB	03	Thursday	10:30 - 12:00	Salon III	“Innovation Management - 9”
HB	04	Thursday	10:30 - 12:00	Salon IV	“TM in Education - 1”
HB	05	Thursday	10:30 - 12:00	Salon V	“Entre/Intrapreneurship - 1”
HB	07	Thursday	10:30 - 12:00	Guadalupe	“Collaborations for Technology Management - 2”

SCHEDULE OF SESSIONS

HB	09	Thursday	10:30 - 12:00	Willow Glen I	TUTORIAL: “Regions 2.0 - A Living-Lab for Management Engineering and Technology Progress”
HB	10	Thursday	10:30 - 12:00	Willow Glen II	“Intellectual Property - 4”
HD	01	Thursday	14:00 - 15:30	Salon I	“Cultural Issues in Technology Management - 1”
HD	02	Thursday	14:00 - 15:30	Salon II	“Decision Making - 5”
HD	03	Thursday	14:00 - 15:30	Salon III	“Tracking Technological Emergence: Nano-Enhanced Drug Delivery”
HD	04	Thursday	14:00 - 15:30	Salon IV	“Technology Acquisition - 1”
HD	05	Thursday	14:00 - 15:30	Salon V	“Entre/Intrapreneurship - 2”
HD	07	Thursday	14:00 - 15:30	Guadalupe	PANEL: “Immigrant Entrepreneurs in Silicon Valley”
HD	09	Thursday	14:00 - 15:30	Willow Glen I	“Sustainability - 1”
HD	10	Thursday	14:00 - 15:30	Willow Glen II	“Management of Technical Workforce - 2”
HE	03	Thursday	16:00 - 17:30	Salon III	“PICMET 2014 Planning Session”

SCHEDULE OF SESSIONS BY ROOM

Session	Number	Day	Time	Room	Session Title
MA	00	Monday	08:30 - 10:00	Salon III-IV	PLENARY: “Plenary - 1”
MD	00	Monday	14:00 - 15:30	Salon III-IV	PLENARY: “Plenary - 2”
TA	00	Tuesday	08:30 - 10:00	Salon III-IV	PLENARY: “Plenary - 3”
WA	00	Wednesday	08:30 - 10:00	Salon III-IV	PLENARY: “Plenary - 4”
HA	00	Thursday	08:30 - 10:00	Salon III-IV	PLENARY: “Plenary - 5”
MB	01	Monday	10:30 - 12:00	Salon I	“NPD - 1”
ME	01	Monday	16:00 - 17:30	Salon I	“R&D Management - 1”
TB	01	Tuesday	10:30 - 12:00	Salon I	“R&D Management - 2”
TD	01	Tuesday	14:00 - 15:30	Salon I	“R&D Management - 3”
TE	01	Tuesday	16:00 - 17:30	Salon I	“NPD - 2”
WB	01	Wednesday	10:30 - 12:00	Salon I	“Technology Roadmapping - 1”
WD	01	Wednesday	14:00 - 15:30	Salon I	“Technology Roadmapping - 2”
WE	01	Wednesday	16:00 - 17:30	Salon I	“NPD - 3”
HB	01	Thursday	10:30 - 12:00	Salon I	“Strategic Management of Technology - 1”
HD	01	Thursday	14:00 - 15:30	Salon I	“Cultural Issues in Technology Management - 1”
MB	02	Monday	10:30 - 12:00	Salon II	“Decision Making - 1”
ME	02	Monday	16:00 - 17:30	Salon II	“Decision Making - 2”
TB	02	Tuesday	10:30 - 12:00	Salon II	“Disruptive Technologies - 1”

SCHEDULE OF SESSIONS

TD	02	Tuesday	14:00 - 15:30	Salon II	“Decision Making - 3”
TE	02	Tuesday	16:00 - 17:30	Salon II	“Decision Making - 4”
WB	02	Wednesday	10:30 - 12:00	Salon II	“TM in Health - 1”
WD	02	Wednesday	14:00 - 15:30	Salon II	“Technology Assessment and Evaluation - 1”
WE	02	Wednesday	16:00 - 17:30	Salon II	“TM in Health - 2”
HB	02	Thursday	10:30 - 12:00	Salon II	“TM in Health - 3”
HD	02	Thursday	14:00 - 15:30	Salon II	“Decision Making - 5”
HE	03	Thursday	16:00 - 17:30	Salon III	“PICMET 2014 Planning Session”
MB	03	Monday	10:30 - 12:00	Salon III	“Innovation Management - 1”
ME	03	Monday	16:00 - 17:30	Salon III	“Innovation Management - 2”
TB	03	Tuesday	10:30 - 12:00	Salon III	“Innovation Management - 3”
TD	03	Tuesday	14:00 - 15:30	Salon III	“Innovation Management - 4”
TE	03	Tuesday	16:00 - 17:30	Salon III	“Innovation Management - 5”
WB	03	Wednesday	10:30 - 12:00	Salon III	“Innovation Management - 6”
WD	03	Wednesday	14:00 - 15:30	Salon III	“Innovation Management - 7”
WE	03	Wednesday	16:00 - 17:30	Salon III	“Innovation Management - 8”
HB	03	Thursday	10:30 - 12:00	Salon III	“Innovation Management - 9”
HD	03	Thursday	14:00 - 15:30	Salon III	“Tracking Technological Emergence: Nano-Enhanced Drug Delivery”
MB	04	Monday	10:30 - 12:00	Salon IV	“Forecasting Innovation Pathways”
ME	04	Monday	16:00 - 17:30	Salon IV	“Technology Transfer - 1”
TB	04	Tuesday	10:30 - 12:00	Salon IV	“Technology Transfer - 2”
TD	04	Tuesday	14:00 - 15:30	Salon IV	“Technology Forecasting - 1”
TE	04	Tuesday	16:00 - 17:30	Salon IV	“Technology Forecasting - 2”
WB	04	Wednesday	10:30 - 12:00	Salon IV	“Technology Forecasting - 3”
WD	04	Wednesday	14:00 - 15:30	Salon IV	“Emerging Technologies - 1”
WE	04	Wednesday	16:00 - 17:30	Salon IV	“Technology Forecasting - 4”
HB	04	Thursday	10:30 - 12:00	Salon IV	“TM in Education - 1”
HD	04	Thursday	14:00 - 15:30	Salon IV	“Technology Acquisition - 1”
MB	05	Monday	10:30 - 12:00	Salon V	“Knowledge Management - 1”
ME	05	Monday	16:00 - 17:30	Salon V	“Leadership - 1”
TB	05	Tuesday	10:30 - 12:00	Salon V	“Knowledge Management - 2”
TD	05	Tuesday	14:00 - 15:30	Salon V	“Knowledge Management - 3”
TE	05	Tuesday	16:00 - 17:30	Salon V	“TM in Services - 1”
WB	05	Wednesday	10:30 - 12:00	Salon V	“Knowledge Management - 4”
WD	05	Wednesday	14:00 - 15:30	Salon V	“Knowledge Management - 5”
WE	05	Wednesday	16:00 - 17:30	Salon V	“TM in Services - 2”
HB	05	Thursday	10:30 - 12:00	Salon V	“Entre/Intrapreneurship - 1”

SCHEDULE OF SESSIONS

HD	05	Thursday	14:00 - 15:30	Salon V	“Entre/Intrapreneurship - 2”
MB	06	Monday	10:30 - 12:00	Salon VI	“Project/Program Management - 1”
ME	06	Monday	16:00 - 17:30	Salon VI	“Project/Program Management - 2”
TB	06	Tuesday	10:30 - 12:00	Salon VI	“Project/Program Management - 3”
TD	06	Tuesday	14:00 - 15:30	Salon VI	“Project/Program Management - 4”
TE	06	Tuesday	16:00 - 17:30	Salon VI	“Enterprise Management - 1”
WB	06	Wednesday	10:30 - 12:00	Salon VI	TUTORIAL: “Aligning the Technology Business with a Quick-Hits Strategy”
WD	06	Wednesday	14:00 - 15:30	Salon VI	“E-Business - 1”
WE	06	Wednesday	16:00 - 17:30	Salon VI	TUTORIAL: “Technology Roadmapping for Efficient and Clean Power”
MB	07	Monday	10:30 - 12:00	Guadalupe	PANEL: “Introducing the International Society of Service Innovation Professionals”
ME	07	Monday	16:00 - 17:30	Guadalupe	“Supply Chain Management - 1”
TB	07	Tuesday	10:30 - 12:00	Guadalupe	“Supply Chain Management - 2”
TD	07	Tuesday	14:00 - 15:30	Guadalupe	“Technology Management Framework - 1”
TE	07	Tuesday	16:00 - 17:30	Guadalupe	“Technology Marketing - 1”
WB	07	Wednesday	10:30 - 12:00	Guadalupe	“Technology Management Framework - 2”
WD	07	Wednesday	14:00 - 15:30	Guadalupe	TUTORIAL: “From User Experience to Benutzererlebnis – UX joins L10N to offer a better global user experience and change the world!”
WE	07	Wednesday	16:00 - 17:30	Guadalupe	“Collaborations for Technology Management - 1”
HB	07	Thursday	10:30 - 12:00	Guadalupe	“Collaborations for Technology Management - 2”
HD	07	Thursday	14:00 - 15:30	Guadalupe	PANEL: “Immigrant Entrepreneurs in Silicon Valley”
MB	08	Monday	10:30 - 12:00	San Carlos	“Resource Management - 1”
ME	08	Monday	16:00 - 17:30	San Carlos	“Technology Adoption - 1”
TB	08	Tuesday	10:30 - 12:00	San Carlos	“Manufacturing Management - 1”
TD	08	Tuesday	14:00 - 15:30	San Carlos	TUTORIAL: “Tech Mining”
TE	08	Tuesday	16:00 - 17:30	San Carlos	“Manufacturing Management - 2”
WB	08	Wednesday	10:30 - 12:00	San Carlos	“Science and Technology Policy - 1”
WD	08	Wednesday	14:00 - 15:30	San Carlos	“Science and Technology Policy - 2”
WE	08	Wednesday	16:00 - 17:30	San Carlos	“Science and Technology Policy - 3”
MB	09	Monday	10:30 - 12:00	Willow Glen I	“TM in Telecom - 1”
ME	09	Monday	16:00 - 17:30	Willow Glen I	“Information Management - 1”
TB	09	Tuesday	10:30 - 12:00	Willow Glen I	“Information Management - 2”
TD	09	Tuesday	14:00 - 15:30	Willow Glen I	“TM in Biotech - 1”
TE	09	Tuesday	16:00 - 17:30	Willow Glen I	PANEL: “Meet the Editors”
WB	09	Wednesday	10:30 - 12:00	Willow Glen I	“TM in Wireless - 1”
WD	09	Wednesday	14:00 - 15:30	Willow Glen I	“TM in Energy - 1”

SCHEDULE OF SESSIONS

WE	09	Wednesday	16:00 - 17:30	Willow Glen I	“Environmental Issues - 1”
HB	09	Thursday	10:30 - 12:00	Willow Glen I	TUTORIAL: “Regions 2.0 - A Living-Lab for Management Engineering and Technology Progress”
HD	09	Thursday	14:00 - 15:30	Willow Glen I	“Sustainability - 1”
MB	10	Monday	10:30 - 12:00	Willow Glen II	“TM in Semiconductor/Electronics - 1”
ME	10	Monday	16:00 - 17:30	Willow Glen II	“TM in Semiconductor/Electronics - 2”
TB	10	Tuesday	10:30 - 12:00	Willow Glen II	“Competitiveness in Technology Management - 1”
TD	10	Tuesday	14:00 - 15:30	Willow Glen II	“Intellectual Property - 1”
TE	10	Tuesday	16:00 - 17:30	Willow Glen II	“Competitiveness in Technology Management - 2”
WB	10	Wednesday	10:30 - 12:00	Willow Glen II	“Intellectual Property - 2”
WD	10	Wednesday	14:00 - 15:30	Willow Glen II	“Intellectual Property - 3”
WE	10	Wednesday	16:00 - 17:30	Willow Glen II	“Management of Technical Workforce - 1”
HB	10	Thursday	10:30 - 12:00	Willow Glen II	“Intellectual Property - 4”
HD	10	Thursday	14:00 - 15:30	Willow Glen II	“Management of Technical Workforce - 2”
MB	11	Monday	10:30 - 12:00	Willow Glen III	“Commercialization of Technology - 1”
ME	11	Monday	16:00 - 17:30	Willow Glen III	“Commercialization of Technology - 2”
TB	11	Tuesday	10:30 - 12:00	Willow Glen III	“Commercialization of Technology - 3”
TD	11	Tuesday	14:00 - 15:30	Willow Glen III	“Management of ICT - 1”
TE	11	Tuesday	16:00 - 17:30	Willow Glen III	“Management of ICT - 2”
WB	11	Wednesday	10:30 - 12:00	Willow Glen III	“Management of ICT - 3”
WD	11	Wednesday	14:00 - 15:30	Willow Glen III	“TM in Financial - 1”
WE	11	Wednesday	16:00 - 17:30	Willow Glen III	TUTORIAL: “You’re Entering the Analytics Zone..”
MB	12	Monday	10:30 - 12:00	Silicon Valley Boardroom	PANEL: “UFO’S”



PERSONAL SCHEDULE

	Sunday July 28, 2013	Monday July 29, 2013	Tuesday July 30, 2013	Wednesday July 31, 2013	Thursday Aug 1, 2013
08:00 – 08:30 Bright Start (Breakfast)					
08:30 – 10:00 (A)		Plenary - 1 (Salons III & IV)	Plenary - 3 (Salons III & IV)	Plenary - 4 (Salons III & IV)	Plenary - 5 (Salons III & IV)
10:00 – 10:30 Coffee Break					
10:30 – 12:00 (B)					
12:00 – 14:00 Lunch Break					
14:00 – 15:30 (D)		Plenary - 2 (Salons III & IV)			
15:30 – 16:00 Coffee Break					
16:00 – 17:30 (E)					PICMET '14 & '15 Planning Session (Salon III)
19:00 – 22:00	Welcome Reception (Salons III & IV)	Dinner San Jose State University "Tower Lawn"	Awards Banquet Salons III & IV		

PLENARIES

PLENARY SESSION—1

DATE: MONDAY, JULY 29, 2013
TIME: 08:30-10:00
ROOM: BALLROOM SALONS III & IV

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

KEYNOTE

Dr. Robert JT Morris, VP Global Labs, IBM Research, USA

“Science, Technology and Innovation in IT Services”



The services sector is the largest segment of advanced economies and is growing as a portion of the world economy. We will discuss why this is happening, not just in IT but also in many other industries. However, many services industries have struggled with problems of productivity and quality. We believe that the recipe for increasing the health of services industries

is by increasing the innovation in services, including through the broad application of science and technology. This belief led to the founding of services science as a discipline. We will discuss where progress has been made and where some stubborn problems remain, illustrating with examples from IT, financial services, health, education and government. Examples will be given of how innovation is evolving in growth markets, especially China and Africa. Finally, we will describe an emerging model called cognitive computing and show how it is contributing to the improvement of services industries.

Dr. Robert JT Morris is Vice President, Global Labs, IBM Research, where he is responsible for IBM Research Laboratories in China, India, Japan, Brazil, Australia and Africa. He leads these labs from the IBM Growth Market headquarters in Shanghai. From 2006-2011 he led Services Research across IBM from the TJ Watson Research Center in New York, and from 2004-2006 he led the transformation of IBM's services business to become technology-asset or IP-based.

From 1999-2004, he was the director of the IBM Almaden Research Center, a hub of applied research in computer, physical and behavioral sciences. Dr. Morris was also concurrently vice president for Personal Systems and Storage

Research at IBM. During this period the field of “services science” was initiated by IBM Research and developed working closely with university, industry and government partners. Earlier, he was a director at the IBM TJ Watson Research lab in New York, where he led teams in systems research. Originally from Australia, he began his career at Bell Laboratories where he was involved in developing a number of networking and computing technologies.

Dr. Morris was chairman of the Bay Area Science and Innovation Consortium (BASIC) from 2002-2005, an organization consisting of the heads of major research institutions in Silicon Valley and the San Francisco Bay Area. He has been a member of the National Academies' Government University Industry Research Roundtable, an Editor of IEEE Transactions on Computers, he has published more than 50 articles on computer science, electrical engineering, and mathematics, and he has received 11 patents. He is a member of the IBM Academy of Technology, a Fellow of the IEEE, and is on a number of advisory boards for leading universities and governments labs.

PLENARY SESSION—2

DATE: MONDAY, JULY 29, 2013
TIME: 14:00-15:30
ROOM: BALLROOM SALONS III & IV

Session Chair: Dr. Alan L. Porter, Director of Research, Search Technology, Inc., USA

KEYNOTE-1

Dr. Nam P. Suh, The 13th and 14th President, Korea Advanced Institute of Science and Technology (KAIST), Korea; and Ralph E. & Eloise F. Cross Professor, Emeritus, Massachusetts Institute of Technology (MIT)

“Challenges of Creating a World-Class University System”

A world-class science and technology (S&T) research university is a complex system that produces educated people, knowledge, and technological innovations, and provides services for public good. Creation and development of such a university system requires vision, long-term goals, strategic plans, organizations, effective management, and financial resources, in addition to outstanding faculty and students, competent professional staff, and functional physical facilities. The process of designing and developing an S&T research university is similar to the development of other innovative and com-

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plex systems. The more challenging aspect of the process for a research university is the creation of a culture that enables outstanding faculty and students to flourish in pursuit of knowledge and innovation, while garnering buy-in and enabling the concerted involvement of a majority of productive faculty and staff in the development and implementation of ambitious plans.

This presentation will describe how a strategic plan, created using axiomatic design, was implemented at KAIST in order to make it a world-class S&T research university. It changed the governance and academic policies to make it more productive and competitive in solving the most important problems humanity is facing today through research. Under the plan, KAIST has also initiated a new educational program that replaced traditional lectures with a new format of learning. Also, a new organizational and physical structure was created to promote research at the traditional disciplinary boundaries. Thanks to these efforts, the overall world ranking of KAIST was elevated from 196th in 2006 to 63rd in 2012, and in engineering to 24th. During this period, KAIST has appointed more than 350 new professors, increasing the number of faculty from about 400 to about 620. KAIST has also built 14 new buildings, including a modern medical center and a well-equipped modern sports complex. This was done to accommodate the increased faculty size, to improve the overall quality of campus life, and to have modern research infrastructure. Its research budget and the total annual budget increased by more than 2.5, while the basic government support for KAIST had decreased to 22% from over 40% of the overall budget during the same period. Also, the activities for basic research and technological innovation have increased significantly, which resulted in increases in major publications and technology innovations, e.g., On-Line Electric Vehicle (OLEV) and Mobile Harbor (MH). Many generous donors, who had no prior relationship with KAIST, gave significant gifts to KAIST to support its ambitious goals

Dr. Nam Pyo Suh was the 13th and 14th President of the Korea Advanced Institute of Science and Technology (KAIST). He is also the Ralph E. & Eloise F. Cross Professor, Emeritus, M.I.T. During his tenure at KAIST (from July 2006 to March 2013), its worldwide reputation has increased from 198th to 63rd overall and to 24th in engineering and IT. He was the presidential appointee in charge of engineering at NSF. He received nine honorary doctoral degrees. He is the recipient of the 2009 ASME Medal, the 2006 General Pierre Nicolau Award, the National Science Foundation's Distinguished Service Award, and many oth-



er distinguished awards. He is the author of over 300 papers and seven books, and holds more than 70 patents, including those related to the on-line electric vehicle (OLEV) and the Mobile Harbor (MH). He is a member of the Board of Trustees of King Abdullah University of Science and Technology (KAUST) and a member of the International Advisory Board of the King Fahd University of Petroleum and Minerals (KFUPM), and the Khalifa University of Science, Technology and Research (KUSTAR). He is a member of the Board of Directors of Axiomatic Design Software, Inc., OLEV Technology, Inc., and Parker Vision, Inc.

KEYNOTE-2

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

“Customer Integration in Technology Development of IT-based Services”

Customer integration into development processes is frequently recommended to align development outcomes with customer wants and expectations. Reports on success of this involvement are mixed. Most empirical results supporting the recommendations relate to customer-supplier relations that are either characterized by large numbers of customers or by a 1:1-relationship. It is less well understood what happens in those relationships which have a small number of customers. This is typical of highly complex development projects. In this situation particular conflicts might arise between customers and suppliers and among customers. The types of conflicts are explained. As uncertainty makes it impossible to regulate all conflicts by contractual relations, it is even more important to understand the reasons for conflicts and to invest in building trust. To achieve success, conflicts need to be foreseen by the supplier.



Dr. Klaus Brockhoff, in a teaching career spanning more than 40 years, has held business faculty positions at six universities, including the University of Bonn (Germany), University of Kiel (Germany), University of Lund (Sweden), New Jersey Institute of Technology (United States), and currently, since 1999, WHU—Otto Beisheim School of Management (Germany). A graduate of the University of Bonn and the University of Munster, and a former research fellow at the University of California, Berkeley, Dr. Brockhoff has documented his research in the areas of technology management, innovation management, business strategy, and business policy in 21 books and more than 280 articles, many of

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which were published in leading international research journals, such as *Management Science*, *Journal of Product Innovation Management*, *IEEE Transactions on Engineering Management and Research Policy*. He has consulted for numerous government and business organizations and has received two noteworthy awards, the Max Planck Research Award and Karl Heinz Beckurts Award. Dr. Brockhoff is also an elected member of the Berlin-Brandenburg Academy of Sciences (Berlin) and the Academy of Technology (Berlin); he sat on the board of six journals (including *Research Policy*, *R&D Management* and *Technology Analysis & Strategic Management*), two corporations (Steuler Industrierwerke, Metro Group), and three foundations (VolkswagenStiftung, Pro Futura Stiftungen, and WHU Foundation). He holds an honorary doctorate from the University of Berne (Switzerland).

PLENARY SESSION—3

DATE: TUESDAY, JULY 30, 2013
TIME: 08:30-10:00
ROOM: BALLROOM SALONS III & IV

Session Chair: Dr. James C. Spohrer, IBM Innovation Champion and Director of IBM University Programs (IBM UP), USA

KEYNOTE-1

Dr. James M. Utterback, David J. McGrath jr (1959)
Professor of Management and Innovation, MIT Sloan School of Management; and Professor of Engineering Systems, School of Engineering, Massachusetts Institute of Technology, USA

“Explorations in Technology, Innovation and Entrepreneurship”

Over the past 50 years, hundreds of scholars have contributed important ideas, research, articles, and books that address innovation and technology management. Contributors have been diverse coming from fields such as economics, history, management, sociology, political science, science and engineering, geography, population ecology, and law. Despite the variety of perspectives of the contributors to this body of work, their results show emergent and resonant themes. These include exploration of the sources of and stimuli for successful innovations; the importance of connections between actors in the innovation process; resources and actions related to success and value of innovations; the diffusion of innovations; consequences for firms, the economy, and society; the co-evolution of technology, markets, and institutions; and changes in many of

these factors over time and across cultures. *Explorations in Technology, Innovation and Entrepreneurship* will organize and highlight the work of some of the seminal authors in these streams of research. The work of one early contributor, William J. Abernathy, will be highlighted.

Dr. James M. Utterback is David J. McGrath jr (1959) Professor of Management and Innovation at the MIT Sloan School of Management and Professor of Engineering Systems in the School of Engineering at the Massachusetts Institute of Technology. Since receiving the Ph.D. in 1968 from the MIT Sloan School of Management, Prof. Utterback has held faculty positions at Indiana University, the Harvard Business School, and Chalmers Technical University as well as MIT. From 1983 through 1989, he served as Director of Industrial Liaison at MIT. He is author of *Mastering the Dynamics of Innovation*, published by Harvard Business School Press in 1994 and of *Design-Inspired Innovation*, published by World Scientific Press in 2006. His current research examines the sustained growth of newly formed technology-based firms worldwide at the confluence of bio and nanotechnology.



Dr. Utterback received the D.Sc. (Hon) from Chalmers University in Gothenburg, Sweden, in 1997, and was elected a foreign member of the Royal Swedish Academy of Engineering Sciences in 1999. He was elected a Life Fellow of Clare Hall at the University of Cambridge in 2006. Last year he received an honorary doctorate from Katholieke Universiteit Leuven in Belgium.

KEYNOTE-2

Dr. Adnan Akay, Vice President and Professor, Bilkent University, Turkey

“Technology Management in a Transdisciplinary World”

Technology continues to profoundly change our lives, how we make products, provide services, communicate, share information, and treat illnesses. Relied on by nations and businesses to increase their competitiveness, efforts across the globe are focused on accelerating technological advances to the market place, bringing innovation and improvements to quality of life, and thus fueling economic growth. All of these efforts are accompanied by a proliferation of quantity and availability of technical information challenging the boundaries of technology management. In particular, development and acquisition of technologies are facing intense challenges to demonstrate

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strategic use. The demarcation between scientist and engineer is blurring as the innovation cycle starts from the laboratory and ends in the market place. The recent attention drawn to the importance of transdisciplinary research brings with it new challenges to its management. This presentation will explore ideas from different organizational viewpoints of technology management as transdisciplinary research and technologies gain traction.



Dr. Adnan Akay joined Bilkent University in 2009 as Vice President and Professor to found the Mechanical Engineering Department, on a leave

of absence from Carnegie Mellon University. He moved to Bilkent from the National Science Foundation where he was the Director for the Civil, Mechanical and Manufacturing Innovation Division. Dr. Akay started his tenure at Carnegie Mellon in 1992 as a professor and head of the Mechanical Engineering Department and was awarded the Lord Chair in Engineering in 1997. Earlier he was on the faculty at Wayne State University where he last held the DeVlieg Chair in Engineering. He has held visiting appointments at MIT, the University of Rome "La Sapienza," and INSA de Lyon in France. Professor Akay's interest and activities in engineering education focus on broadening the basis of engineering and build on the concept of "multiple intelligences" to allow students become the renaissance engineers of tomorrow. His active research areas are on vibrations, acoustics, and tribology. He is the recipient of the Per Brüel Gold Medal in Acoustics and Noise Control (2005) and the Alexander von Humboldt Research Award (2011). He is a fellow of the American Society of Mechanical Engineers and the Acoustical Society of America.

PLENARY SESSION—4

DATE: WEDNESDAY, JULY 31, 2013

TIME: 08:30—10:00

ROOM: BALLROOM SALONS III & IV

Session Chair: Dr. Kiyoshi Niwa, Professor Emeritus, The University of Tokyo, Japan

KEYNOTE-1

Dr. Eliezer Geisler, Distinguished Professor, Stuart School of Business, Illinois Institute of Technology, USA

"Beyond Analytics: The Special Case How Technology Managers Translate Big Data into Actionable Decisions"

Analytics provides managers with tools to analyze massive data in today's organizations. However, there are theoretical and empirical gaps between the analysis of such data and the useful knowledge derived from it for managers to make decisions. This is the crux of the concept of "Beyond Analytics." The framework presented here links analytics with cognition and classifies managers by the mode in which they apply data analyses to their representations of organizational phenomena so that relevant decisions can be made. This allows us to establish a link which tailors data analyses to the manager's "preference platform," similar to targeting pharmaceuticals to patients by the analysis of their DNA. The framework is then constructed as a special case focused on technology managers. How do these managers construct the phenomenon of managing technology within their organizations by the use of the analysis of "big data" to which they are exposed? How do these managers process and translate such data to formulate adequate decisions in the conduct of their operational responsibilities? What makes these managers and their technology organizations different from other sectors and industries?

The framework presented here was tested empirically in a sample of 231 R&D and technology managers in five large organizations. The results provide a promising step in our ability to close the gap between analytics and actual decisions made by technology managers.

Dr. Eliezer (Elie) Geisler is a distinguished professor in the Stuart School of Business at the Illinois Institute of Technology. He holds a doctorate in organizational behavior from the Kellogg School at Northwestern University (1979). Dr. Geisler is the author and co-author of over 100 papers in the areas of the management, evaluation and metrics of R&D, innovation, science & technology, knowledge management and the management of medical technology. He is the author and co-author of 14 books, including: Managing the Aftermath of Radical Corporate Change (1997); The Metrics of Science and Technology (2000), also translated into Chinese; Creating Value with Science and Technology (2001); Installing and Managing Workable Knowledge Management Systems (2003, with Albert Rubenstein), Knowledge and Knowledge Systems: Learning from the Marvels of the Mind (2007), and Change in Organizations (2013). He was the founder and editor of the Department Of Information Technology for the IEEE Transactions on Engineering Management and is the co-founder and associate editor of the International Journal of Healthcare Technology and Management. He co-founded the international Health Care Technology

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Management Association and the series of conferences on the Hospital of the Future. Since 2001 these conferences were held in the Netherlands, U.S.A., United Kingdom, Denmark, Austria, and Italy. At the Illinois Institute of Technology, in 2003-2012, he founded and directed the IIT research Center for the Management of Medical Technology. Dr. Geisler consulted for major corporations and for many government departments and agencies. He served on over a dozen editorial boards for major journals in the fields of technology management and organizational behavior. He was chair of the College of Innovation Management and Entrepreneurship (COLIME) of the Institute of Management Sciences (INFORMS). Dr. Geisler has served on the board of directors of Mount Sinai Medical Center in Chicago, Illinois. His research was funded by, among many others, NASA, NSF, and IBM. His current research, teaching, and consulting activities focus on the organization and commercialization of technology, and on the nature, progress and diffusion of human and organizational knowledge, and the management of knowledge systems.

KEYNOTE-2

Dr. Hans Georg Gemuenden, Professor, Berlin University of Technology, Germany

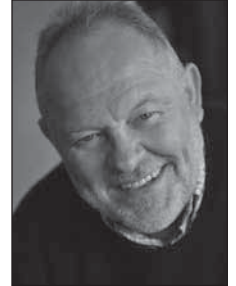
“Implementation of Innovation Strategies through Project Portfolio Management – Research Results from the TU Berlin Studies”

Companies perform a growing number of innovation projects simultaneously, contributing to a growing share of future value, thus increasing the relevance of their innovation project portfolio. However, increasing requirements from customers, suppliers, and regulatory institutions, and increasing interdependencies between projects regarding financial and human resources and knowledge, create difficulties to coordinate between projects and to align them to the business strategy. Many firms perform too many projects, do not spend their resources according to their business strategy, and they do not terminate projects consequently which have lost their justification.

In the last 10 years we have performed several studies analyzing how firms in German-speaking countries manage their innovative project portfolios, covering more than 1,000 portfolios with a combined budget of more than 100 billion Euros. We have looked at their multi-project management systems comprising an aligned set of organizational actors, strategies, structures, processes, methods (including IT), and cultures (including

incentives) to reach defined performance criteria of relevant stakeholders.

Our findings show that the set of relevant success factors comprises three dimensions: (1) strategic clarity, (2) operational transparency, and (3) responsiveness and pro-activeness.



Prof. Dr. rer. oec. habil. Hans Georg Gemuenden is a full tenured Professor at the Berlin University of Technology (TU Berlin). He has the Chair for Technology and Innovation Management. He received his “Diplomkaufmann” (equivalent to an MBA) and his Dr. rer. oec. at the University of Saarbrücken, and his habilitation degree at the University of Kiel.

He was chairman of the TIM Division of the Association of University Professors of Management from 2000-2002. He was representative-at-large of the TIM Division of the Academy of Management from 2009 until 2011 and responsible for the best-dissertation award in 2011. In January 2013 he became the editor of the Project Management Journal.

He was a member of several supervisory boards (Thyssen-Krupp Technologies AG, Hauck & Aufhauser, InnoZ). He hosted several international conferences: the IMP conference in Karlsruhe (1996), the G-Forum in Berlin (2006), and the IRNOP (2009) in Berlin.

He has published in Organization Science, Research Policy, Journal of Product Innovation Management, Creativity and Innovation Management, International Journal of Research in Marketing, Journal of Business Research, Management International Review, IEEE Transactions on Engineering Management, R&D Management, International Journal of Project Management, and Project Management Journal.

PLENARY SESSION—5

DATE: THURSDAY, AUGUST 1, 2013
TIME: 08:30—10:00
ROOM: BALLROOM SALONS III & IV

Session Chair: Dr. Jin Chen, Tsinghua University, Beijing, PR China

KEYNOTE-1

Dr. James C. Spohrer, IBM Innovation Champion and Di-

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rector of IBM University Programs (IBM UP), USA

“Students for a Smarter Planet”

The best way to predict the future is to inspire the next generation of students to build it better. The management of engineering and technology (MET) is a field that helps prepare student to build a smarter planet. Closely related to MET, IBM is encouraging the development of new tightly interconnected fields such as service science, data science, and urban science. The common characteristic of all these emerging fields is their boundary spanning nature. This talk will review the IBM Smarter Planet strategy, the rise of these new boundary spanning fields, and the transformation of education towards a challenge-based curriculum in which student teams guided by faculty from multiple disciplines, working with industry and government, are re-defining professional development in the 21st Century, and



giving rise to more T-shaped service innovation professionals who understand the benefits of complex service system platforms for scaling the benefits of new knowledge globally and rapidly. In addition, this talk will describe 11 innovation trends that will transform all major industries and the planet over the next two decades.

Dr. James (“Jim”) C. Spohrer is IBM Innovation Champion and Director of IBM University Programs (IBM UP). Jim works to align IBM and universities globally for innovation amplification. Previously, Jim helped to found IBM’s first Service Research group, the global Service Science community, and was founding CTO of IBM’s Venture Capital Relations Group in Silicon Valley. During the 1990’s while at Apple Computer, he was awarded Apple’s Distinguished Engineer Scientist and Technology title for his work on next generation learning platforms. Dr. Spohrer has a Ph.D. in Computer Science/Artificial Intelligence from Yale and a BS in Physics from MIT. His current research priorities include applying service science to study nested, networked holistic service systems, such as cities and universities. He has more than 90 publications and been awarded nine patents.

KEYNOTE-2

Dr. Francoise D. Roure, French High Council for Economy, Industry, Energy and Technologies, France

“Managing Immersive Technology: A Shared Responsibility”

Immersive Technology (Im-Tech) may be defined as a set of technologies and systems creating a persistent, individual and shared, 4D perception of reality in cyberspace, whose main added-value is to produce radical, potentially unlimited innovation. Im-Tech gives access to powerful tools for design with applications along the value chains from the conception to the end of the product life cycle. Already used in the car and aircraft industries as well as in the energy sector, Im-Tech also paves the way for “safer by design” products and systems, with the possibility to include, at a very early stage, the societal issues brought in by consumers and citizens. This powerful tool may also be subject to misuse and create actual societal concerns. Societal engineering enhanced by immersive technology may deliver low hanging fruits like shaping the energy demand in areas where smart grids are implemented; but misuses of Im-Tech, by error or by will, must be avoided to ensure their ability to keep aligned with stakeholders’ trust. This is where the shared responsibility appears. The presentation will provide options for managing immersive technology and its induced innovations in a shared, responsible way.

Dr. Francoise D. Roure is an economist specialized in emerging technologies. She is currently the chair of the committee “Technology and Society” of the French High Council for Economy, Industry, Energy and Technologies, a national advisory body chaired by the minister in charge of economy. She was elected in 2011 Chair of the OECD Working Party of Nanotechnology.



Dr. Roure has two Ph.D.s in international and industrial economics. As a civil servant, she has contributed since 1992 to international and European regulations. She also advises the European Commission on International Dialogues related to the Responsible Research and Innovation required by Emerging and Converging Technologies (in particular nanotechnologies, synthetic biology). She is also an associated researcher at University of Paris-1 Pantheon-Sorbonne.

Dr. Roure’s most recent contribution to the European Union in the field of responsible research and innovation is a report published in 2013 by the European Commission: “Options for Strengthening Responsible Research and Innovation” (http://ec.europa.eu/research/science-society/document_library/pdf_06/options-for-strengthening_en.pdf).

PHD COLLOQUIUM

GETTING YOUR PH.D.... AND BEYOND

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

DATE: SUNDAY, JULY 28

TIME: 13:00—17:00

LOCATION: GUADALUPE

REGIST: \$35

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 versus 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.

Please contact Professor Antonie Jetter at jettera@cecs.pdx.edu if you have any questions about the Colloquium.



TUTORIALS

TECH MINING

DATE: TUESDAY, JULY 30

TIME: 14:00-15:30

LOCATION: SAN CARLOS

SPEAKER: Dr. Alan L. Porter, Director of Research, Search Technology, Inc., USA; Mr. Nils C. Newman, Director, New Business Development, Search Technology, Inc., USA

“Tech mining” is shorthand for text mining of science, technology & innovation (ST&I) information resources to inform management and policy decision making. We are involved with PICMET sessions on emerging technologies (“Nano-Enhanced Drug Delivery”) and technology forecasting (“Forecasting Innovation Pathways”) that rely on tech mining to develop “competitive technical intelligence.” That addresses basic questions of “who is doing what, where, and when” in terms of R&D and commercialization of an emerging technology. This training session describes how such analyses are done. The basic approach entails search on the ST&I topic of interest in multiple databases that index R&D, business, or related activity. Search results are downloaded to a desktop computer (often in minutes) for convenient data cleaning and analyses in a Windows environment. We demonstrate such steps using VantagePoint software to take sample data through these stages to generate a range of tabulations and visualizations to identify key players (e.g., companies), their emphases, and potential developmental priorities. Such ST&I intelligence can inform decisions regarding R&D management (e.g., portfolio management), competitor threats and joint development opportunities, and likely innovation pathways.



Dr. Alan L. Porter's major concentration is technology intelligence, forecasting and assessment. He has led development of “technology opportunities analysis” -- mining electronic, bibliographic data sources to generate intelligence on emerging technologies. He received a B.S. in Chemical Engineering from Caltech (1967) and a PhD in Engineering Psychology from UCLA (1972).

Dr. Porter is Director of R&D for Search Technology, Inc., Norcross, GA, pursuing application of VantagePoint software to analyze emerging technologies and profile

research domains. He is author or editor of 12 books, some 175 articles, and co-founded the International Association for Impact Assessment (IAIA) in 1980, serving as president (1995-96).

He is also Professor Emeritus of Industrial & Systems Engineering, and of Public Policy at Georgia Tech, where he remains involved with the Technology Policy and Assessment Center.

Nils Newman has worked for nearly two decades on the development of analytic tools to assist in the management of technology. His work focuses on the use of bibliographic and patent information in research evaluation, competitive intelligence, and strategic planning. Mr. Newman has a Bachelor of Mechanical Engineering and an MS in Technology and Science Policy from Georgia Tech. In his spare time, he is pursuing a PhD in Economics from UNU-MERIT at the University of Maastricht in the Netherlands studying the economics of technical change.

ALIGNING THE TECHNOLOGY BUSINESS WITH A QUICK-HITS STRATEGY

DATE: WEDNESDAY, JULY 31

TIME: 10:30-12:00

LOCATION: SALON VI

SPEAKER: Mr. Jeffrey Busch, Jeffrey S. Busch PMP, USA

Strategy is about applying principles that are adaptive to businesses whether it is during economic growth, stabilization or in the midst of a downturn in order to maintain a profitable business. This tutorial will discuss strategy as a self-defined position that lays the framework for outward and inward looking perspectives, especially in the technology arena. It will combine a number of strategic business components such as the relationship between strategy and goals, sustainable competitiveness, innovation, value increasing business actions and strategy assessments. The objective is to deliver fast returns for the business through a strategic Quick-HitsSM approach. A Quick-hits approach is not about large initiatives or business makeovers developed through strategic planning. Rather, it is about the operational adjustments and for the business to ask questions of itself, seeking efficiencies, being creative and taking specific, practical approaches to satisfying an identified need. The speaker has used this strategy in his consult-

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ing practice to deliver fast, cost efficient services to clients across multiple industries. A few of the application tools will be demonstrated during this seminar.

Jeffrey S. Busch is a recognized authority on project management, scheduling and alternative dispute management with more than 30 years of experience covering consulting and training for various industries including design/construction, product development/manufacturing and semi-conductor/IT/software across the US and the globe.



In 2003 he retired from a principal position at Pinnell-Busch, Inc., a leading project management firm that seeks out new ventures and challenges in project management. He provides independent consulting, is a senior consultant/trainer with Cadence Management Corporation, and teaches as an adjunct professor at Portland State University, USA. He has worked for such organizations as eBay, Starbucks, Boston Scientific, Network Appliance, Kimberly-Clarke, AT&T Federal Systems, CH2M Hill, Northwest Natural Gas, Boise, Freightliner, Tektronix, Nike, AMD, Polaris Industries, Tyson Foods, Rockwell Collins, Spansion, and Johnson & Johnson. As a practitioner he has facilitated consulting and training sessions for federal, state and local governments and more than 300 corporations in the US and abroad. He has served on committees with PMI Global Operations, including a 2006/07 role as a core team lead with PMI Standards for the development and publication of the Second Edition of the Construction Extension (2008) to the *PMBOK Guide*.

FROM USER EXPERIENCE TO *BENUTZER-ERLEBNIS* – UX JOINS L10N TO OFFER A BETTER GLOBAL USER EXPERIENCE AND CHANGE THE WORLD!

DATE: WEDNESDAY, JULY 31
TIME: 14:00-15:30
LOCATION: GUADALUPE

SPEAKER: Mr. Loic Dufresne de Virel, Localization Strategist, Intel Corp., USA

There is much to gain by combining UX and L10N, too often afterthoughts in the world of software development,

to provide a better global user experience. From basic internationalization best practices to customization and culturalization aspects, we will start by covering topics that might seem trivial but present some significant challenges from a user experience and localization standpoint: organization and display of information, from highly hierarchical societies to less “distant” communities; methods of payment – COD, Paypal, Credits Cards, etc. If you end up doing business there, you probably still want to get paid; collection of personal information and use of “forms” – including privacy issues that, yes, might vary from country to country; handling of genders, numbers, cases, and declensions – how to properly code “You and %d friends like this” so it can be translated into multiple languages; language selection, and more. We will then look into the new usage models offered by technologies such as machine translation, voice recognition, or perceptual computing, which promise to change the way we access content and interact with our devices, by making the content more “self-aware” and intelligent, and making the computing experience more natural, intuitive, and immersive. At the end of the day, these technologies will allow us to bridge the digital divide by enabling people who do not speak English or cannot read / write to access and consume information, thus redefining the concept of literacy.



Loic Dufresne de Virel is the localization strategist within Intel’s in-house localization team. His main activities include overseeing the use of Intel’s translation management system and deployment of other localization tools, constantly advocating for proper and improved internationalization and localization practices and processes for web,

software and “print” collateral, as well as defining the training roadmap for localization and internationalization or exploring new areas of application for his expertise, such as Digital Health or Perceptual Computing.

TECHNOLOGY ROADMAPPING FOR EFFICIENT AND CLEAN POWER

DATE: WEDNESDAY, JULY 31
TIME: 16:00-17:30
LOCATION: SALON VI

SPEAKER: Mr. James R. Bowen, Program Analyst, Bonn-

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eville Power Administration, USA; Dr. Tugrul U. Daim, Associate Professor, Portland State University, USA; Ms. Judith A. Estep, Program Analyst, Bonneville Power Administration, USA; Mr. James Hillegas-Elting, Bonneville Power Administration, USA; Mr. Ibrahim Iskin, Portland State University, USA; Mr. Jisun Kim, Bonneville Power Administration, USA; Mr. Terry Oliver, Chief Technology Innovation Officer, Bonneville Power Administration, USA

Throughout its history, the Bonneville Power Administration (BPA) has been successful in responding to political, business, environmental and technological changes and demands. BPA has earned regional, national and international recognition as an innovative leader in technology breakthroughs and achievements that have saved regional electricity consumers millions of dollars. In addition, the Agency has significantly contributed to the overall development of, and incremental improvements to, the high-voltage power system in the Pacific Northwest, energy efficiency programs that support regional and national goals, non-wire solutions and environmental technologies. Technology roadmaps are created to support research and development (R&D) agendas that meet the strategic goals of industries and organizations with research needs. BPA's technology roadmaps are essentially a snapshot of current perspectives to inform a research agenda that will help BPA adapt to a new environment in which technology, regulation, generation resources, customer demands and power flows are changing dramatically.

This tutorial will review the technology roadmapping process at BPA and will introduce the most recent energy efficiency technology roadmap. Technology has played a central role in the Northwest's development, from the Federal Columbia River Power System to technology giants like Boeing, Microsoft and Intel; and it has impacted thousands of businesses, universities and laboratories. This savvy has allowed the region to meet half of its load growth through cost-effective investments in energy efficiency for more than 30 years. Through the leadership of the region's utilities, labs, universities, energy organizations and private businesses, the Northwest has been able to successfully deliver energy efficiency as a reliable resource.

The Northwest Power and Conservation Council's Sixth Power Plan calls for roughly 85 percent of the region's load growth to be met with energy efficiency by 2030. To meet these goals, we must find ways to increase the adoption rates of existing products and services. At the

same time, we must also strategically target the region's research and development resources into efforts that will produce the technologies needed to enable the products of tomorrow. In December 2009, 35 experts from 20 organizations pooled their efforts to develop an energy efficiency technology roadmap portfolio that would define a research agenda for the Northwest. The results of the intensive 10-week effort have been expanded and refined through additional workshops and the integration of critical comments from experts beyond the region. Revised drafts of the National (formerly Northwest) Energy Efficiency Technology Roadmap Portfolio were released in March and July 2010; March 2011; March, August, and September 2012; and January 2013.

The Technology Executive Committee of the United Nations Framework Convention on Climate Change referenced the Energy Efficiency Technology Roadmap as an example of a "good practice" roadmap.

YOU'RE ENTERING THE ANALYTICS ZONE...

DATE: WEDNESDAY, JULY 31
TIME: 16:00-17:30
LOCATION: WILLOW GLEN III

SPEAKER: Mr. Tim O'Bryan, AnalyticsZone - Product Evangelist, IBM, USA



In this session, you will see an interactive demonstration of business and entertainment related applications developed in the personal analytics solution, IBM Cognos Insight. IBM Cognos Insight delivers outstanding data interactivity, analysis and visualization capabilities to individual desktop users. You will see how IBM Cognos Insight allows users to import, merge and analyze data on your desktop, build custom dashboards and applications without scripting, optimize outcomes through what-if analysis any time, create compelling visualizations to help you deliver insights in the most meaningful and understandable way for your role or organization, and support collaboration and action at the team or enterprise level.

Tim O'Bryan has developed and delivered customer programs delivering product and process best practices in IBM's Business Analytics division. Tim rou-

TUTORIALS

tinely meets with customers and prospects discussing analytics-based strategies for driving better insight and decision making. Prior to his current role in IBM's AnalyticsZone, he was a Cognos Services engagement manager for their Central U.S. Region while spending over 10 years as a principal consultant building financial applications and reporting solutions for both Cognos and Hyperion Solutions. These implementations focused on enabling practices such as enterprise planning, business forecasting, financial consolidation, financial reporting, management reporting, strategy management, and scorecarding. Previous to this, Tim worked in various finance department positions in the consumer products and financial services industries.

REGIONS 2.0 - A LIVING-LAB FOR MANAGEMENT ENGINEERING AND TECHNOLOGY PROGRESS

DATE: THURSDAY, AUGUST 1

TIME: 10:30-12:00

LOCATION: WILLOW GLEN I

SPEAKER: Dr. James C. Spohrer, IBM University Programs World Wide, USA

This will be an engaging and interactive tutorial hosted by Jim Spohrer, who will guide you through a series of steps to articulate your expectations or hopes for what industry, students and faculty should be doing to create and maintain an upward spiral of capabilities in regions around the world. You will be organized into groups with representatives from each constituency and taking on a role, and you will compose a manifesto for industry, students or faculty. How might we deploy apprenticeships? There are the old ways of doing things, but then there are new and better, faster, and cheaper ways to be invented. However, what if they are disruptive and displace labor (people from jobs), and therefore people will need to find new jobs and new skills and new productive activities as this goes faster and faster. What kind of system can young people be part of? You will capture your assertions and ideas, and we will publish them on one of our platforms. It is possible that this output could be the basis for a new white paper!

Dr. James ("Jim") C. Spohrer is IBM Innovation Champion and Director of IBM University Programs (IBM UP).



He works to align IBM and universities globally for innovation amplification. Previously, he helped to found IBM's first Service Research group, the global Service Science community, and was founding CTO of IBM's Venture Capital Relations Group in Silicon Valley. During the 1990's while at Apple Computer, he was awarded Apple's Distinguished Engineer Scientist and Technol-

ogy title for his work on next generation learning platforms. Dr. Spohrer has a Ph.D. in Computer Science/Artificial Intelligence from Yale and a BS in Physics from MIT. His current research priorities include applying service science to study nested, networked holistic service systems, such as cities and universities. He has more than 90 publications and been awarded nine patents.



PANELS

INTRODUCING THE INTERNATIONAL SOCIETY OF SERVICE INNOVATION PROFESSIONALS

DATE: MONDAY, JULY 29
TIME: 10:30-12:00
LOCATION: GUADALUPE

MODERATOR: James C. Spohrer, IBM

PANELISTS: Stephen Kwan, San Jose State University; Yassi Moghaddam, International Society of Service Innovations Professionals; Yuriko Sawatani, Waseda University

A new organization, the International Society of Service Innovation Professionals (ISSIP), has been formed (www.issip.org/). The council is made up of executives from IBM, CISCO, HP and other companies. It is "...a democratically run non-profit organization. Individual and institutional members work together to expand career options for service innovators while impacting business and society through new and improved service innovations." The council members of ISSIP will present a panel to discuss the mission of the organization: "To promote service innovations for our interconnected world" through professional development, education, research, practice, and policy work of its member individuals and institutions working hard to improve our world's diverse, interconnected, complex service systems. This is part of ISSIP's effort to connect the many diverse professional associations (such as PICMET, IEEE, ACM, AMA, INFORMS, AIS, etc.) that have service science-related special interest groups or focus areas to support their conferences and publications, linking members from academia, industry, government, and the social sector. The panel will also discuss what does a professional association in the 21st century look like, and what should a 21st century service professional's CV look like?

UFO'S

DATE: MONDAY, JULY 29
TIME: 10:30-12:00
LOCATION: SILICON VALLEY BOARDROOM

MODERATOR: Charles W. N. Thompson, Northwestern University

PANELISTS: Eliezer Geisler, Illinois Institute of Tech-

nology; Donald Kennedy, Willbros Group, Inc.; Simon Philbin, Imperial College London

Last year, in Vancouver, a panel forecasting PICMET 2020 was scheduled just after the opening plenary session with the intention of providing a venue for those who were not already committed to a specific session during that period and needed a place to go. This panel is intended to provide, in part, that same function, but it also provides a forum for discussing relevant but orphan issues – issues that concern technology management and managers but do not conveniently fit into the several conventional categories that provide a framework for organizing



sessions. The topic is UFO's. Not Allen Hynek's or Major Kehoe's (two of the three who, back then, really knew whether they existed or not). This is about unusual, unconventional, universal forms of organization. The grand daddies, functional and project, have seen additions come and go, e.g., informal, matrix, hierarchical, street corner, and there is a formal literature on most of these. What about the informal literature? What about block parties, flea markets, or dorm roommates hatching golden eggs? An eclectic panel of experts and wannabes is proposed to open this Pandora's Box.

MEET THE EDITORS

DATE: THURSDAY, JULY 30
TIME: 10:30-12:00
LOCATION: WILLOW GLEN I

MODERATOR: Tugrul U. Daim, Portland State University

PANELS

PANELISTS: Gloria Barczak, Northeastern University; Toni Doolen, Oregon State University; Hans Georg Gemuenden, Berlin University of Technology; Fred Phillips, Stony Brook - State University of New York; Ozcan Saritas, Istanbul Technical University; Steven Walsh, University of New Mexico

Meet the editors of the Technology Management related journals. The editors will discuss the philosophies, criteria, and submission processes of their journals and answer questions from prospective authors.

IMMIGRANT ENTREPRENEURS IN SILICON VALLEY

DATE: THURSDAY, AUGUST 1
TIME: 14:00-15:30
LOCATION: GUADALUPE

PANELISTS: Anuradha Basu, San Jose State University; Xiaohong (Iris) Quan, San Jose State University

Immigrants have played a key role in the growth of entrepreneurship in Silicon Valley, having founded more than half of all Silicon Valley startups between 1995 and 2005. Recent studies indicate two major trends. Firstly, most immigrant entrepreneurs in Silicon Valley have established “global start-ups” (Oviatt and Mc-

yet to be fully understood. A second, more recent trend, identified by Wadhwa (2012), suggests a slowdown in immigrant entrepreneurship in Silicon Valley and, more generally, in the U.S., with entrepreneurial and highly skilled immigrants from China and India returning to their home countries to start new companies or take up senior positions in multinational companies. The latter is attributed to U.S. immigration laws that have compelled many immigrants to return home, but it is also indicative of the growing market opportunities in China and India. This phenomenon merits further research to understand the role played by returnees in founding and funding new businesses and contributing to the growth of global startups by virtue of their transnational experience. This panel will discuss both of these important aspects of immigrant and transnational entrepreneurs, and the ways in which they contribute to their home country and the U.S./Silicon Valley economy.

PICMET '14 AND '15 PLANNING SESSION

DATE: THURSDAY, AUGUST 1
TIME: 16:00-17:30
LOCATION: SALON III

This panel session will provide an opportunity to give feedback on PICMET '13 and to get involved in the planning for PICMET '14 and '15 conferences. PICMET '14 will be held July 27-31, 2014, at the ANA Crowne Plaza in Kanazawa, Japan. PICMET '15 will be held August 2-6, 2015, at the Hilton Portland & Executive Tower in Portland, Oregon, USA.



Dougall 1994) or “born globals” (Knight and Cavusgil, 1996) that operate in multiple countries from inception. However, the precise ways in which these operate and the underlying success factors of global start-ups have



SESSIONS

MA-00 PLENARY - 1

DATE: MONDAY, 7/29/2013
TIME: 08:30 - 10:00
ROOM: SALON III-IV
CHAIR: DAVID M STEELE; SAN JOSE STATE UNIVERSITY

MA-00.1 [K] Science, Technology and Innovation in IT Services

Robert Morris; IBM Research, United States

The services sector is the largest segment of advanced economies and is growing as a portion of the world economy. We will discuss why this is happening, not just in IT but also in many other industries. However, many services industries have struggled with problems of productivity and quality. We believe that the recipe for increasing the health of services industries is by increasing the innovation in services, including through the broad application of science and technology. This belief led to the founding of services science as a discipline. We will discuss where progress has been made and where some stubborn problems remain, illustrating with examples from IT, financial services, health, education and government. Examples will be given of how innovation is evolving in growth markets, especially China and Africa. Finally, we will describe an emerging model called cognitive computing and show how it is contributing to the improvement of services industries.

MB-01 NPD - 1

Monday, 7/29/2013, 10:30 - 12:00

Room: Salon I

Chair(s) Timothy Anderson; Portland State University

MB-01.1 [R] Embedding Technology Vendors for Developing Improved Performance and Sustainable Capabilities in Product Development

Rakesh Hira; University of Pretoria, South Africa

Kai-Ying Chan; University of Pretoria, South Africa

Embedding technology vendors within the organization allows improvement of product development performance and sustainable capabilities. This empirical research aims to investigate the relationships between embedding vendors and the performance of product development and product development capabilities (PDC) using a case study of a large South African pay-TV provider. Data was collected by means of questionnaire survey from 40 team members who were involved in ten different product development projects. The research findings show that two integration factors, namely, the timing of vendor involvement and the extent of technology fit with the organization, are the significant contributors towards developing improved PDC. Both factors contribute towards improved differentiation and integration of skills, decision-making, communications, development flexibility, and reduced support requirements from top management. Early involvement also leads to improved resource availability, while longer relationships with vendors further improves communications, reduces support requirements from top management, and leads to shorter turn-around times.

MB-01.2 [R] New Product Development: From Efficiency to Value Creation

Marcelo A Machado; Kwantlen Polytechnic University, Canada

New product development (NDP) is a major source of competitive advantage to companies. For decades researchers have studied the phenomena and various approaches have emerged over the years. Firstly, NDP was structured in clearly defined phases or stages to enable a quick and risk-free flow from idea to launch. Later, concurrent engineering (CE), in which critical development phases are performed simultaneously, was successfully introduced by Japanese companies like Toyota. In recent years, CE has become a widely used option world-wide. CE proven benefits include reduced time-to-market, reduced human and capital cost, and increased product quality, all factors related to project efficiency.

More recently, lean product development (LPD) validated some aspects of CE (e.g., overlapping of phases) but proposed a more structured way of reducing non-value added activities. The main objective of this study is to discuss the idea that thus far NPD research has mostly focused on efficiency—eliminating waste, reducing time-to-market and costs. This study also discusses the need for an emphasis on creativity in NPD to enhance value creation. In terms of organization, this study contains a literature review on CE, LPD, and group creativity. This study also proposes an abstract model combining concurrent and lean product development aiming at enabling both creativity and efficiency, consequently enhancing value creation. Lastly, limitations and opportunities for future research are proposed.

MB-01.3 [R] Module Based Release Planning for Technical Changes

Guenther Schuh; RWTH Aachen University, Germany

Sasa Aleksic; RWTH Aachen University, Germany

Jens Amoscht; RWTH Aachen University, Germany

Increasing international competition as well as profound individualization of customer requirements are in the present time only manageable if companies make systematical use of synergies by product platforms and “volume bundling” effects for components of various products. Latest surveys outline the fact that producing companies restructure their mechatronic products in modular product architectures. This is supported by the availability of multiple approaches for defining modular product architectures. However, the wide range of available modularization approaches does not answer the question of how flexible modules must be in their further lifecycle regarding changes and how release cycles have to be defined. Studies imply that more than 50% of the changes made to a product containing mechatronic systems are conducted after the start of production. In the absence of early planning this leads to increasing complexity and dissipation of resources. The success of the modular product architectures after implementation thus is largely dependent on consequent and early release planning. This paper outlines a novel approach to implement release planning during the design of modular product architectures. By thoroughly planning modules and product releases whilst setting up the modular product architecture, a profound base for the planning and future realization of the releases is set. Moreover, this approach is extended in order to cover the identification of the optimal introduction point of a technical change.

MB-02 Decision Making - 1

Monday, 7/29/2013, 10:30 - 12:00

Room: Salon II

Chair(s) Oliver Yu; San Jose State University

MB-02.1 [R] Models-Talking-to-Models for Policy

Frederick Betz; Portland State University, United States

Fred Phillips; SUNY-Korea and SUNY Stonybrook, Korea, South

As is well known, research on the challenge of having computers communicate with computers led eventually to the technology of the Internet, and the Internet changed the world. So too it may be possible that attaining the capability of models communicating with models will alter the world of policy making. A methodological problem occurs in this approach when the situation a policy addresses is complicated and requires more than a single model to characterize the situation. Then models need to connect to one another for a full characterization of the situation. A second methodological problem occurs when more than one policy addresses a situation, then also the models underlying each policy must connect to one another in order to fully understand the interactions between policies. We explore the idea of a “model ontology.” We apply this concept to the issue of communication between models, proposing both a theoretical framework and an initial structuring of knowledge for practice.

MB-02.2 [A] Using a Group Decision Support System to Make Investment Prioritisation Decisions

Martin Read; University of Portsmouth, United Kingdom

SESSIONS

Tony Gear; University of Gloucestershire, United Kingdom
Leonard Minkes; University of Birmingham, United Kingdom
Ann Irving; Southampton Solent University, United Kingdom

This paper is concerned with how decision making groups involved in making investment prioritisation decisions involving funding of technology and science projects may be supported by a group decision support system (GDSS). While interested in decision outcomes, the primary focus of this paper is the role of a group support system as an aid to developing shared understanding within a group. The paper develops the conceptual framework of decision-making, communication and group support, and demonstrates, through a field application involving a strategic investment decision making group, how a group decision support system based on individual handsets can support the development of shared understanding in the group decision-making process. By quickly highlighting on differences of opinion, the system enabled discussions to be focused on the important areas of disagreement, and also reduced negative group affects such as domination. This leads to improved shared understanding between members of the group, and the possible generation of additional options. We suggest that the usefulness of these types of systems, at this stage of their development, are in their role of developing shared understanding and learning between members of a decision making group.

MB-03 Innovation Management - 1

Monday, 7/29/2013, 10:30 - 12:00

Room: Salon III

Chair(s) Hitoshi Abe; OKI Electric Industry Co., Ltd.

MB-03.1 [R] Collective Innovation: A Literature Review

Kai Wang; Stevens Institute of Technology, United States

Open innovation, the innovation model characterized by permeable firm boundary for innovations, is gaining popularity. At the intersection of open innovation and collective intelligence lies collective innovation, an approach of innovation from crowd. First, some relevant topics, such as open innovation and crowdsourcing, are reviewed to present a big picture. The concept of collective innovation is differentiated from similar terms. Then different aspects of collective innovation are reviewed, including its advantage, typology, mechanisms, tools, motivation of the crowd, and the performance. Finally, future research directions are discussed.

MB-03.2 [R] Determining Factors in the Unforeseeable Uncertainty Management in Innovation Projects

Rosaria M Russo; FEA/USP, Brazil
Roberto Sbragia; FEA/USP, Brazil
Abraham S Yu; FEA/USP, Brazil

The more innovative a project is, the greater the probability of occurrence of unforeseeable uncertainties. This kind of uncertainty would be realized through the identification of early signs of a change; however, for the recognition of these signs it is necessary to make sense of them. Thus, this study aims to recognize relevant factors that can block out or facilitate the management of unforeseeable uncertainties. A field survey was conducted based on a questionnaire about the projects that could be considered innovative. From the sample intentionally chosen, only 16 projects met the requirements of the study and they were considered units of analysis. Subsequently, for each project an in-depth interview was applied. The participant was requested to identify at least two unforeseen events as representative of unforeseeable uncertainties; thus we have obtained 35 unforeseen events, considered unit of analysis embedded. Data analysis was initially qualitative; in addition, a statistical analysis was made through non-parametric tests. The results pointed out determinant block factors as biases. The results of this analysis suggest incorporating the diagnosis of unforeseeable uncertainty, seeking areas of uncertainty for the project, and envisioning the more appropriate management methodology for each level of uncertainty.

MB-03.3 [R] Identifying Determinants of Broadband Diffusion by Stage and by Service

Mao-Shong Lin; National Chengchi University, Taiwan
Feng-Shang Wu; National Chengchi University, Taiwan

This study, based on a Gompertz diffusion model, examines the determinants of diffusion for total broadband, DSL, and cable modem services by applying the Arellano-Bond GMM dynamic panel estimation with the data for OECD countries from 1997 to 2009. For an overall diffusion, the determinants of the services are commonly the same. This study further examines the determinants in three diffusion stages segmented based on the Innovation Diffusion Theory proposed by Rogers. For the same service, the estimation results indicate that the determinants differ by diffusion stage. The reason is very possibly due to the different adopter attributes in each stage. Except for the early majority stage, the determinants in each stage are also different between DSL, cable, and total broadband services. Therefore, governments or service providers should tailor appropriate policies or strategies by stage and by type of service instead of adopting one-sizes-fit-all strategies.

MB-04 Forecasting Innovation Pathways

Monday, 7/29/2013, 10:30 - 12:00

Room: Salon IV

Chair(s) Alan L Porter; Search Technology, Inc.

MB-04.1 [R] The Role of Text Mining of Patent in Mergers and Acquisitions

Lu Huang; Beijing Institute of Technology, China
Ying Guo; Beijing Institute of Technology, China
Yanhua Zhao; Beijing Institute of Technology, China
Yue Wang; Beijing Institute of Technology, China
Alan L Porter; Georgia Institute of Technology, United States

Technology strategy plays an increasingly important role in today's mergers and acquisitions (M&A) activity, especially that aiming to obtain key technology capabilities. A big challenge that faces corporate managers and government policy makers is how to bring technology development prospects into play in order to help enterprises complement and strengthen their advantages. In this study, based on text mining of patents, we devise a method for extracting technology intelligence to facilitate M&A, focusing on potential targets by assessing technological synergy value for a firm. We present results pertaining to technology M&A in the field of numerical control systems in China.

MB-04.3 [R] Are Applied Science Threads More Monopolistic?

Stephen Carley; Georgia Tech, United States
Arho Suominen; VTT Technical Research Centre of Finland, Finland
Kevin Boyack; SciTech Strategies, Inc., United States
Alan L Porter; Georgia Tech & Search Technology, United States

We analyze if we can identify applied research through it being more monopolistic than basic research. Focusing on micro-communities within a case technology, the dye-sensitized solar cell, we seek to identify market structures within these communities that correlate with how basic or applied their science is. Combining economic measures of competitiveness with a ranking scheme provided by the National Science Foundation, we show that more competitive market structures are more basic—attracting more citations—whereas, more applied R&D tends to be more localized in fewer organizations, presumably with different motivations. These results are useful as we try to identify how a technology emerges to being a commercially viable technology. Although there has been an active discussion if the linear model of technological development holds true, to an extent we would presume some that there should be applied research prior to commercial application. Identifying the structure of this research enables a more holistic portrait of the landscape of a technology.

MB-04.4 [A] Extending the FIP (Forecasting Innovation Pathways) Approach Through an Automotive Case Analysis

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

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Scott W Cunningham; *Technical University, Delft, Netherlands*
Alejandro Sanz; *Group Technology Intelligence SKF, Netherlands*

The “FIP” approach seeks to Forecast Innovation Pathways for an emerging technology of interest. It does so by combining empirical “tech mining” analyses with expert opinion. Tech mining extracts intelligence from multiple sources, but especially through bibliometric and text analyses of thousands of records retrieved from global R&D publication, patent, and business/context databases. FIP blends expert opinion from multiple sources, but especially by convening a focused workshop. SKF conducted an FIP exercise on hybrid & electric vehicles (HEVs) that presents special challenges. HEVs combine multiple sub-systems, advancing at different rates technologically, with complex technical and market infrastructures. Asian automotive production and markets appear vital for the future of HEVs, and various technologies and applications (e.g., two-wheelers) warrant tracking. Grappling with this complex innovation system helped extend the FIP approach. Enhancements included extending the previous innovation tiers framework to array multiple technological and contextual factors in conjunction. This is the first FIP workshop to split into small groups to address three priority market segments and three prime geographical regions, then regroup to review and develop consensus. Manifold factors influence HEV innovation paths, so technology delivery systems are more complex than those addressed in previous FIP studies. We reflect on FIP process development, with suggestions regarding scoping, identification of sub-systems, and possible opportunities to systematize certain analyses.

MB-05 Knowledge Management - 1

Monday, 7/29/2013, 10:30 - 12:00

Room: Salon V

Chair(s) Naoshi Uchihira; JAIST

MB-05.1 [A] Managing Knowledge Impedance: A Case from the Office Products Industry

Charles M Weber; *Portland State University, United States*
Jiting Yang; *Portland State University, United States*

We present a case from the office products industry, which reveals some of the processes that govern distributed knowledge creation and innovation in new product development. The case demonstrates that for a firm to deliver technology in a timely manner, it must manage its knowledge impedance. Failure to do so can cause significant delays in development, which result in loss of market share and severe loss of revenue. Knowledge impedance is defined as the degree of difficulty with which a particular type of knowledge is transferred between two or more entities, co-created by two or more entities, or transformed by two or more entities. Entities can be individuals, groups, organizations or firms, which may operate at different sites in different geographic regions. We find that it no longer suffices to coordinate concurrent knowledge creation activities that transpire across different organizations and sites. Effectively managing knowledge impedance requires the distributed entities to synchronize their knowledge creation activity. They must frontload inter-organizational socialization processes in order to engage in joint, simultaneous problem-solving across sites.

MB-05.2 [R] Knowledge Value Chain Development: Cross-Field Open Team Knowledge Integration

Shu-Hui Chen; *National Cheng Kung University, Taiwan*
Cheng-Ta Lin; *National Cheng Kung University, Taiwan*

To reflect the growing importance of networking beyond disciplinary and organizational boundaries toward an open R&D system with the commercialization aim, the Taiwan Engineering Section of the National Science Council in October 2009 began to support the “Promoting Program for Cross-Field Creative Scenario Value-adding.” This promoting program aims to facilitate the formation and cooperation of the interdisciplinary open teams toward developing one specific knowledge integration process for innovative R&D, method from “creative idea,” “feasibility assessment,” “prototyping,” to commercialization bridging. We reflect upon the outcomes of primary and supportive activities performed in the knowledge

value chain that has been proposed to explore based on the value-based commercialization framework. The subsequent empirical parts have been presented here based on the activities developed since 2009 and extensive case studies of nine open teams that undertook all knowledge value creation activities designed by the project office in the first year. In the last section, this study aims to discuss the issues of how to make these interdisciplinary open team participants work together as one innovation system as well as one specific interdisciplinary team in an integrated knowledge value chain. Implications and further research for such a peer mentoring process are provided.

MB-05.3 [R] Understanding the Knowledge Needs of Engineers: A Comparative Analysis of Japanese Software and Hardware Engineers

Caroline F Benton; *University of Tsukuba, Japan*
Remy Magnier-Watanabe; *University of Tsukuba, Japan*

Product and service innovation has become an increasingly complex process, requiring knowledge from a wide range of sources both external and internal to the organization. The purpose of this research is to identify the knowledge that software/service engineers—in comparison to hardware engineers—need to retrieve from past projects and for future projects and to identify enablers and barriers to knowledge management. A quantitative study of Japanese engineers was conducted, and the accumulated data was analyzed using text-mining and regression analysis. Results showed that software/service engineers value knowledge related to specifications and development, while design/production/maintenance engineers attach more importance to knowledge related to technology, design, cases, customers and competitors. There was also a difference in the amount of time spent on knowledge management activities, which was significantly lower for software/service engineers. And although intention emerged as the most important enabler of knowledge management overall, a combination of individual and organizational factors were found to hinder knowledge management activities. These findings suggest that software/service engineers and design/production/maintenance engineers have different requirements and perceptions with regards to knowledge management, and that firms need to motivate engineers by providing distinct organizational contexts specific to their engineering needs.

MB-06 Project/Program Management - 1

Monday, 7/29/2013, 10:30 - 12:00

Room: Salon VI

Chair(s) Hans J Thamhain; Bentley University

MB-06.1 [R] Customer Involvement in Projects: Adapting the Involvement Mode to Project Characteristics

Michael Peled; *Ben Gurion University of the Negev, Israel*
Dov Dvir; *Ben Gurion University of the Negev, Israel*

Customer involvement in large scale, innovative and technologically challenging projects is typically intensive, reaching far beyond the classical customer roles of requirements definition and product verification. The involvement may include active participation of customer personnel in project design and in technical and program management decision making, blurring the line between the producer and the customer. Based on a concept of adapting management practices to project properties, the study proposes a contingency model regarding the effects of customer involvement on project success. A triple-stage research was conducted, combining findings from a qualitative multiple case study of aerospace projects in Israeli government-owned defense industry; and a quantitative web-based survey of 155 projects. The study results augment the existing body of knowledge by a detailed analysis of customer representatives’ involvement modes, focusing on the supervision-participation continuum, and the impact on project success, in various types of projects. The study proposes practical managerial guidelines for customers and producers organizations. The results of improving the way customers are involved in projects may be significant.

MB-06.2 [A] Discipline in Project Management: Why Is It Hard to Find and What Is Its Most Challenging Obstacle?

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Jeffrey Busch; Jeffrey S. Busch PMP, United States

Project management is not new to industry, R&D or even technology management. The facts about its success in application are well documented and demonstrated. It does deliver, it is known to be the best approach, it's efficient and business knows it. So why is it, given these known conditions and facts, that we as individual project managers find it so difficult to apply the practice on a consistent basis? What holds us back, what obstructs us from applying it entirely, and what and who should we say is the most challenging obstacle? This application paper will describe through various citations, interviews and publication reviews, some of the barriers and obstacles of discipline in a profession that is securely founded in discipline. It is anticipated to provide practicing project managers a little more motivation or courage to add a practice of personal discipline to their project management practices. This is the initial groundwork for an industry-wide research survey on the challenges and costs associated with the project management discipline.

MB-06.3 [R] Integrated Project Development as Applied to Public Projects

Neslihan Alp; University of Tennessee at Chattanooga, United States

Nick vonWerssowetz; University of Tennessee at Chattanooga, United States

All projects pursue a perfect triad of cost, schedule and quality, but unfortunately, these three are highly difficult to accomplish concurrently. As such, the tendency is to believe that a well-designed and specified project will yield a quality project that can be built in an acceptable timeframe. Integrated project delivery (IPD) is a project delivery method that incorporates all stakeholders during the life of the project. By including the various stakeholders throughout the entirety of the project, the owner and project benefit from the collaborative talents and viewpoints of all participants in order to provide an effective project in an efficient timeframe. All parties enter into a singular, multi-party contract that shares both the risks and the rewards of IPD. The higher level of communication and collaboration among the owner, architect, and constructor yields a project that optimizes project results, increases value to the project, reduces waste and maximizes efficiency throughout all aspects of the project, from conception to completion. This study compares the benefits and shortcomings of the traditional design, bid, build delivery method to the IPD method in order to make a recommendation to improve public projects.

MB-07 PANEL: Introducing the International Society of Service Innovation Professionals

Monday, 7/29/2013, 10:30 - 12:00

Room: Guadalupe

Panelist(s) James C Spohrer; IBM

Stephen K Kwan; San Jose State University

Yassi Moghaddam; Int'l Society of Service Innovations

Professionals

Yuriko Sawatani; Waseda University

A new organization, the International Society of Service Innovation Professionals (ISSIP), has been formed (www.issip.org/). The council is made up of executives from IBM, CISCO, HP and other companies. It is "...a democratically run non-profit organization. Individual and institutional members work together to expand career options for service innovators while impacting business and society through new and improved service innovations." The council members of ISSIP will present a panel to discuss the mission of the organization: "To promote service innovations for our interconnected world" through professional development, education, research, practice, and policy work of its member individuals and institutions working hard to improve our world's diverse, interconnected, complex service systems. This is part of ISSIP's effort to connect the many diverse professional associations (such as PICMET, IEEE, ACM, AMA, INFORMS, AIS, etc.) that have service science-related special interest groups or focus areas to support their conferences and publications, linking members from academia, industry, government, and the social sector. The panel will also discuss what does a professional association in the 21st century look like, and what should a 21st century service professional's CV look like?

MB-08 Resource Management - 1

Monday, 7/29/2013, 10:30 - 12:00

Room: San Carlos

Chair(s) Muhammad A Choudhary; University of Engineering and Technology

MB-08.1 [R] Performance Management and Remuneration as Main Dimensions of Talent Management in a Natural Resources Mining Company in Africa

Lize van Hoek; Tshwane University of Technology, South Africa

Cecile M Schultz; Tshwane University of Technology, South Africa

The concept "talent management" has progressed into a worldwide and crucial management practice to ensure the development and retention of performing individuals in the workplace. The purpose of the study reported on here was to establish whether performance management and remuneration are indeed the most important talent management factors in a natural resources mining company in Africa. The population for the study included professionals and specialists in fields such as engineering at 14 sites in a natural resources mining company in Africa including fields such as engineering, science, research, technical services, geology, marketing, human resource management, legal services and electricians. Different commodities are mined, such as copper, cobalt, coal, platinum, fluorspar, bauxite and other non-ferrous divisions. The countries under study were Malawi, the Democratic Republic of Congo, Zimbabwe, Zambia, Mozambique and South Africa. A total of 784 questionnaires were distributed to the different mines via the SurveyMonkeyTM website, and 396 questionnaires were received back representing a response rate of 51%. A principal axis factor analysis was conducted to determine the most important factors. The results confirmed that performance management and remuneration are the two main dimensions to manage talent successfully in a natural resources mining company in Africa.

MB-08.2 [R] Engineering Competences: A Content Analysis of Job Advertisements

Florian Steinmann; FAU Erlangen-Nuremberg, Germany

Kai-Ingo Voigt; FAU Erlangen-Nuremberg, Germany

Thomas Schaeffler; Siemens AG, Germany

In many areas of the German industry exists a shortage of engineers. A challenge is the demanding education and the competences required for engineers, depending on the specialist area. Thereby an increasing importance of soft skills is visible, e.g., in the key qualifications published by the Association of German Engineers (VDI). This paper contributes the understanding of the professional requirements set on engineers by analyzing 60 job advertisements in the German machinery and plant engineering industry. One major result is all advertisements request professional expertise. Besides technical competences, in about 72% of the vacancies the ability to communicate and in about 58% of the vacancies the ability to work in a team is required. Completing the top three soft skills, individual responsibility is required in about 48% of the vacancies. It illustrates that social skills are on the advance regarding requested competences for engineers.

MB-08.4 [R] Egypt Post ICT Management Structure: Hierarchical Layered Design

Amr H Badr-El-Din; The American University in Cairo, Egypt

Farah Shurab; The American University in Cairo, Egypt

This paper attempts to illustrate a different approach to creating organizational structure or developing a management model structure along the lines of operating systems, given the high degree of similarity between ICT architecture approaches and organizational needs. This paper discusses ICT approaches and focuses on the use of the hierarchical approach to create a management model structure and identifies how such a structure can be aligned to ensure the execution of the end functions for which the system was initially built to deliver. The paper uses the structure of Egypt Post's ICT department as an example to

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illustrate the validity of the concept.

MB-09 TM in Telecom - 1

Monday, 7/29/2013, 10:30 - 12:00

Room: Willow Glen I

Chair(s) Antonie J Jetter; Portland State University

MB-09.1 [R] Effect of Service Platform on Innovation Trajectories of Value Network Players: The Case of Japanese Mobile Internet Services

Takayuki Otsuka; Tokyo Institute of Technology, Japan

Kumiko Miyazaki; Tokyo Institute of Technology, Japan

This paper contributes to the research on the effect of platform and value network towards the trajectories of service innovation in the case of Japanese mobile Internet services. Mobile communication connected to the Internet in 1999. The mixed players have involved different industries. Many platforms have been established and helped to expand the total value of the services. Product innovation of the handset has also happened concurrently. The objective of this paper is to discover the potential cause of the Japanese players losing competitiveness. A platform is often deployed with intentions of value network owner or/and players to maximize the total value of the network. In previous studies, a series of innovations brought competitive elements in products, organizations, processes and industry. Despite the experiences, the players of the Japanese mobile service industry have not yet obtained world-class competitiveness. We used the methodology of value network analysis. At first, the players are defined and value network mapping is done to understand the exchange mechanism of tangible and intangible assets. Also, the role of each player and other industries' cultures which are brought to the value network are identified. Then we discuss and analyze how and which platform innovation merits did not emerge because of NTT Docomo's role in managing the suppliers of handsets.

MB-09.2 [R] The Innovation Dynamics in the Korean Mobile Network Services: Focusing on the Role of Mobile Network Operator's Capabilities

Seunghye Hong; Tokyo Institute of Technology, Japan

Kumiko Miyazaki; Tokyo Institute of Technology, Japan

Radical changes driven by overseas smartphone might weaken mobile network operators' presence in the domestic market, but they are still active innovators in the market. The trend of convergence between devices, services and technologies within and across industries has offered a breakthrough for the Korean mobile network operators to continuously create new service products in the saturated domestic market. This study explores the mobile network operator's dynamic capabilities for innovation by structuring innovation models of service design and delivery in Korea's business-to-business (B2B) mobile service sector. We observed 151 network solutions services which are mainstream services of mobile network operator's B2B service products. The findings of this research reveal that mobile network operators, as service providers, play a dynamic role in achieving innovation by recombining the existing technologies and components in service design or by delivering customized services for specific customers at the user/provider interface. Such capabilities of mobile network operators are represented as "recombinative innovation" and "customized innovation," respectively. These modes of innovation may not be achieved through long-term technological advancement, but can be drawn from existing resources by utilizing them creatively in modification or combination with new ones to develop a uniquely different service product.

MB-09.3 [R] Evaluation of RFID and Wi-Fi Technologies for RTLS Applications in Healthcare Centers

Bing Wang; Beijing University of Posts & Telecommunications, China

Mehdi Toobaie; Portland State University, United States

Rodney Danskin; Portland State University, United States

Thanaporn Ngarnnil; Portland State University, United States

Larry Pham; Portland State University, United States

Harry Pham; Portland State University, United States

The purpose of this paper is to provide a comparative analysis about radio frequency identification (RFID) and wireless fidelity (Wi-Fi) technologies for the real-time location system (RTLS) applications in healthcare centers/hospitals. Focus is on the five criteria and nine sub-criteria for choosing a RTLS and the research about the features of RFID and Wi-Fi technologies is done. Firstly, these criteria are used for the evaluation purpose based on literature review; secondly, the RFID and wi-fi technologies are compared by listing out the facts, pros and cons, according to the problems found out during the investigation about the technologies and the result of interviews with the IT experts in healthcare centers/hospitals, nurses, vendors and engineers of RTLS. Finally, an information retrieval guideline for the RTLS solution selection is given out and demonstrated with RFID and wi-fi technologies.

MB-10 TM in Semiconductor/Electronics - 1

Monday, 7/29/2013, 10:30 - 12:00

Room: Willow Glen II

Chair(s) Tugrul Daim; Portland State University

MB-10.1 [A] Benchmarking R&D in the Semiconductor Industry Using DEA

Ramin Neshati; Intel Corporation, United States

Leading firms in the semiconductor manufacturing industry invest significant capital outlays and other resources in R&D to attain and retain competitive advantage over their rivals. How effective and efficient are such massive investments, and do they result in superior outputs that disproportionately enhance the capabilities of the firm for unsurpassed competitive advantage? A review of the academic literature reveals that the R&D efficiency of semiconductor manufacturing firms deserves more attention by researchers. Using data envelopment analysis (DEA), a comparative benchmark of the efficiency of R&D in semiconductor manufacturing is conducted among the industry's leading firms. Managers in ten semiconductor manufacturing firms are interviewed using a survey instrument to collect data on the relevant measures of R&D productivity. The dataset is analyzed using an output-oriented DEA model with variable returns to scale (VRS). The findings are consistent with expectations: firms that invest in R&D through capital outlays, human resources and development time lead the industry in the generation of intellectual assets and reap the benefits that accrue from such investments. Managerial implications are discussed along with suggestions for further study, including refining the proposed model to yield additional output measures, comparing the efficiency of firms across multiple generations of semiconductor manufacturing process technologies, and updating the model with other measures or parameters of semiconductor manufacturing efficiency based on expert knowledge.

MB-10.2 [A] A Statistical Model to Analyze the Complexity of Semiconductor Manufacturing

Ramin Neshati; Intel Corporation, United States

Semiconductor chips power all modern electronic devices and gadgets, such as smartphones and tablets, as well as the massive infrastructure that supports the Internet. These chips are manufactured using progressively smaller integrated circuits that measure in the billionth of a meter, or nanometer. The fabrication methods used to develop these chips entail some of the most advanced and complex technological processes known to humankind. Semiconductor manufacturing processes have evolved enormously over the years, with each evolution harboring increasing complexity and novel innovations. The academic literature confirms that the accelerating pace of technological obsolescence necessitates the continued investments in process innovations even in the face of increasing risk and uncertainty brought about by large capital outlays that are vital to overcoming the complexity of manufacturing these chips. Using multivariate statistical analysis methods and publicly available data from a leading semiconductor manufacturing firm, a model is developed to assess the increasing difficulty of semiconductor manufacturing. The findings are consistent with the hypothesis that semiconductor manufacturing difficulty is accelerating despite massive investments in process innovations. Managerial implications are discussed along with suggestions for further study, including refining the proposed model to more accurately measure the rate of change, investigation of the impact of breakthroughs in technological capabilities and environmental factors, such as the "green" movement, and in updating the

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dataset and the model to comprehend other leading semiconductor manufacturing firms through survey of the experts.

MB-10.3 [R] Business Groups' Dynamic Performance of Taiwan Semiconductor Industry: The Carry-Over Perspective

Shiu-Wan Hung; National Central University, Taiwan

Dong-Sing He; National Central University, Taiwan

Wen-Min Lu; National Defense University, Taiwan

Min-Jhih Cheng; National Central University, Taiwan

This study evaluates dynamic operating performance for Taiwan's semiconductor industry from 2006 to 2009 by using dynamic DEA, a technique based on the perspective of inter-period carry-over in accounting. Furthermore, the industry's various characteristics are evaluated to determine their relationships to the semiconductor industry's efficiency. The following empirical results are found: companies within a business group are more efficient on average than ones under a non-business group; while IC design companies are more efficient than others, investment firms in China are more competitive; companies with high-level scopes generally operate better than those with low-level scopes. The potential applications and strengths of using DEA to assess the semiconductor industry are also highlighted.

MB-11 Commercialization of Technology - 1

Monday, 7/29/2013, 10:30 - 12:00

Room: Willow Glen III

Chair(s) Ahto Kalja; Tallinn University of Technology

MB-11.1 [R] The Complementary Assets and Appropriability Affect Patent Commercialization on The Moderate Effect of Marketing Sensing Capability: The Case of Bio-Patents in Taiwan

Jie-Heng Lin; National Taiwan University, Taiwan

Ming-Yeu Wang; National Chiayi University, Taiwan

Hsien-Chen Lo; National Tsing Hua University, Taiwan

The issues of technology commercialization continued to be of concern when Teece demonstrated the profit from innovation model (PFI model). From invention to commercialization, it is a complex process that has high costs and uncertainties. There are many factors that affect patent commercialization, including appropriability, complementary assets, technical quality and the lead time of a new technology. However, previous studies have often overlooked that the sensing capability of a firm strengthens the effect of patent commercialization on complementary assets and appropriability. Therefore, this study takes the PFI model to be the principal theory to construct the research framework to know the impacts about patent of biotech commercialization. Through reviewing the literature, this study, which on the condition of PFI model, not only proposes the effect of patent commercialization on complementary assets and appropriability but also considers the moderating influence of sensing capability. This study collected samples from firms that hold biotech patents in the United States Patent and Trademark Office (USPTO) or Taiwan Intellectual Property Office (TIPO). Of the 354 questionnaires sent to firms, 22 valid questionnaires were returned. The result of the study, the complementary assets and appropriability are significant positively affect patent commercialization, also the sensing capability moderate this positively influence.

MB-11.2 [A] A Reference Model for Commercializing IT-based Convergence Technology in the u-Health Service

Hoyoung Hwang; ETRI, Korea, South

Seong In Hong; Daejeon Technopark, Korea, South

This shows a reference model for commercializing IT-based convergence technology in the u-health service. For fast commercialization, a test-bed project is conducted in Daejeon City, Korea. In the project, two service models, the Greencare service for young people and the Silvercare service for elderly people, are introduced and tested. In a test level, the two

services are accepted by users; however, it is necessary to enhance performance of the services with more personal health devices.

MB-11.3 [R] The Network Diameter and Its Impact on Company Performance

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

Paul Rohmeyer; Stevens Institute of Technology, United States

This study shows how the impact of network evolution on the network's overall performance is mediated by the network's diameter. Our principle argument in this paper is that the diameter serves as a criterion to measure the performance of a network structure. A small or reduced diameter indicates tight relationships between the vertices comprising the network. This facilitates higher network capacity and flow between the vertices, which, in turn, leads to better overall performance of the network. On the other hand, a larger diameter leads to performance degradation due to a loosely connected network.

MB-12 PANEL: UFO's

Monday, 7/29/2013, 10:30 - 12:00

Room: Silicon Valley Boardroom

Panelist(s) Charles W. N. Thompson; Northwestern University

Eliezer Geisler; Illinois Institute of Technology

Donald A Kennedy; Willbros Group, Inc.

Simon P Philbin; Imperial College London

Last year, in Vancouver, a panel forecasting PICMET 2020 was scheduled just after the opening plenary session with the intention of providing a venue for those who were not already committed to a specific session during that period and needed a place to go. This panel is intended to provide, in part, that same function, but it also provides a forum for discussing relevant but orphan issues – issues that concern technology management and managers but do not conveniently fit into the several conventional categories that provide a framework for organizing sessions. The topic is UFO's. Not Allen Hynek's or Major Kehoe's (two of the three who, back then, really knew whether they existed or not). This is about unusual, unconventional, universal forms of organization. The grand daddies, functional and project, have seen additions come and go, e.g., informal, matrix, hierarchical, street corner, and there is a formal literature on most of these. What about the informal literature? What about block parties, flea markets, or dorm roommates hatching golden eggs? An eclectic panel of experts and wannabes is proposed to open this Pandora's Box

MD-00 PLENARY - 2

DATE: MONDAY, 7/29/2012

TIME: 14:00 - 15:30

ROOM: SALON III-IV

CHAIR: ALAN L PORTER; SEARCH TECHNOLOGY, INC.

MD-00.1 [K] Challenges of Creating a World-Class University System

Nam P Suh; KAIST, Korea, South

A world-class science and technology (S&T) research university is a complex system that produces educated people, knowledge, and technological innovations, and provides services for public good. Creation and development of such a university system requires vision, long-term goals, strategic plans, organizations, effective management, and financial resources, in addition to outstanding faculty and students, competent professional staff, and functional physical facilities. The process of designing and developing an S&T research university is similar to the development of other innovative and complex systems. The more challenging aspect of the process for a research university is the creation of a culture that

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enables outstanding faculty and students to flourish in pursuit of knowledge and innovation, while garnering buy-in and enabling the concerted involvement of a majority of productive faculty and staff in the development and implementation of ambitious plans.

MD-00.2 [K] Customer Integration in Technology Development of IT-based Services

Klaus Brockhoff; Otto Beisheim School of Management, Germany

Customer integration into development processes is frequently recommended to align development outcomes with customer wants and expectations. Reports on success of this involvement are mixed. Most empirical results supporting the recommendations relate to customer-supplier relations that are either characterized by large numbers of customers or by a 1:1-relationship. It is less well understood what happens in those relationships which have a small number of customers. This is typical of highly complex development projects. In this situation particular conflicts might arise between customers and suppliers and among customers. The types of conflicts are explained. As uncertainty makes it impossible to regulate all conflicts by contractual relations, it is even more important to understand the reasons for conflicts and to invest in building trust. To achieve success, conflicts need to be foreseen by the supplier.

ME-01 R&D Management - 1

Monday, 7/29/2013, 16:00 - 17:30

Room: Salon I

Chair(s) Frederick Betz; Portland State University

ME-01.1 [R] The Impact of R&D Team Diversity to R&D Performance: KIST Case

Euseong Kim; Korea Institute of Science and Technology, Korea, South
Suyoung Choi; Korean Institute of Science and Technology, Korea, South
Sanjoon Kang; Korean Institute of Science and Technology, Korea, South

The production of scientific knowledge has been changed from a research process largely based on the activities of individual researchers to collative efforts of R&D teams. This shift brings a new question for the effect of team composition to scientific knowledge production. Based on knowledge base theory, the diversity of an R&D team is a key factor of R&D output production. However, most research focused on the effect of disciplinary diversity, and there is little attention given to the effect of education level diversity or hierarchical diversity. In this paper, we find that i) age diversity in a research team is negatively associated with R&D performance, ii) the ratio of permanent research is positively associated with R&D performance, and iii) there is an optimal level of collaboration. Thus, it can be concluded that the diversity of an R&D team can affect to R&D performance.

ME-01.2 [A] An Empirical Study on the Successful Factors of Government-Supported Creative R&D in Korea

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

This study is an analysis on the successful factors and performance level of government-supported Creative R&D Program in Korea. A regression analysis was conducted based on the result of a questionnaire (120) on researchers who participated in the program. The result shows that the successful factors are leadership, information sharing, networking, autonomy, creativity and academic exchange which have influences on the research performance. Therefore, the success of creative R&D supported by government is dependent on R&D management including selecting project leaders. Additionally, a data analysis using the impact factors of journals (categories of Nature, Science and Cell) indicates that clear performance targets contribute to the good qualities of creative R&D.

ME-01.3 [R] R&D Efficiency from the Perspective of RIS: Korea's Government Sponsored R&D Program

Jeong-Sook Han; GSTEP, Korea, South

The R&D productivity of 16 of Korea's local governments was analyzed with DEA (data

envelopment analysis) methodology with two inputs and two outputs. The input variables are the R&D expenditure, researchers in 2006 and 2008, and the output variables are the number of papers and patents in 2008 and 2010 as two years-lagged R&D performance measures. R&D efficiency was different among the 16 regions according to three research types. Efficiency level of the region depended on its regional attributes and environmental elements. Higher efficiency region had abundant innovation resources, high levels in both industry agglomerations and networking capability. Compared to other studies, the current study enhanced the vigor and complexity of the R&D efficiency research in terms of heterogeneities among basic, applied and development R&D. Furthermore, it sheds lights on providing a sound basis for the decision making in the R&D policy through analyzing down to the level of RIS (regional innovation system) for a way to improve the R&D productivity in NIS as a whole.

ME-02 Decision Making - 2

Monday, 7/29/2013, 16:00 - 17:30

Room: Salon II

Chair(s) Hiroshi Osada; Tokyo Institute of Technology

ME-02.1 [R] The Hierarchical Decision Model for Non-profit Organization's Project Selection

Bing Wang; Beijing University of Posts & Telecommunications, China
Kruti Narvekar; Portland State University, United States
Tin Nguyen; Portland State University, United States

This paper describes the process of setting up a hierarchical decision model for non-profit organizations to use for evaluation and selection of projects. Based on the constrained weighted factor scoring model for project evaluation and selection, referring to the mission-objective-goal-strategy-action (MOGSA) model and the expectancy theory, we set up a prototype for the project selection of non-profit organizations. Based on the prototype model for project selection of non-profit organizations, we investigated the non-profit organizations by interview and survey questionnaire, and then set up the model for them to select projects. The weights of criteria are derived from the survey questionnaire and demonstrate how we use this model to assist the decision-making process with three charity event projects. By doing this, we built up the model for them to improve their decision-making process in project evaluation and selection.

ME-02.2 [A] Using Best Practices to Improve Portfolio Management

Michael M Menke; Value Creation Associates, United States

Portfolio management has a long history and good track record for improving strategy execution, optimizing business value and balancing risk & return. Methods for strategic alignment, opportunity evaluation and portfolio optimization are well established. There is also much portfolio management software available. But even though methods and tools abound, many organizations are still not very effective with portfolio management. Maximum effectiveness also requires a well-designed process supported by good management practices. Much of this boils down to good behavior. This presentation discusses how to identify best practices, diagnosis the strengths and weaknesses of actual portfolio management organizations, and then develop practical recommendations for improving the process. It is illustrated by the results of an international project portfolio management (PPM) benchmarking study involving about fifty organizations from a wide range of R&D-intensive and capital-intensive industries. Participants include Bayer, Boeing, Cisco, Dow, Exxon-Mobil, Genentech, J&J, Lockheed-Martin, P&G, Pfizer, Philips, Takeda and Unilever. The presentation covers identifying PPM best practices, assessing their importance and usage, determining best-in-class performance, using best practices to diagnose an organization's PPM, developing recommendations for improving PPM, and improvements made by benchmarking participants. This study offers a powerful yet inexpensive way to diagnose portfolio management organizations and develop recommendations for improvement.

ME-02.3 [R] PLM Software Selection Model for Project Management Using

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Hierarchical Decision Modeling with Criteria from PMBOK Knowledge Areas

James Eastham; TriQuint Semiconductor, United States

David Tucker; ConMet, United States

Sumir Varma; TriQuint Semiconductor, United States

Scott Sutton; Portland State University, United States

This paper presents a methodology for product lifecycle management (PLM) software selection utilizing the nine knowledge areas of the Project Management Body of Knowledge (PMBOK). The methodology utilizes a five-process gate approach where the PLM offerings are researched, sorted, paired down, evaluated, and implemented. The primary decision model utilizes hierarchical decision modeling (HDM). Prioritizations are assigned to the PMBOK knowledge areas utilizing a pair-wise comparison survey and then assessed across the different PLM system offerings. The proposed decision methodology is meant to serve only as a guide to assist with selection of PLM software from a project management perspective. To validate the model, several case studies are presented that apply the selection methodology to different industries: semiconductor, information technology (IT), and automotive supply.

ME-03 Innovation Management - 2

Monday, 7/29/2013, 16:00 - 17:30

Room: Salon III

Chair(s) Bala Mulloth; Central European University Business School

ME-03.1 [R] Coevolution of Organizational Culture and Innovation Capabilities: The Case of Hylsa, the Laggard That Became Technology Leader

Carlos E Atoche-Kong; Universidad de Monterrey (UEM), Mexico

This paper analyzes the case of Hylsa, a Mexican steel company that was capable of transforming from a laggard company into a technology leader. It combines two approaches, the organizational culture tradition with the accumulation of innovation capabilities literature, finding that it is not just organizational culture that fosters the innovation activity, but that positive innovation outcomes create and configure this organizational culture, providing evidence that there is a mutual relationship in the development of both, an innovation friendly organizational culture and the development of innovation capabilities. Hylsa's organizational culture evolves as well as its innovation capabilities, the former from elementary determinants into a strong organizational culture that favors innovation, and the latter from routine levels into advanced innovative levels, when Hylsa was capable to create first to the world innovations. The study uses a framework of determinants of organizational culture and the innovativeness levels framework to facilitate this analysis.

ME-03.2 [R] Innovation in the Road and Bridge Industry

Karen Manley; Queensland University of Technology, Australia

Tim Rose; Queensland University of Technology, Australia

This paper reviews innovation activity in a key service industry - road and bridge construction. Based on a large-scale Australian survey and descriptive statistics, the paper finds that there is little difference in innovation levels between different types of industry participants and that innovation is difficult to implement. The survey gathered responses from suppliers, consultants, contractors and clients and compared results across these four industry sectors. The absorptive capacity and relationship capacities of respondents were also investigated. One in five respondents had poor absorptive capacity. Suppliers were found to be the most effective learners and were the best adopters of ideas from outside their organizations; clients were found to be the least effective. Australian construction organizations have relatively good relationship skills because relationship-based contracts are common compared to other countries. Indeed, the survey found that nearly 60% of respondents had experience with such contracts, with clients having more experience than the other three sectors. The results have implications for the measurement of innovation in project-based industries, and the relative roles of clients and suppliers in driving innovation in the construction industry. Further research will examine the extent to which particular governance mechanisms within relationship contracts lead to improved innovation and project performance.

ME-03.3 [R] Institutional Design and Operation for Building up the Innovative Enterprises in China

Jizhong Zhou; Univ of the Chinese Academy of Science, China

Chao-ying Tang; Univ. of the Chinese Academy of Sciences, China

Tao Lu; Graduate Univ. of the Chinese Academy of Sciences, China

This paper discusses the process of constructing the national innovative enterprises in China since 2008, the indicator system and the method of evaluating the national innovative enterprises. Finally, the paper analyzes the main problems existing in the process of building up the innovative enterprises. The paper's method is making criteria for how to evaluate innovative enterprises. When an innovation-oriented enterprise is judged, it is key to evaluate the correlation between its development and its technological innovation, i.e., its dependence on technological development, so as to make judgment on its "innovativeness." Considering characteristics of Chinese enterprises and related international experience, the criteria involved are divided into two groups, i.e., "basic numerical indicators" and "indicators of experts' evaluations." Basic indicators are figures for comparisons and analyses of all the enterprises and can be compared with those in related foreign studies to some extent. With figures evaluated, enterprises are assessed in the aspects related to the above-mentioned basic indicators. Indicators of experts' evaluations include both qualitative and quantitative ones. The qualitative indicators are the scores made by experts in the industry based upon their analyses and judgments of an enterprise. The quantitative indicators are experts' value judgments based upon the data submitted by an enterprise.

ME-04 Technology Transfer - 1

Monday, 7/29/2013, 16:00 - 17:30

Room: Salon IV

Chair(s) Humberto Merritt; National Polytechnic Institute (IPN)

ME-04.1 [R] Multiple Perspectives of Technology Transfer: Technology Transfer from Government Labs

Judith A Estep; Bonneville Power Administration, United States

Tugrul Daim; Portland State University, United States

Ultimately, the goal of conducting research and development is to move the technology into application. This process is commonly referred to as technology transfer and potentially involves many stakeholders and business strategies. It can also depend on the type and maturity of the technology. While the emphasis of this research focuses on energy innovation, the methodology can be applied to any sub-category of technology transfer. This paper represents the first step in identifying and understanding the elements of a successful technology transfer. A variety of articles, interviews, and secondary sources are organized using Reisman's taxonomy framework and analyzed using H.A. Linstone's multiple perspectives approach. Specifically, technology transfer literature is considered from the technological, organizational, and personal (TOP) perspectives. The primary purpose of this research is to take the first steps at identifying the barriers of a successful technology transfer from national labs to the public.

ME-04.2 [R] The Role of Alumni Attachment in the University Technology Transfer Process

Joanne Scillitoe; New York Institute of Technology, United States

Research suggests that the ties of university scientists/technologists serve as the primary force that enables the transfer of university knowledge to external parties. These ties include joint research, publications, presentations, and the mentoring and industry placement of students. However, little research has been done to understand the role of alumni and their networks in the university technology transfer process. Drawing from the social network theory, technology transfer, and attachment theory literature, a conceptual model is presented regarding how university alumni ties and alumni attachment, including alumni beyond the direct students of university scientists/technologists, enable university technology transfer through the formation of university-industry firm alliances.

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ME-04.3 [R] Framework Design for an Automated Patent Licensing Negotiation System

Ling Wang; China University of Political Science and Law, China
Xiao-Fei Liu; China University of Political Science and Law, China
Fang Li; China University of Political Science and Law, China

Effective strategies for dealing with patent licensing have been attracting greater interest amongst enterprises due to acceleration in high-tech development and rapidly expanding international trade. In a modern society, patent licensing is a widely accepted approach, viewed as a form of formal transaction. It allows for a licensee to implement the patented technology for future applications, and in return, pay royalties to a licensor for the potential value of the patents provided. Most patent licensing activities were face-to-face talks; however, due to complexities and uncertainty during the negotiation processes of a patent licensing transaction, asymmetric information between licensors and licensees exists. This can hinder a fair and optimal solution for licensing transactions. This study attempts to analyze the requirements of a multi-agent negotiation system for automatically choosing best-fit strategies for patent licensing matching in the Chinese market. The system, which serves as a patent intermediary, relies on experts from industries and professional organizations to establish the licensing negotiation conditions. Based on these realistic conditions provided by experts, an automated negotiation system framework has been explored to conduct preliminary negotiation activities between licensees and licensors. We hope that this system has the potential for handling multi-attribute based negotiations for real situations in the future.

ME-05 Leadership - 1

Monday, 7/29/2013, 16:00 - 17:30

Room: Salon V

Chair(s) Cecile M Schultz; Tshwane University of Technology

ME-05.1 [R] An Exploratory Study on the Leadership Style Preferences of Male and Female Managers: Implications on Team Performance

Antonie J Jetter; Portland State University, United States
Emy Loanzon; Portland State University, United States
Shabnam Jahromi; Portland State University, United States
Alaa Nour; Portland State University, United States
Pinprapa Pakdeekasem; Portland State University, United States

Despite the fact that women earn almost half of the degrees awarded in STEM (science, technology, engineering, mathematics), these fields are still perceived to be male-dominated. In efforts to promote gender diversity and inclusion, an increasing number of companies are implementing programs such as Northrup Grumman's STEM Connector program, and Intel's Women Principal Engineers and Fellows Forum. These gender diversity and inclusion initiatives raise several debates on gender and leadership: Are there key differences between the leadership styles of male managers versus women managers in STEM fields? What contributions do women's leadership styles bring to strategic decision-making positions in the engineering and scientific workplace? Using Bass and Avolio's transformational leadership style model, this exploratory study aims to revisit the on-going debate on gender and leadership styles in STEM fields. The implications of the study offer insights for current and future technology leaders in managing an increasingly diverse workforce.

ME-05.2 [R] Skills Needed by Engineers in the Platinum Mining Industry in South Africa

Danny L Motsoeneng; Mining Qualifications Authority, South Africa
Cecile M Schultz; Tshwane University of Technology, South Africa
Adele Bezuidenhout; University of South Africa, South Africa

The South African platinum mining industry faces continuous challenges in terms of increased global competition, demand for productivity, skills shortages, loss of scarce technical skills due to emigration, strikes and high turnover rates. Hence, the lack of engineering skills (technical and management skills) may seriously hamper the capacity of the mining

industry to ensure that productivity and safety standards are maintained. A quantitative study was conducted on skills needed by platinum mining engineers in three provinces in South Africa. A four-point Likert-type scale questionnaire ranging from strongly agree to strongly disagree was developed. The Cronbach's alpha coefficient was above 0.8, indicating high internal reliability. The population consisted of 300 engineers in platinum mines in three provinces in South Africa. A convenience sample was used; 79 engineers volunteered to complete the questionnaire. The response rate was 26.3%. A factor analysis was conducted to determine which skills of the engineers were the main concerns. The results of the study indicated that theoretical knowledge, technical skills, management skills and engineering principles were skills needed for technology-based engineering in the platinum mines under study.

ME-05.3 [R] A Leadership Initiative to Enhance Employee Engagement amongst Engineers at a Gold Mining Plant in South Africa

Cecile M Schultz; Tshwane University of Technology, South Africa
Adele Bezuidenhout; University of South Africa, South Africa

Employee engagement mainly consists of three dimensions, namely emotional engagement, cognitive engagement and physical engagement. The aim of the current research was to determine whether a leadership initiative such as a leadership orientation workshop had a positive influence on the engagement of engineers at a gold mining plant in South Africa. A qualitative research method was utilized by conducting group interviews with engineers. Six focus group interviews with engineers from the plant were conducted. The interviews were recorded and transcribed. The narrative data was broken down into smaller units, coded and named according to the content represented. The recurring themes were then categorized and described. Categories such as bottom-up leadership, transformational leadership, charismatic leadership, authentic leadership, change leadership, mind-set training, values, strategic alignment, two-way feedback, recognition, trust, diversity, safety, relationships, job profiles, performance management and career development were identified. The charismatic leadership style of the plant manager and his commitment to engaging the engineers were strong themes throughout the research. The importance of enabling managers to become leaders was also clear. The overall perceptions were that the leadership workshop initiated employee engagement amongst the engineers.

ME-05.4 [R] Exhibiting Leadership and Facilitation Behaviors in Project-Based Work: Does Team Personal Style Composition Matter?

Pete G Dominick; Stevens Institute of Technology, United States
Zvi H Aronson; Stevens Institute of Technology, United States
Mo Wang; University of Maryland, United States

Teams are increasingly becoming primary in the way employees in organizations conduct work. The effects of similarities and differences among team members in project-based work influence every aspect of that work. We explored the relationship between team composition attributes and team members' team leadership and facilitation behaviors, drawing from the literature on similarity-attraction effect. Data from two time points that are 12 weeks apart were collected from 144 professional employees working in 48 work teams to test the study's hypotheses. Using HLM 6.0, the current study shows that when it comes to team composition, members of a team who are similar on the personal style traits, extraversion and neuroticism, that have an affective tone, demonstrate greater team leadership and facilitation behaviors, we refer to as team process behaviors. We provide implications for generating team leadership and facilitation behaviors in project-based work.

ME-06 Project/Program Management - 2

Monday, 7/29/2013, 16:00 - 17:30

Room: Salon VI

Chair(s) Neslihan Alp; University of Tennessee at Chattanooga

ME-06.1 [R] Evaluating R&D Project Proposals

Hans J Thamhain; Bentley University, United States

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The ability to evaluate R&D project proposals, assessing future success and organizational value, is critical to overall business performance for most enterprises. Yet, predicting project success is difficult and often unreliable. A two-year field study shows that the effectiveness of available methods for evaluating and selecting R&D project proposals depends on the specific project type, organizational culture and managerial skills. This paper examines the strength and limitations of various evaluation methods. It also shows that, especially in complex project situations, the decision-making process has to go beyond the application of just analytical methods, but has to incorporate both quantitative and qualitative measures into a combined rational-judgmental evaluation process. Equally important, the evaluation process must be effectively linked among functional support groups and with senior management in order to strategically align the project proposal and to unify the evaluation team and stakeholder community behind the mission objectives. All of this requires leadership and managerial skills in planning, organizing, and communicating. The paper suggests specific leadership actions, organizational conditions and managerial processes for evaluating R&D project proposals toward future value and success.

ME-06.2 [A] Case Study: Project Management Office Implementation in a Multi-Location Organization

Melda Polat; Arcelik A.S., Turkey

Iffet Iyigun Meydanli; Arcelik A.S., Turkey

The project management office (PMO) is a mechanism used to address common project management issues in an organization in order to support and facilitate project success. A PMO may perform these functions: provide a standardized project management methodology with tools, mentoring and training; integrate the project management process and infrastructure within the enterprise; oversee the entire project cycle, from project approval to project closure; and evaluate the project performance. The first PMO was established in 1997 in central R&D at Arcelik. As a part of globalization goal, the upper management is required to monitor projects simultaneously. Thus, PMOs were spread to the product manufacturing plants. Since it requires a cultural change within the organization, it takes substantial time and effort to implement project management throughout the whole organization. Currently, more than 500 projects, consisting of both production and R&D projects, are running concurrently in the Production and Technology Group of Arcelik. Structure, role and evolution of the PMOs as well as the added value will be elaborated. Lessons learned and discussion about PMO's value for an organization will be shared.

ME-06.3 [A] The Utility of Planning in Large Projects

Donald A Kennedy; Willbros Group, Inc., Canada

During informal discussions at EM conferences, the subject often comes up that the schedules developed for a particular large project are not used by the execution team. As employee turnover rates increase, the planner's familiarity with the organization decreases their ability to produce a usable plan. Organizational barriers, outsourcing of tasks, and lack of managerial expertise further aggravate the ability to create useful plans to direct the activities on a project. This paper looks at several large projects to show that the function of the plan as perceived by management was not in line with the views of how the plan was being used in the field. Despite spending millions of dollars in building a schedule, management discovers it is largely ignored outside the planning department once construction starts. People within the organization become skeptical of the planning process and incorrectly view it as a total waste. Benefits of well-developed plans are provided even for the cases where they became ignored. Recommendations are provided to help managers understand the reality of planning and to help generate plans that are more likely to be used to direct field work.

ME-07 Supply Chain Management - 1

Monday, 7/29/2013, 16:00 - 17:30

Room: Guadalupe

Chair(s) David Kruger; Tshwane University of Technology

ME-07.1 [R] Purchasing Commissioning Services for International Plant Construction: An Analysis of Future Challenges

Liliana Simon; FAU Erlangen-Nuremberg, Germany

Florian Steinmann; FAU Erlangen-Nuremberg, Germany

Kai-Ingo Voigt; FAU Erlangen-Nuremberg, Germany

In a fast-changing business environment, it is essential for companies to adapt to changes and react to upcoming challenges. Therefore, it is of high significance for decision-makers to be constantly up-to-date with future challenges. This research study focuses on an important but often neglected part of product-oriented services—commissioning services. Especially in the investment-intensive sector of plant construction, this kind of service greatly affects customer satisfaction as well as the profitability of international solution business. In order to address the research gap, this paper elaborates the future challenges of commissioning services in international plant construction projects. A qualitative study with ten representative expert interviews was conducted and supported by an in-depth literature research. The interviewees are chosen from different departments and hierarchical levels to ensure a holistic view on the relevant topic. This paper presents a comprehensible, coherent and up-to-date list of challenges, which are summarized by the three following categories: personnel resource base, organizational structure, and mixed teams.

ME-07.2 [R] Developing Service Concepts for Managing Disturbances in Supply Networks

Lea Hannola; Lappeenranta University of Technology, Finland

Ville Ojanen; Lappeenranta University of Technology, Finland

Sirra Toivonen; VTT Technical Research Center of Finland, Finland

Nina Tervonen; Lappeenranta University of Technology, Finland

Tuomo Kassi; Lappeenranta University of Technology, Finland

The objective of this study was to identify new ideas and business opportunities for developing new IT-driven service concepts for managing disturbances and to minimize the risks related to disturbance management in supply chains. The data for this study were collected by arranging an electronic expert session from several perspectives, e.g. those of service and technology providers, logistic solution providers and cargo owners. The new ideas for service concepts were also prioritized according to their impact and feasibility for disturbance management. As a result of the study, altogether 94 ideas and business opportunities were identified for IT-driven services and products related to disturbance management, and the prioritization of the ideas highlighted the most significant ones for further service concept development. The most significant service concepts were related especially to the electronic monitoring services for supply chains and deviations, training services, tools for reporting and analyzing disturbances, and calculation services of the cost effects of disturbances.

ME-07.3 [R] Digitalization as a Key Enabler for Efficient Value Creation Networks in the Tool and Die Making Industry

Guenther Schuh; RWTH Aachen University, Germany

Kristian Kuhlmann; RWTH Aachen University, Germany

Martin Pitsch; RWTH Aachen University, Germany

Nicolas Komorek; RWTH Aachen University, Germany

The tool and die making industry is one of the most important industries in the manufacturing sector due to its key role in the value chain between product development and mass production. In an increasingly global production environment, the tool and die making industry in high wage countries faces margin losses as well as expanding competition from Eastern Europe and Asia. Successful tool and die making companies counter these challenges with global value creation networks. Differentiating factors of efficient value creation networks are the smooth integration into the process chain of product development and mass production as well as the use of sophisticated supplier structures for the manufacturing process. According to latest field research, the practical execution of these differentiating factors is not sufficiently addressed by existing approaches for the coordination of value creation networks. However, digitalization offers a capable solution to manage

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interfaces between entities and reduce complexity of the coordination of value creation networks. A recent study by the Laboratory for Machine Tools and Production Engineering (WZL) at RWTH Aachen University and Caggemini Consulting examines the capability of digital instruments for IT-coordination of value creation networks. This paper defines the key digital instruments for the tool and die making industry as the result of the study.

ME-08 Technology Adoption - 1

Monday, 7/29/2013, 16:00 - 17:30

Room: San Carlos

Chair(s) Vijay K Gupta; IMT Ghaziabad

ME-08.1 [R] E-Court: Information and Communication Technologies for Civil Court Management

Wan Satirah Wan Mohd Saman; University of South Australia, Australia
Abrar Haider; University of South Australia, Australia

Technology adoption is a widespread phenomenon in courts of law around the world. It supports a speedy process in justice administration from case registration through case decision. It allows justice to take place virtually using the advanced technologies such as video conferencing between parties in two separate places, high-tech video presenters, business process automation/workflow management through Electronic Case Management System (ECMS), electronic filing system, court recording and transcribing, immersive virtual environment for re-creation of crime scene, forensic investigation and so on. This paper reveals a result of a case study conducted in Malaysian court environment after the adoption of E-Court project, an integrated electronic court project implemented throughout the country. This qualitative case study focuses on the four main types of applications: the Electronic Filing System (EFS), the Case Management System (CMS), Court Recording and Transcribing (CRT) and Queue Management System (QMS). Data was collected through interview, survey and document analysis in the busiest court in the country. The result shows a significant improvement in terms of court workflow management, court information and records management and integration with other agencies. At the same time, a number of technological, operational and people issues arise out of this technology adoption.

ME-08.2 [A] Diffusion of Materials Technology-Based Products in Bio Industry

Noriyuki Kawata; Nagoya Institute of Technology, Japan
Nobutaka Otake; Nagoya Institute of Technology, Japan

The bio industry has special characteristics. First, it is a science-based industry in which research in the scientific community is directly linked to industry. Second, the industry has borderline transgressive properties across many technological disciplines. Many technologies in the industry are incorporated from different fields, including information technology, mechanics and materials. However, products based on plural technologies do not easily diffuse in the industry due to their radical innovative features. In this study, we extracted driving factors to transfer materials technology-based products from life science field to clinical inspection market that is one of the most prominent applications in the bio industry. Immunochromatography and DNA micro array were selected as typical cases of success in transfer and failure in transfer, respectively. We investigated each case in the aspect of contents, patents, de facto standard, complementary goods, competing products and creation process of product idea. Consideration with diffusion theory reveals that combination with contents, biological active agents, were most important for diffusion in the market. Materials functions were complemented by combination with contents, because materials do not have biological activities. Complementary goods consolidated competitiveness of products and enhanced their diffusion. In addition, elimination of complexities in product configuration led to stimulate reinvention by users such as biochemical researchers. The reinvention let products be usable at medical front.

ME-08.3 [A] Policy Support to Activate Ecosystem of New Growth Engine (NGE) Industries

Minjung Shon; National IT Industry Promotion Agency, Korea, South

Ji-Bum Jung; National IT Industry Promotion Agency, Korea, South

Since the Korean government announced its comprehensive driving strategy for a new growth engine in 2009, the Korean government has been supporting the investment promotion act for new growth engine in many ways. Over the five years spanning 2009 to 2013, the government will make a massive investment of KRW 24 trillion in fostering 17 new growth engine industries. This move calls for efforts to boost the government's investment efficiency towards fostering and activating new growth engine industries. We will seek to analyze the new growth engine companies' investment achievements, investment intentions and difficulties with a view to creating an ecosystem of new growth engine industries so as to use the resulting studies in forecasting the size of and growth prospects for relevant industry markets. Correspondingly, the move requires efforts to devise measures for activation private companies' investment in order to define a policy direction for maximizing new growth engine business achievements. This study aims to survey and analyze the annual investment record and intention of domestic new growth engine industries, and is to find how efficient the government investment and how to support the promotion of private investment are. Additionally, we tried to analyze the ecosystem of 17 new growth engine industries which were based on the survey.

ME-09 Information Management - 1

Monday, 7/29/2013, 16:00 - 17:30

Room: Willow Glen I

Chair(s) Kumiko Miyazaki; Tokyo Institute of Technology

ME-09.1 [R] Managing Knowledge in Web Portals for Improved Customer Loyalty and Satisfaction

Tarmo Robal; Tallinn University of Technology, Estonia
Ahto Kalja; Tallinn University of Technology, Estonia

The Web has become a crucial part of our everyday lives, being a source for information and news, a platform to connect with other users through various social web applications, a medium for citizens to communicate with state via of e-government services, and doing business online, regardless whether it is online banking or shopping. It has also become an important instrument for online marketing. Today, the Web is everywhere, starting from computers and ending up with portable devices such as smart-phones and tablets. As more and more information is made available over the Internet, users are facing information overload making it harder for them to find information searched for at once. With every click users make on a website (portal), they leave behind pieces of information describing their preferences and intentions. Applying advanced methods, these events can be captured into web usage logs for further processing by means of web usage mining to tailor web information systems to its users' needs and guarantee their loyalty and satisfaction.

ME-09.2 [R] Co-occurrence Analysis in Innovation Management: Data Processing of an Online Brainstorming Platform

Pailin Chen; National Chengchi University, Taiwan
Su-Chuang Li; National Chengchi University, Taiwan
Ming Tse Hung; National Chengchi University, Taiwan

To adapt to the rapid changing business environment, it is important for businesses to adopt open innovation strategy in their daily research and development routines. The Creative Concerto Platform (CCP) created by CCIS (Center for Creativity and Innovation Studies) helps organizations to leverage the power of crowd sourcing. CCP is an online brainstorming platform for the product and service innovation process, which enables a variety of stakeholders to participate in a large-scale brainstorming activity over the Internet. Due to the excessive number of participants of CCP in contrast to traditional face-to-face brainstorming sessions, the large amount of data generated in the process cannot be analyzed efficiently without additional help. To identify the key issues and ideas in such a big data pool, we developed an information system module to extract key concepts in each article posted by the participants. Furthermore, to get a better understanding of how the key concepts are linked together conceptually in the discussion session, we utilized co-occurrence analysis to see which concepts occur in pairs and the frequency of the co-occurrence

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instances, and a visual presentation of the network of concepts can be generated to give us a better understanding of the relationships between the concepts. The system can also generate network data and visual presentation of the relationships between the participants for us to identify if any opinion leader emerges from the brainstorming process. In this essay, we use data from a CCP event as an example to illustrate how co-occurrence analysis can be helpful for the data processing and creative idea generation process, and why it is important for a business to deploy the open innovation strategy to gain innovative inputs from users / customers.

ME-09.3 [R] The Relationship between Prior Military Education and Academic Performance in an Online Technology Management Undergraduate Program

Dorothy K McAllen; Eastern Michigan University, United States

Guy H Downs; Eastern Michigan University, United States

Heather K Ascani; Eastern Michigan University, United States

This study examined the relationship between academic performance and prior military service through the use of two models: A logit model to determine the effect of prior military education on the probability that a student will graduate from a Technology Management program within three years of enrollment, and a fixed-effects regression model to determine the effect that prior military education has on academic performance (measured by grade point average). In both cases, the study controlled for variables such as age, gender, and the total number of credit hours the student transferred in to the program. The results of the logit model suggest that there is no statistically significant relationship between the probability that a student will graduate within three years and the student's age, gender, number of transfer credits, or prior military experience. However, the outcomes also indicate that while the independent variables have little stand-alone value, when taken in totality the model's predictive power is significant. The results of the regression model provide no evidence of statistical significance between academic performance and prior military experience. This model did, however, uncover significant results beyond the scope of this study, indicating a future line of inquiry focusing on gender, military experience, and student success.

ME-10 TM in Semiconductor/Electronics - 2

Monday, 7/29/2013, 16:00 - 17:30

Room: Willow Glen II

Chair(s) Charles M Weber; Portland State University

ME-10.1 [R] A Framework for Embedded Software Sourcing: Another Strategic Sourcing in the Electronics Industry

Keisuke Inoue; Japan Advanced Institute of Science and Technology, Japan

Yasuo Ikawa; Japan Advanced Institute of Science and Technology, Japan

With the digitization of electronics products and the enhancement in hardware performance, software is starting to play a key role in product development. First, the means for realizing functions has been changing from that of using dedicated hardware to installing embedded software on it. Second, the ratio of software development cost in product development is on the rise. Furthermore, as horizontal specialization structure has progressed to enhance the efficiency of product development and production, the outsourcing of its software that make up the product is becoming increasingly more important. These trends indicate that today, the securing of embedded software development capability is the key factor which determines the company's ability to develop products. However, most of the discussions in the literature up till now have been on hardware sourcing; there have been fewer discussions on embedded software sourcing. In consideration of the product development trend toward emphasis on embedded software, discussions for embedded software sourcing must become more widespread. This paper considers to what extent the knowledge in hardware sourcing thus far accumulated can be applied to this important topic, embedded software sourcing, and suggests a practical framework.

ME-10.2 [R] Do First Movers Have the Advantage?: Empirical Study of Taiwan's Semiconductor Industry

Dong-Sing He; National Central University, Taiwan

Shiu-Wan Hung; National Central University, Taiwan

Wen-Min Lu; National Defense University, Taiwan

While the preemptive advantages of first movers have met with wide approval from scholars, some also agree that late entrants may gain competitive edge through catch-up strategies and accumulation of resources. Unlike the single-period performance evaluation adopted in the past, this paper employed the Malmquist productivity index (MPI) to analyze data from the Taiwan Economic Journal Data Bank (TEJ) between 2007 and 2011 to investigate the dynamic business performance of first movers in and later entrants to the Taiwanese semiconductor industry. Bootstrap confidence intervals were used to verify the significance of the MPI. Our results indicate that late entrants to the Taiwanese semiconductor industry display better performance and higher productivity change than first movers.

ME-10.3 [R] Emerging Business Trends in the Semiconductor Industry

Samar K Saha; Prospicient Devices, United States

This paper describes the evolving trends in the major business segments of the semiconductor industry. As the MOSFET device dimensions approach to their ultimate scaling limit, the progress in the semiconductor industry has slowed down significantly. In order to maintain the competitive advantage, the different segments of the semiconductor industry are adopting new business strategies as the industry continues to evolve. In the emerging business trends, the R&D is continuously searching for the next generation devices and technologies; dedicated foundries are transitioning to become complete product development solution providers; fabless companies are adopting innovative business strategies to compete in the global market; the integrated device manufacturers are outsourcing some of their production to foundries; and the assembly and test business segment is developing scaled packages to gain competitive advantage. As a result, the semiconductor business model is evolving continuously. This paper discusses the evolution of the different segments in the semiconductor industry.

ME-11 Commercialization of Technology - 2

Monday, 7/29/2013, 16:00 - 17:30

Room: Willow Glen III

Chair(s) Hairong Gui; Nike

ME-11.1 [A] Mobilizing Resources to Pursue Technology Commercialization: The Role of Bricolage

Shih-Chang Hung; National Tsing Hua University, Taiwan

Min-Fen Tu; Tamkang University, Taiwan

The purpose of this study is to examine how the Industrial Technology Research Institute (ITRI, a Taiwan-based public R&D organization) exploits internal and external resources to speed up the commercialization process of emerging technologies which, in turn, stimulate the development of new technology-based industries. We draw on the perspective of bricolage as well as the resource-based view, organizational routine and technology commercialization to develop our conceptual framework. Our research target is the comparative study of six Taiwanese industries: ICs, PCs, notebooks, HDDs, opto-storages, and TFT-LCDs.

ME-11.2 [A] How to Push New Technologies into the Market: An Approach for Business Model Design of New Technologies

Antonino Ardilio; Fraunhofer Institute of Industrial Engineering, Germany

Sven Seidenstricker; Fraunhofer Institute of Industrial Engineering, Germany

Pushing new technologies in the market and boosting the rate of adoption are key factors for the competitiveness of high-technology companies. However, companies face a number of barriers and challenges when marketing their new technologies, for example, the existing risk aversion among the market participants. In many cases, new technologies were marketed just the same way as the old ones, even if they show other characteristics. The reflection of new business models for technology marketing could add a significant

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benefit to companies to increase the rate of adoption of their new technology. Business model innovation is one of the topics in the research of technology management to which attention has been paid to in recent years. However, a lot of approaches lack applicability, especially in terms of generating and evaluating business model ideas for technologies. Thus, this paper introduces an approach on how to create business models ideas for new technologies. It contains the description of business model concepts, an evaluation model and a process model for the development of business model ideas. A use case in the field of organic photovoltaic technology will demonstrate the practical applicability of this approach.

ME-11.3 [R] Method towards a Scenario-Based Planning of Technology Exploitation

Guenther Schuh; WZL of RWTH Aachen, Germany

Daniel Bremer; Fraunhofer Institute for Production Technology IPT, Germany

Markus Wellensiek; Fraunhofer Institute for Production Technology IPT, Germany

Toni Drescher; Fraunhofer Institute for Production Technology IPT, Germany

In today's business environment, market turbulences, changing resources or maturing technologies can dramatically influence technology exploitation. Nevertheless, current methods supporting exploitation decisions focus on static considerations neglecting the influence of environmental discontinuity. Because of complexity and risk embedded in exploitation decisions, technology-oriented companies furthermore rarely think of externally commercializing their technologies. So do companies frequently ignore the benefits of systematically exploiting technologies over their whole lifecycle? In the paper we introduce a scenario-based method for the exploitation of technologies considering the whole technology lifecycle. The method offers the opportunity to evaluate different combinations of technology exploitation options (such as licensing, joint venture, etc.). Thereby, the description of environmental factors influencing commercialization strategies over time is a key element. Emphasis is put on the integration of dynamics and the multitude of expected interactions between the variables. Thus, the various expected interactions between influential variables of the exploiting entity, the market and the external environment on the benefit of different commercialization strategies are taken into account using the scenario technique and a system dynamics approach. The presented method of this on-going research can assist companies in determining the pathway to commercialize technologies in order to maximize the benefit over the complete lifetime.

TA-00 PLENARY - 3

DATE: TUESDAY, 7/30/2013

TIME: 08:30 - 10:00

ROOM: SALON III-IV

CHAIR: JAMES C SPOHRER; IBM UNIVERSITY PROGRAMS WORLD WIDE

TA-00.1 [K] Explorations in Technology, Innovation and Entrepreneurship

James M Utterback; Massachusetts Institute of Technology (MIT), United States

Over the past 50 years, hundreds of scholars have contributed important ideas, research, articles, and books that address innovation and technology management. Contributors have been diverse coming from fields such as economics, history, management, sociology, political science, science and engineering, geography, population ecology, and law. Despite the variety of perspectives of the contributors to this body of work, their results show emergent and resonant themes. These include exploration of the sources of and stimuli for successful innovations; the importance of connections between actors in the innovation process; resources and actions related to success and value of innovations; the diffusion of innovations; consequences for firms, the economy, and society; the co-evolution of technology, markets, and institutions; and changes in many of these factors over time and across cultures. Explorations in Technology, Innovation and Entrepreneurship will organize and

highlight the work of some of the seminal authors in these streams of research. The work of one early contributor, William J. Abernathy, will be highlighted.

TA-00.2 [K] Technology Management in a Transdisciplinary World

Adnan Akay; Bilkent University, Turkey

Technology continues to profoundly change our lives, how we make products, provide services, communicate, share information, and treat illnesses. Relied on by nations and businesses to increase their competitiveness, efforts across the globe are focused on accelerating technological advances to the market place, bringing innovation and improvements to quality of life, and thus fueling economic growth. All of these efforts are accompanied by a proliferation of quantity and availability of technical information challenging the boundaries of technology management. In particular, development and acquisition of technologies are facing intense challenges to demonstrate strategic use. The demarcation between scientist and engineer is blurring as the innovation cycle starts from the laboratory and ends in the market place. The recent attention drawn to the importance of transdisciplinary research brings with it new challenges to its management. This presentation will explore ideas from different organizational viewpoints of technology management as transdisciplinary research and technologies gain traction.

TB-01 R&D Management - 2

Tuesday, 7/30/2013, 10:30 - 12:00

Room: Salon I

Chair(s) Dorothy K McAllen; Eastern Michigan University

TB-01.1 [R] A Method for Partner Selection in R&D Collaboration Between Large Companies and SMEs Using Patent Information

Kee Eun Lee; Dongguk University, Korea, South

Byungun Yoon; Dongguk university, Korea, South

This study has focused on the increasingly R&D cooperative efforts that are being made, especially between large firms and small and medium-sized enterprises (SMEs). In order to promote win-win alliances beginning at the planning stage, it is necessary to consider the capabilities of both large firms and SMEs. To overcome this problem, we propose a method of partner selection for R&D collaboration between large companies and SMEs. In order to develop this method, the first step was to consider technology roadmapping that is a necessary element in the selection for this purpose of a large firm. Second, we used context analysis to generate a list of appropriate SME candidates. Finally, we suggested a Bayesian network model that uses patent information as a tool for selecting an SME among potential candidates R&D with a large firm. We applied this approach to the semiconductor industry and selected theoretical R&D partners for a large firm, and the Bayesian network model was used to select the SME that had the highest potential for good collaboration among the available candidates. This paper will elucidate how to use it as a systematic and analytic method for creating effective partnerships between large firms and SMEs.

TB-01.2 [A] Institutionalizing Innovation Management: A Case Study from the Utility Industry

Sheila Bennett; Bonneville Power Administration, United States

Judith A Estep; Bonneville Power Administration, United States

Gordon Matthews; Bonneville Power Administration, United States

Justin Reel; Bonneville Power Administration, United States

James Bowen; Bonneville Power Administration, United States

Jisun Kim; Bonneville Power Administration, United States

Innovation management requires systematic and widely adopted processes in order to be effective at identifying and implementing research and development results. Independent of the industry, the basic framework includes identifying short to long term strategies, developing portfolios which address these goals, managing the subsequent projects, and finally making these innovative solutions available to the organization. This paper uses a case study approach to describe one method of institutionalizing R&D management in the utility

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industry. The organization's use of roadmapping, portfolio selection, project management, and technology transfer are discussed. As well, lessons learned are captured to help readers avoid similar barriers.

TB-01.3 [R] R&D Investment and Firms' Financial Performance: The Moderating Role of Chairman-CEO Duality

Wensheng Huang; Zhejiang Gongshang University, China
Zhaohui Zhu; Zhejiang Gongshang University, China

Though technological innovation by R&D is at the core of business strategy for firms to compete in the competitive market, the previous studies did not lead to a consensus about the R&D impacts on financial performance. The study suggests that the separation of a Board's chairman and CEO may play an important moderating role in a firm's R&D investment decision making. After testing the correlation between a firm's R&D investment intensity and the one-year lagged financial performance, the moderating effect of chairman-CEO duality is studied, and the results suggest that duality does mediate the effect of R&D investment on a firm's financial performance. But further analyses of subsample suggest that it is the fact only in the low-tech firms.

TB-02 Disruptive Technologies - 1

Tuesday, 7/30/2013, 10:30 - 12:00

Room: Salon II

Chair(s) Jeffrey M Alexander; SRI International

TB-02.1 [R] A Typology of Technological Changes: Theory of Technological Paradigm, Trajectory and Regime with a Case Study on the Photographic Industrial Sector

Jonathan C Ho; Yuan Ze University, Taiwan
Chung-Shing Lee; Pacific Lutheran University, United States

Shifts in technological paradigms simultaneously disrupt existing industrial organization and raise opportunities for entrepreneurial companies. Analyzing the process of paradigm shift requires a systematic framework and involves a variety of factors related to market conditions, industrial organization, and the broader technical environment. This research develops a typology as an analytical framework covering technological paradigm, trajectory and regime, and applies it to the photographic industry. The development of digital optical technologies disrupted existing film material and chemistry technologies in a paradigm shift from analog film cameras to digital cameras. This finding is in contrast to the dichotomy that technological competence can only either be disrupted or accumulated. A case study shows that separating a firm's sustainable competence from the disrupted aspect is critical during periods of technological change. Depending on its technology strategy, a firm could turn from technological innovator to technological defender when its technological competence is disrupted. Additionally, changes in the technological regime increase innovation opportunity, which attracts fiercer technological competition, thus decreasing appropriability. In the new paradigm, collective innovation has emerged as a new pattern in technological trajectory. The proposed typology is designed as a generic framework and should be applicable to technological changes in other industrial sectors.

TB-02.2 [R] Disruptive Technology in Mature Industries: Its Contribution to Industry Sustainability

Jose Albors-Garrigos; Univ. Pol. Valencia, Spain
Jose Luis Hervás-Olive; Univ. Pol. Valencia, Spain

Academic literature has often emphasized how firms in regional clusters exploit both place-specific local resources and external, world-class knowledge to strengthen their competitiveness by expanding the influence of regional systems of innovation. Innovation based in more complex and disruptive technologies tends to be based in more open systems which utilize the clusters' external networks. However, most of the literature has associated clusters with incremental innovation. This paper will analyze the determinants of disruptive innovation development in traditional (low and medium tech) clusters caused by high-tech

located entrepreneurs. It will analyze the case of the development of breakthrough innovation, its diffusion in the Spanish ceramic tile cluster and its consequent diffusion in the industry worldwide. It will examine how market demands, customer orientation, technology diffusion from other industries and industry competitiveness as well as internal and external networking of clusters can facilitate the development of a complex technology within a common set of social capital, shared cognitive schemes and understandings. The main contribution of this paper to technology strategy theory will be thorough the utilization of the disruptive technology paradigm in explaining industry changes and sustainability.

TB-02.3 [R] Study on Controversial Issues Related to Network Neutrality in Leading Countries, Focusing on Economic Efficiency and User Protection

Jeong Eun Byun; ETRI, Korea, South
Seungkoog Lee; ETRI, Korea, South

Perspectives on the issue of network neutrality, which has emerged due to the rapid increase in internet traffic, vary around the world depending on the circumstances and the stakeholders in each country. The goal of this study is to derive the main issues related to network neutrality based on cases from different countries, and suggest solutions that consider both economic efficiency and user protection. This study surveys the existing theoretical studies on network neutrality, and summarizes the basic principles of network neutrality as guarantee of transparency, prohibition of charging for incoming calls, prohibition of traffic discrimination, and reasonable network management, to help the reader understand the issue of network neutrality.

TB-03 Innovation Management - 3

Tuesday, 7/30/2013, 10:30 - 12:00

Room: Salon III

Chair(s) Tero H Peltola; CITER / Tampere University of Technology

TB-03.1 [R] Innovation, Capital and Market Capture

Frederick Betz; Portland State University, United States
Youngrak Choi; Korea University, Korea, South
Whasik Min; Korea University, Korea, South

From the beginning of management of technology, technological innovation has always been thought of as consisting of two concepts—*invention* and *commercialization*. And this definition of technological innovation does capture the short-term history of innovation and industrial competition but not the long-term history. In the early history of any new radical technology and new industry built upon it as a core technology, the two ideas capture that early part but not the later part in what Schumpeter had called “creative destruction.” For example, if invention and commercialization were sufficient to capture the long-term history of the semiconductor IC chip industry, then America would still be the dominant producers of memory chips; but it is not. American firms invented and commercialized DRAMS in the 1970s; and yet they were not significant producers of these after 1981. DRAM industrial dominance passed to Japanese firms. But by 2000, market dominance was captured by Korean firms, eliminating Japanese competition, although earlier Japanese firms had eliminated American competition. How did all that happen? It is well known that, as anticipated by Moore's Law, DRAM products went through many next-generation-technology products (from 16K chips in the 1970s to 16G chips in the 2010s). At certain of these technology discontinuities, there occurred major changes in industrial dominance. How did these dominant industrial shifts occur, over the long-term of technological innovation? To explain this, we add a third basic idea to the definition of “technological innovation”—which is the idea of “market capture.” In this way, one can think not only about short-term technological innovation (as invention + commercialization) but also about long-term technological innovation (as invention + commercialization + market-capture). For market-capture, the role of a capital structure, in addition to technology, has turned out to be a critical factor. To understand in long-term of technological innovation how precisely does capital interact with a technology-discontinuity, we review the cases of Japanese and Korean captures of the memory chip market.

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TB-03.2 [R] The Impact of Social Capital on the Outcomes of Innovation Intermediation Process

Songphon Munkongsujarit; Portland State University, United States

Antonie J Jetter; Portland State University, United States

In today's open business environments, innovation happens in globally dispersed organizations that exchange technological knowledge across increasingly permeable boundaries. Innovation intermediaries operate as middle-men between solution seekers (companies seeking technological knowledge for solving their problems) and problem solvers (experts with specialized knowledge and solutions); thus, they help to connect suppliers and customers of technological knowledge. To be successful, intermediaries need to understand the solution seeker's problem and reach to their networks of contacts or connections with various experts to match the right expert to the right problem. The literature indicates that there are two different focuses in social capital, i.e., bridging (or broadening of the network) and bonding (or deepening of the relationship). In this study, a research model and hypotheses are developed to investigate the relationship between social capital and outcomes of the intermediary process. The hypotheses are tested with the data from a government-sponsored intermediary organization in Thailand, called iTAP. The findings support the synergistic view of social capital which indicates that both bonding and bridging are necessary for the intermediation process to be successful.

TB-03.3 [R] Element-oriented Innovation and Evolvement of Mainstream and New Stream Innovation: Case Study of Fujian Haiyuan Automatic Equipments Co., LTD

Bin Zhu; Fuzhou University, China

Xinjie Jiang; Fuzhou University, China

The theoretical research on enterprises' elements innovation has gradually developed from the single element innovation to multi-elements collaborative innovation, including technology, market, system, culture elements, etc. This paper proposes a dominant element innovation theory of enterprises, analyzes the theoretical connotation which start from extracting the dominant element, and ends in forming a dominant innovation pattern, with the dominant element driving other elements to realize collaborative innovation sequentially, then takes the dynamic and evolutionary perspective to describe the evolvement mechanism of mainstream and newstream innovation "alternation between old and new—convergent innovation—result representation—meet recycling" later through a case study of three development course stages in Fujian Haiyuan Automatic Equipment Co. LTD, which has realized "single element innovation—combination elements innovation—total elements innovation" led by dominant element innovation to analyze and prove the theory proposed above, aims to provide a theoretical reference and practical guidance for enterprise innovation and gradually towards innovative enterprises.

TB-04

Technology Transfer - 2

Tuesday, 7/30/2013, 10:30 - 12:00

Room: Salon IV

Chair(s) Bing Wang; Beijing University of Posts & Telecommunications

TB-04.1 [A] A Research on Transformation Mechanism of Scientific and Technological Achievements and the Countermeasures: In Case of Zhejiang Province in China

Jing Hu; China Jiliang University, China

Yueyi Zhang; China Jiliang University, China

During the Eleventh Five-year Plan, Zhejiang Province has taken the lead in economic and social development in China. Especially, scientific and technological development is ranking top among all provinces and municipalities directly under the Central Government in China. A great number of research fields are domestically or even globally leading. Scientific and technological achievements transformation plays a crucial role in the regional economic development. However, the proportion of scientific and technological development transformed into practical productive forces is quite low. The rate of scientific and technological

contribution on economics is far lower than that in developed countries and areas. Therefore, it is a topic worthy of investigation how to promote the transformation of scientific and technological achievements of social and economic values into economic benefits in a timely and all-round manner so as to serve the society and finally boost the scientific development of China's economics. The current situation of scientific and technological development transformation of Zhejiang is described comprehensively in this paper from four aspects: personnel investment, capital investment, existing results and social benefits of the scientific and technological achievements; a DEA model is established to make overall evaluation of the transformation situation of the scientific and technological development in Zhejiang Province. The comparison with several provinces and municipalities directly under the Central Government with advanced scientific and technological development reveals the shortages in the scientific and technological achievements transformation process. Finally, the related countermeasures are proposed to boost the scientific and technological achievements transformation of Zhejiang Province in terms of development of scientific and technological finance, consummation of evaluation mechanism on scientific and technological achievements, and improvement in transformation platform construction of scientific and technological achievements.

TB-04.2 [A] Analysis of the Relative Importance of Attributes Promoting Technology Transfer in South Korea

YuCheong Chon; Korea Institute of S&T Evaluation and Planning, Korea, South

Jung Ha Yoon; Korea Institute of S&T Evaluation and Planning, Korea, South

Kil-Woo Lee; Korea Institute of S&T Evaluation and Planning, Korea, South

This study aims to evaluate the relative importance of attributes which contribute to transfer of technologies developed under the national R&D program in South Korea. Four different attributes—activation of technology finance, expanding patent commercialization model, enhancing technology licensing office (TLO) expertise, and strengthen TLO network—were selected and compared with each other using a decision-making process. TLO staffs in universities and research institutes in South Korea were asked to fill in a questionnaire, and analytic hierarchy process (AHP) was applied for the evaluation. Outcomes from this study would provide decision makers with information necessary when establishing an appropriate policy on technology transfer in South Korea.

TB-04.3 [R] Introduction of Tunnel Kiln in Modern Ceramic Industry: Technology Transfer and Improvement

Yoichi Yamada; Nagoya Institute of Technology, Japan

Nobutaka Odake; Nagoya Institute of Technology, Japan

In the ceramics industry, the system of work always depends on the kiln in use. The industrial revolution in Europe brought the widespread use of the coal-fired round kiln which changed the working style from in-home craft work to factory manufacturing. The introduction of the tunnel kiln to the modern ceramics industry is considered to be an important innovation which was initiated by Kazuchika Okura, one of the founders of the ceramics industry in Japan. The ability to make practical use of the tunnel kiln marked the start of mass production system in the ceramics industry. The most up-to-date kiln after the tunnel kiln has been the roller hearth kiln, which has changed the production system from the mass production to the "flexible specialization." In the history of the innovation of the kiln in the ceramics industry, as a first step the process of enterprise introduction of the tunnel kiln are clarified which contributed to the rapid development of a modern ceramics industry in Japan, seen from the viewpoint of technology innovation.

TB-05 Knowledge Management - 2

Tuesday, 7/30/2013, 10:30 - 12:00

Room: Salon V

Chair(s) Daniel Trejo-Medina; Universidad Nacional Autonoma de Mexico

TB-05.1 [R] Role of Knowledge Management Systems Within the Expertise Transfer

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Jose Manuel M Cardenas; University of Sao Paulo, Brazil
Mauro M Spinola; University of Sao Paulo, Brazil

This paper reviews three cases of information seeking environment within Brazilian KIBS (knowledge intensive based services) companies aiming to present how experts (or people with greater expertise) use or fail to use information technology to generate meta knowledge (or knowledge about knowledge). We are concerned about the differences between the perspective of information seeking from an expert in regard to a novice, but by considering other intermediate degrees of capability as well. In general, access to information is performed by using knowledge management systems in order to search within the organizational database; however, even when the "information" remains stored into a data warehouse, the meta knowledge produced from this interaction belongs only to the user. So if the user has enough expertise, the use of any information system comes to be obsolete. Thus, through the observation of the expert's behavior, we suggest and test a model for diminishing that problem. Results demonstrate that the efficiency in the use of a computer system depends largely on the requirements of experts and their relationships with the people involved in developing such systems. Although our model remains as a theoretical approach, it suggests a basis for a software engineering to develop customized knowledge management systems for underpinning the research problem.

TB-05.2 [R] Knowledge Sharing and Application in Complex Software and Systems Development in Globally Distributed High-Tech Organizations Using Suitable IT tools

Natalia Samoilenko; University of Jyväskylä, Finland
Nazmun Nahar; University of Jyväskylä, Finland

Although the quality of complex software and systems development greatly depends on the effectiveness of knowledge sharing and application, there is a dearth of research on effective knowledge sharing and application in globally distributed complex software and systems development of high-tech organizations by using suitable IT tools. Knowledge sharing and application in globally distributed complex software and systems development often fails due to inappropriate tools, processes, strategies and culture. Hence, the research is conducted to fill in this gap by examining how knowledge sharing and application can be facilitated, reviewing applicable theories (i.e. absorptive capacity theory) and identifying the most appropriate IT tools, methods and strategies that can significantly enhance knowledge sharing and application in developing complex software and systems in globally distributed high-tech organizations. An IT-supported framework has been developed based on an extensive review of past literature, expert views and personal experience in the field. The framework presents the most relevant IT tools, methods and strategies that have the capacities to facilitate knowledge sharing and application in globally distributed teams of high-tech organizations to a greater extent. The framework can be applied in both research and practice. The implications and future research directions are discussed as well.

TB-05.3 [R] Challenges of Managing Knowledge Across Projects

Rafael E Landaeta; Old Dominion University, United States

This article identifies a series of challenges for managing knowledge across projects. Knowledge management can be broadly defined as the set of processes, tools, and techniques for the most effective and efficient use of knowledge. Knowledge management across projects (KMAP) offers an opportunity for multi-project organizations to improve, maintain, and create organizational capabilities to generate sustained competitive advantage. The challenges for managing knowledge across projects were identified through the literature and by the experience of the author as applied researcher. This investigation serves as a foundation for further research and development in the effort to define the appropriate set of managerial actions required for successful knowledge management in multi-project environments.

TB-06 Project/Program Management - 3

Tuesday, 7/30/2013, 10:30 - 12:00

Room: Salon VI

Chair(s) Gita Mathur; San Jose State University

TB-06.1 [R] Business Evaluation of Information Communication Technology Projects in Southern Africa: The Case Study of Lesotho Revenue Authority

Michael O Kachieng'a; University of Pretoria, South Africa
Molupe Mothepu; Lesotho Revenue Authority, Lesotho
Wellington Omodho; Palm Tree Investments Limited, Kenya

Historically, in the Southern Africa, information communication technology (ICT) projects have been deemed successful whenever they were delivered on time, within budget, and according to the specification, without much concern as to whether or not the investment yielded any measurable business improvements. Such project evaluation procedures do not take into account that an ICT project is a business investment subjected to making business sense to the organization, and should, at least contribute positively to the bottom line. Due to the lack of a business framework for evaluating ICT projects, all projects meeting project management evaluation criteria were assumed to have contributed positively to business of the organization in terms returns on investment and operational efficiency. This practice ultimately had an impact on the way investment decisions were made and created a bias which was favorable towards ICT implementation projects without critical business evaluation. The growing requirement for the demonstration of due diligence and cost-effectiveness in relation to the bottom line has made investments in ICT projects a major concern for business executives in the Southern Africa. Investigations stemming from these concerns resulted in a realization that traditional project management metrics alone were not sufficient in the determination of the success of ICT projects. Business executives are now demanding reasonable returns on ICT projects investments and their value-add to the operational efficiency of the organization. This led to a number of companies attempting to link the returns from ICT projects to organizational performance, as measured using contemporary financial instruments. The challenge that was encountered was that traditional financial management metrics were also found incapable when used independently to determine the value yielded by investments in ICT projects. This paper investigates the challenges around the measurement of ICT project business value and the measurement of ICT project success. The research is based on a case study of the Lesotho Revenue Authority (LRA). The paper further proposes business instruments for the evaluation of ICT projects success from a business point of view. The mechanics and results of the study are discussed, and the conclusion is provided.

TB-06.2 [R] Technological Project Portfolio Selection in the Front End of Innovation for a Higher Education Institute: The Development of an Evaluation Tool

David Guemes-Castorena; Tecnologico de Monterrey, Mexico
Rosa M Fierro Cota; Tecnologico de Monterrey, Mexico
Gonzalo I Uscanga Castillo; Tecnologico de Monterrey, Mexico

Higher education institutes (HEI) develop technological projects as part of their on-going academic and research activities. Faculty activities are, among others, academic, research, patenting, and attending social and industrial needs, some of them resulting in intellectual capital. Therefore, the opportunity exists for early stage technologies (EST) generated by the HEI to be licensed and exploited. Also, since there is limited funding for EST project development, HEI need to assess their technological project portfolios and select the most promising ones. Within this context, some challenging questions need to be solved: how to decide what projects should receive further funding? How much information is needed in order to make a decision? This research is focused on the development of a comprehensive evaluation tool that aims at this objective: to select the best technology projects for the HEI. To achieve this, a bibliographic analysis was performed to identify the factors that influence or impact the commercial success; also, information related to technology assessment in the early stage, technology portfolio assessment criteria, and process and valuation methods for technology was analyzed. Special attention was put to the tools used by the technology transfer offices to determine inventions license priority and important intangible aspects that influence investment decision.

TB-06.3 [R] PM Competency in Product Development Organization: A Case

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Study of a Precision Device Manufacturer

Nobuhiro Horie; Japan Advanced Institute of Science and Technology, Japan
Yasuo Ikawa; Japan Advanced Institute of Science and Technology, Japan

Many companies adopt project management organization to develop products. In the current business environment, there are several ongoing trends such as globalization, commoditization, open systematization, etc. Under such a business environment, it is getting more difficult for project managers to bring projects to success. The expectations are increasing for a methodology that helps to train project managers. The goal of this study is to contribute to the establishment of a methodology that helps to train project managers. Competency is the ability of an individual to do a job properly. It is a set of defined behaviors that provide a structured guide enabling the identification, evaluation and development of the behaviors in individual employees. Competency will be defined for every kind of job and competency of project manager is called PM competency. As a necessary and important key factor for project success, we focus on PM competency. We conducted a case study in a precision device manufacturer in Japan. We interviewed with high performing project managers and asked them about their behavior that brought their projects to success, their concept of value behind their behavior, and background of their concept of value. We indicate PM competency and propose a method to develop it.

TB-07 Supply Chain Management - 2

Tuesday, 7/30/2013, 10:30 - 12:00

Room: Guadalupe

Chair(s) He Li; China Research Inst. for Science Popularization

TB-07.1 [R] A Fleet Scheduling Optimization Model: A Case of Natural Gas Distribution System in Thailand

Chayakrit Charoensiriwath; NECTEC, Thailand

This research presents a development and implementation of a web-based fleet scheduling system to support logistics process of the natural gas commerce in Thailand. The logistics network for vehicle-use natural gas in Thailand consists of two types of stations: main stations and substations. Natural gas tanks, which can be refueled only at the main station, are delivered by trucks from the main station to its substations. This logistics problem can be classified as the hub and spoke distribution system with the main station as hub and the substations as spokes. The distribution process of natural gas has to be managed precisely and efficiently. A web-based system was developed to monitor the logistics process and help in planning and scheduling the fulfillment process. A new mathematical model is developed to create delivery schedules. The model is a mixed integer nonlinear programming model with the objective to minimize the total transportation costs. From numerical results, the new model shows more accurate predictions of gas shortages and can improve the performance of a natural gas distribution system. The shortage time at the substations decreased significantly. Currently, the company is implementing this web-based system to manage the replenishment process of all of its 484 substations.

TB-07.2 [R] The Impact of Rapidly Changing Technology on the Supply Chain

Elizabeth C Gibson; Portland State University, United States
Darin Matthews; North Clackamas Schools, United States

According to the institute for supply management (ISM), technology is progressing more rapidly than ever and these changes are shaping the future of supply management. Not only are these technological advancements bringing about changes in society, they are changing the manner in which business is conducted through the supply chain. All sectors, including manufacturing, high-tech, automotive, and government, are evaluating their existing business practices to ensure they are fully leveraging current technology. As an example, the supply chain is shifting from suppliers within a certain geographic boundary to suppliers throughout the world, which is made possible by advancing technologies. A more recent shift by many public agencies is the use of locally preferred suppliers, which has resulted in a blend of both approaches. This paper, through an extensive survey of the literature, will examine how technological changes are changing how organizations do business within

the supply chain. This survey evaluates the current technology used in the supply chain for both public and private environments. The challenge for governments at every level is how to integrate new technology in the supply chain so that it can be used to their strategic advantage. Areas of concentration include supplier selection, product research, and electronic commerce. This paper will examine the potential of these areas within federal, state and local government, as well as their potential application to private sector markets. This paper provides recommendations for practitioners that are drawn from the literature.

TB-07.3 [A] The Trends for Smartphone Products and Software Consumption in Taiwan: An Application Research Combining Industry Analysis and Consumer Focus Group Interviews

Mavis Tsai; Shih Hsin University, Taiwan

Among all mobile multimedia internet devices (MMID), smartphones receive considerable attention from both producers and consumers. Taiwan is one country with fairly high mobile phone penetration. By 2009, Taiwan's mobile phone penetration was hovering near 110%, with fixed lines holding a steady 55%. By May 2012, one-third of Taiwanese over age 13 owned smartphones. This paper investigates the development of smartphone products and application software from the industry analysis based on both literature review and interviews with five managers. Those managers, holding positions in prominent, related companies, include a carrier, a device producer, a mobile application software producer and a mobile marketing company. The mobile industry interviewees includes: (1) Chunghwa Telecom, which is the largest carrier in Taiwan; (2) ACER, which is a well-known computer producer now developing smartphones and tablet products as well; (3) Ecovox and Mobimedia, which are two larger application software and mobile marketing companies in Taiwan. Also, the researcher launched several consumer focus group interviews to gather information regarding trending in smartphone products and software consumption. This study shows the viewpoints from both mobile industry representatives and consumers.

TB-08 Manufacturing Management - 1

Tuesday, 7/30/2013, 10:30 - 12:00

Room: San Carlos

Chair(s) Charles W. N. Thompson; Northwestern University

TB-08.1 [R] Algorithm for an IT-Based Scheduling of Flow Line Production in a One of a Kind Manufacturing

Hagen Ziskoven; RWTH Aachen University, Germany

A one-of-a-kind production usually requires a high manual operating effort to finish every part on time. High lead times, great stocks before the work units and very uncertain predictable completion dates are also typical. Therefore, the author started to transfer the flow line concept from the batch production to the one-of-a-kind production in cooperation with several companies. After two years of research, a solution was found and three companies began to implement the flow line concept for a one-of-a-kind manufacturing in their daily business. After some minor adjustments the concept today meets the expected results: Lead times and stocks reduced up to 50% and the efforts of operating and progress control minimized. Completion dates can be reliably calculated even before manufacturing starts due to the fixed lead time of a flow line. On the other hand, the effort needed for scheduling the manufacturing is dramatically higher. Therefore, the author developed a mathematical algorithm which allows an IT-based scheduling of the flow line production in a one-of-a-kind manufacturing. This paper will present the concept of the specific flow line production as well as the new developed IT-based scheduling algorithm.

TB-08.2 [R] System Dynamics Structure for Management Support: An Analogy with a Capacitated Delay Structure

Dirk Van Dyk; University of Pretoria, South Africa
Leon Pretorius; University of Pretoria, South Africa

Manufacturing operations may use quality improvement programs such as six sigma to improve quality and reduce cost. One of the steps in the design and analyze phase in the

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process is to use simulation and design of experiments (DoE) to find the transfer function between the voice of the customer (VOC) and the voice of the process (VOP). During the simulations the influence of the different factors are simulated, but the influence of the soft issues like stakeholder involvement, policies, training, management support and other related issues are not simulated. Typical causality is studied using one of the six sigma tools, fish bone diagram. This tool does not allow the user to study and understand feedback from other factors in the improvement process system, typically referred to as feedback causality. It is in these cases that system dynamics can serve a useful role in six sigma practice. Management support is identified as one of the elements to ensure sustainability of quality improvement programs. The purpose with this research is to model the management support from a system dynamics perspective. An analogy is drawn between the capacitated delay structure and the management support structure. The analogy is grounded in theory through theory building from data gathered in interviews during the case studies.

TB-08.3 [R] The Implementation of Ergonomics as a Sustainable Competitive Advantage in the Clothing Industry

Kemlall Ramdass; University of Johannesburg, South Africa
David Kruger; Tshwane University of Technology, South Africa

The manufacture of clothing, along with the closely associated activities of fiber and textile production, continues to be one of the driving forces of industrialization throughout the developing world. At the same time, the clothing industries of many developed consumer industries are fighting to maintain their share of the total value (as opposed to volume) which is created throughout the entire chain of apparel design, manufacturing and distribution. In order to accomplish this objective, managers are empowering employees to take responsibility for productivity and performance. By creating a workplace that is conducive to achieve this performance, in consideration of health and safety, work design and productivity, the implementation of ergonomics can become one of the sustainable competitive advantages in the clothing industry. Integrating ergonomics into a plant's culture can cut worker's compensation costs, reduce lost time, improve productivity and quality, and strengthen labor-management relations. The investigation focused on gathering information relating to workers in the different sections of clothing manufacture from incoming raw materials to dispatch of finished goods. The objective was to highlight the plight of the clothing manufacturing employees and to provide workable solutions that could be implemented in order to improve their health and safety. A cross-sectional analytical survey was conducted using direct observation, discussion and questionnaires to gain insight into ergonomic related illnesses experienced by employees.

TB-09 Information Management - 2

Tuesday, 7/30/2013, 10:30 - 12:00

Room: Willow Glen I

Chair(s) Emerson A Maccari; Nove de Julho University - Uninove

TB-09.1 [R] Governance Structures for Engineering and Infrastructure Asset Management

Waqar Haider; Center for Advanced Studies in Engineering, Pakistan
Abrar Haider; University of South Australia, Australia

Engineering asset lifecycle management is data driven. Asset lifecycle processes generate, process, and analyze enormous amounts of data on a daily basis. Asset lifecycle management can be viewed as a combination of data based informed decisions associated with strategic, planning, and operational levels of the organization. Realization of such a view of asset lifecycle requires appropriate quality, standardized, and interoperable data that provides the strategic fit between asset lifecycle processes and their enabling technologies. However, this data needs governance policies in place to ensure that it is managed and handled in a way that provides optimum value to the entire organization. This paper sketches out a framework for asset lifecycle management data governance, which highlights the roles and accountabilities related to asset lifecycle information management. The

framework describes how common business data and metrics should be defined, propagated, owned and enforced throughout the organization, thereby allowing for better quality and faster decision making, business intelligence reporting, cost reductions, compliance, and better controls of business processes.

TB-09.2 [R] Improving Engineering Asset Lifecycle Data Quality: Setting the Rules

Abrar Haider; University of South Australia, Australia
Waqar Haider; Center for Advanced Studies in Engineering, Pakistan

Business rules are constraints that validate data relationships. They form the cornerstone of the data quality. Understanding the business rules helps with identification and precise classification of the majority of data problems. Enforcing data quality checks and rules in information systems ensures quality and consistency of data by validating quality of data against business rules at each stage of data lifecycle, thereby not allowing poor quality data to enter the system. Conformance to data quality rules provides a number of benefits to businesses, including enhanced data quality and agility in responding to the ever-changing demands of the business environment. It is particularly important for engineering asset management data, since these organizations mature technologically along the continuum of standalone information technologies to integrated systems, and in so doing aim to achieve maturity of processes enabled by these technologies and the information produced by the business processes. This paper outlines the process of data quality business rule design and discusses data quality rules for asset lifecycle data.

TB-09.3 [A] Identifying Relationships of Information Quality Dimensions

Sang Hyun Lee; University of South Australia, Australia
Abrar Haider; University of South Australia, Australia

Information and its quality are impacted by numerous internal and external sources and dynamic factors, most of which influence them continually. Since information is a multidimensional construct, information quality improvement in an organization is required to consider various dimensions that are associated with degree of information quality. Therefore, information quality dimensions are the fundamental components and indicators to assess and improve information quality in organizations. However, information quality dimensions research is still immature to cover or identify all information aspects. This is because despite the vast information quality research by researchers and practitioners over the last two decades, little is known about the mutual relationships of information quality dimensions. In order to address the mutual relationships of information quality dimensions, the authors have three objectives: 1) identifying what types of attributes are embedded in information quality dimensions; 2) analyzing how differently combinations of information quality dimensions impact quality of information; and 3) discussing the relative importance of information quality dimensions from real-world practice. In this research, the authors conducted a case study employing analytic hierarchy process to fulfill the objectives.

TB-10 Competitiveness in Technology Management - 1

Tuesday, 7/30/2013, 10:30 - 12:00

Room: Willow Glen II

Chair(s) Donald A Kennedy; Willbros Group, Inc.

TB-10.1 [R] Total Interpretive Structural Modeling of Strategic Technology Management in Automobile Industry

Prakash K Kedia; Indian Institute of Technology Delhi, India
Sushil; Indian Institute of Technology Delhi, India

In the present complex economic and social environment, technology intensive industries are facing global technology-based competition. Also, critical role played by technology in this competitive environment, strategic technology management (STM) is becoming important for these enterprises. For their long-term success, companies must develop and sustain their technological capabilities. As a practical implication, the technology intensive

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industry, such as the automobile industry, should therefore define and develop necessary structures and objectives for strategic technology management to proactively manage impacts of technology for competitiveness of the enterprise, and for sustainable development of its socioeconomic environment. Based on literature findings and perceptions of enterprise practitioners, some critical elements in the area of automobile industry have been identified and hierarchical model developed, which shows the interpretation of the relationship between the elements. An upgraded version of interpretive structural modeling (ISM), i.e., total interpretive structural modeling (TISM) methodology, is used to develop the model. This model provides a logical structure to elements both for practitioners and scholars.

TB-10.2 [R] Production of Charcoal: Industrial Unit Against Handcrafted Model

Kazuo Hatakeyama; University of the Valley of Bells River, Brazil

Sueli de Fatima Oliveira Miranda Santos; Federal University of Technology - Parana, Brazil

Brazil responds for an approximately one third of the world's charcoal production, with 90% is used to produce pig iron, iron alloys, among others. Surely, 70% of the charcoal is still produced by traditional handicraft method, with almost half of the firewood from the native forests. The pressure for ecologically correct and self-sustainable production has driven the search for cleaner and more efficient technologies. These can contribute to change the present charcoal production model in Brazil. This paper intends to show the research on a metallic vertical cylinder for a charcoal production unit as a model that can meet the basic requirements of being ecologically correct, socially fair, economically and then be culturally accepted to replace the traditional model. According to the sustainability pillars, this model has shown the possibility of a 25% of firewood saving, pointing out to an economical feasibility, an ecologically correct procedure and then to comply with the Brazilian labor legislation, achieving a socially fair condition for the work force. Finally it was evidenced that the process' crucial point is to burn the dirt smoke generated during the wood's carbonization process and the use of the generated heat for a previous drying of the firewood.

TB-10.3 [R] The Relationship Between Complexity of Innovation Strategy and Automotive Component Manufacturing Innovation in South Africa and India

Kathrynne J Vermaak; University of Pretoria, South Africa

Jasper L Steyn; University of Pretoria, South Africa

The associations between complexity of innovation strategy and type, degree of novelty and diversity of innovation were investigated in the automotive component manufacturing industry. This was done in the developing country context of South Africa and was compared with that in the emerging economy context of India. The literature indicates that complex strategies are more successful than simple ones in growing competitiveness in a turbulent environment. Governments in many developing countries support automotive manufacturing because of the opportunities for job creation, economic growth and skills development. A better understanding of the effect of complexity of innovation strategy and type, degree of novelty and diversity of innovation will enable policy makers to improve their support to enable firms to grow their competitiveness and sustainability. Data were obtained from a survey conducted in South Africa and in the Pune region of India. Statistical analysis of the South African data yielded no associations between complexity in strategy and innovation but it did yield several significant associations in the case of the India data. These results appear to be consistent with strategy complexity theory when considering the detail of the two contexts. It would indicate that companies in developing countries should be supported to implement innovation strategies to grow their competitiveness.

TB-11 Commercialization of Technology - 3

Tuesday, 7/30/2013, 10:30 - 12:00

Room: Willow Glen III

Chair(s) Oliver Yu; San Jose State University

TB-11.1 [R] Supporting Technology Transfer via Web-based Platforms

Guenther Schuh; Fraunhofer Institute of Production Technology, Germany

Susanne Aghassi; Fraunhofer Institute of Production Technology, Germany

Andre Calero Valdez; RWTH Aachen University, Germany

In order to stay globally competitive, enterprises face an increasing pressure to be innovative. Furthermore, the rising complexity of new technologies forces enterprises into R&D-cooperation with third parties as technology development can often not be handled by one organization on its own. In spite of this need for technological innovations, lots of excellent research results from academia remain unexploited. The reason for this often lies in a lacking industrial partner for commercialization of developed technologies, which again is often caused by lacking visibility. Although several measures are taken to bridge the gap between research and industry, their success is not broadly achieved. In the past years, with the rising technical capabilities of modern Web 2.0 and social software technologies, several web-based platforms were built up in order to support technology transfer, and increase the visibility of the developed technologies at various research establishments. In this paper of ongoing research, different types of platforms are introduced and analyzed. Based on this analysis of existing platforms and the characterization of specific transfer situations, we introduce a concept of a social technology transfer platform which is currently established within the Cluster of Excellence in Aachen known as "integrative production technology for high-wage countries."

TB-11.2 [R] A Semantic Approach for Providing Open USN Services

Sunjin Kim; ETRI, Korea, South

Hyochan Bang; ETRI, Korea, South

Donghwan Park; ETRI, Korea, South

Youngseok Lee; Kunsan National University, Korea, South

There are currently a large number of available middleware for (ubiquitous) sensor networks. Furthermore, ubiquitous sensor network (USN) services may utilize widely distributed sensors or sensor networks through different USN middleware. In this widely distributed environment, USN services need to know of the various USN middleware, sensors and sensor networks used, and there is no standard method for data representation and access. This paper proposes an open USN service platform to share USN resources and sensed (or semantic) data with various applications and services by supporting semantic description and providing unified access for heterogeneous USN middleware. In particular, focusing on a semantic approach for open USN services, an ontology structure and model is designed including a process flow to deduce context data. Additionally, a use case using the proposed platform for a food information service is presented.

TB-11.3 [R] Understanding the Level of Faculty Involvement and Interest in the Commercialization of Discoveries, Innovations and Technology

Cory Hallam; University of Texas at San Antonio, United States

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

Anita Leffel; University of Texas at San Antonio, United States

The growing trend of universities to promote and tout the level of tech transfer and commercialization they are engaged in appears to be on the rise in the U.S. A multi-campus study of faculty interests, perceptions, and needs of technology commercialization was conducted as a means to baseline the demand and response in universities. The baseline data provides initial insight into the magnitude of the issue from the faculty perspective and the types of faculty that are primarily involved and interested in technology transfer. Discussion of proof of concept funding and a faculty Entrepreneurs' Academy are included as contextual drivers for spurring involvement in new technology commercialization from university labs.

TD-01 R&D Management - 3

Tuesday, 7/30/2013, 14:00 - 15:30

Room: Salon I

Chair(s) Xiaohong "Iris" Quan; San Jose State University

TD-01.1 [R] Practice of Creativity Techniques and Processes in Business

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Kai Wang; Stevens Institute of Technology, United States

While creativity techniques and processes (CTP) are gaining popularity at work place, only a few have studied what CTPs are actually being used and in what context they are used. Furthermore, little is known about the factors influencing the usage of CTP. This study explores these topics by interviewing four professionals who are knowledgeable and experienced in using CTPs in the business world. The commonly used CTPs are identified, with brainstorming being considered the most popular one. Three groups of factors influencing the usage of CTP are organizational context, willingness to use CTP and factors during the usage. The identified factors can be useful for business practices, while more research may be needed to confirm some suggested relationships between some factors and the effectiveness of CTP.

TD-01.2 [R] Managing University-Industry Research Partnerships through a Process of Alignment

Simon P Philbin; Imperial College London, United Kingdom

University-industry research partnerships provide a mechanism for enhanced knowledge transfer, thereby contributing to improved technology development within industry as well as providing a secure source of research funding at universities. However, misalignment of objectives, difficulties in the negotiation of research contracts, and challenges arising from research coordination are just some of the issues that can be encountered. Therefore, following a review of the literature, a management framework has been developed to help practitioners manage these issues. The framework is based on the need for alignment in three core areas, namely technical, commercial and social. The alignment mechanism will be explored through case study investigations of three research partnerships, which included two successful partnerships and one that encountered difficulties. The case studies will be compared and contrasted to help identify management strategies and supporting activities that can be undertaken to underpin the development and subsequent management of university-industry research partnerships. The findings include a need for clear leadership of partnerships including boundary spanning; robust commercial arrangements including the allocation of intellectual property rights; effective governance mechanisms and performance measurement; and the significance of companies' absorptive capacity.

TD-01.3 [A] An Analytical Study of the Relative Importance in National R&D Performance Index

Kil-Woo Lee; Korea Institute of S&T Evaluation and Planning, Korea, South
YuCheong Chon; Korea Institute of S&T Evaluation and Planning, Korea, South
Jung-Min Song; Korea Institute of S&T Evaluation and Planning, Korea, South

The objective of this study is to examine the relative importance of the attributes of national R&D output index. Relative importance data were collected from an analytic hierarchy process (AHP) survey of experts who have responsibility of R&D output management in universities and institutes located in Seoul and Dae-jeon cities in Korea. Five attributes were basic research output, application development research output, economic outcome, social outcome, and human-resource outcome. We found that economic outcome was the attribute that affected researcher preference. The findings of this study could be applied as basic information in terms of the decision-making process for the efficient management of national R&D performance.

TD-02 Decision Making - 3

Tuesday, 7/30/2013, 14:00 - 15:30

Room: Salon II

Chair(s) Bing Wang; Beijing University of Posts & Telecommunications

TD-02.1 [R] Nuclear Power Plants Alternative Sitings: A Literature Review and Research Gaps

Marwan M Lingga; Portland State University, United States

Dundar F Kocaoglu; Portland State University, United States

Nuclear energy is a major part of the power generation mix of many countries in the world. More than 430 nuclear power plants (NPPs) are operating and spreading all over the inhabited land. Although there were only a few NPP accidents, social and environmental impacts were too high. These impacts have made the nuclear power safety a controversial issue. In order to enhance NPPs safety, one suggested solution was to build NPPs in different sitings than the land-based. Offshore and underground were the two sitings that have been proposed in the literature. Studies have shown that these two sitings have the potential to improve safety measures of NPPs. In spite of the large number of published papers and the extensive studies on the topic, there is almost no single study that relatively evaluates the three sitings at once. This paper represents a review of what has been done in the literature of NPPs' alternative sitings in terms of technologies, characteristics, applications, and methods used to manage and evaluate the siting process. In addition, this paper identifies the literature gaps and underlines the need of developing a holistic systematic decision model. A decision model to evaluate NPPs' alternative sitings is proposed.

TD-02.2 [R] Selection of Smart Phone Plans

Noshad Rahimi; Portland State University, United States

Rachanida Koosawangsrri; Portland State University, United States

With the increasing popularity of smart phones, mobile carriers have been launching various mobile communication plans providing voice, text, data and other services. The changes are primarily influenced by the increasing usage of smart phones. The usage extended beyond the traditional voice communication to the massive utilization of text messaging, and the exponential increase in data usage, including services to other types of mobile devices like hotspot (Malik, 2012) capabilities. The goal of this paper is to create an empirical model that incorporates quantitative and qualitative criteria for evaluation and selection of the best individual smartphone plan. This hierarchical model creates a quantitative framework applying semi-absolute scale to measure the value of each factor that contributes to the overall score of a plan. It integrates the relative desirability of the factors in the decision-making criteria with their priority assigned by the experts. The developed model with four levels of Objectives, Criteria, Factors and Plan desirability measures decode the complicated process of evaluating available smartphone plans. The result of the process is a subjective score that provides a relative desirability measure that helps with the selection of the best plan for each user category. In the effort to stay objective and away from personal preferences, this model is studying individual plans and not considering the phone hardware as well as the provider.

TD-02.3 [R] A Hybrid Decision Support System for Storage Location Assignment in the Fast-Fashion Industry

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

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

Canhong Lin; The Hong Kong Polytechnic University, Hong Kong

Carmen K.H. Lee; The Hong Kong Polytechnic University, Hong Kong

In the highly competitive market of the fast-fashion industry, the fashion trend keeps on changing rapidly while customers always chase after new fashionable products. To meet customers' expectation and to cater for seasonal demand fluctuation, the product life cycle becomes shorter. The result of this is that frequent delivery of new products from the distribution center to the fashion retailers is necessary. This puts extra pressure on the warehouse of the fashion retailer, in which a large number of fashion products of different sizes have to be handled within a limited period of time. Due to the lack of an appropriate storage location assignment strategy, fashion products are always stored randomly, which increases the difficulties of picking the designated products. This results in low warehouse operations efficiency. In this paper, a decision support system for facilitating hybrid storage location assignment decisions is proposed to improve the warehouse operations by consid-

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ering the fashion product characteristics and the order picking patterns. By integrating the class-based storage assignment policy and association rule mining, the fashion products are classified into different classes and stored according to the correlation between products. Through conducting a pilot study in a retailer store, it was found that the systematic storage location assignment strategy improves the order picking efficiency in terms of shorter travel distance.

TD-03 Innovation Management - 4

Tuesday, 7/30/2013, 14:00 - 15:30

Room: Salon III

Chair(s) Kiyoshi Niwa; Professor Emeritus, The University of Tokyo

TD-03.1 [A] A Proposal of Business Model to Foster Innovation in Knowledge Intensive Service Companies

Clarissa Cortes Pires; Aeronautics Technological Institute - ITA, Brazil

Ligia Maria S. Urbina; Aeronautics Technological Institute - ITA, Brazil

For a long time, the service companies have been marginalized in academic studies on innovation because they are considered less innovative than product companies. However, this scenario has changed with the emergence of the new era of knowledge that leads these companies to seek new ways to organize and generate business value from innovative processes and services. In this context, the purpose of this article is to propose a business model for the R&D in KIBS, built from conducting theoretical research and analysis of the case study of a software development company.

TD-03.2 [A] Modularity and Disruptive Innovation by Local Firms: Evidence from the Chinese Shanzhai Mobile Phone Industry

Xuefeng Liu; Xiamen University, China

Yuying Xie; Shepherd University, United States

Local firms in emerging economies are catching up technologically and carrying out innovations, especially disruptive innovations. From the investigation of Chinese Shanzhai mobile phone industry, we found that technological modularity breaks down the complexity of the design of mobile phones into the development of several simpler modules. The industrial value chain evolves in such a way that a few key technologically advanced firms focus on designing and producing chipsets and software, while local firms focus on appearance design and marketing. Therefore, technological modularity and the evolution of industrial value chain lower the threshold for local small firms' entry into technology-intensive markets and promote disruptive innovations. By accumulating technology and market knowledge, these local firms can work their way up to eventually become major players in this technology-intensive sector. This finding offers a new path for latecomers in emerging markets to catch up with established competitors.

TD-03.3 [R] Relational Embeddedness and Disruptiveness of Innovation: The Mediating Role of Absorptive Capacity

Zhiwei Wang; Fuzhou University, China

Zhenxiu Cai; Fuzhou University, China

Yan Zheng; Fuzhou University, China

We developed a model in which absorptive capacity mediates between knowledge network relational embeddedness and disruptive innovation performance. Using a survey-based sample of 251 Chinese firms, this study's findings show that relational trust between knowledge network linkages will enhance corporation disruptive innovation performance through the mediation of exploratory learning. In the three dimensions of ACAP, exploratory learning is the only factor which can foster disruptive innovation performance. In contrast, neither transformative learning nor exploitative learning has direct impact on disruptiveness of innovation. More surprisingly, our research suggests that relational closeness with knowledge network linkages has no relationship with disruptive innovation. Relational closeness of knowledge network may only improve transformative learning and exploitative learning but not exploratory learning. Implications for the theory and practice of disruptive

innovation are discussed, and future research directions offered.

TD-04 Technology Forecasting - 1

Tuesday, 7/30/2013, 14:00 - 15:30

Room: Salon IV

Chair(s) Fang-Mei Tseng; Yuan Ze University

TD-04.1 [R] A Structured Approach to Classifying Evolutionary Patterns of Technology-Driven Business Models: Hybrid Analysis of Co-Word and Citation Approaches

Hyun Joung No; Seoul National University, Korea, South

Technology convergence, which promotes collaboration among different technological fields, had become the major source of changes in innovation trends and technology-paradigm shifts. With the emergence of convergence between technologies and services, it is easily noticed that the varieties of technology-driven business models are greatly expanded as well. From the previous research, it is conjectured that the technological bases of source technologies would play an important role in technology convergence since technology convergence combines two or more existing technologies and turns into a different technology with different capabilities. The same rule would apply to the convergence between technology and service. This research proposes an algorithm to characterize the evolutionary patterns of technology-driven business models. It is examined by utilizing the both citation and textual information of business model patents. The suggested evolutionary patterns might be able to guide companies to assess where their current business model stands in relation to its potential and to find new opportunities.

TD-04.2 [R] Scenario Planning for the National Wind Energy Sector through Fuzzy Cognitive Maps

Muhammad Amer; Portland State University, United States

Antonie J Jetter; Portland State University, United States

Tugrul U Daim; Portland State University, United States

In this paper, multiple future scenarios are developed using a fuzzy cognitive maps (FCM) based approach for the national wind energy sector of a developing country. Building scenarios with FCM is a very new approach, and three FCM-based scenarios are developed for the national wind energy sector. An expert panel was used to develop these scenarios. The developed scenarios help to establish a future vision of the national wind energy sector. In the economic growth scenario, energy security concerns emerged as a dominant driver, leading towards utilization of the indigenous wind resources. In the favoring policies scenario, scarcity of financial resources is an important concern because the country is not making good economic growth. Finally, climate change and emissions of greenhouse gases are the dominant concerns in the third scenario. These scenarios provide a detailed overview of the probable future landscape of the wind energy sector. Moreover, these developed scenarios also provide a basis for long-term energy planning for the national energy sector.

TD-04.3 [R] Investigating the Merge of Exploratory and Normative Technology Forecasting Methods

Yonghee Cho; Portland State University, United States

This paper aims to investigate the origins and historical evolution and revolution of technology forecasting (TF) methods. A thorough review on TF techniques is conducted to help researchers easily capture numerous methodologies as well as research gaps in the TF field. For over 60 years, a number of TF methods have been developed, and it recently become a distinct field of investigation of the future world. The study introduces a historical overview of the development of TF and describes a variety of TF approaches, initiated in the 1950s, with the pioneering research carried out by the US department of Defense, and some researchers of The RAND Corporation. The paper also offers a classification of the approaches and methods that are available for TF studies. Mostly revolutionary techniques would have been to combine different methods characterized by the several disciplines, such as exploratory and normative approaches. Finally, the paper proposes research gaps

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of the main TF techniques, identifying their methodological origin and characteristics. Some concluding remarks and lessons learned complete the research.

TD-05 Knowledge Management - 3

Tuesday, 7/30/2013, 14:00 - 15:30

Room: Salon V

Chair(s) Remy Magnier-Watanabe; University of Tsukuba

TD-05.1 [A] An International Comparative Study of the Knowledge Services Industry: Focusing on Korea, the US, UK, and Japan

Pang Ryong Kim; UST & ETRI, Korea, South

Jeong Eun Byun; UST & ETRI, Korea, South

Knowledge services is a field that is expected to greatly invigorate the national economy, as it is considered a new growth engine for a world economy that is facing growth without employment. This study aims to comparatively analyze the present state of the knowledge services industry in Korea, the United States, the United Kingdom and Japan, and based on the analysis, to derive implications for policy that will boost the knowledge services industry in Korea. The most recent input-output tables published by each government are used as statistical data and will serve as the reference for the comparative analysis.

TD-05.2 [R] IT Tools for Knowledge Storage and Retrieval in Globally Distributed Complex Software and Systems Development of High-tech Organizations

Nataliia Samoilenko; University of Jyväskylä, Finland

Nazmun Nahar; University of Jyväskylä, Finland

After identification or creation of knowledge, it is codified and stored in the corporate database or knowledge-based systems for retrieval and application or reuse by globally distributed software development teams of high-tech organizations. Increasing volume of knowledge and rapid changes in knowledge and technologies make it difficult to store, update, search and maintain corporate knowledge. In addition, it is difficult to identify which of the currently available IT tools are the most appropriate ones, what is the most suitable method, and what is the best strategy for storage and retrieval of knowledge. Despite a high need for tackling the knowledge storage challenges and high potential to address the problem, an in-depth literature review shows that the prior studies have dealt with IT tools, methods and strategies for knowledge storage and retrieval significantly inadequately. Therefore, this research has been conducted to examine and summarize the most effective IT tools that have the capacities for knowledge storage and retrieval and performing the associated activities, identify the most appropriate method and the best strategy for knowledge storage and retrieval. A framework has been developed based on the rigorous analysis of literature on the utilization of relevant IT tools for knowledge storage and retrieval, expert views and our personal experience in the field. The framework can be used by both academic researchers and practitioners. The implications of the framework for research and practice are discussed. This study also suggests some future research directions.

TD-05.3 [A] How Competitiveness is Achieved with Lean Synchronisation Implementation

Andre Vermeulen; University of Johannesburg, South Africa

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

David J Kruger; University of South Africa, South Africa

Lean is seen as an instrument to increase competitiveness through continuous improvement. According to numerous research papers, less than 0.5% of an organization's process operations are value adding. Lean principles need to be understood in the context of performance and service delivery, and organizations need to adopt a lean mindset and deploy lean approaches for retention, loyalty and customer satisfaction. Key decision makers resolve and dedication is critical for launching an initiative that seeks to modify workplace behaviors. An organization therefore requires rational improvement measurement guidelines ensuring a structured approach in helping systems delivery to drive business

innovation through measured and continuous improvement of its processes. In short, it is fruitless if performance is only measured without improvement made. Organizations should 1) empower people to measure, manage, and improve their delivery capabilities; 2) adopt a measured approach to transformation; 3) focus on core practices that matter most; 4) describe capability improvements in terms of business value; and 5) accelerate improvement through capable resources. The paper identifies what then must be done to ensure that businesses improve value adding when implementing Lean. It addresses essential elements required to implement Lean focusing specifically on capability performance measurement techniques to ensure effective Lean Synchronization.

TD-05.4 [A] Organizational Knowledge and Ambidexterity in National Laboratories: A Tale of Three Industries

Patravadee Ploykitikoon; Portland State University, Thailand

Charles M Weber; Portland State University, United States

Ambidexterity, i.e. balancing the need to exploit against the need to explore, is a well-known challenge in most innovation-driven firms. Does it also apply to national laboratories? We conduct an empirical study of the national laboratories of a rapidly developing country, whose stated missions are 1) satisfying the needs of targeted local technology users; 2) commercialization of technology; and 3) developing a long-term R&D capability for the country. We try to identify internal and external sources of organizational knowledge and quantify how they contribute to the laboratories' success at these missions. Our study covers 208 recently completed R&D projects that span three industries: biotechnology; electronics and computers; materials and nano-materials. Our study finds that, regardless of industry, ambidexterity is a major challenge for the national laboratories. Factors that contribute to the success of the short-term missions of satisfying user needs and commercializing technology have a detrimental impact on developing a long-term R&D capability, and conversely.

TD-06 Project/Program Management - 4

Tuesday, 7/30/2013, 14:00 - 15:30

Room: Salon VI

Chair(s) Jeffrey Busch; Jeffrey S. Busch PMP

TD-06.1 [R] Evaluating the System Engineering Management Model Used by a South African Defence Contractor: A Case Study

Teboho Nyareli; University of Pretoria, South Africa

Louwrence D Erasmus; University of Pretoria, South Africa

Organizations in the defense industry have to be more competitive in a global market. In order for a South African defense contractor to survive in the global markets, it has to develop products that meet its client's needs, are delivered on schedule, are produced on cost and after-sales support can be provided. To make this feasible, the systems engineering management (SEM) model used by the contractor should be implemented successfully. A case study is undertaken to evaluate the SEM model used by a South African defense contractor and how relevant it still is in a radically transforming society that is putting people first and questioning the technocratic ways of the past. The results obtained reveal that the successful implementation of the SEM has contributed to the contractor developing products that meet client's needs and are on schedule. The results also reveal that the successful implementation of the SEM does not contribute to contractor developing products that are on cost and for which after-sales support can be provided. Even though the contractor SEM model has been tailored, it is still comparable to SEMBASE model (a formal theoretical model for SEM). There are gaps between the contractor SEM model and SEMBASE. The contractor SEM model does not stress the importance actors (i.e., employees) play in the SEM model. Recommendations are made on how to improve the contractor's SEM model and to address the gaps between SEM models.

TD-06.2 [R] Analysis of the Career Path and Skills Required by Project Managers: An Energy Sector Perspective

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Pilani Ndhlovu; Eskom - Rotek Engineering, South Africa
Richard Weeks; University of Pretoria, South Africa

Project managers all over the energy sector today come from very diverse backgrounds and have followed different career paths before and after taking up the role of project manager. From the investigations it is clear that there is a lack of a common skills-set framework to guide the development of project managers within the highly technical energy sector. The current skills set of project managers is quite diverse, and there is a significant variation in the career progression and background. There have been a lot of cases of "accidental project managers" appointed without consideration of required skills and competencies to run projects. Some have succeeded as project managers while some have run their projects into the ground. On the other hand, project managers coming from a pure project management domain are appointed to head projects outside their primary technical competence area, also achieving mixed results. Every organization has had successes and failures in their projects, and the project manager has been cited as a key contributor to these outcomes. Since the project manager is identified as key to the successful delivery of projects, the skills profile of the project manager becomes paramount. This paper intends to shed light on the skills, competences required by project managers in the South African energy sector to be effective, and their career paths thereof.

TD-06.3 [R] Organisational Impact of Implementing IEC 61850 Standard for Communication Networks and Systems in Substations

Ramaesela P Madiba; University of Pretoria, South Africa
Lourence D Erasmus; University of Pretoria, South Africa

The lack of international standards for communication within a substation led to the development of proprietary protocols by utilities and vendors. The impact on utilities was complex and required expensive solutions, and limitations in multiple vendor solutions for substations infrastructure. Towards the end of the 20th century there was a compelling requirement in the power industry to standardize protocols for substation automation systems that would enable multiple vendor substation solutions. The requirement prompted the development of the IEC 61850 standard in 1997, a standard for Communication Networks and Systems in Substation. A case study was conducted at Eskom to establish the relationships between the substation function consolidation (enabled by technological advancement) and IEC 61850 standard, as well as organizational structure and the skills required by the power utilities. The case study findings highlighted that the skills and competency requirements were not properly defined, measured or monitored, nor was an alignment to the existing organizational structures defined. Based on the findings the authors propose a framework model to map the requirements of IEC 61850 with the capabilities of the organization, and formulate a potential solution for the implementation of the IEC 61850 standard.

TD-06.4 [R] Exploring Critical Success Factors for the Reintegration of Lean Six Sigma Black Belts into Line Function Roles in the Technology Environment

Nozipho Mashinini-Dlamini; University of Pretoria, South Africa
Cornelis C van Waveren; University of Pretoria, South Africa

The success that Lean and Six Sigma deployment has brought to organizations such as General Electric, Toyota, Motorola and AlliedSignal has generated great interest in the business and process improvement circles in recent years. Organizations are training Black Belts with the intention to reintegrate them into line function roles. These Black Belts are expected to be change agents in their organizations to transform the business culture to one that embraces continuous improvement. However, certain success factors govern the reintegration of trained Black Belts. The goal of this study is to guide organizations that will be reintegrating Black Belts on which critical factors to prioritize for successful reintegration. The body of knowledge relating to these success factors was identified and evaluated. Analysis was conducted to rank the success factors in order of importance. It was found that the highest ranking factors were the importance of the credibility of Black Belts; the amount of time spent by Black Belts in training to build solid skills; and management training and buy in.

TD-07 Technology Management Framework - 1

Tuesday, 7/30/2013, 14:00 - 15:30

Room: Guadalupe

Chair(s) Sushil; Indian Institute of Technology Delhi

TD-07.1 [R] Approach for the Measurement of Technology Management Performance and Value

Guenther Schuh; WZL of RWTH Aachen, Germany
Daojing Guo; Fraunhofer-Institute for Production Technology, Germany
Markus Wellensiek; Fraunhofer-Institute for Production Technology, Germany

Often the question arises regarding how technology management's added value can be measured and which contents contribute to a firm's successful as well as effective technology management. Despite its relevance and various research that has been accomplished on technology management, scientific guidance for assessing and designing a company's technology management is insufficient. There is still no unified understanding and framework of technology management activities. In this paper, we present the current version of the developed approach for assessing a firm's technology management performance depending on the effort being invested, by specifying a technology management performance index (TMPI). Generally, companies are striving towards the accumulation and application of technologies in order to create competitive advantages and economic value. We therefore promote the need for a TMPI which can be defined as a logistic function comprising possible situational choices representing the technology management process (technology intelligence, technology planning, etc.). It is assumed that with rising technology management performance efficiency, TMPI will also increase, expressing a firm's technology-intensive performance. This paper aims at investigating whether TMPI can represent technology management performance efficiency and eventually is associated with financial measures, e.g., R&D expenditure, sales with introduced products, in the ongoing research.

TD-07.2 [A] Understanding Management of Technology as a Dynamic Capability: Case Study by Dynamic Analysis Model for Technology Management Activities

Hideki Hayashida; Osaka University, Japan
Hiroki Funashima; Osaka University, Japan
Hiroshi Katayama-Yoshida; Osaka University, Japan

This study is part of our attempt to understand the management of technology (MOT) through the lens of dynamic models. Technological evolution creates new products, market opportunities, services, and organizational developments. For chemical firms, in particular, new materials or product developments are the cornerstone of sustainable competitiveness. Effective and dynamic technology management is essential for converting these developments into products of tangible value. MOT has previously been studied in terms of new product development processes, the correspondence between technology and the market, organization theory, leadership, and R&D investment. A new integrated way of understanding MOT that captures its dynamic nature as well as the managerial aspects is needed. We present here a six-dimensional analytical model (based on the physics of the phase transition model) that can be applied to the state of technology management activities with respect to the wider business context. The development of a high-purity ammonia gas business for the blue light-emitting diode industry is used as a case study. The six-dimensional analytical model, which is based on the Ising model, is also applied to the case study. The results of the dynamic model are useful for visualizing the state of the MOT. In addition, the results indicate how to improve the interaction network of the six factors of the MOT in each project.

TD-07.3 [R] Overview of evolution in study of External Technology Search

Farshad Madani; Portland State University, United States
Ron Khormaei; Portland State University, United States

Early identification of external technology threats and opportunities has been a key driver for innovations for a long time. Formalized studies of such external information gathering have

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gone through an evolution to capture its various facets. Simplifying the concept to its core value of “external technology search” (ETS), we have found that many researchers have tackled this work under different headings including technology intelligence, technology foresight, technology scouting, and technical intelligence. ETS is used as the umbrella term to cover these multiple terms in the literature with the goal of providing a better cohesive view of this field for the practitioners. In this literature review, the evolution of this area has been documented.

TD-08 TUTORIAL: Tech Mining

Tuesday, 7/30/2013, 14:00 - 15:30

Room: San Carlos

**Speaker(s) Alan L Porter; Search Technology, Inc.
Nils C Newman; Search Technology, Inc.**

“Tech mining” is shorthand for text mining of science, technology & innovation (ST&I) information resources to inform management and policy decision making. We are involved with PICMET sessions on emerging technologies (“Nano-Enhanced Drug Delivery”) and technology forecasting (“Forecasting Innovation Pathways”) that rely on tech mining to develop “competitive technical intelligence.” That addresses basic questions of “who is doing what, where, and when” in terms of R&D and commercialization of an emerging technology. This training session describes how such analyses are done. The basic approach entails search on the ST&I topic of interest in multiple databases that index R&D, business, or related activity. Search results are downloaded to a desktop computer (often in minutes) for convenient data cleaning and analyses in a Windows environment. We demonstrate such steps using VantagePoint software to take sample data through these stages to generate a range of tabulations and visualizations to identify key players (e.g., companies), their emphases, and potential developmental priorities. Such ST&I intelligence can inform decisions regarding R&D management (e.g., portfolio management), competitor threats and joint development opportunities, and likely innovation pathways.

TD-09 TM in Biotech - 1

Tuesday, 7/30/2013, 14:00 - 15:30

Room: Willow Glen I

Chair(s) Xiao Zhou; Beijing Institute of Technology

TD-09.1 [R] Incentive of Mediator on k-Implementation of Strategy Game

*Akihiko Nagai; Nagoya Institute of Technology, Japan
Takayuki Ito; Nagoya Institute of Technology, Japan*

In a firm’s business activities, it is important to decide which product market to target. Actually, firms are mispending great cost and time on marketing. Nevertheless, firms overlap products of the same quality in the market. In the strategic form game of the game theory, there is proposed a solution of the game in which the mediator participates as another party. This paper focuses on k-Implementation, from the viewpoint of the three problems in Nash equilibrium, analysis and consider about the solution of the game. In addition, the authors complement the problem of k-Implementation, and indicate that it is useful in deciding the business strategy.

TD-09.2 [A] Exploring the Nonlinear Interaction Effects of Technology and Market on Firm Performance in Emerging Biotechnology Industry

*Lucheng Huang; Beijing University of Technology, China
Kangkang Wang; Beijing University of Technology, China
Zheng Qiao; Beijing University of Technology, China
Zhun Huang; China Development Lab, IBM, China*

Technology pull and market push are two key factors driving the emerging industry to success. Although there are some precious studies focusing on the interaction effects of technology and market on firm performance, most of which are conceptual, the empirical studies are few and almost linear. So the nonlinear empirical results are lack, especially in emerging industry. The objective of this study is to explore the nonlinear effects of technol-

ogy and market on firm performance in the emerging biotechnology industry by using BP neural network. Based on a sample of 43 global top sales biotechnology firms, the results show that the interaction effects of technology and market actually affect firm performance in a nonlinear way, which is in the form of a U shape, i.e., the interaction effect is detrimental to firm performance until a threshold level is reached, and then the effect becomes contributory thereafter. The paper concludes with a discussion of theoretical and practical implications of the finding.

TD-09.3 [R] University-Industry Collaboration in Drug Discovery in Japan: An Empirical Analysis over Thirty Years

*Ryo Okuyama; Tokyo Institute of Technology, Japan
Hiroshi Osada; Tokyo Institute of Technology, Japan*

With respect to the pharmaceutical industry, university-industry (U-I) collaboration in drug discovery has played an important role in industrial innovation because drug discovery research is closely linked with basic science performed in academic institutions. In this study, we collected comprehensive data on cases of U-I collaboration in drug discovery in Japan over the last 30 years. We found that there were significantly fewer cases of drug discovery involving U-I collaboration than cases of in-house drug discovery. U-I collaboration in drug discovery was most active in Japan in the 1980s, but its activity level has declined in recent years. We also found that the companies involved in U-I collaborations were typically those with limited pharmaceutical research capability. The percentage of projects related to biologics among those involving U-I collaboration was higher than the percentage among in-house drug discovery projects. The distribution of targeted disease application revealed that U-I collaboration has been used to compensate for the lack of in-house research capability. Several academic researchers who participated in drug discovery projects involving U-I collaboration demonstrated strong research performances. Our findings serve as a basis for discussion regarding the future direction of U-I collaboration in drug discovery in Japan.

TD-09.4 [R] Challenges in Commercializing Stem Cells and Regenerative Medicine Technologies: A Case Study on Dedicated Biotech Firms in Japan

*Hawa I Munisi; Kyoto University, Japan
Shintaro Sengoku; Kyoto University, Japan*

This research has focused on studying the central role that patents, strategic alliances and funding play in commercializing stem cells or regenerative medicine-related dedicated biotech firms in Japan. The paper bases its conceptual stand in the role of resource competencies as an object of commercializing and strategizing knowledge in dedicated biotech firms. It does this by postulating its theoretical foundations in the resource-based view and the competence-based theories on analyzing the challenges faced by these knowledge-based firms. Using an integrated set of data retrieved from the Japanese Biotech Database or JaBit, we conducted a case study of six dedicated biotech firms (DBFs), which consist of three stem cells and regenerative medicine businesses and three conventional drug discovery businesses. Using descriptive statistical analysis, our results indicate that the former type of DBFs have managed to perform better in terms of the enterprise value and the number of employees but not for the firm size indicated by the number of projects in the pipeline and their net amount of assets. Furthermore, as an underlying statistic for innovation productivity, the stem cells and regenerative medicine DBFs have shown a positive trend in terms of average number of patent production per scientists who have close ties with larger firms. The stem cells and regenerative medicine DBFs also have a more experienced management group with a variety of industry experiences. Based on these findings, we conclude that the data-driven empirical approach contributes to the field of resource- and competence-based strategy building and offers a new insight to the biotech industry in Japan.

TD-10 Intellectual Property - 1

Tuesday, 7/30/2013, 14:00 - 15:30

Room: Willow Glen II

Chair(s) Manuel M Godinho; Technical University of Lisbon

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TD-10.1 [R] Driving and Creating Brand Value Through Brand Equity Valuation

Hairong Gui; Nike, United States

Tom Gillpatrick; Portland State University, United States

William Bloom; Portland State University, United States

Rui Xu; Portland State University, China

Business decision makers must effectively allocate scarce resources in order to survive and thrive in today's competitive business environment. The dramatic advances in technology over the last decade, fueled in part by the rapidly expanding use of social media, have created an extremely complex and fast-moving global marketplace. The traditional tools and methods used to measure brand equity and returns from brand investments have become less effective in providing decision makers guidance in gauging returns, and in determining where and what to invest to maximize brand value. The traditional tools are therefore no longer able to provide significant impactful or actionable information to assist executives making resource allocation decisions. This paper examines traditional brand equity valuation approaches, identifying their strengths and limitations. It then introduces a proactive brand equity valuation methodology—the Brand Equity Valuation Methodology (BEVM). This new approach applies the Black-Sholes Option Pricing Model (BSOPM) statistical and mathematic logic to brand equity valuation. The BEVM reconfigures the BSOPM variables enabling the BSOPM to generate a measure of the brand's equity value for publicly held companies (in this paper) as well as for privately owned business. It is anticipated that future applications of this methodology will enable quantification of the likely returns on brand-building investment initiatives. The BEVM model will offer decision makers a robust and effective tool to enable improved resource allocation decisions that maximize overall brand value.

TD-10.2 [A] Two Emerging Innovative Dragons: An Analysis of the IPR Strategy of China's Huawei and ZTE

Manuel M Godinho; Technical University of Lisbon, Portugal

Vitor H Ferreira; Polytechnic Institute of Leiria, Portugal

China has been experiencing a historical take-off in its use of intellectual property rights (IPR). This paper discusses the IPR strategy of two leading high-tech Chinese firms, Huawei and ZTE, analyzing how they are moving to global leadership in the telecom equipment market. Specifically, the paper addresses their IPR performance with respect to patenting and trademark registration in the most relevant global IPR systems. By 2008 Huawei had already reached world leadership in the international PCT patents applicants' ranking, while in 2011 Huawei was substituted by ZTE in that position (with Huawei dropping to 3rd place). The paper shows how both firms have developed dynamic capabilities in innovation by investing strongly in R&D. This investment has reflected in a dramatic growth of patent applications. Even if a direct correlation between patent applications and capacity to innovate is not assumed, the growing demand for patents (and more recently trademarks) in different IPR systems reveals an aggressive technological and commercial stance of both firms on the global market.

TD-10.3 [R] Car2X-Communication Mirrored by Business Method Patents: What Documented Inventions Can Tell Us about the Future

Helen Niemann; University of Bremen, Germany

Martin G Moehrl; University of Bremen, Germany

Car-to-X-Communication (Car2X) represents a set of central business processes of future mobility. It possesses the potential to establish new business models built upon new business processes. In this paper we anticipate future developments in car-to-x communication by means of an information source that has only recently become available: business method patents. Business method patents are a growing information basis and refer to inventions from different technological fields as well as applications of technologies. We develop a systematic forecast on the basis of these business method patents. By using semantic similarity measurement and setting up evolutionary patterns, it is shown that car-to-x induces many new applications, such as collusion warning, stopping distance

measurement and, surprisingly, also communication systems in automobile production, e.g. modularity production.

TD-11 Management of ICT - 1

Tuesday, 7/30/2013, 14:00 - 15:30

Room: Willow Glen III

Chair(s) Frederick Betz; Portland State University

TD-11.1 [R] Management of Geographic Information Technology in Service of the Water Erosion's Assessment in the Eastern Part of Antananarivo

Herindrainy Olivier Rakotomalala; University of Antananarivo, Madagascar

Elise Raveloson; University of Antananarivo, Madagascar

Saraha T. N. Ramanase; University of Antananarivo, Madagascar

Frank Razafindrabe; University of Antananarivo, Madagascar

Etienne Rakotomaria; University of Antananarivo, Madagascar

Degradation of watersheds by the phenomenon of erosion is now a great danger for the development of rural areas in Madagascar since on the one hand, the risk of losing a considerable amount of arable soil into rivers is rising and this is irreversible, and on the other hand, the alluvial deposits continue to overrun the agricultural parcels already developed. This paper aims to introduce an assessment methodology with reliable accuracy of the extent of damage caused by water erosion in order to guide the actions of protection and watershed management. This methodology is based on geographic information technology management. Accurate orthophotographies and digital terrain models were established from aerial photography of the study area taken on two different dates. The orthophotography is used to evaluate the surface extent of the phenomena through digitization, the digital terrain model used to evaluate the movement of land through the volumetric calculation. This method has the advantage of being rich in information and can therefore generate other useful products such as the slope map and aspect map. In conclusion, it is a great decision-making tool for the politics as well as developers.

TD-11.2 [R] The Adoption Behaviors of Mobile Multimedia Internet Device (MMID) in Taiwan

Mavis Tsai; Shih Hsin University, Taiwan

With the crisp designs and the unbounded capabilities for sharing information, the mobile multimedia internet device (MMID) is taking the world by storm technologically. By using such MMID examples such as smartphones and tablets, the researcher launched a national telephone survey in Taiwan to get a representative sample with over one thousand responses. The survey shows the newest trends in the adoption of MMID devices and how Taiwanese use smartphones and tablets as well as the related application software. Based on the researcher's prior in-depth interviews of smartphone users, generation and gender variables were found to explain some consumption behaviors. Hence, in this paper, the researcher seeks to use generation and gender variables primarily to investigate the adoption behaviors, plus the different consumption motivations and usage habits of MMID users. In this survey, the researcher found that more than one-third of Taiwanese own smartphones and 12% own their own tablets. Also, 9% of consumers don't have their own tablets, but share them within their own families. Surfing the internet and social messaging are MMID consumers' primary interests. This study shows the profile of MMID users in Taiwan.

TD-11.3 [R] A Study on Sources and Performance of Internet Access in Nigeria

Titilayo O Olaposi; Obafemi Awolowo University, Nigeria

Gbonjubola O Binuyo; Obafemi Awolowo university, Nigeria

Billy A Oluwale; Obafemi Awolowo university, Nigeria

Oluwatoyin S Ayanlade; Obafemi Awolowo university, Nigeria

Internet access is the means by which individual terminals, computers, mobile devices, and local area networks are connected to the global Internet. Internet access is usually sold by Internet service providers (ISPs) that use many different technologies offering a wide range of data rates to the end user. These different technologies have different cost implications

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and also vary in terms of performance. Existence of an empirical study on this subject in Nigeria is not known to the authors. Hence, this study investigates the sources of Internet access that are available in the study area, examines the determinant factors for the choice of source of Internet access, appraises the economic implication of each source and assesses the performance of each Internet access source. Primary data were collected for the study. A set of questionnaire containing structured and semi-structured questions were administered to 300 randomly selected respondents. Data were analyzed using descriptive and inferential statistics. Policy recommendations are made based on the findings of the study.

TE-01 NPD - 2

Tuesday, 7/30/2013, 16:00 - 17:30

Room: Salon I

Chair(s) Hideki Hayashida; Osaka University

TE-01.1 [R] Verification of Effectiveness of the Nursing-Care Service Space Visualization and Evaluation System: Field Experiment Aiming to Improve Nursing-Care Services

Yuji Hirabayashi; JAIST/ Shimizu Corporation, Japan

Naoshi Uchihira; JAIST, Japan

Kentaro Torii; Toshiba Corporation, Japan

Yasuo Ikawa; JAIST, Japan

In order to improve nursing-care services, we are developing the Service Space Visualization and Evaluation System, which collects location information and twittering of nursing-care staff and integrates record of nursing-care and nurse call. We verified that the system is effective in improving nursing-care services by conducting a field experiment. Utilizing twittering and location information enabled nursing-care staff to grasp the situation, which had been difficult for them. We confirmed it is efficient that nursing-care staff share up-to-date information of residents and that they recognize and evaluate their services for each other objectively. We also confirmed that they could search important matters and consider an improvement plan.

TE-01.2 [R] Netnography: Evolution, Trends, and Implications as a Fuzzy Front End Tool

Emy Loazon; Portland State University, United States

Jeremy Provenzo; Portland State University, United States

Benjamas Siriwannangkul; Portland State University, United States

Manar Al Mallak; Portland State University, United States

Since its inception in 1995, Netnography has undergone notable shifts from its most fundamental premises and assumptions to its procedures and applications. Through a study and evaluation of a timeline of relevant literature, this paper explores the elements that have evolved since 1995, what has caused such shifts to take place, and what the future of Netnography may look like and its implications for the product development process as a fuzzy front end tool. The analysis revealed that Netnography is effectively applied during phases 1 and 2 of the fuzzy front end. Although Netnography may prove valuable in the opportunity identification phase, particularly given the relative ease with which it can be used to identify lead users, it is not a sufficient tool to replace conventional FFE tools. Its evolution is found to be directly related to the respective evolution of computer-mediated communications and the online infrastructure. Netnography has expanded to include more automated and passive applications and will continue to evolve as a tool as long as the online consumer environment and respective behaviors continue to change.

TE-01.3 [R] Multivariate Analysis Applied in the Initial Phase of the Development of a New Eco-Friendly Product

Marcia S Echeveste; Federal University of Rio Grande do Sul, Brazil

Istefani C Paula; Federal University of Rio Grande do Sul, Brazil

Manoel M Silveira; Federal University of Rio Grande do Sul, Brazil

Angela M Marx; Federal University of Rio Grande do Sul, Brazil

The development of products that do not harm the environment is a major concern of manufacturing companies. Market research and statistical methods are used to access consumer preferences and are useful to build in features that encourage the consumer to choose products with sustainable characteristics. This paper presents a research proposal for the initial phase in the development of a household-cleaning product with environment friendly characteristics. The aim is to illustrate multivariate statistical procedures that will provide data to guide the R&D team to design a sustainable appealing solution. Qualitative interview is used to elicit consumer's requirements for the product purchase, use and discard phases. Factor analysis is used to prioritize the most important requirements from consumers. Conjoint analysis is used to allow consumers to make trade-offs between those requirements considering a set of combinations and correspondence analysis is used to associate the requirements with consumers' characteristics. The combined use of such procedures generates information that contributes to the understanding of what elements are essential for the consumer perception about the product benefits. This information is important to guide the buy-collaborate-make decision in the acquisition stage of Technology Management concerning the product-system life-cycle.

TE-02 Decision Making - 4

Tuesday, 7/30/2013, 16:00 - 17:30

Room: Salon II

Chair(s) Amir Sanayei; Wayne State University

TE-02.1 [R] Uncovering Project Screening Heuristics With Cognitive Task Analysis: How Do Gatekeepers Decide Which Technologies to Promote?

Fatima M Albar; Portland State University, United States

Antonie J Jetter; Portland State University, United States

Screening decisions in the early stages of product and technology development strongly rely on gatekeepers' intuition or "gut feel." This paper opens the black box of heuristic project screening by investigating the screening behavior of experienced gatekeepers through two approaches to cognitive task analysis: critical decision method and process tracing. Results show that project screening heuristics are fast, based on a small number of criteria, focused on "good enough" solutions, and adaptive. However, in comparison to "fast and frugal" heuristics, managerial screening heuristics are complex and entail several distinct screening steps. The paper provides a formal model of the heuristic screening process.

TE-02.2 [R] Analysis of Decision Inconsistencies in Judgment Quantification

Mustafa Abbas; Portland State University, United States

Many of the technology management decisions are analyzed using multi-level, multi-criteria decision models with quantified expert judgments. Some examples of such decisions include selection of projects, evaluation of technologies, determination of plant locations, assessment of the effectiveness of operational strategies with respect to multiple objectives, development of technology strategies under multiple perspectives, among others. When expert judgments are quantified in these types of decisions models, analysis of inconsistencies becomes a critical issue. This paper presents a comprehensive literature review on the topic, identifies the research gaps in inconsistency analyses, and describes a proposed method to fill the primary gaps in measuring and analyzing inconsistencies in constant-sum method for judgment quantification.

TE-02.3 [A] Safaricom Kenya Ltd: 2000 to 2010

Caroline V Mudavadi; Portland State University, United States

Charles Weber; Portland State University, United States

The mobile telephony industry in Kenya has been dominated by Safaricom Kenya Ltd, a company that has come to be known as one of the most innovative companies in Africa. This paper describes the company's background, strengths, weaknesses, and mainly its strategy. The Kenyan mobile telephony industry is analyzed based on Michael Porter's Five-Force Competition model. The industry starts off with just two players in 2000, but by 2010 there are four players intensifying the competition and threatening to weaken Safaricom's

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position as market leader. The governing forces in the external environment are found to be the rivalry among competitors, the bargaining power of suppliers and the bargaining power of buyers. The conclusion is that Safaricom needs to reinvent itself using its strengths as leverage, for the sake of its long-term survival in the fast maturing industry.

TE-03 Innovation Management - 5

Tuesday, 7/30/2013, 16:00 - 17:30

Room: Salon III

Chair(s) Nobutaka Otake; Nagoya Institute of Technology

TE-03.1 [R] Harnessing ICT on Innovation Projects: Managing Remote Co-Design Experiences from 24 Hours of Innovation

Luz-Maria Jimenez-Narvaez; Ecole de Technologie Superieure, Canada

Kimiz Dalkir; McGill University, Canada

Mickael Gardoni; Ecole de Technologie Superieure/INSA de Strasbourg, Canada

The Ecole de Technologie Superieure (ETS) organizes an annual international design competition, "24 Hours of Innovation," with almost 850 participants from more than 20 universities in all continents. Students are given 24 hours to create an innovative solution to an industrial problem of their choosing, which provides them a co-design experience in creativity and innovation issues. The co-design experience of "24 Hours of Innovation" follows a charrette method. This method organizes thoughts from experts and users into a structured medium in a way that promotes creativity and the generation of concepts and multiple scenarios in a rapid period of time. This study analyzed how design teams used ICTs to support collaboration between participants in different countries. Particular emphasis was placed on ICT tools used by designers to produce and share ideas (e.g., from the web, from experts) in nine design stages. Teams made use of the Internet, groupware, computers graphic applications and cloud-computing systems during product design and development. Results show that the process of developing new ideas was not sufficiently supported by ICT tools. The data also revealed the important role played by the Internet in the knowledge sharing process during the process of project development.

TE-03.2 [R] Services Innovation in Construction Machinery Industry: A Case Study of China

Qian Wu; Zhejiang University, China

Jin Chen; Zhejiang University, China

Yinjuan Yang; Zhejiang University, China

Previous studies on service innovation are mostly focused on the service sector, but with the servitization of manufacturing companies, service innovation in the manufacturing industry is getting more attention. This paper tries to build a theoretical framework for service innovation in manufacturing, especially in the construction machinery industry. First, we conduct a literature review about service innovation focusing on a four-dimensional model of service innovation and driving force behind service innovation. Then, we build a theoretical framework according to the literature review. Finally, we explore a case study about a leading company in the construction machinery industry of China, to modify the former theoretical framework, aiming at making it more appropriate and general to guide service innovation in the construction machinery industry in China.

TE-03.3 [R] Study on Motivation Mechanism of R&D Team Creativity Based on Team Shared Mental Model

Liyang Wang; China Jiliang University, China

Zhitong Lin; China Jiliang University, China

Hongtao Wang; China Jiliang University, China

Shujing Chen; Zhejiang Sci-Tech University, China

The creativity capacity of R&D team depends largely on the amount of shared information among the members and the efficiency of information exchange. In recent years, the gradual rise of the team-sharing mental model has been of significant theoretical value in the explanation of an R&D team's dealing with difficult and changing creation task through implicit

collaboration. By analyzing the structural features of the team-sharing mental model, this article puts forward the necessity of utilizing the team-sharing mental model as a means of motivation. Based on exiting studies, the results indicated that it is more appropriate to describe the team-sharing mental model of a Chinese R&D team with a two-dimension model. The study summarizes the principles and rules of the two-dimension model and establishes some measures in order to construct a positive team-sharing mental model. Moreover, this article also provides a comprehensive motivation mechanism based on a team-sharing mental model of R&D team creativity and the proposal to establish commitment-focused incentives.

TE-04 Technology Forecasting - 2

Tuesday, 7/30/2013, 16:00 - 17:30

Room: Salon IV

Chair(s) Leon Staphorst; GSTM, University of Pretoria

TE-04.1 [R] Forecasting Microprocessor Technology in the Multicore Era Using TFDEA

Saranya Durairajan; Portland State University, United States

Maria Ibarra; Portland State University, United States

Noshad Rahimi; Portland State University, United States

Shabnam Jahromi; Portland State University, United States

Technological advancements in the microprocessor industry are benchmarked and gauged against a set of diverse criteria, specific to the fabrication process, usage as well as achieved performance. Changing trends in the appeal factor as well as a wide variety of growing applications of microprocessors in different industries also have a defining impact on the advancement of the technological features in the future. This study improves the previous investigation in forecasting microprocessors' technology and uses technology forecasting using data envelopment analysis (TFDEA) methodology for an enhanced model. The study takes advantage of the recent microprocessor dataset including multi-core processors, from a variety of resources including the dataset collected by Stanford University, the database made available by Standard Performance Evaluation Corporation (SPEC), and the specifications announcements by the microprocessor manufacturers such as Intel and AMD. The result of this study is a rate of change (RoC) that is obtained based on the recent design trends including the state-of-the-art generation of multi-core microprocessors and hence, is superior for forecasting the future microprocessor technology trends. The RoC obtained provides the rate at which values of expected output performance or input requirements for the state-of-the-art microprocessors change in future years and can be used to evaluate the competitiveness of the projects being researched and developed.

TE-04.2 [A] Asphalt Global Market Analyst: Consumption, Demand & Industry Forecast

David Guemes-Castorena; Tecnologico de Monterrey, Mexico

Juan Antonio Espinosa; CEMEX, Mexico

Bernardo Vazquez-Gomez; CEMEX, Mexico

The research developed describes a methodology based on trends and scenarios to understand the dynamics of the bitumen industry at the country level in order to identify business opportunities in this sector. This methodology is supported by the concept of information management, which is used by organizations, institutions and corporations to identify, assemble, collect, process and analyze information carefully in a decision-making process to develop new businesses or optimize existing ones. It has been developed based on different tools, such as identification of reliable sources of information, statistical analysis of future events using historical data, the use and/or development of statistical forecasts. The issues have been linked in a systematic sequence that facilitate our understanding of the evolution of the bitumen industry but mainly of what will be its future for the next four years.

TE-04.3 [A] How Function Analysis of Manufacturing Processes Can Stimulate Technology Intelligence Processes

Moritz Vollmer; Daimler AG, Germany

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Michael Schmitz; Fraunhofer IAO, Germany
Joachim Warschat; Fraunhofer IAO, Germany

Volatile and unpredictable economic situations create a complex framework in which manufacturing companies are forced to operate. In order to safeguard their existence, manufacturing companies heavily depend on enduring superior and innovative technologies. Technology intelligence systems identify promising future technologies and determine measures for their implementation. Promising technology search results require the identification and transformation of information needs into appropriate search criteria. Functional analysis and function terms can stimulate technology intelligence processes by systematically verbalizing information needs for technology intelligence activities in a problem-oriented but solution-neutral way. The intention of this paper is to demonstrate the possible potential of function analysis for technology intelligence processes and how it could be applied to manufacturing processes in the future. A currently ongoing study of a truck engine assembly line will help to carry out and validate the intended approach.

TE-05 TM in Services - 1

Tuesday, 7/30/2013, 16:00 - 17:30

Room: Salon V

Chair(s) Man Hang Yip; University of Cambridge

TE-05.1 [R] Strategic Alliances in Services of Audiovisual Entertainment Content in the Context of Digital Convergence: Evidence from TV and Telephone Companies in Brazil

Luciana C Lenhari; Campinas University, Brazil
Ruy Quadros; Campinas University, Brazil

The paper aims at analyzing the emerging strategic alliances and partnerships between traditional and new agents in the value chain of services of audiovisual entertainment content (AEC) in the context digital convergence in Brazil. Such alliances seek to accumulate relevant competencies for the effective exploration of the emergent market of multiplatform AEC: TV, IPTV, mobile phones, web, and tablet. Our theoretical framework is based on the literature on value chains and strategic alliance management under the perspective of the resource-based view (RBV). Research methodology has mainly comprised in-depth interviews in television and telecom service providers in Brazil, which hold together from 50% to 90% of market share, depending on business segment. Research results reveal that whilst the new strategic alliances and partnerships are enabling television and telecom service providers to share costs, revenues and accumulate learning and competencies in order to change and expand their resource basis, this strategy is empowering potential new competitors in the value chain. This is a key management challenge to these companies in building a new market for this service.

TE-05.2 [A] Creating Knowledge Structure for Service Science

Yuriko Sawatani; Waseda University, Japan
Tamio Arai; Shibaura Institute of Technology, Japan
Teruyasu Murakami; Research Institute for Industrial Strategy, Japan

Service science is a new research area initiated in 2004. Service science related research communities aim to establish a common foundation for service science, including concepts, theories, technologies and methodologies by multidisciplinary research approaches. Service Science, Solutions and Foundation Integrated Research program (S3FIRE), which is a government funded R&D program launched in 2010, is one of them. S3FIRE is trying to form service science knowledge infrastructure by solving problems at the site. Already many articles discuss why and when service science research should be done; however, answering to what/where questions are not enough. Through managing 14 projects selected in three years, new knowledge structures are evolving in S3FIRE. In this paper, we introduce communication tools which improve the understanding of what is service science research, where we are challenging. Then we analyze and show the impacts of these communication tools by applying them at the S3FIRE workshop. Lastly, we discuss the next steps to improve communication tools for service science.

TE-05.3 [R] The Impact of Openness on Innovation Efficiency: Manufacturing and Service Industry

Joungin Choi; Korea-Israel Industrial R&D Foundation, Korea, South
Jung Wook Byun; SungKyunkwan Univ., Korea, South
Byoung Chul Lee; Foundation of Agri. Tech. Commercialization, Korea, South
Yun Bae Kim; SungKyunkwan Univ., Korea, South

As innovation activity within cooperation, network, and openness is paid attention to, open innovation that reinforces competitiveness of innovation activity using various inside and outside sources was introduced. In this study, the innovation efficiency of Korean manufacturing and service industry is measured and relationship with openness is analyzed. In comparative analysis among observed firms with relative efficiency measurement, it should be evaluated under identical conditions by ruling out external environmental influences. Therefore, a three-stage approach is applied to estimate net innovation efficiency that excludes advantage or disadvantage from environmental factors. This study estimates net innovation efficiency that terminates effects of external factors placed in out of operational control of firm using the three-stage approach. It aims to improve reliability of research because observed firms are evaluated under identical conditions. Furthermore, the results show the degree of openness affects innovation efficiency positively in the manufacturing sector. It implicates the need for a policy that encourages manufacturing firms to cooperate with external facilities actively.

TE-06 Enterprise Management - 1

Tuesday, 7/30/2013, 16:00 - 17:30

Room: Salon VI

Chair(s) Paulo Tromboni de Souza Nascimento; Universidade de Sao Paulo

TE-06.1 [R] Innovative Cognitive Style, Proactive Personality and Employee Creativity: The Moderating Effects of Work Discretion and Time Pressure

Yu-Yu Chang; National Chung Hsing University, Taiwan
Ming-Huei Chen; National Chung Hsing University, Taiwan

This paper aims to examine the influence of innovative cognitive style, proactive personality and working conditions on employee creativity by taking an interactional perspective. Innovative cognitive style refers to individual's idiosyncrasy of thinking about and dealing with an original idea, while proactive personality conceptualizes individual's strategic opportunity-seeking behaviors toward exploring novelty. Work discretion and time pressure, two critical contextual factors suggested to impact employee creativity in organizational literature, may also influence how individuals convert their innovative cognitive style and proactive personality into creativity. In an attempt to extend current understanding of creativity in organizations, this study examines the relationship between individual characteristics (innovativeness and proactiveness) and employee creativity, and how the relationship is moderated by work discretion and time pressure. Hierarchical regression analysis was used to examine the proposed hypotheses for a sample of 344 middle-level managers in Taiwanese manufacturing companies, including R&D managers and marketing managers. Results reveal that innovative cognitive style and proactive personality are positively related to employee creativity. Work discretion was found to enhance employee creativity while time pressure was found to constrain creativity. Our findings support the hypothesized moderating effects, indicating that employees will exhibit the highest level of creativity when they possess an innovative cognitive style and proactive personality as well as performing tasks with high work discretion and less time pressure.

TE-06.2 [R] ERP Implementation Influence in SME's Organizational Structure

Ana Carolina M Pimentel; Sao Paulo University (USP), Brazil
Mauro M Spinola; Sao Paulo University (USP), Brazil

The enterprise resource planning (ERP) software market has experienced a significant increase in the past few years, in large companies and also in small and medium enterprises (SMEs). However, studies are still concentrated on bigger companies and little focused on the post implementation phase. Therefore, it is important to understand how ERP imple-

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mentation has influenced changes in SMEs, since they cause impacts and these companies have specificities. The objective is to identify changes in SME organizational structures after an ERP implementation, through a multiple case study with medium companies. With a script based on the literature, interviews were made in three companies. Results suggest changes in companies' structures, specially linked with process standardization. As limitations, it was observed that results cannot be generalized, since it is a case study, and also because results reflect the company's point of view, what can lead to subjectivity. Future studies must extend the research to other cases, or yet convert it to a survey.

TE-06.3 [R] Institutional and Organizational Factors Associated to Academic Patenting in a Mexican University: Teams' Trajectories, Networks and Performance

Claudia Diaz-Perez; Universidad Autonoma Metropolitana Cuajimalpa, Mexico
Jaime Aboites Aguilar; Universidad Autonoma Metropolitana Xochimilco, Mexico

This paper explores the main characteristics of the most productive academic teams, when productivity is defined in terms of the number of granted patents. The Metropolitan Autonomous University is the fourth patent producer in the country, among academic institutions. Institutional arrangements and university policies configure a complex set of incentives and restrictions that affect patenting. Institutional arrangements and policies are used to explain groups' trajectories, composition and performance. The hypothesis assumes that better performance is associated with group characteristics such as density, reciprocity, centrality, internal and external links, students' participation, publications, industry links, and financial support. University patent information and professors' curriculum vitae were used to characterize and to identify groups through network analysis. Group leaders and team members were interviewed in order to explore their trajectories and challenges. Also, the interviewees discussed the role of institutional and organizational factors related to group performance. Results show that industry links and student participation in the patenting group are important characteristics related to performance. Also, it has been found that leader orientation to risk could explain the network dynamic and industry links. The more resources generated by the group, the greater the independence from organizational formal structures.

TE-07 Technology Marketing - 1
Tuesday, 7/30/2013, 16:00 - 17:30
Room: Guadalupe
Chair(s) Hairong Gui; Nike

TE-07.1 [R] Competence-Based Diversification: A Conceptual Approach for Evaluating the Attractiveness of New Market Opportunities

Guenther Schuh; RWTH Aachen University, Germany
Markus Wellensiek; Fraunhofer Institute for Production Technology, Germany
Julius von Mangoldt; Fraunhofer Institute for Production Technology, Germany

Technological competences are the central and success-determining factors for the competitiveness of every technology-oriented company. In this context technology management has become a vital and crucial discipline not only to anticipate technological changes and to ensure a sustainable technological base but also particularly to identify new market opportunities towards future company growth, e.g., through competence-based diversification. However, companies find it more and more difficult to evaluate different diversification options and to select the most suitable one(s) due to the lack of a systematic evaluation methodology. As a result decision making is often based on intuition rather than on resilient evaluation criteria. In this paper, the authors present a conceptual approach to develop a methodology to systematically support and facilitate the process of evaluating different diversification options. This is done by introducing a quantitative measure, the so called "competence-fit," which indicates the attractiveness of a specific diversification option. In the first step a diversification target system is derived from the company's characteristic attributes and its specific diversification objectives. Then a procedure model is developed to systematically carve out a company's competence profile from its specific tangible and intangible resources. In the next step the target system model and the competence profile

model are used to consistently describe the identified diversification options and to derive a requirement profile for each option. The degree of overlap between the competence profile and the requirement profile finally represents the attractiveness of a specific diversification option.

TE-07.2 [A] Application of Bibliometric Analysis to Market Analysis

Yosuke Nishijima; University of Tokyo, Japan
Tomohiro Anzai; University of Tokyo, Japan
Shintaro Sengoku; Kyoto University, Japan

Bibliometric analyses have been applied to wide variety of fields including the measurement of the academic outcome, the policy assessment and R&D management of academic research institutes. In this paper, we have investigated the applicability of the bibliometric analyses to the assessment of the research market whose growth could be driven by the scientific innovation originated by academic researchers. For this purpose, we have focused on the market of technologies for culturing stem cells because the global standardization of culture technology tends to be driven by academic researchers and could have a significant influence on the market formation. The bibliometric data was obtained from a publication database by using the Medical subject headings (MeSH) terms related with cell culture and stem cells. The growth rate of the market was estimated by the analysis of academic research papers. Also, standardization process was analyzed by paper citations between academic institutes. The results obtained in bibliometric analyses and a series of interviews were likely to be consistent with the growth rate of the market and standardization process of culture technologies for stem cells, indicating that bibliometric approaches in this study could be applicable to analyses of the new market formation.

TE-07.3 [R] Social Media in Service: An Analysis of the Top 20 Restaurants in New York and Lima

Juan D Govea; Universidad de Piura, Peru
Guillermo Cangahuala; Universidad de Piura, Peru

Is there any similarity in the restaurant industry between New York and Lima? From the experiences of a technologically more developed country, what lessons could be learned by a country which is developing new uses and access to new technologies? The service industry has contributed 60% to Peruvian GDP and in the last 10 years, the Peruvian GDP has grown at a rate of over 6% annually. In the service industry, one of the most developed and internationalized is the restaurant industry. Moreover, about one third of the Peruvian population has an account on Facebook (according to Facebook, 9,566,320 of its users live in Peru); this data is certainly a reason for all companies involved to develop a marketing strategy that exploits this media. Facebook is the most used social network service worldwide. Based on an in-depth analysis of the top 20 restaurants in New York, according to a Zagat ranking, we will examine how these restaurants use their social media and what could be learned for the development of this tool in Peru. On the other hand, we will also perform an exhaustive analysis of the top 20 restaurants in Lima to see if they are on the right track, and what could be improved in the use of these tools. Finally, a comparison is made to formulate recommendations learned from one of the most important gastronomic cities with a high-paced city life. The quality of its restaurants and access to new technologies make NYC a city with an interesting benchmarking to compare to others, and to evaluate for its management of new tools to manage customer service and marketing.

TE-08 Manufacturing Management - 2
Tuesday, 7/30/2013, 16:00 - 17:30
Room: San Carlos
Chair(s) Jisun Kim; Bonneville Power Administration

TE-08.1 [A] Delivering Optimal Real-Time Manufacturing Intelligence

Jonathan Cooley; Advantage Partners USA & Asia, United States
Jim Petrusich; North West Analytics, United States

IT services can now deliver optimal real-time manufacturing intelligence (MI). Enterprise

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resource planning (ERP) has been implemented for years, providing supply chain and business improvement intelligence. Real-time MI has the opportunity for rapid ROI with enhanced yields, less downtime, and less waste. Much research has shown that people are poor at determining correlations subjectively. Most industry experts only trust computer calculated correlations using statistical models. MI is a concept in the world of process manufacturing - unique for analytically alarming process trends to prevent out of control product problems. Chemical, packaging, pharmaceutical and energy companies have long known that automating data collection and data analysis can lead to improving processes and yields. These companies have developed massive databases that collect detailed measurements from factory automation tools which are used later for off-line analysis. The key to today's MI improvement is to use new IT capabilities to leverage these existing, disparate database silos; provide real-time analysis and intelligence; and identify and correct problems in-line. This can be done without creating, duplicating or installing yet another database. This paper looks at MI and case studies in chemical, pharmaceutical, and packaging process manufacturing and compares the major companies providing software options.

TE-08.2 [R] Lean Transformation in the Aerospace MRO world: Sustained Effort, Longitudinal Outcomes and Changing Management Perceptions and Drivers

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

With the introduction of lean transformation practices in the 1990's, many aerospace companies in the US began the deployment of tools and techniques to varying levels of success. Seen as a source of improved competitive advantage, the styles and successes of lean transformations were as numerous as the number of companies trying to affect the transformation. While initially seen as a manufacturing-centric operating philosophy, aerospace companies in the maintenance, repair, and overhaul business (MRO) attempted transformations. In some cases, former military MRO depots became privatized and were looking for ways to improve operations. This study provides data from almost a decade of transformation and sustainment efforts at one such facility and provides insights to the initial drivers of lean transformation and the changing objectives and metrics that have sustained a successful enterprise transformation effort.

TE-08.3 [R] Using Manufacturing Kaizen to Improve a Manufacturing Process

Gift S Nhlathi; Exxaro South Africa, South Africa
Pule A Kholopane; University of Johannesburg, South Africa

Major businesses in South Africa have been trying to adopt new business initiatives in order to stay competitive. One way to increase this is to apply proper manufacturing strategy and use of tools to achieve business objectives in order to stay competitive and to increase profit. This paper addresses the application of a manufacturing tool called manufacturing kaizen. Manufacturing kaizen refers to a method for improving a work process by eliminating waste within an organization. It achieves the elimination of waste by empowering people with tools and a process to uncover improvement opportunities and make changes. It explains waste to be any activity that is not value adding from the perspective of the customer. The aim of this paper is to unpack manufacturing kaizen and to look into its qualitative nature, its application within a working environment and how it influence productivity. It also investigates how this tool can be applied in a process or chemical industry and the benefits it can provide to an organization. The results show that labor productivity can be improved over time after the introduction of manufacturing kaizen. It concludes that with the introduction of manufacturing kaizen, transformation at the workplace can be established leading to productivity improvement within an organization.

TE-09 PANEL: Meet the Editors

Tuesday, 7/30/2013, 16:00 - 17:30

Room: Willow Glen I

Panelist(s) Tugrul Daim; Portland State University
Gloria Barczak; Northeastern University

Toni L Doolen; Oregon State University
Hans Georg Gemuenden; Berlin University of Technology
Fred Y Phillips; Stony Brook - State University of New York
Ozcan Saritas; Istanbul Technical University
Steven T Walsh; University of New Mexico

Meet the editors of the Technology Management related journals. The editors will discuss the philosophies, criteria, and submission processes of their journals and answer questions from prospective authors.

TE-10 Competitiveness in Technology Management - 2

Tuesday, 7/30/2013, 16:00 - 17:30

Room: Willow Glen II

Chair(s) Evelina Ericsson; Royal Institute of Technology

TE-10.1 [R] Prime-Movers in a Commodity Industry

Frederick Betz; Portland State University, United States
WonKoo Park; Korea University, Korea, South

A commodity industry is one in which core technologies in products have matured, and further technological progress is focused upon production. William Abernathy had introduced the concept of an "industrial life cycle" to depict the transition of a high-tech industry into a commodity industry (Abernathy, 1978). This is when the rate of product innovations peak and then declines; and yet the rate of production innovations increase and continue. During this transition the number of firms in the new industry also peaks and then declines. Alfred Chandler addressed the problem of which new firms in the new industry would rise to market dominance and called these "first movers" (Chandler, 1990). And in new industries, such companies as Ford (automobiles) and IBM (computers), there had been first movers which rose to dominance. These two concepts fit historical patterns in the early times of new high-tech industries, but not over longer times. First movers have not always maintained dominance in a market. For example, Ford lost U.S. dominance to General Motors after the 1920s; and General Motors lost dominance to Toyota after the 1990s. Xerox lost dominance in printing in the 1980s; and IBM lost dominance in computers in the 1980s. Why? What are the criteria for market dominance in commodity-type industries? We introduce the concept of a "prime-mover" in a commodity industry (as an analogous concept to that of a "first-mover" in a high-tech industry). After the middle of the twentieth century, the commodity industry of steel underwent major industrial restructuring, with Asian firms emerging as new prime movers in the restructuring. To understand this, we analyze the remarkable global success of the Korean firm of POSCO, established long after the steel industry had become a commodity industry.

TE-10.2 [R] Creating a Lean Manufacture Structure in a South African Organisation

David J Kruger; University of South Africa, South Africa

Of late, numerous industries from diverse sectors endeavored to implement lean manufacturing (LM). The execution of a LM stratagem exemplifies a dynamic input to the stepped progression leading to operational ascendancy and the continuous improvement via the eradication of non-value added actions. The subsequent progressive productivity is crucial to marketplace dominance and achieving a maintainable competitive gain. Instances are proliferating of organizations which could not attain the anticipated advantages and performance attainable via LM execution. In South African the situation is similar. A manufacturing organization in South Africa was researched which previously attempted to execute LM and failed. A major barrier is the ineffectual exploitation of lean production techniques in long-established manufacturing establishments. Two foremost contributing aspects were distinguished. They are the outmoded program or ineffectual system to be enhanced as well as the nonexistence of members of staff's grasp of the hypotheses and philosophies of LM. Despite the fact that LM has been performed for years, a dearth of comprehension amongst the workforce vis-a-vis the execution of LM nevertheless endures. This paper makes an attempt to suggest a schema for LM execution in a South African manufacturing

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organization. Several practices / instruments / procedures and methods were explored.

TE-10.3 [R] Sectoral Patterns of Technological Change, Technology Diffusion and Global Competition: Comparison of the Semiconductor and the Pharmaceutical Industries

Bao Lin; Tsinghua University, China

Though both are seen as "high-tech" industries, the pharmaceutical and the semiconductor industries are in fact very different in the patterns of technology diffusion and global competition. In the pharmaceutical industry, innovations are concentrated in few regions, and the industrial leaders enjoy sustainable advantages; while in the semiconductor industry, innovations gradually distribute, and the advantages of the industrial leaders are vulnerable. By comparing these two industries, this article argues that different patterns of technology diffusion and competition should be explained by different patterns of technological change. The analysis of this article shows that the differences of technological change in these two industries are mainly originated in different relationships between science and technology, which can be represented by "linear model" in the pharmaceutical and "chain-linked model" in the semiconductor industry, and which also cause different relationships between product innovations and process innovations, differences in uncertainties, costs and requirements of resources and capabilities. Finally, this article discusses the possibility to generalize the distinction between science-based and technology-based patterns of technological change.

TE-10.4 [R] Alignment Strategies for the Clothing Industry in SA: Lessons Learned

Kemlall Ramdass; University of Johannesburg, South Africa
David Kruger; Tshwane University of Technology, South Africa

The clothing industry globally has undergone rapid change within the past few decades. The production of fashion has evolved into a multi-faceted industry that is not only concerned with the manufacture of clothing but also the systems of production, distribution, diffusion, reception, adoption and consumption which drive the fashion industry. The South African Clothing and Textile Workers Union (SACTWU) estimates 13,400 jobs were lost in the sector in the first 11 months of 2009. SACTWU researcher Etienne Vlok says that in the mid-2000s, the industry was losing about 20,000 jobs a year, but in the past three years, job losses have dropped to between 12,000 to 14,000 jobs a year. Changes in the global economy have enabled the requirement for flexibility, adaptability and innovation that have led to new education and training demands in order to remain competitive. The most significant demand is the proposed need for a highly skilled labor force that has the ability to employ new knowledge, technologies, business improvement methodologies, and ultimately add value to existing goods and services. Essentially, these skills and capabilities are developed through a broad general higher education system. Based on research undertaken as part of doctoral studies at the University of Johannesburg, the paper highlights current experiences in the South African clothing industry and academia, and proposes the alignment of industry and academia in order to improve the skills of the workforce.

TE-11 Management of ICT - 2

Tuesday, 7/30/2013, 16:00 - 17:30

Room: Willow Glen III

Chair(s) Kumiko Miyazaki; Tokyo Institute of Technology

TE-11.1 [R] Competing Technologies and Consumer Behavior: The Adoption of New ICT Platforms in Mexico

Humberto Merritt; National Polytechnic Institute (IPN), Mexico

The incessant pace of innovations in the information and communications technology sector (ICT) has transformed the scope of several industries. On the one hand, consumers are increasingly able to decide whether or not new technologies are worth adopting. On the other hand, ICT manufacturers, seeking to expand their market shares, encourage the continuing purchase of newer versions of their products regardless of their elapsed technology

life cycle. These phenomena have prompted the advent of competing ICT platforms, which include mobile telephony, broadband Internet, terrestrial digital TV and cloud computing. Yet, the diffusion of newer platforms still requires suitable conditions to prosper as, for example, an appropriate technological environment. In the case of developing countries such as Mexico, socio-economic factors also play an important role. In this paper we analyze users' intentions to adopt available ICT platforms. Although a considerable proportion of Mexicans already make use of newer technologies, some are still attached to older ICT platforms, such as analog radio and television. There are several public policy implications for this situation, among which the necessity to encourage the rapid diffusion of more efficient ICT technologies as well as the urgent deployment of an appropriate supportive infrastructure stand out.

TE-11.2 [R] Exploring Technological Convergence Based on Value Proposition Types of IT Firms

Eunhee Kim; Chonnam National University, Korea, South

Throughout the past decade, technology convergence has received particular attention. The creation of synergies, blurring of industry boundaries, integration, and overlapping of market are all used to describe convergence. The convergence phenomenon has been mainly observed and discussed in information technology sectors, and the technical changes due to the convergence give rise to the creation of new values. IT innovations diffuse into existing products and come to form a new integral part of the goods. Patents play an increasingly important role in innovation, and patent data are used to indicate innovative activity of companies, industries and countries. This is an exploratory study to examine and to compare global IT firms' technological convergence, using patent co-classification network analysis, which visualizes the interactions between different technology fields.

TE-11.3 [R] Evolutionary Patterns of an Artifact: The Mobile Phone

Jeong-Dong Lee; Seoul National University, Korea, South
Euy-Young Jung; Seoul National University, Korea, South
Jungsub Yoon; Seoul National University, Korea, South
Seong-Jin Kim; Korea Institute of S&T Evaluation and Planning, Korea, South
Hojin Jung; Seoul National University, Korea, South

We establish an algorithm that explains the evolutionary patterns of artifacts and construct a mobile phone phylomemetic tree using a very simple statistical method with the principles of biological evolution. Based on the results, we find that the change of an artifact and society's relationship to that artifact follow a certain pattern. First, the evolution of an artifact's characteristics takes a direction that differs depending upon the characteristics involved. In addition, the outcome of this evolution is connected to the general human perception of consumers. Second, each of an artifact's characteristics evolves sequentially rather than simultaneously. Furthermore, characteristics of one artifact that are held in common with those of other artifacts, such as a digital camera and PDA, have an effect on the speed of that artifact's evolution. Finally, producers that launch many evolved artifacts end up in a leading position in the marketplace.

WA-00 PLENARY - 4

DATE: WEDNESDAY, 7/31/2013

TIME: 08:30 - 10:00

ROOM: SALON III-IV

**CHAIR: KIYOSHI NIWA; PROFESSOR EMERITUS,
THE UNIVERSITY OF TOKYO**

WA-00.1 [K] Beyond Analytics: The Special Case How Technology Managers Translate Big Data into Actionable Decisions

Eliezer Geisler; Illinois Institute of Technology, United States

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Analytics provides managers with tools to analyze massive data in today's organizations. However, there are theoretical and empirical gaps between the analysis of such data and the useful knowledge derived from it for managers to make decisions. This is the crux of the concept of "Beyond Analytics." The framework presented here links analytics with cognition and classifies managers by the mode in which they apply data analyses to their representations of organizational phenomena so that relevant decisions can be made. This allows us to establish a link which tailors data analyses to the manager's "preference platform," similar to targeting pharmaceuticals to patients by the analysis of their DNA. The framework is then constructed as a special case focused on technology managers. How do these managers construct the phenomenon of managing technology within their organizations by the use of the analysis of "big data" to which they are exposed? How do these managers process and translate such data to formulate adequate decisions in the conduct of their operational responsibilities? What makes these managers and their technology organizations different from other sectors and industries? The framework presented here was tested empirically in a sample of 231 R&D and technology managers in five large organizations. The results provide a promising step in our ability to close the gap between analytics and actual decisions made by technology managers.

WA-00.2 [K] Implementation of Innovation Strategies through Project Portfolio Management – Research Results from the TU Berlin Studies

Hans Georg Gemuenden; Berlin University of Technology, United States

Companies perform a growing number of innovation projects simultaneously, contributing to a growing share of future value, thus increasing the relevance of their innovation project portfolio. However, increasing requirements from customers, suppliers, and regulatory institutions, and increasing interdependencies between projects regarding financial and human resources and knowledge, create difficulties to coordinate between projects and to align them to the business strategy. Many firms perform too many projects, do not spend their resources according to their business strategy, and they do not terminate projects consequently which have lost their justification. In the last 10 years we have performed several studies analyzing how firms in German-speaking countries manage their innovative project portfolios, covering more than 1,000 portfolios with a combined budget of more than 100 billion Euros. We have looked at their multi-project management systems comprising an aligned set of organizational actors, strategies, structures, processes, methods (including IT), and cultures (including incentives) to reach defined performance criteria of relevant stakeholders. Our findings show that the set of relevant success factors comprises three dimensions: (1) strategic clarity, (2) operational transparency, and (3) responsiveness and pro-activeness.

WB-01 Technology Roadmapping - 1

Wednesday, 7/31/2013, 10:30 - 12:00

Room: Salon I

Chair(s) Oliver Yu; San Jose State University

WB-01.1 [R] A Challenge for PPP (Public Private Partnership) Concept Modeling by the IST (Innovation Support Technology)

Hitoshi Abe; OKI Electric Industry Co., Ltd., Japan

Masahide Mitsuoka; Sony Corporation, Japan

Masahiko Nakamura; Teikoku Databank, Ltd., Japan

Kazuhiro Kojima; AIST, Japan

The IST (innovation support technology) has been developed by a group of researchers from JATES (Japan Techno-Economics Society) since 2002 and reported several times at PICMET Conferences. Toyo University established the PPP Graduate School (Toyo PPP) in the spring of 2006 to study and educate the students (working professionals), who can understand the issues of PPP and attempt to improve the worsening conditions of finance and public facility redevelopment at the local government level. The issues on regional economic development and PPP innovations should be focused in the future. People involved in PPP projects are required to communicate and understand each other from quite different

backgrounds. In this paper we briefly review the PPP recent movements. We propose the IST as a concept modeling tool and a communication tool for PPP projects.

WB-01.2 [R] Study of Multi-Scenario Based Technology Roadmapping: Bayesian Causal Maps Approach

Yulianto Suharto; Institute of Technology, Bandung, Indonesia

The increasingly important role of the technology roadmap in today's business success is well established. The main reason for this is that the technology roadmap is considered to reflect all the plans (technology and business performance) and as such build on rather than replace existing techniques in use within a company. Despite all the possibilities offered by the technology roadmap, it is subject to some limitations that stem from only consideration of straight-line projection or single scenario; thus, it becomes complex in the face of high volatility, rapid, systematic, and unanticipated changes. In order to overcome such limitations, this paper offers multi-scenario based technology roadmap using the approach of Bayesian causal maps. In addition to Bayesian causal maps, a systematic probability generation method is also used to compute conditional probability distribution that is needed to compute the prior and posterior probability of the variables in the maps.

WB-01.3 [R] Assessing the Status of a Roadmap: When is the Time to Review?

Ronald S Vatananan; Mahidol University, Thailand

Nathasit Gerdseri; Mahidol University, Thailand

Maintaining a roadmap is a crucial task for any organization that wants to keep the roadmapping process alive after its development. However, it is not easy to maintain and review a roadmap because an organization is exposed to constant changes in its business environment. An organization has to review its roadmap to include the changes that have a significant effect on the status of the roadmap. But to determine when it is time to review a roadmap is a major challenge for any organization. As a result, most organizations maintain a roadmap on a predetermined regular basis. This paper proposes an analytical approach and evaluation model to determine the status of a roadmap. The proposed approach will assist an organization to decide when a review of its roadmap is necessary. A case example is presented to demonstrate the computational process and applicability of the proposed approach.

WB-02 TM in Health - 1

Wednesday, 7/31/2013, 10:30 - 12:00

Room: Salon II

Chair(s) Joao Chang Junior; Centro Universitario da FEI

WB-02.1 [R] Heterogeneities and Patterns of Innovations in Life Sciences Sector: The Case of Stem Cells Employing Patent Families Data

Zhongquan Xie; Kyoto University, Japan

Shintaro Sengoku; Kyoto University, Japan

While study on innovations in life sciences is not new, technology breakthrough in this field always attracts scholars to exploring new innovation insights, due to its expected significance to economic development and social welfare. This paper explores the heterogeneities and patterns of innovations in life sciences sector with the case of stem cells, an emerging and promising field. By employing 10,853 stem cell-related patent families published up until 2011 retrieved from Thomson Reuters/Derwent Innovations Index database, this paper clarifies the heterogeneities of innovation activities in stem cells sector in terms of regions, actor types, focus and significance of technological fields, foreign patenting and time frame, especially in the fields of embryonic stem (ES) cells and induced pluripotent stem (iPS) cells. It is found that there has been a shift of innovation trajectories from ES to iPS cells. Both academic and/or medical institutions and firms have centered on the innovation system, but their roles differ across regions in term of innovation performance. The types of academia-centered, firm-centered and combined innovations in different regions are identified. The results highlight that regions and types of organizations significantly

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influence innovation activities in the stem cells field due to different regional innovation strategies and regulations.

WB-02.2 [R] Development of Methodology for Forecasting Hospital Occupancy by Econometric Method

Joao Chang Junior; Centro Universitario da FEI, Brazil
Domenico Caruso; Hospital Sao Francisco, Brazil

The demand for health services in Brazil has increased significantly in recent years. From 2007 to 2011 there has been an increase of 87.2% in the number of patients-day in Brazilian hospitals. The purpose of this article is to develop a methodology for forecasting the occupancy in hospitals through daily information of occupation and admission that are provided by the emergency service. It is believed that by means of this information and its projections, it will be possible to improve both the flow of patients in a hospital as well as the customer services. To this end, we used econometric analysis and projection methods of time series for evaluating the forecast of these variables for two Brazilian hospitals.

WB-02.3 [R] The EuroScore Additive is a Valid Measure to Predict Mortality in Cardiac Surgery?

Joao Chang Junior; Centro Universitario da FEI, Brazil
Alfredo Fernandes; Instituto do Coracao da Fac. de Medicina da USP, Brazil
Anibal Panaino; Centro Universitario da FEI, Brazil
Gabriela Favaro F Guerrer; Instituto do Coracao da Fac. de Medicina da USP, Brazil

In the last years, advancements of cardiological research in Brazil were very significant, both at the academy, such as in hospitals and clinics, generating not only an increase in the number of publications, but also an improvement in the results achieved. The cardiological surgery has achieved excellent results because it has reduced the mortality tax and has increased life expectancy of people who need this type of surgery. This article aims to evaluate the effectiveness of an instrument called EuroScore Additive (ES), which is used to evaluate the risk of death in patients undergoing cardiological surgery. The research used applied statistical methodology to analyze data of 238 patients who have undergone valve surgery in a public hospital specializing in cardiological surgery over a period of two years. The results show the limitations of the EuroScore Additive in predicting the outcome of valve surgery.

WB-0 Innovation Management - 6

Wednesday, 7/31/2013, 10:30 - 12:00

Room: Salon III

Chair(s) Bala Mulloth; Central European University Business School

WB-03.1 [R] Evidence from Surveys and Case Studies: What We Know and What We Do Not Know About Industrial Innovation in South Africa

Andre J Buys; University of Pretoria, South Africa

Innovation, and particularly technological innovation, has come to be recognized as the primary force driving economic growth and prosperity. In the last decade a number of national innovation surveys were conducted in South Africa to measure innovation with the aim of utilizing the findings for policymaking. National surveys of innovation in South Africa were conducted in 1996, 2001, 2005 and 2008. These national innovation surveys were supplemented by more detailed sub-sector surveys that focused on particular sectors of interest, such as the defense related industries and the automotive component manufacturing sector. Survey research is a positivistic research methodology that provides a broad overview of the national system of innovation, but it does not provide a clear picture of innovative behavior at the individual firm level. Case study research, being a phenomenological research methodology, has to augment our understanding of industrial innovation at the firm level. This paper is an overview of past surveys and case studies of industrial innovation in South Africa and highlights the main findings as well as the major questions that still remain unanswered.

WB-03.2 [R] A Case Study on Partner Heterogeneity in Open Innovation: Evidence from Haier Group

Liang Liang; Zhejiang University, China
Jin Chen; Zhejiang University, China
Hang Wu; Zhejiang University, China

The open innovation paradigm brought forward by Henry Chesbrough offers a new way of thinking about and managing innovation. Literature on open innovation reveals little about to what extent different types of external partners in open innovation are combined to foster innovation. From the resource-based view, we unpack partner heterogeneity into three dimensions from organizational, industrial and national heterogeneity, corresponding to use of diverse knowledge from partners. This paper offers a comprehensive framework to reveal the relationship between partner heterogeneity and innovation performance, and it also gives a good direction for enterprises improving their innovation capability through utilizing external knowledge effectively according to their internal resources.

WB-03.3 [A] Innovation Cluster and Its Development Strategy

Won il Lee; Hanbat National University, Korea, South
Deok Soon Yim; International Innopolis Research Center, Korea, South

This research is focused on the development strategy of innovation clusters in Gyeonggi Province, where there are three major innovation clusters: Gwanggyo Technovalley, Pangyo Technovalley and Ansan Science Valley. In Gyeonggi province, the innovation cluster policy was launched ambitiously. However, there are many issues to be solved for them to be a global R&D hub. For this reason, the study was performed based on both theoretical study and related qualitative study approaches. Particularly, scenario planning method was used for the strategy formulation of the innovation clusters in Gyeonggi Province. The major determinants for the success of the formation of the innovation clusters in Gyeonggi Province can be summarized as follows: the establishment of S&T based host institution, the gradual enlargement of the host institution's role, and the balancing the operational strategy on hardware and software of innovation clusters. In terms of the needs of the times, this study regarding the strategy for the formation of the innovation clusters is anticipated to be a good reference for the R&D organizations and technology cluster participants in coming years.

WB-04 Technology Forecasting - 3

Wednesday, 7/31/2013, 10:30 - 12:00

Room: Salon IV

Chair(s) Joseph P Martino; Yorktown University

WB-04.1 [A] Technology Forecasting of Digital Single-Lens Reflex Camera Market: The Impact of Segmentation in TFDEA

Byung Sung Yoon; Portland State University, United States
Apsit Charoensupyanant; Portland State University, Thailand
Nan Hu; Portland State University, China
Rachanida Koosawangsi; Portland State University, Thailand
Mimie Abdulai; Portland State University, United States
Xiaowen Wang; Portland State University, China

With the advancement of digital image technology, the big change in the camera market is that digital single-lens reflex cameras (DSLRs) have replaced film type single-lens reflex cameras, which have seen very little development lately. This advancement is reflected in some core technologies of DSLRs such as digital image sensors and electronic shutter mechanisms, which have allowed taking photographs even in the toughest conditions. Therefore, as a disruptive technology, the developments in DSLR technologies are worthy of notice. This paper utilizes technology forecast using data envelopment analysis (TFDEA), which is a quantitative forecasting method. In the study, we use input and output data collected from about 100 DSLRs of the top five currently dominant brands such as Canon, Nikon, Sony, Pentax and Olympus. Final results show future DSLRs' capabilities and provide insight that TFDEA, as a forecasting method, can be applicable to determine market trends of consumer electronics as well as technologies. Furthermore, the results show that

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market segmentation provides more reliable and accurate results with lower mean absolute deviation (MAD) value, while all camera market approaches provide less accurate results with a high standard deviation or MAD value.

WB-04.2 [R] A System Dynamics Approach to Technology Interaction Including Cyclic Behaviour

Leon Pretorius; University of Pretoria, South Africa
Jan-Harm C Pretorius; University of Johannesburg, South Africa
Siebert J Benade; GSTM, University of Pretoria, South Africa

This paper is an extension of previous research on the simulation of three competing technologies that interact. Some exploration into cyclic behavior of a modified version of the three technology system is attempted. Technology is considered in this research as a result of innovation, a rate dependent process that may include several non-linearities due to interaction with the environment. Technology growth patterns can be traced in a number of ways. Using bibliometrics as a research data source is one interesting way to trace these technology growth patterns very effectively. In this research the existence of cyclic behavior in two real-life technologies is illustrated using bibliometrics. In this paper a technology system consisting of three interacting technologies is treated and modeled in a coupled manner where the interacting dynamics is described by the Lotka-Volterra system of differential equations. The effect of interaction between the technologies and the period of cyclic behavior is illustrated parametrically. Furthermore, the possible uncertain diffusion effect in one of the technologies is also addressed in this research using a Monte Carlo multivariate simulation technique and a system dynamics approach. The research method is exploratory and case based. This method has been shown before to be useful especially early on in research projects.

WB-04.3 [R] Forecasting Hybrid Electric Vehicles Using TFDEA

Shabnam Jahromi; Portland State University, United States
Anca-Alexandra Tudorie; Delft University of Technology, Netherlands
Timothy Anderson; Portland State University, United States

The Toyota Prius was introduced in Japan 15 years ago, and over 60 additional hybrid electric automobiles and redesigns have been brought to the market around the world since that time. There is major interest in the future of the electric cars as using "the alternative fuel" can significantly decrease the environmental and fuel dependency concerns. This work has used data envelopment analysis to forecast the future of hybrid electric cars. It is based on a previous research on the same subject with an improvement in the input-output model that has enhanced the outcomes to a great extent. The former study applied technology forecasting for both full-battery and hybrid electric cars. This research focuses on hybrid electric vehicles only, and improving the model for battery electric cars will be a subject for future research. The dataset is the same as the one used in former research with some additional parameters that are gathered from manufacturers' websites and other relevant resources.

WB-05 Knowledge Management - 4

Wednesday, 7/31/2013, 10:30 - 12:00

Room: Salon V

Chair(s) Remy Magnier-Watanabe; University of Tsukuba

WB-05.1 [R] Effects of Relational Embeddedness on Knowledge Acquisition: An Empirical Study in China

Guannan Xu; Tsinghua University, China
Yuan Zhou; Tsinghua University, China
Lei Xu; Tsinghua University, China

This paper aims to explore the influential mechanism of upstream and downstream relational embeddedness on knowledge acquisition in different context of environmental dynamics. The upstream relational embeddedness is evaluated by firm's trust, information sharing and joint problem solving with its suppliers, and the downstream relational embed-

dedness is evaluated by such attributes with clients. Based on the survey data from 157 Chinese manufacturing firms analyzed with multivariate linear regression, the empirical results show that upstream and downstream relational embeddedness has positively effects on knowledge acquisition through mutual trust, information sharing and joint problem solving. Moreover, high technological dynamics enhances the effects of upstream embeddedness. The results imply that firms should participate in manufacturing networks and manage inter-firm relationships properly to acquire new knowledge and achieve competitive advantages.

WB-05.2 [R] Investigation of Knowledge Management Maturity and Benchmarking Practices in Chinese Enterprises

Xin Jin; Tongji University, China
Song Chen; Tongji University, China
Jie Wang; Stanford University, United States
Jinghua Xia; Landray Research Institute, China

Knowledge management (KM) has become widely employed as a new but promising management tool for optimizing business management and operations in China. In order for enterprises to develop a mature KM process capable of demonstrable benefits, they must assess their adoption of KM with regard to certain benchmarking practices. This paper, using a systematic approach, attempts to design and build a novel KM maturity (KMM) evaluation mechanism that combines and adapts existing models developed in the context of western management practices with new features from China's unique culture and social background. First, the key criteria are extracted via empirical analysis of the results of an extensive questionnaire, completed and returned by hundreds of Chinese enterprises in 2012. Next, based on a quantitative assessment of KMM, we further analyze the KM benchmarking practices in China. Finally, we demonstrate that KM practice in China is in a transitional stage from a content-oriented approach to a community-practice-oriented and employee-growth-oriented approach; we also observe that the Chinese enterprises with better management practices and more advanced information technology infrastructure are experimenting with integrated application-oriented KM approaches that can better foster technology and management innovations in enterprises.

WB-05.3 [A] Embedding Knowledge Management to Project Management Standard (PMBOK)

Farshad Madani; Portland State University, United States

In knowledge-based projects, many risks can result from a lack of technical and managerial knowledge applied in the project. To avoid these risks, project based companies need to apply or embed a convenient mechanism based on knowledge management (KM) to their project management processes. Lots of tools such as portals, expert systems, social networks, etc. have been developed so far, but in this article, the main focus is applying knowledge management as a philosophy and as an approach so that project management processes are capable of reaching KM objectives. To apply and embed this approach, a process model, named KM strategic planning model, is developed which must be implemented in project management processes. This model helps to build a bridge between PMBOK processes and knowledge management strategy development. The foundation of this bridge is made on two pillars. First, the spiral of knowledge introduced by Nonaka and, second, PMBOK processes. To develop the KM strategic planning model, an empirical knowledge is applied based on a systems engineering approach.

WB-06 TUTORIAL: Aligning the Technology Business with a Quick-Hits Strategy

Wednesday, 7/31/2013, 10:30 - 12:00

Room: Salon VI

Speaker(s) Jeffrey Busch; Jeffrey S. Busch PMP

Strategy is about applying principles that are adaptive to businesses whether it is during economic growth, stabilization or in the midst of a downturn in order to maintain a profitable business. This tutorial will discuss strategy as a self-defined position that lays

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the framework for outward and inward looking perspectives, especially in the technology arena. It will combine a number of strategic business components such as the relationship between strategy and goals, sustainable competitiveness, innovation, value increasing business actions and strategy assessments. The objective is to deliver fast returns for the business through a strategic Quick-HitsSM approach. A Quick-hits approach is not about large initiatives or business makeovers developed through strategic planning. Rather, it is about the operational adjustments and for the business to ask questions of itself, seeking efficiencies, being creative and taking specific, practical approaches to satisfying an identified need. The speaker has used this strategy in his consulting practice to deliver fast, cost efficient services to clients across multiple industries. A few of the application tools will be demonstrated during this seminar.

WB-07 Technology Management Framework - 2

Wednesday, 7/31/2013, 10:30 - 12:00

Room: Guadalupe

Chair(s) Azadeh Pishdad; University of South Australia

WB-07.1 [A] Towards Mass Individualization: Life-Cycle Oriented Configuration of Time-Variable Product-Service Systems

Guenther Wuerzt; Steinbeis University Berlin, Germany

Antonino Ardilio; Fraunhofer Institute for Industrial Engineering, Germany

Heiner Lasi; University of Stuttgart, Germany

Joachim Warschat; Fraunhofer Institute for Industrial Engineering, Germany

The objective of this article is to identify the requirements for product service systems (PSS) with non-predefined services due to unknown customer demands over the life cycle of the product and to identify the requirements to the non-predefined stakeholders of the PSS within a collaborative network due to unknown business processes/scenarios over the life cycle of the solution. The aim of this paper is to describe an approach for simultaneous life-cycle optimization of product services and business processes within the network of stakeholders. This paper presents an in-depth case study based on a network of OEMs, components suppliers and system suppliers of durable capital equipment, organized within a best practice network with focus on mass customization. The basis of the approach is an analysis of realized projects of the past in combination with strategic approaches of the future. The approach used is based on the findings of modularization of products and processes and is adapted to non-predefined business services and business processes.

WB-07.2 [R] Responding to External and Internal Changes: Organizational Responsiveness Pressures in Institutionalising ERP Systems

Azadeh Pishdad; University of South Australia, Australia

Abrar Haider; University of South Australia, Australia

Organizational responsiveness is a critical factor for the success of any business. It requires business organizations to understand and respond to changes in their external and internal environment. As a consequence, organizations are required to create a dynamic internal environment. This dynamism is built around exchanging information and ideas relating to business sustainability, progress, and growth. Enterprise technologies like ERP systems are becoming more popular among contemporary businesses. Implementation of these technologies is, therefore, engaged in a conscious effort to develop internal capabilities, so as to use the same to address external challenges and to look similar to other evolving institutions. It is important that the organization continuously evaluate itself to assess how it is going, what are the performance gaps (if any), how can it sustain its operations, and how should it grow both internally as well as externally. Being responsive helps the organization to view every new technology investment as a means to providing a coherent view of organizational information, allowing for informed decision making, and helping the organization to assess, learn, and grow. This paper opens up new research streams in institutional thinking by introducing organizational responsiveness as a new form of isomorphism among organizations and other sub-institutions.

WB-07.3 [R] Innovation through 'Meta-Engineering' – Mining – Exploring – Converging – Implementing Process –

Hiroshi Suzuki; Japan University of Economics, Japan

Yuji Okita; Kanazawa Institute of Technology, Japan

Yasutoshi Komatsu; Watanabe Co. Ltd., Japan

The authors propose the new creative concept of "meta-engineering" as a radical engineering approach that is critical for breakthrough innovation. Conventional engineering is defined to design a solution to a given issue optimally using technologies under given constraints. However, confronting increasingly diverse and complicated issues, the authors find limitations in this approach. Meta-engineering, a spiral process for innovation and for solutions to challenges confronting the world, includes "mining potential issues from a bird's eye view (M)," "exploring and strengthening of the necessary science and technologies by thinking outside the box (E)," "converging these science and technologies to generate solutions (C)," and "implementing the solutions into challenges creating social added value (I)." This process is designated as a MECI cycle. The authors studied meta-engineering in several cases of pursued innovation. The first was the on-demand bus (ODB) services. The authors describe that analysis of R&D and social implementation of ODB by the meta-engineering methodologies suggests further progress of ODB services. Meta-engineering is evident in historical innovations such as blue LEDs and LED lamps, and the Walkman. Those observations suggest the importance of a meta-engineering approach in the pursuit of breakthrough innovation.

WB-08 Science and Technology Policy - 1

Wednesday, 7/31/2013, 10:30 - 12:00

Room: San Carlos

Chair(s) Jeffrey M Alexander; SRI International

WB-08.1 [R] Studies on Scientists Engagement in Public Outreach in China: Motivations, Impediments and Countermeasures

Qi Liang; China Research Inst. for Science Popularization, China

Xuan Liu; China Research Institute for Science Popularization, China

Fujun Ren; China Research Inst. for Science Popularization, China

Scientists' engagement in public outreach plays a crucial role in the advancement of science for the public at large. China has issued a number of policies to encourage scientists to participate in communicating science with the general public. Currently, national leaders are calling for scientists to get more involved in public outreach in the process of their scientific research. Communicating the latest scientific research findings to the public and improving public understanding of science is not only the respect and rewards of the taxpayers, but also a necessary component for sustainable development of the science community itself. Through several groups of interviews with scientists at all career stages about their engagement in outreach activities, we found that scientists were often recruited into public outreach activities by government departments, enterprises and NGOs. Scientists of all types viewed outreach as a form of volunteer work that was auxiliary to their other responsibilities. This paper presents analysis on the motivators that encouraged scientists' engagement in outreach and points out the main obstacles. The strongest motivating factor was the desire to contribute, and time constraint was one of the significant barriers. Consequently, countermeasures to promote scientists' engagement are put forward including cognition improvement, mechanism enforcement and platform construction.

WB-08.2 [A] An Evaluation of Urban Citizens' Awareness of Climate Change in Three Capital Cities in Northeast China

Xiujun Li; China Research Inst. for Science Popularization, China

Fujun Ren; China Research Inst. for Science Popularization, China

Qi Liang; China Research Inst. for Science Popularization, China

Climate change is a people concerned issue in the world. Based on the analysis of literature of public awareness about climate change, it includes: understanding of climate change knowledge, attitudes towards climate change, and behaviors of response to climate

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change. This paper analyzes the climate change awareness of urban citizens in three capital cities of China's northeast area. The results show that most urban citizens understand the basic knowledge of climate change. TV, broadcast and newspaper are the three main channels that provide climate change information to urban citizens. Most urban citizens think that climate change is a serious problem, and science and technology can give some help for mitigating climate change. Nearly half of the interviewees think that economic development is more important than mitigating climate change. Urban citizens' awareness of the climate change in Northeast China has a dual structure. The paper gives some suggestions for educating citizens about climate change.

WB-08.3 [R] A Study on the Science Communication Models of Response to Disaster Threats with Examples from China

Ren Fujun; China Research Inst. for Science Popularization, China

Liu Xuan; China Research Inst. for Science Popularization, China

Dang Weillong; China Research Inst. for Science Popularization, China

It is an effective approach to undertake science communication with public concerned issues. To provide an analysis of the science communication models of response to disaster threats, this paper starts with several models in terms of lectures, face-to-face talks between scientists and media, new media and science cafes. Consequently, the features of these models were analyzed. For example, the effect of lectures depends on the celebrity of the scientists and the size of audience. Face-to-face talks between scientists and the media stress the interactions. However, the effect depends on the quality of the reports done by the journalists. Science cafe is easy-accessible and casual, while it may not have huge influence in a short time because of its limited number of participants. The new media is popular among the youths, but not favored by seniors and children, and credit of online news is in doubt. No matter which model is applied, science communicators should focus on both science and interestingness to have a good effect. Since the voice of NGOs in science communication activities of response to disaster threats stays weak in China, the paper calls for more engagement of NGOs in science communication of response to disaster threats.

WB-09 TM in Wireless - 1

Wednesday, 7/31/2013, 10:30 - 12:00

Room: Willow Glen I

Chair(s) Mavis Tsai; Shih Hsin University

WB-09.1 [R] Consumer's Perception Regarding Recycling of Mobile Phones: A Prospective Assessment in the State of São Paulo, Brazil

Guilherme A Koga; NOKIA, United States

Emerson A Maccari; Nove de Julho University - Uninove, Brazil

Claudia T Kniess; Nove de Julho University - Uninove, Brazil

Mauro S Ruiz; Nove de Julho University - Uninove, Brazil

Consumption of mobile phones has become a consumer fever in Brazil with more than 190 million devices connected at the national market in 2010. This impressive figure leads to an important question: what is the final destination of these devices at the end of their life-cycle? The main purpose of this paper is to evaluate consumer's behavior in terms of mobile phone discard and recycling in Brazil based on (i) a literature review of the main practices and programs involving reverse logistics of mobile phones currently in place nationwide; and (ii) a quantitative survey carried out in Sao Paulo state in order to seek the consumer's perception concerning mobile phone recycling and other factors that also influence their behavior in this regard. The survey results showed that although 60% of the respondents know that a mobile phone can be recycled, only 7% have already recycled their old devices. It was also possible to identify the main factors that could contribute to increasing mobile phone recycling and also the most convenient collecting points according to the respondents' answers.

WB-09.2 [R] Corporate Governance and Organizational Slack in the IT Industry

Ibrahim A Shaikh; Rensselaer Polytechnic University, United States

This study fills an important gap in the financial slack and board of director's literatures by focusing on how different directors apportion financial slack into R&D investments under alternative environmental contingencies. We draw inspiration from both Agency theory (AT) and Stewardship theory (ST) and argue that both executives and independent directors remain important in allocating financial slack into R&D investments in high-tech IT-intensive service industries. Consistent with our theory we find in R&D intensive IT industries the boards control role, high proportion of independent directors, remains important in ensuring financial slack is distributed into R&D investments. However, in the presence of cash flow disruptions we find too much emphasis on strict controls can jeopardize R&D investments. The board's collaborative role, a board composed with a high proportion of executives, remains indispensable in preserving R&D investments in the presence of cash flow volatility.

WB-09.3 [R] The Model of Science Communication Under New Media Context: The Application of Mobile Phone Microblog and Its Management in China

Nian Zheng; China Research Inst for Science Popularization, China

Huijun Zhang; China Research Inst for Science Popularization, China

Rongrong Ren; CRISP, Northeastern University, China

Cell phone microblog has become a new horizon of science dissemination. Its influence on the society enhances with the increase in the number of microblog users. Since the media era, the characteristics of cell phone microblog include the following: everyone is media; affair disclosure may happen in real time; every point can break out; communications are easy in each link. So, in the dissemination process, it also becomes the major place of origin and dissemination pusher of wrong information. Thus, this paper constructs an assessment system and selects the assessment method of information entropy and unascertained measurement to establish cell phone microblog public opinion monitoring index system which provides model support for the government to carry out microblog monitoring and management. This can effectively eliminate or defuse the crisis of public opinions, reach favorable science dissemination effect and improve scientific literacy of the public.

WB-10 Intellectual Property - 2

Wednesday, 7/31/2013, 10:30 - 12:00

Room: Willow Glen II

Chair(s) Xiangdong Chen; Beihang University

WB-10.1 [R] Studying the Patent of Technology Development on Dye Sensitized Solar Cell

James K Chen; Asia University, Taiwan

Van Kien Pham; Asia University, Taiwan

Fang Chi Lin; Asia University, Taiwan

Yi Ren Chen; Asia University, Taiwan

Greenhouse effects and global warming problems have awoken human's attention to green energy. Recently, dye-sensitized solar cells (DSSCs), which are known as one of the key technologies of green energy, have been widely applied to many different industries and quickly grown with a number of scientific publications and patent applications. These applications have D upgraded SSCs to the third generation innovation and highlighted the importance of green energy. Therefore, this study aims at identifying the relationship between DSSCs patent and technological innovation. This study applied USPTO to figure out the research data, patent right, and other items. The use of Boolean logic combinations found out 141 documents related to DSSCs patents in the past years and 459 documents connected to solar energy 33 years ago. In addition, this research also focused on the patent number, International Patent Classification (IPC) and quote of patent in order to determine the independence of the patented technology and possibility of infringement. Then, the evolution of technological innovation was explored and demonstrated by the patent map through social network analysis. Finally, the study selected five countries, which were the United States, Japan, South Korea, Taiwan, and Australia, as typical representatives of the

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technology development to show the process of technological innovation via social network analysis diagram. The results show that the DSSCs patent in Australia is still in the first stage of enlightenment. The H01L021/00 is an important type of technology development in Taiwan. The social network analysis diagram of Japan and South Korea shows the different models of development, and the largest number of applications for DSSCs patents belong to the USA. This indicates that the USA has abundant human resources in R&D and E-ink Corporation, which is one of the most cited firms.

WB-10.2 [R] Study on Influence Factors of the Implementation of Enterprise Patent Strategy

Liyang Wang; China Jiliang University, China
Zhitong Lin; China Jiliang University, China
Hongtao Wang; China Jiliang University, China
Shujing Chen; Zhejiang Sci-Tech University, China

The mastery of the characteristics and impact factors of the enterprise patent strategy contributes to the advancement of innovation capabilities. In order to understand the implementation of enterprises' patent strategies, the study investigates 863 enterprises in China and finds three important influence factors on implementation of patent strategy such as the ability of R&D of enterprise, the consciousness of application patent strategy, and the ability of synthesis management of intellectual property rights. Enterprises should improve the ability of R&D and synthesis management of intellectual property rights. Then, there are some inspirations and suggestions on reinforcing the transformation of patents to realism productivity for enterprises.

WB-10.3 [A] Strategic Implications of AIA for IT Entrepreneurs:

A Practical Primer About the New Patent World
W. Austin Spivey; University of Texas at San Antonio, United States
J. Michael Munson; University of Santa Clara, United States

Protecting intellectual property remains a crucial requirement for technology entrepreneurs. This paper focuses on the global issues created by the America Invents Act: specifically, the implications for patent protection of IT innovations. Around the world, key differences remain among patent systems, although some of the essential elements match more closely now than ever before. We contrast patent protection in the United States with Brazil, China, the European Union, and Korea. A key implication is that today, more than ever, an IT entrepreneur must be aware of the options available via national patent offices versus regional patent offices versus the Patent Cooperation Treaty: each comes with its own pros and cons. We highlight the strategic implications by sharing a short case illustrating both filing and enforcement options for a designer of IT software. In addition, possible, unintended consequences are emphasized, not only for technology entrepreneurs, but also for national innovation rates. Lessons learned are generalizable to other technology arenas.

WB-11 Management of ICT - 3

Wednesday, 7/31/2013, 10:30 - 12:00

Room: Willow Glen III

Chair(s) Joe Amadi-Echendu; University of Pretoria

WB-11.1 [R] Evolving the Network Operator's Business Model in an OTT Environment Using Fuzzy Cognitive Maps

Simon W Ross; University of Pretoria, South Africa
Lourence D Erasmus; University of Pretoria, South Africa

The growth in mobile broadband technologies coupled with increasing smartphone penetration, that has placed intelligence at the network's edge, has enabled over-the-top (OTT) players to compete with traditional network operators in the ICT industry. This research analyzed a selection of proposed strategies in the literature that could be employed by a network operator in order to remain competitive in the OTT environment. These strategies were then imported into a fuzzy cognitive map (FCM) together with the elements of the

V4 business model for network operators proposed by Al-Debei & Avison (2009). FCMs are a fast-emerging tool that can be used to model relationships between concepts and determine the strength of impact of these relationships. The FCM weights were generated by gathering data from sources in the industry by means of an electronic survey. This data was imported into the FCMapper tool and simulated to predict the impacts of the external factors on the operator's business model and to determine the indegree/outdegree of each item in the environment. The research serves as a proof of concept for the application of FCMs to a complex and dynamic industry environment. Applications of FCMs in this way can be used as a tool for analysts and strategists in the industry to support business and strategic decision making.

WB-11.2 [R] A Study into the Implementation of Water Conservation/Water Demand Management in Gauteng Municipalities

Obby A Masia; University of Pretoria, South Africa
Lourence D Erasmus; University of Pretoria, South Africa

The provision of water of good quality and quantity is important to utilities in urban areas due to water scarcity and growth in demand. South Africa is a water scarce country and non-revenue water (NRW) is 37% on average in the municipalities. Demand for water exceeds supply in Gauteng and the municipalities are the biggest consumers. The municipalities have developed water conservation/water demand management (WC/WDM) strategies, and this research study wanted to establish if these strategies are being implemented successfully or result in NRW reduction. It was also intended to establish if smart meter technology is utilized in the implementation of the WC/WDM strategies or if there is interest/will to use this technology by municipalities. The method of data collection that was used in this study was structured questionnaires that were prepared for the managers and engineers. The results indicated that there are strategies and policies in place for the WC/WDM implementations, but it was concluded that these are on a small scale because the NRW remains high. The municipalities are aware of water problems facing the industry and the capabilities of smart metering technology. Pre-payment metering is currently in use and smart metering technologies can be used in the future.

WB-11.3 [R] A Perspective on Cloud Computing and Managed ICT Services

Joe Amadi-Echendu; University of Pretoria, South Africa
Ayodele Boglo; Oracle Software Nigeria, Nigeria

Information and communication technologies (ICT) have become ubiquitous and are regarded as basic infrastructure for sustainable development of nation states and global systems. As utility and cloud computing go mainstream, they accentuate greater value propositions to users and present new challenges for providers of mobile communications services, especially in developing countries where data regarding managed ICT services are relatively scanty. This paper considers that the challenges for the controlled exchange of ICT components and systems between service providers and user clients involve multi-criteria decision making. The focus here is on the application of the analytical hierarchy process to explore the influencing factors for cloud computing and managed ICT services in a developing country context.

WD-01 Technology Roadmapping - 2

Wednesday, 7/31/2013, 14:00 - 15:30

Room: Salon I

Chair(s) Hitoshi Abe; OKI Electric Industry Co., Ltd.

WD-01.1 [A] Integrating Roadmapping and Disagreement Management Methodologies for Coordinating Development of Competency-Driven Education Standards: The ICOPER Case

Vana Kamtsiou; Brunel University, United Kingdom
Tomaz Klobucar; Jozef Stefan Institute, Slovenia

Although roadmapping methodologies are widely used, a standard methodology for road-

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mapping does not exist, and customization of the process is required depending on the community of practitioners developing the roadmap. A common problem when designing standards for education is that a top-down approach is used by the learning technologists that often doesn't take into account recent developments coming from research or the actual practice. This paper examines a particular methodology, processes and tools used for developing a roadmap for the standards community (CEN WS-LT) with application for competency-driven education. A series of models and activities were developed to describe how community requirements are fed into the specification design process and valorized in the standards consensus process. Our roadmapping methodology made extensive use of foresight analysis methods, including visioning, futuring, and gap analysis. In addition, we have used semantic modeling tools for capturing and extending the knowledge and modeling activities of the target group communities. A special interest group was created under the CEN WS-LT workshop umbrella in order to facilitate disagreement management and modeling activities among the groups working in the field. The created roadmap served as a tool for collaborative strategic planning for the involved community.

WD-01.2 [R] Research on the Development Path of China's Solar Photovoltaic Industry Based on Technology Roadmapping and Bibliometric

Xin Li; Tsinghua University, China

Yuan Zhou; Tsinghua University, China

Lucheng Huang; Beijing University of Technology, China

Kangkang Wang; Beijing University of Technology, China

Zhun Huang; IBM China Development Lab, China

China's solar photovoltaic (PV) industry has experienced rapid progress in the last 10 years. To achieve the sustainable development of the solar PV industry in China, it is necessary to review the emergence path of the industry and analyze the future development of the industry. This paper firstly reviews the emergence path of China's solar PV industry based on technology roadmapping from R&D, technology, production, market and policy to understand the characteristics of the industry, and identifies the problems impeding China's solar PV industry development. Then, in order to analyze the future development path of China's solar PV industry, the bibliometric method is applied to analyze the development status of China's dye-sensitized solar cells technology. Finally, combined with the analysis results of the emergence path of China's solar PV industry and the bibliometric method, the policy recommendations for the future development of China's solar PV industry are presented. These results can be a useful reference for the development of the solar PV industry in China, and other developing countries around the world can benefit from this study to develop their own solar PV industry or other emerging industries.

WD-01.3 [A] Social Innovation through a Dementia Project Using Innovation Architecture

Yoichiro Igarashi; Fujitsu Laboratories Ltd., Japan

Makoto Okada; Fujitsu Laboratories Ltd., Japan

This paper demonstrates a process for planning technology strategy using innovation architecture, a technology road mapping (TRM) tool. TRM tools enable high-tech companies to discuss future plans and to acquire knowledge and capabilities necessary to find new technology-based solutions in uncertain markets in the mid-to-long term. To develop business over time, high-tech companies require new ecosystems. The authors selected a project theme of dementia (cognitive impairment) to find potential stakeholders, companies, or nonprofit organizations that could be social partners for such a company. To acquire knowledge and create new technology-based solutions from diverse viewpoints, the authors have been building a "future center," which is a field of dialogue among potential stakeholders. The authors seek to establish relationships between potential stakeholders and technology requirements.

WD-02 Technology Assessment and Evaluation - 1

Wednesday, 7/31/2013, 14:00 - 15:30

Room: Salon II

Chair(s) Timothy Anderson; Portland State University

WD-02.1 [R] Analysis of Core and Proximal Technologies for Electric Vehicles in China

Juan Jiang; Japan Society for the Promotion of Science (JSPS), Japan

Jun Suzuki; National Graduate Institute for Policy Studies, Japan

Having overtaken the United States as the largest vehicle market in 2010, China is expected to continue to achieve substantial growth in the electric vehicles market, in particular supported by a Chinese government announcement about continuing green-car subsidies in 2011 and beyond. The aim of this paper is to examine the technological power of China and scrutinize the intellectual property strategy of foreign companies towards the Chinese market in the electric vehicles industry. Employing EPO World Wide Patent Statistics Database, firstly we can identify not only core technologies but also proximal technologies related to the development of electric equipment or propulsion of electrically propelled vehicles in terms of the distance between technologies using the patent IPC code's co-occurrence methodology. Then we specify the technological power and trends of Chinese companies by use of the Chinese original patent and utility model database. Hence, we explain the landscape and trajectory of foreign companies in this technical area. Finally, some policy implications for the Chinese government, and also for foreign countries, will be discussed.

WD-02.2 [R] Study on Technological Catching-up Performance of China's Auto Firms

Xianjun Li; Tsinghua University, China

Bowen Zhang; Tsinghua University, China

Ke Xu; Tsinghua University, China

Siyu Liu; Tsinghua University, China

Siyu Yan; Tsinghua University, China

This paper mainly discusses two questions: What is the technological catching-up model of domestic auto firms in China, and how about their catching-up performance? Based on existing relevant literature and the fact of domestic car companies' catching-up in China, this study explores and proposes a model of technological catching-up. Different from late-comer firms in other countries such as South Korea, the technological catching-up model of China's car companies is a hybrid model, which consists of a joint venture dominated model, introduction dominated model, introduction accessorial model, independent development model, and cooperative development model. Through the method of principle component analysis, this paper establishes an evaluation model and index system of technological catching-up, by which we evaluate China's domestic auto firms technological catching-up performance. This study finds that the technological catching-up model influences its performance, the descending order of which is as follows: independent development model, introduction accessorial model, cooperative development model, introduction dominated model, and joint venture dominated model. In the end, according to the research finding this paper puts forward, some suggestions are made for both companies and the government.

WD-02.3 [R] Scenario-Based Assessment of Energy Storage Technologies for Wind Power Generation Using Bayesian Causal Maps

Yulianto Suharto; Institute of Technology, Bandung, Indonesia

Wind power shares the major drawbacks of most renewable energy generation alternatives: higher costs and inconsistency of power generation. Power balancing requirements resulting from the intermittency of wind power suggest using energy storage assistance to improve overall generation and load characteristics. The problems in generation imbalance for wind power require multi-criteria analysis for the decision makers. In addition to the required multi-criteria analysis, there is also a problem of uncertainty inherent in future changes as a result of interdependence among these criteria. To counter these two problems, this paper describes a systematic approach of Bayesian causal maps and systematic probability generation method. Bayesian causal maps, which are built from causal maps, are used to develop a proposed framework on scenario-based assessment of energy stor-

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age technologies for wind power generation. Causal maps provide a rich representation of ideas through the modeling of complex structures, representing the chain of arguments, as networks. However, causal maps are not easy to define, and the magnitude of the effect is difficult to express in numbers. Hence, Bayesian causal maps can be used to make inferences in causal maps. A systematic probability generation method is used to estimate the conditional probability tables, which can reduce biases and inconsistencies.

WD-03 Innovation Management - 7

Wednesday, 7/31/2013, 14:00 - 15:30

Room: Salon III

Chair(s) Kai Wang; Stevens Institute of Technology

WD-03.1 [R] Innovative Profile of 176 Companies in the Regions of Antioquia, Santander, Risaralda and Quindio Colombia

Daniel I Sanchez Alzate; Universidad Pontificia Bolivariana, Colombia

Juan C Escobar Martinez; Universidad Pontificia Bolivariana, Colombia

Jhon Zartha Sossa; Universidad Pontificia Bolivariana, Colombia

Andres F Avalos Patino; Universidad Pontificia Bolivariana, Colombia

Katia C Mendez Naranjo; Universidad Pontificia Bolivariana, Colombia

Daniel H Gomez Franco; Universidad Pontificia Bolivariana, Colombia

David A Coy Mesa; Universidad Pontificia Bolivariana, Colombia

Bibiana Arango Alzate; Universidad Pontificia Bolivariana, Colombia

Jose G Medina Henao; Universidad Pontificia Bolivariana, Colombia

This paper shows the key factors that influence the development of innovation in Colombian companies of the departments of Antioquia, Quindío, Risaralda and Santander. Taking as input the innovative profile of the methodological tool, developed by the research group in "Policy and Management of Technology" from The Pontificia Bolivariana University: "Technology Management Methodology for Project "(MGT), applied to 176 companies. This approach was conducted through a series of tests of hypotheses focused on measuring variables like, "diffusion of innovation", "know-how", "competitive technical intelligence", "employees with technology training" and "experimental development budget for R & D + I", among others. According to these approaches, the states of the innovation, key factors to the analyzed firms in each region, were validated. Statistical models, critical z and percentage distribution, were used to validate the hypotheses, by means of which it was possible to identify weak key factors and opportunities in the various departments analyzed.

WD-03.2 [R] Evolution and Innovation: Analysis of the Results Methodology of DNA of Innovation in Colombian Companies

Jose G Medina Henao; Universidad Pontificia Bolivariana, Colombia

Jhon Zartha Sossa; Universidad Pontificia Bolivariana, Colombia

Bibiana Arango Alzate; Universidad Pontificia Bolivariana, Colombia

Daniel H Gomez Franco; Universidad Pontificia Bolivariana, Colombia

Researchers of the school of engineering of the Pontificia Bolivariana University of Medellín (Colombia) have developed a web tool in which they are inspired by DNA. The tool is composed of 43 variables or key factors of innovation, which are all associated to a certain nitrogenous base. Every variable or key factor explains some of the following subprocess or innovation activity: planning and administrative processes, investment, communication and human resources. At the same time, each of them belongs to one of the dimensions of innovation set out in the Oslo manual: product-service, process, organizational and marketing. This tool introduces three structures of DNA of innovation (double helix), with which to try to explain the innovation in product- service, marketing and processes. The tool works under the assumption that the user knows how the key factors are related within their organization in accordance to the structure that is being analyzed. Up to this date, the tool has been applied by more than 100 entrepreneurs. On the basis of the results obtained, we analyzed trends and identified how is perceived or relate the key factors of innovation. This was done for those who had high impact on the structure of the DNA innovation in product-service as well as for the most representative relationships that are presented in

some Colombian companies.

WD-03.3 [R] Developing Emerging Industries Through Innovation of Business Model: The Case from Guangdong LED Industry, China

Fugang Zhao; GGRIT, China

Jizhen Li; Tsinghua University, China

Quwen Deng; GGRIT, China

Min Liu; GGRIT, China

China is accelerating the process of developing strategic emerging industries to adjust its industrial structure and transform the mode of economic development after the world financial crisis and European debt crisis. In one of China's most innovative provinces, the Guangdong government has selected the light emitting diode (LED) industry as one of its policy focus in the "12th Five-Year (2010-2015)" period. Besides traditional fostering measures such as "technological push" and "market pull," the Guangdong government introduced a new business model that stimulated a rapid growth of the LED industry from 39 billion RMB output value in 2009 to 151.5 billion RMB in 2011, accounting for more than 70% of total LED output value in China by now. This paper first introduces the current situation of Guangdong LED industry and government policy support, and then proposes an interactive model including factors of "technological push," "market pull" and "innovation of business model" to analyze the development of emerging industries. Focusing on innovation of the business model, this paper gives an in-depth analysis on the practice of "energy management contract" (EMC) and "benchmark system" in Guangdong Province. It shows that the new business model sharply reduces risk taken by LED users to speed up market growth and meanwhile forces LED firms to continuously improve technology to enter the market, therefore effectively solving a dilemma of "immature technology" interlocked with "immature market" in the starting period of the LED industry. In the conclusion, this paper offers some policy suggestions for the LED industry in Guangdong and some potential implications for industrial policy when it comes to the development of emerging industries in China and other countries.

WD-04 Emerging Technologies - 1

Wednesday, 7/31/2013, 14:00 - 15:30

Room: Salon IV

Chair(s) McDonald R Stewart; George Washington University

WD-04.1 [R] Entzonet: A Social Collaborative Platform for Enterprise

Alisa Kongthorn; National Electronics & Computer Technology Center, Thailand

Chatchawal Sangkeettrakarn; National Electronics & Computer Technology Center, Thailand

Social networking services such as Facebook have become popular tools to enhance customer engagement and experiences. Many enterprises are now assessing the potential to adopt this technology to boost productivity, build relationships and strengthen employee engagement. Enterprise social networks are on the rise as they become a corporate tool for sharing ideas and collaborating among employees. In this paper, we propose a system architecture for Entzonet, a social collaborative platform for enterprise. We also address opportunities and challenges provided by this new platform.

WD-04.2 [A] Data Integration for Thailand Disaster Risk and Response Management System

La-or Kovavisaruch; NECTEC, Thailand

Pobsit Kamolvej; Kasetsart Universityline, Thailand

Guntapon Prommoon; Kasetsart University, Thailand

Nitirat lamrahong; Kasetsart Universityline, Thailand

The paper presents a computerized application on disaster warning in Thailand, developed in support by the National Disaster Warning Center. The system is an effort in Thailand to integrate disaster related information through a centralized information hub to increase disaster warning accuracy and speed. The system currently supports five disaster types: earthquake, tsunami, flashflood and mudslide, weather storm and major flood. Two main

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functions of the application are reviewed, the web service approach on integrating data from 12 source agencies and the decision support system for listed experts to review specific cases and make informed warning announcements. The effort on this application is an ongoing project, projecting to expand integration to more agencies and supporting more disaster types as well as increasing the universality of the web service compatibility.

WD-04.3 [A] Emerging Technologies in Business Intelligence

Nayem Rahman; Portland State University, United States

Fahad Aldhaban; Portland State University, United States

Shameem Akhter; Western Oregon University, United States

Business organizations continuously make effort to improve their decision making capability using business intelligence (BI). On the other hand, they also want to improve performance of BI tools and drive down the information technology (IT) budget. With the advancement of computing technologies, software engineering, data warehousing technologies, cloud computing, computer processing powers and emergence of smartphones, the use of business intelligence tools has increased tremendously, and these tools have become more sophisticated than ever before. Emerging technologies and methods are being adopted steadily in the near future by business organizations. This paper gives an account of the emerging technologies in business intelligence and data warehousing that significantly help with improving the performance data warehouses and business intelligence tools.

WD-05 Knowledge Management - 5

Wednesday, 7/31/2013, 14:00 - 15:30

Room: Salon V

Chair(s) Nataliia Samoilenko; University of Jyväskylä

WD-05.1 [R] Comparative Analysis of Civic Scientific Literacy and Its Influential Factors among the Regions in China

Ren Lei; China Research Inst. for Science Popularization, China

Zhang Chao; China Research Inst. for Science Popularization, China

He Wei; China Research Inst. for Science Popularization, China

It was divided into regions of eastern, central and western in China according to geographical positions and levels of economic development, reflecting the disparity of regional economic and social development. The results of China Civic Scientific Literacy Survey conducted in 2010 showed there were significant differences between the levels of civic scientific literacy and the citizens' participation and interests in science and technology among these regions. Multi-group analysis via structural equation modeling (SEM) could be used to evaluate the differences among these regions based on the model of civic scientific literacy and its influential factors. This comparative analysis was the crucial process to learn the characteristic of each region in the field of public understanding of science in China, which was the reference for science related policy-making.

WD-05.2 [R] The Indexation Study to Evaluate Fair Development of Civic Scientific Literacy Construction in China

Zhang Feng; China Research Inst. for Science Popularization, China

Ren Lei; China Research Inst. for Science Popularization, China

He Wei; China Research Inst. for Science Popularization, China

This article explores an objective and useful assessment methodology to evaluate the development of civic scientific literacy construction (CSLC) among different provinces in China, and promote the improvement of CSLC. This paper puts forward a fair view of CSLC, builds the Index of Scientific Literacy Construction (ISLC) to evaluate the disparity among regions in China. This assessment methodology can provide the credible reference to allocate science popularization (SP) resources more fairly.

WD-05.3 [R] Adopting AHP Approach on Evaluation and Selection of Outsourcing Destination in East and Southeast Asia

James K Chen; Asia University, Taiwan

Van Kien Pham; Asia University, Taiwan

Benjamin J. C. Yuan; National Chiao Tung University, Taiwan

Outsourcing is regarded as one of the most popular strategies whereby firms can focus on core competencies when outsourcing to the rest of their overseas partners. Before companies step beyond their country boundaries, it is vital to evaluate and select the best destination for an outsourcing service. Unfortunately, only a few studies have been done to help firms make decisions in relation to evaluating a potential outsourcing partner. The purpose of this paper is to solve this problem by constructing a hierarchy model via the analytic hierarchy process (AHP) approach. In the study, seven typical outsourcing countries in the East and Southeast Asia (China, Indonesia, Malaysia, The Philippines, Singapore, Thailand, and Vietnam) were chosen as possible alternatives for outsourcing companies based on four main evaluating criteria. These are: 1) cost competitiveness; 2) human resources; 3) business and economic environments; 4) government policies and legal framework. Each criterion includes key sub-criteria as shown in the hierarchy model. The results showed that cost competitiveness is the most important factor in the second level of the hierarchy, and it results in the dominance of employee salary, taxes, freight price, and real estate costs respectively in the third level. For these reasons, China and Indonesia are the best outsourcing destinations. Besides, Vietnam and Thailand are emerging to be attractive countries due to their low labor costs and new government policies. Finally, the research meets the need of rational selection of the outsourcing countries and provides a great practical significance to practitioners.

WD-05.4 [A] Learning Effect Through International Sub-Contracting Arrangement in Aircraft Industry in China

Xiangdong Chen; Beihang University, China

Jiyun Zhang; Beihang University, China

Min Huang; Beihang University, China

The paper investigates engineering technology learning effects in international sub-contracting production projects in aircraft industries in China. As aircraft industries usually represent the most sophisticated technology, or complex product and complex technology sectors, the knowledge learning effect can be heavily questioned with theoretical and practical problems. A research framework is provided by this study, including investigation through collaborative process and output performance in terms of overall economic plus quality performance, and knowledge learning effect; a corresponding questionnaire based survey data of over 119 acceptable sample respondents at a typical Chinese aircraft company are processed and analyzed, knowledge learning effects are studied, especially contrasted under the two influencing factors (collaborative linkage as positive and technology gap as negative). The research finding indicates that there is still a technology gap existing in such international sub-contracting arrangement; however, the knowledge learning effect can be significant if both parties closely collaborate in typical operations, and technology gaps are not significantly big.

WD-06 E-Business - 1

Wednesday, 7/31/2013, 14:00 - 15:30

Room: Salon VI

Chair(s) Akihiko Nagai; Nagoya Institute of Technology

WD-06.1 [R] Cloud-Marketplace: New Paradigm for e-Marketplaces

Antonio Grilo; FCT-UNL, Portugal

Ricardo Jardim-Goncalves; UNINOVA, FCT-UNL, Portugal

Sudeep Ghimire; FCT-UNL, Portugal

This paper aims to present the cloud-marketplaces approach that delivers a new paradigm to e-marketplaces. The proposed cloud-marketplaces architecture is a combination of the cloud computing paradigm and service-oriented architecture (SOA), and decouples the traditional e-marketplaces into e-marketplaces and community services clouds. The new e-marketplace architecture is being experimented in a real business scenario, and the case study of Vortalway, an industrial-based research project conducted by a major international

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e-marketplace, is presented with the description of three pilots. The paper concludes that despite the cloud-marketplaces paradigm being technically a sound concept, besides the engineering and technological issues, it poses interesting challenges regarding business models.

WD-06.2 [R] The Impact of Technology on the Buying Behaviour in an Online Retail Environment in India

R. Srinivasan; Indian Institute of Science, India

A S Vindhyalakshmi; Indian Institute of Science, India

S Shrishia; National Institute of Technology, India

Among the BRIC Nations, India has been the fastest growing online market, adding over 18 million internet users growing at an annual rate of 41%. India is also among the top three fastest growing markets worldwide in the last 12 months. A study by The Associated Chamber of Commerce and Industry of India (ASSOCHAM) and ComScore has suggested online retail has grown 43% and has a 60% market penetration. With increasing competition, the Indian online book industry has been witnessing an intense price war. There has been no empirical study done, to the best of our knowledge, in the Indian market, of the effect of these price wars on the company's image, price sensitivity and the basket size. In this paper we analyze how price wars affected a leading online retailer's performance in terms of the basket size and the number of orders. We also analyze the effect of the reduced price on the overall market share of the retailer. We found strong empirical evidence suggesting an increased frequency of purchase and increased basket size with the reduction in price in certain groups of customers. There is also strong empirical evidence suggesting an increase in market share with the price drop. We also found strong empirical evidence suggesting that high frequency buyers had a bigger basket post the price drop as compared to low frequency buyers, while no such evidence exists in the period before the price drop.

WD-06.3 [A] Estonian eGovernment Services: Lesson Learned

Ahto Kalja; Tallinn University of Technology, Estonia

Janari Pold; Tallinn University of Technology, Estonia

Tarmo Robal; Tallinn University of Technology, Estonia

Uuno Vallner; Ministry of Economic Affairs and Communications, Estonia

Vladimir Viies; Tallinn University of Technology, Estonia

The Europe 2020 project, "Digital Agenda for Europe," sets the goal of covering all of Europe with high-speed Internet. All homes, companies and institutions in the EU must have the possibility of connecting to at least a 30 Mbit/s Internet connection, and at least half must have access to 100Mbit/s and faster connection. Estonia also has set the goal of ensuring that everyone has the opportunity to connect to the new generation broadband network and to get eGovernment services 24/7. This paper provides an analyses and overview of lessons learned from how to gain a practical eGovernment functioning.

WD-07 TUTORIAL: From User Experience to BENUTZERLEBNIS – UX JOINS joins L10N to offer a better global user experience and change the world!

Wednesday, 7/31/2013, 14:00 - 15:30

Room: Guadalupe

Speaker(s) Loic Dufresne de Virel; Intel Corp.

There is much to gain by combining UX and L10N, too often afterthoughts in the world of software development, to provide a better global user experience. From basic internationalization best practices to customization and culturalization aspects, we will start by covering topics that might seem trivial but present some significant challenges from a user experience and localization standpoint: organization and display of information, from highly hierarchical societies to less "distant" communities; methods of payment – COD, Paypal, Credits Cards, etc. If you end up doing business there, you probably still want to get paid; collection of personal information and use of "forms" – including privacy issues that, yes, might vary from country to country; handling of genders, numbers, cases, and declensions – how to properly code "You and %d friends like this" so it can be translated into multiple languages; language selection, and more. We will then look into the new usage models offered by technologies such as machine translation, voice recognition, or

perceptual computing, which promise to change the way we access content and interact with our devices, by making the content more "self-aware" and intelligent, and making the computing experience more natural, intuitive, and immersive. At the end of the day, these technologies will allow us to bridge the digital divide by enabling people who do not speak English or cannot read / write to access and consume information, thus redefining the concept of literacy.

WD-08 Science and Technology Policy - 2

Wednesday, 7/31/2013, 14:00 - 15:30

Room: San Carlos

Chair(s) Shintaro Sengoku; Kyoto University

WD-08.1 [R] Popular Science Industry Development in China: Opportunity and Challenges in the Context of New Information Technology Booming

Xuan Liu; China Research Inst. for Science Popularization, China

Lixin Xu; Hebei Normal University, China

Lin Yin; China Research Inst. for Science Popularization, China

Dan Wu; China Research Institute for Sciencepopularization, China

Considering the great development opportunity for popular science industry brought by new information technology, the research team conducted an intensive study on China Popular Science Industry (PSI) to analyze the opportunities and challenges in the new media age. This paper consists of five parts. The first part demonstrates the general development context and status for current popular science industry in China. The second part briefly introduces the methodology, and the third part presents the general development context and opportunities in China at present. The fourth part illustrates the main findings from a separate survey, such as popular science websites' scale and content, quality of the popular science websites and user features. The author also lists three major problems and challenges facing the popular science development as follows: lack of original contents and high quality popular science resources, the target users of popular science are lack of subdivision and the popular science website requires the introduction of a deeper market mechanism. At last, suggestions are given on policy-making strategies for PSI.

WD-08.2 [R] An Investigative Analysis of Public Understanding and Acceptance of Popular Science Media in China

Xiang-dong Liu; China Research Inst. for Science Popularization, China

Lin Yin; China Research Inst. for Science Popularization, China

This article presents an investigation into the understanding and degree of acceptance of popular science media by the public, analyzes their rationale and attempts find solutions to the problems they raise. The method adopted involved a random sampling of citizens in 18 cities in China, administering questionnaires and statistically analyzing the data using SPSS 20.0. The survey results show how factors such as gender, age, residence, nationality, occupation and public education influence attitudes to popular science media, and shows that the public holds a low degree of satisfaction with popular science media. In conclusion, the authors suggest that science communicators should adopt an innovative approach to communicating about science with the general public. In particular, great attention should be paid to the interests of the audience, communication channels, and techniques of expression.

WD-08.3 [R] Analysis of the Relationship between Science Literacy and China's Socio-Economic Development

He Li; China Research Inst. for Science Popularization, China

In this paper, the Vensen-PLE system dynamics software is used to build the simulation models. The data resource comes from China's civic science literacy survey (2003-2009) of the Chinese Association for Science and Technology and includes computational analysis of the contribution of the scientific quality of the GDP growth as well as science and technology, education and science. In addition there is a financial investment in the growth of science literacy. And there is an interactive feedback relationship between the improvement of science literacy and GDP growth along with science, technology, education and invest-

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ment in science popularization. This paper provides an in-depth analysis of the relationship between the improvement of science literacy and economic development in China. The enhancement of science literacy, education and the investment in science popularization is promoted in order to develop important conclusions and make proper recommendations.

WD-09 TM in Energy - 1

Wednesday, 7/31/2013, 14:00 - 15:30

Room: Willow Glen I

Chair(s) Hiroshi Suzuki; Japan University of Economics

WD-09.1 [R] Bibliometric Analysis of Net Zero Energy Buildings

Asato Tashiro; CMTA, Inc., United States

Hisato Tashiro; The University of Tokyo, Japan

Shino Iwami; The University of Tokyo, Japan

Ichiro Sakata; The University of Tokyo, Japan

The idea of net zero energy buildings (NZEB) is very attractive and significant for innovative development. However, since the term represents a broad sense, there does not exist common understanding about what does the study of NZEB consist of. We apply a methodology to determine the structure and geographical distribution of knowledge, as well as to reveal the structure of research collaboration in such an interdisciplinary area as NZEB, by performing journal information analysis, citation network analysis and visualization. Knowledge in these areas has been growing rapidly in recent years. Research competency of each field shows some characteristics by subject and is distributed among USA, China, and the EU. With knowledge structure analysis, non-technical policy makers understand the fields of study and focus resources to necessary technologies.

WD-09.2 [R] Agriculture and Energy Industry in the Setting of an Emerging Bioeconomy: Are There any Signs of Convergence on the Horizon?

Birte Golembiewski; University of Muenster, Germany

Nathalie Sick; University of Muenster, Germany

Jens Leker; University of Muenster, Germany

Shrinking fossil fuel resources and growing global energy demand lead to a strong interest in renewable resources, particularly in the energy industry, where electricity, heat and fuel are increasingly produced by using bio-based feedstock. Agricultural companies with direct access to renewable raw materials enter energy markets and gain increasing influence on their competitive environment. These developments at the interface between the energy and the agriculture industry seem to reflect the formation of a new bioeconomy. The fading boundaries between the so far distinct agricultural and energy industry can indicate an industry convergence process. In a setting of convergence, a firm's flexible response and dynamic capabilities represent the key for its future success. Based on the well-accepted notion that convergence of research-intensive industries follows convergence of scientific fields and technologies, we use patent analyses to identify potential patterns of convergence. Our work focuses on examining a potential technological convergence with regard to German bioenergy applications, whereby a potential new industry segment could not be confirmed at this point in time. For now, a bioenergy value chain can be described as being integrated in the energy value chain as a complementary sub-segment.

WD-09.3 [R] Innovation in Restructured Electricity Sector: Diagnosis, Root Causes, Method of Inquiry

Sertac Oruc; Delft University of Technology, Netherlands

Scott W Cunningham; Delft University of Technology, Netherlands

The paper investigates innovativeness of the electricity sector in conjunction with the ongoing liberalization process. Firstly, the paper demonstrates the lack of innovation in today's partly restructured electricity sector by reviewing existing empirical evidence. To make this point, a case that shows how low R&D spending is compared to other major sectors is provided. Moreover, the societal consequences of the lack of innovation is touched upon. Secondly, the paper systematically investigates the root causes of the problem by highlight-

ing the innovation related characteristics of the sector and relating these characteristics to Schumpeterian technology regimes. This contribution builds the bridge between existing theoretical results and the existing empirical evidence. Furthermore, the paper argues that formal models (of a game theoretic character) are needed to better disentangle alternative hypotheses concerning industrial organization and innovation. Such game theoretic models are needed in order to make sense out of messy, conflicting empirical data concerning innovation and performance. A systemic review of these models in the literature is given. An overarching conclusion from these game theoretic reviews is that innovation is not fully compatible with market mechanisms. This is the reason in fact that science funding and innovation policy are shielded from market forces where there is inevitably an underinvestment in R&D. The paper concludes with remarks relating reformed markets to innovations. We conclude that given the scope of needed new innovations, better market designs (or mechanism designs) are needed. These conclusions do not foreclose the necessity of improved energy policies at the national or member state level.

WD-10 Intellectual Property - 3

Wednesday, 7/31/2013, 14:00 - 15:30

Room: Willow Glen II

Chair(s) Yun Liu; Beijing Institute of Technology

WD-10.1 [A] Using a Text Mining Tool for Patent Analyses: Development of a New Method for the Repairing of Gas Turbines

Yvonne Wich; Fraunhofer IAO, Germany

Joachim Warschat; Fraunhofer IAO, Germany

Dieter Spath; Fraunhofer IAO, Germany

Antonino Ardilio; Fraunhofer IAO, Germany

Kamilla Koenig-Urban; Fraunhofer IPK, Germany

Eckart Uhlmann; Fraunhofer IPK, Germany

The content analysis of hundreds of patents during early phases of R&D processes is still complex and time consuming. Many companies avoid the analysis of patents and are not aware of the huge knowledge that might be useful for their own R&D. Therefore, Fraunhofer IAO developed a method for a software-based patent analysis, the so-called White Spot Analysis. The core element of this analysis is the usage of a text-mining solution for the analysis of patents, especially for the analysis of problems and solutions provided by patents. This paper demonstrates the result of a White Spot Analysis: The practical example deals with the development of a new method for the repairing of gas turbines, especially the repairing of high pressure turbine blades. It is shown how the developed text-mining solution assisted the patent analysis and the idea generation process.

WD-10.2 [A] Development of Intellectual Property Service Industry in China

Haoshu Peng; Shanghai Advanced Research Institute, CAS, China

Jia Jia; Shanghai Advanced Research Institute, CAS, China

The IP service industry, as one of the high-tech service industries, is a newly cultivated industry in China. However, the mechanism and methods to develop the industry are still to be learned. The research studies the industry by its concept, category, function and experiences of how developed countries have helped to develop the IP service industry. Based on the status quo and problems observed in China's IP service industry, we conducted a survey of IP pilot companies that conduct R&D in Shanghai to understand their needs for IP services and compared IP information service business structures in China with those in Japan and the Europe. Finally, we studied different models of IP service talent cultivation worldwide. Policy implications based upon the study are provided.

WD-10.3 [A] Applying International Patent Classification (IPC) to Strategic Planning Processes of an R&D Organization: The Case of NECTEC, Thailand

Maleeya Jotisakulratana; NECTEC, Thailand

Naphassanun Koomgun; NECTEC, Thailand

Ratnatee Virojrid; NECTEC, Thailand

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Bhubate Udomsaph; NECTEC, Thailand

The International Patent Classification (IPC) is a technology hierarchical classification system used by the World Intellectual Property Organization (WIPO) to classify patents. The fact that IPC covers wide areas of technology (70,000 groups) and is universally used makes its benefits not just limited to a classification of patent but also applicable to other types of R&D output. This paper shares the experience from the National Electronics and Computer Technology Center (NECTEC), an R&D organization of Thailand, in its study to identify the organization's technological strengths. The organization applied IPC to classify its prototypes and papers, then analyzed and compared the organization's R&D performance for each IPC. The analysis was conducted using several factors that represent the quality and quantity of prototypes, patents, and papers. Research results suggested which technologies the organization should focus and allocate more resources on, which should be retained, and which should be dropped.

WD-10.4 [R] Chinese Patent Explosion Factors: An Empirical Analysis Based on System and Policy

Yun Liu; Beijing Institute of Technology, China

Long Tan; Beijing Institute of Technology, China

Sai Sai Song; Beijing Institute of Technology, China

China's patent application has been rising tremendously since its patent system was preliminarily built in 1985 represented by the issuing of its patent law. China has surpassed Japan in 2010 and the US in 2011 to be the largest patent applying destination country with an annual rising rate of over 25%. Patent production and application are very complicated social and economic phenomena, and influenced by many factors. In this study, we explain the Chinese patent explosion by empirical analysis on the view of system and policy. The system and policy factors include national patent system reformation, patent subsidy policy, high-tech enterprises certification, patent intermediary service, patent pledge financing, intellectual property management of governmental S&T programs, and intellectual property pilot and demonstration project. Non-parameter tests and correlation analysis have been applied to discover and distinguish the impact of these factors. The result shows that even endogenous factors such as capital (R&D fund) and labor (scientists) basically decide the maximizing amount of patentable technology, and exogenous factors such as institution and environment could also play a very important role in patent rising respectively. Patent system, patent subsidy and intellectual property management are the most important factors; however, patent pledge financing's influence is limited relatively.

WD-11 TM in Financial - 1

Wednesday, 7/31/2013, 14:00 - 15:30

Room: Willow Glen III

Chair(s) J. Michael Munson; University of Santa Clara

WD-11.1 [R] The Impacts of IT Governance Implementation: A Case Study on Banking Industry in Thailand

Sureerat Saetang; University of South Australia, Australia

Abrar Haider; University of South Australia, Australia

According to the turmoil in contemporary business, IT governance is becoming popular with high demand in large organizations. Certainly, it leads top management people to concentrate on IT (information technology). This elevates their IT awareness by paying more attention to their organizational management. With this increase, they realize in examining the relationships between organizational structure and people. However, it is complicated to understand the whole processes of IT governance implementation, which is complex and requires intensive capability and operational efficiency. It is therefore compulsory for leaders to adopt the appropriate IT governance framework, which fits both IT-business strategies and the combination of all IT resources. This paper aims to identify an understanding of capability and operational efficiency to encourage an effective IT governance implementation by delivering a sample case study to identify as lessons learned for other organizations. It could be hands-on material for practitioners to manage complexity by adopting IT governance.

WD-11.2 [R] Sharing Knowledge as Collective Intelligence Approach to Improve the IT Department's Operation at Commercial Banking

Daniel Trejo-Medina; Universidad Nacional Autonoma de Mexico, Mexico

This research reviews the knowledge management (KM) usage and how the internal personnel collective working provides benefits, or not, to commercial banking information technology (IT) departments in Mexico. Alongside the assessment, the research shows the principal concerns in regards to KM for IT to design an international point-of-view strategy with local market overview in order to gain value for its IT operation. The research follows a qualitative and quantitative approach through questionnaires and face-to-face interviews with IT executives and proposes a structural equation model to measure the main manifest activities the KM and collective intelligence address under the bank's perspective. Mexican banks have different IT operational philosophies based in their country's headquarters origin—European, North American or Mexican—which also change the value perception they must obtain from their IT departments; most of them agreed the main reason to move forward to a KM policy is to increase value for their internal customers. The originality of the paper is regarding the way it addresses simultaneously knowledge management and collective intelligence as related concepts to improve IT operation.

WD-11.3 [R] Development of a Financial Model for Non-traditional Lending to Entrepreneurs and Its Applicability to the Technology Sector

Cory Hallam; University of Texas at San Antonio, United States

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

Anita Leffel; University of Texas at San Antonio, United States

The availability of financial resources for small businesses and new entrepreneurs spans safe, collateralized loans through financial institutions to high-yield predatory loans targeted at entrepreneurs lacking traditionally acceptable financial characteristics. An assessment model was developed based on four primary characteristics, including entrepreneurial personality, business skills, business potential, and lender assessment to create a new method for delivering small business loans. Results of a reduced set logic regression model relating to payback are presented using the beta test of the financial tool, and a discussion of its applicability to the tech sector is provided.

WD-11.4 [R] Service Innovations of the Banking Industry in Taiwan: The Perspective of Reverse Product Cycle

Phil Y Yang; National Taichung University of Education, Taiwan

Jian-Hang Wang; National Tsing Hua University, Taiwan

Wang-Yin Ruan; Shuen Der Industry Corporation, Taiwan

Previous research has mostly focused on the manufacturing industry to explore product and process innovation. Limited theoretical and empirical works have linked with the service industry. And little research investigated the appropriate service innovations that influence firm performance in the banking industry. Based on the theories of reverse product cycle and innovation level, this study tentatively classified service innovations into four strategies including steady value-added, emerging goals, prosperous business, and satisfactory efficiency. Through a postal survey of the publicly listed commercial banks in Taiwan, 48 respondents (mostly CEOs) returned the valid questionnaires (a response rate of 24%). By conducting cluster analysis, the strategies steady value-added, emerging goals and prosperous business were successfully clarified. Specifically, the firms that aligned to steady value-added strategy have higher performance than those of emerging goals strategy and prosperous business strategy. The result showed that disruptive innovations are prevalent in Taiwan's banking industry; however, the sustaining innovations have the higher impacts on firm performance than the disruptive innovations. The innovation strategies combined with customized services help commercial banks to accurately respond to customers' demands and build sustainable competitive advantages. Managerial and policy implications from the research findings were provided in the conclusions.

WE-01 NPD - 3

Wednesday, 7/31/2013, 16:00 - 17:30

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Room: Salon I

Chair(s) Jasper L Steyn; University of Pretoria

WE-01.1 [R] Crafting a Product Platform Strategy: Change in Strategy of Mabuchi Motors, a Leading DC Motor Manufacturer

Tomoatsu Shibata; Tohoku University, Japan

Mituru Kodama; Nihon University, Japan

The aim of this article is to build a new product development strategy for parts suppliers. One difficulty in product development of parts suppliers is that they are faced with the dilemma of choosing between product efficiency and product differentiation. To achieve efficiency, suppliers need to standardize parts as much as possible. On the other hand, to achieve product differentiation, suppliers need to customize parts, and it will decrease efficiency. Therefore, achieving both is difficult. Particularly, parts are embedded within final products, and final product manufacturers have strong demand for customized parts best suitable for their products. First, we conduct an in-depth case analysis of Mabuchi Motor from the perspective of product architecture and organization. Mabuchi specializes in miniature DC brushed motors. Mabuchi has held a more than 50% share of the worldwide market, a success driven by the company's strategy of creating a common platform for their products. We analyze how Mabuchi is able to continually meet strong demands for customized products while maintaining high profitability. Then, we enhance the product platform strategy from the case study. Finally, we discuss the validity of the strategy, based on existing findings and literature.

WE-01.2 [R] Is There a Need for a New Process Model in Product Development When Implementing DFSS?

Evelina Ericsson; Royal Institute of Technology, Sweden

Design for Six Sigma (DFSS) is a management concept fostering continuous improvement and structuring of organizations' product development processes and their included activities. Traditionally, this concept is described based on the three perspectives of processes, roles, and product development methods. However, most companies working with product development are not new in the product development field. They have a tradition of developing products and thus, an already existing product development process. Therefore, the question arises whether there is a need for another concept introducing a process structure for the product development field. It is also questionable if the provided process structures in DFSS contribute with something new. This article presents an analysis of seven companies, long-time DFSS adopters as well as non-DFSS organizations, from the perspective of how well their product development process resembles the ones advocated in DFSS with the purpose to find out if there is a need for a development process structure in DFSS or if that is common sense and a prerequisite that already exists in mature developing organizations.

WE-01.3 [R] Improving Absorptive Capacity in Product Development with Online Collaboration Tools

Tero H Peltola; CITER / Tampere University of Technology, Finland

Saku J Makinen; CITER / Tampere University of Technology, Finland

In the present paper, we discuss how the adoption of online collaboration tools (OCT) has influenced new product development (NPD). Our aim is specifically to consider how an organization's absorptive capacity is influenced by its adoption of social media tools. We conducted a survey in a case company investigating the state of absorptive capacity before and after the large-scale adoption of social media tools. We conclude that the amount of accessible knowledge and ideas increases as an organization's ability to point out various expertise increases. OCT can be used to access knowledge that originates from external as well as internal sources, but it seems that online tools increase the visibility and accessibility of internal expertise and therefore the use of internal knowledge. Additionally, we observe that the assimilation of externally sourced knowledge improves internally as the means of distribution improve, and it seems that an increased complexity of tasks at the individual employee level does not present additional transaction costs for this improvement.

Subsequently, we derive that organizational absorptive capacity is increased and linked to improved new product development performance. We further elaborate on the theoretical and managerial implications of our findings.

WE-01.4 [R] Managing Technology Selection and Development Decisions in New Product Development Process

Amir Sanayei; Wayne State University, United States

Leslie Monplaisir; Wayne State University, United States

Managing development decisions for new products based on dynamically evolving technologies is a very vital and complex task. Managers often have to choose between introducing a moderately better, less risky product early and a superior, costly, and highly risky product later. We developed a modeling framework in order to analyze the implications of time to market, performance and development cost. The model considers development uncertainty in a competitive environment. Our analysis helps in determining optimal new product launch time and the best managerial actions in order to maximize total profit.

WE-02 TM in Health - 2

Wednesday, 7/31/2013, 16:00 - 17:30

Room: Salon II

Chair(s) Xiao Zhou; Beijing Institute of Technology

WE-02.1 [R] How to Improve Patient Safety by Text Mining With Medical Incident Reports: Innovative Technologies Using e-Health and Health Technology Assessment

Masanori Akiyama; The University of Tokyo, Japan

Katsuhide Fujita; The University of Tokyo, Japan

We propose a new approach to detect the precarious situation in medical care and solve the communication-gap by analyzing tracking records. We evaluated the degree of similarities between incident documents obtained bottom-up and the links between existing classes granted top-down. We made it possible to evaluate overall similarities regarding incident documents with the techniques of natural language processing and network analysis with more than 20,000 reports. In this research, we evaluated the degree of similarities between incident documents obtained bottom-up and the links between existing classes granted top-down. We made it possible to evaluate overall similarities regarding incident documents by using the method of network analysis. With regard to the background, the results of the analysis demonstrated that compared with abstract and solution, existing classes are inadequate for representing the characteristics of documents and that there is a need to improve classes. Some categorizations by top-down analysis don't reflect the category by the bottom-up analysis. Our results suggest the effectiveness of introducing the network analysis method. We made it possible to analyze the differences of understanding of the incident reports between doctors and nurses. We attempted the consensus building that depended bottom-up by the network analysis.

WE-02.2 [R] Efficacy of the Drug Administration Support System for Improving Drug Compliance in Home-Care

Masanori Akiyama; The University of Tokyo, Japan

Yuki Sasaki; The University of Tokyo, Japan

In terms of home-care, drug compliance has become a serious problem. For elderly patients, it is quite difficult to take various drugs properly without support from medical professionals. There seems a demand for instructing drug administration in home-care to improve medication compliance. The aim of this study is to develop a drug administration support system. The device provides the right dose of medicine and opens the box automatically at the right time. It prevents overdose by managing correct drug dosage at appropriate times. The drug-taking behavior of the patient is recorded and sent to a mobile phone with a text message to patient families, nursing staff and home helpers. It ensures an objective evaluation for drug administration since that information is recorded automatically without the patient's reporting. The validation of the system was conducted in ten homes and

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questionnaire with 17 people such as patients, family, home-helpers and care managers for three months. As a result, the system has a positive impact for patients who have multiple diseases, live alone, or with an elderly family. The survey result has revealed that 40% of patients evaluated "the frequency of forgetting to take medicine has reduced." We made a framework to enhance collaboration with patient and pharmacy.

WE-02.3 [R] Functional and Emotional Dimensions: Method to Measure Through Data Collection Instruments for New Products in Healthcare

Raffaella Leane Z Tanure; Federal University of Rio Grande do Sul, Brazil
Patricia F Magnago; Federal University of Rio Grande do Sul, Brazil
Marcia S Echeveste; Federal University of Rio Grande do Sul, Brazil

The development of equipment for the healthcare industry requires systematic management as, according to the standard of usability for medical equipment IEC 62366:2010 (Application of Usability Engineering to Medical Devices), functional and non-functional data should be considered, in that order, aiming to develop safer and more effective products. However, non-functional requirements such as emotions caused to users and usability aspects have not been fully covered, as tests are usually conducted under the technical vision and not in the real environment in which devices will be used. In this context, it is essential to emphasize the importance of an evaluation that expands in two dimensions, seeking technological solutions that meet the conditions of field use (assessed by functional metrics) as well as the emotional aspects (measured by scale of emotions), concerning the usability of the product. This work aims to develop a method to measure functional and emotional dimensions through data collection instruments by assessing users who are able to evaluate the dimensions of usability in medical equipment. The users are patients on dialysis and their nursing staff. Analyses suggested for future research include: descriptive analysis, factor analysis, clustering and MANOVA (multivariate analysis of variance).

WE-03 Innovation Management - 8

Wednesday, 7/31/2013, 16:00 - 17:30

Room: Salon III

Chair(s) Simon P Philbin; Imperial College London

WE-03.1 [R] An Exploratory Study of Interdisciplinarity and Breakthrough Ideas

Jeffrey M Alexander; SRI International, United States
Kevin Bache; University of California, Irvine, United States
John Chase; SRI International, United States
Christina Freyman; SRI International, United States
J. David Roessner; SRI International, United States
Padhraic Smyth; University of California, Irvine, United States

Interdisciplinary research, defined as work which combines theories, methods, tools and concepts from multiple specialized knowledge bases, is often treated as proxy for research which is likely to be "transformative." This treatment presumes that the novel combination of ideas from multiple disciplines has a high probability of generating "breakthrough" insights, which in turn will lead to significant discoveries and innovations. We conduct an exploratory study to understand how to measure the degree of interdisciplinarity involved in novel, significant research fields, and how those measures capture the integration of disparate ideas in novel configurations. Our approach is to examine research fields recognized as "breakthroughs" in their domains, such as tissue engineering and DNA microarrays, and "measure" the interdisciplinarity of the ideas embedded in those research areas in three ways: the Porter-Rafols integration score, a measure of the "topical diversity" of the papers using the method proposed by Newman et al., and hand-coded assessments by informed human reviewers. The results provide promise into the relative capabilities of bibliometrics and text analytics for assessing interdisciplinarity, and also examine more closely whether the characteristics of interdisciplinary research make that research more likely to produce scientific and technical breakthroughs.

WE-03.2 [R] Initiatives for Multi Cross Industry Innovation: The Case of

Future_bizz

Alexander Khan; University of Bremen, Germany
Martin G Moehrl; University of Bremen, Germany
Friedhelm Bottcher; Bottcher Consulting, Germany

Present times are marked by profound changes in industry and enterprises. Many of the ideas that have the capacity to create innovative businesses and markets in the future can only be realized through the co-operation of key partners from different industries. This phenomenon is referred to as multi cross industry innovation. Here, solutions are not solely created within a single industrial branch but also beyond that particular environment. One of the most important questions regarding multi cross industry innovation is how the initiatives for such an innovation are formed or how they emerge. Based upon an in-depth case study of future_bizz, a German inter-industry network, we derive several insights for scientists and managers alike: first, we provide empirical findings that highlight the unique problem quality of multi cross industry innovation (as a new research field). Secondly, we show how innovation initiatives emerge in such a volatile environment. The multi cross industry innovation architect, knowledge intermediaries and future studies take a central role in the alignment of innovation activities. Thirdly, we highlight the need for managing absorptive and desorptive capacity in conjunction. The network approach makes it possible to directly influence both by tapping external knowledge bases.

WE-03.3 [R] Non-R&D Innovation in SMEs: An Empirical Study from China

Yu Meng; Zhejiang University, China
Gang Zheng; Zhejiang University, China
Fang Liu; Zhejiang University, China

For a long time, R&D had been largely equated with technological innovation by both academia and enterprises, sometimes even been regarded as the only effective way of innovation. However, ample empirical studies in recent years showed that some of the innovative firms, especially small and medium sized enterprises (SMEs), often use many other innovative methods to win the competitive advantages. The EU's surveys in recent years even indicated that over half of European innovative firms did not perform formal R&D. Based on a survey of 398 Chinese SMEs in 2012, this paper develops a preliminary theoretical framework for SMEs' non-R&D-based innovation practice in the Chinese context, as well as main patterns of SMEs' non-R&D innovation, such as technology adoption, imitation, marketing innovation, etc. Through our empirical study, we find that non-R&D innovation activities have significant positive impacts on SMEs' innovation performance. In the meantime, good absorptive capacity also helps to improve innovation performance of SMEs. Firms with better absorptive capacity would have better innovation performance when doing marketing innovation. However, firms may act worse with better absorptive capacity when doing technological non-R&D innovation.

WE-04 Technology Forecasting - 4

Wednesday, 7/31/2013, 16:00 - 17:30

Room: Salon IV

Chair(s) Scott W Cunningham; Technical University, Delft

WE-04.1 [R] Technology Substitution Models for LCD and LED TVs

Fang-Mei Tseng; Yuan Ze University, Taiwan

To accurately forecast the demand for and substitution of liquid crystal display (LCD) (cold cathode fluorescent lamp [CCFL] backlight) and light-emitting diode (LED) televisions, it is crucial for LCD manufacturing companies to allocate their resources. There are three popular substitution models for forecasting demand: the Lotka-Volterra competitive model, the Norton and Bass multigenerational innovation diffusion model, and the Marchetti and Nakicenovic technological substitution model. We used and compared these models to estimate the sales volume of 42-inch CCFL and LED televisions. Three criteria of forecasting accuracy were used to compare the forecasting capabilities of these models. The results showed that the technological substitution model was more accurate than other models.

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WE-04.2 [R] Incorporating Value Judgment in Technology Forecasting Using Data Envelopment Analysis

Dong-Joon Lim; Portland State University, United States

Timothy R Anderson; Portland State University, United States

Technology forecasting using data envelopment analysis (TFDEA) has been employed in a wide range of applications because of its ability to model complex tradeoffs. The very name indicates that it is based on data envelopment analysis (DEA), which has strength in that it does not require a fixed a priori weighting scheme. Instead, it adopts a dynamic weighting scheme so that each data point can choose its best possible weights. However, it is well known that this flexibility may result in extreme weights that may be considered unrealistic in certain applications and has been one subject of DEA research. This paper extends the standard TFDEA model to incorporate value judgment in assessment to refine the analysis framework. The proposed model is applied to the liquid crystal display (LCD) industry to address the impact of various weight restrictions on the technology forecast results.

WE-04.3 [R] Structural Equation Modeling Based Data Fusion for Technology Forecasting: A Generic Framework

Leon Staphorst; GSTM, University of Pretoria, South Africa

Leon Pretorius; University of Pretoria, South Africa

Marthinus W Pretorius; GSTM, University of Pretoria, South Africa

Technology intelligence (TI) involves the process of capturing technology related data, converting this data into information by determining relational connections, and refining information to produce knowledge that can guide strategic decision makers. Technology indicators are those sources of technology related data that allow for the direct characterization and evaluation of technologies over their whole life cycle. Future-oriented technology analysis (FTA), which is a forward-looking approach in scrutinizing the information that has been distilled from a set of technology indicators, can potentially provide decision makers with useful technology forecasting (TF) knowledge. The paper postulates that TF can be viewed as an instance of data fusion (DF), which is a formal framework that defines tools, as well as the application of these tools, for the unification of data originating from different sources. Within the field of DF relational connections define context. Context sensitive DF techniques refine the generated knowledge based on the characteristics of exogenous context related variables. Structural equation modeling (SEM), which is a statistical technique capable of evaluating complex hierarchical dependencies between latent and observed problem and context variables, has been shown to be effective in implementing context sensitive DF. In the paper a generic framework is introduced for SEM based DF of technology indicators in order to produce TF output metrics. The paper also provides the research methodology that will be used in a future study to evaluate the validity of the generic framework for the case of National Research and Education Networks (NRENs).

WE-05 TM in Services - 2

Wednesday, 7/31/2013, 16:00 - 17:30

Room: Salon V

Chair(s) Man Hang Yip; University of Cambridge

WE-05.1 [R] Management of New Media Technology Application in Exhibitions of Science and Technology Museums

Zhi-Min Zhang; China Research Inst. for Science Popularization, China

Nian Zheng; China Research Inst. for Science Popularization, China

Fujun Ren; China Research Inst. for Science Popularization, China

Science and technology (S&T) museums are increasingly using new media technology in exhibits design and demonstration nowadays in China. Appropriate application of new media technology makes science communication more effective through improving the information distributing ability of exhibits, attracting visitors and intriguing visitors as well as enriching the ways of learning. However, in recent years, a trend of new media technology abuse in exhibitions of S&T museums led by the idea of "more new media technology superior science communication" has appeared, which results in the entertainment func-

tion exceeding the education function, pollution of the visiting environment and high cost. This paper discusses positive and negative effects of new media technology application in exhibitions of S&T museums and explores the application management tactics, including some application principles and some valuation indicators.

WE-05.2 [R] Achieving the Hybrid Middle Ground in Modern Social Entrepreneurship: A Conceptual Discussion with NYC-Based Clean Technology Enterprises as Cases in Point

Bala Mulloth; Central European University Business School, Hungary

Mel Horwitch; Central European University Business School, Hungary

Peter Hardi; Central European University Business School, Hungary

The focus of this paper is primarily conceptual. It offers an intellectual and managerial architecture for dealing with social entrepreneurship. The paper argues that traditional views of both entrepreneurship and corporate social responsibility are inadequate as guides for researchers or practitioners involved with social entrepreneurship. The emerging arena of social entrepreneurship is becoming too complex and too dynamic. Instead, succeeding in social entrepreneurship now requires what is termed a "hybrid middle ground" comprising business/commercial techniques and not-for-profit managerial approaches and a blend of business and social goals. Achieving a "triple bottom line"—incorporating economic, social and environmental metrics—is facilitated by reaching the middle zone as quickly as possible. This conceptual discussion on social entrepreneurship and the utility of the hybrid middle ground is illustrated with a set of two de novo and eight incubator-based startups in the NYC cleantech sector.

WE-05.3 [R] IT Governance Implementation in Corporate Environments: A Case Study of an International Hospital in Thailand

Sureerat Saetang; University of South Australia, Australia

Abrar Haider; University of South Australia, Australia

In the period of economic confusion and public policy turmoil, the business community loses confidence and feels uncertain in its own positions, in public, and in the broader view. Organizations thus seek the way to govern themselves more effectively and truly to be held accountable. In these circumstances, the role of information systems in particular and technology in general becomes more and more critical. These technologies provide the foundational building block for organizational development, evolution, and responsiveness. This increased emphasis on technology in organizations has also exposed new issues and risks related to technology acquisition, diffusion, operation, and institutionalization. This research leads one to examine how IT governance cope with most concerns in its domains by delivering hands-on knowledge. It presents a case of an international hospital in Thailand and classifies the findings within the areas of strategic alignment, value delivery and risk management. Referring to them, it could be the solutions which lead practitioners to handle difficulties and unlikely situations within their organizations. Therefore, this research aims to achieve long-term sustainability success by deploying IT governance.

WE-0 TUTORIAL: Technology Roadmapping for Efficient and Clean Power **Wednesday, 7/31/2013, 16:00 - 17:30**

Room: Salon VI

Speaker(s) Terry Oliver; Bonneville Power Administration

Tugrul Daim; Portland State University

Jisun Kim; Bonneville Power Administration

Ibrahim Iskin; Portland State University

Judith A Estep; Bonneville Power Administration

James R Bowen; Bonneville Power Administration

James Hillegas-Elting; Bonneville Power Administration

Throughout its history, the Bonneville Power Administration (BPA) has been successful in responding to political, business, environmental and technological changes and demands. BPA has earned regional, national and international recognition as an innovative leader in technology breakthroughs and achievements that have saved regional electricity consumers

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millions of dollars. In addition, the Agency has significantly contributed to the overall development of, and incremental improvements to, the high-voltage power system in the Pacific Northwest, energy efficiency programs that support regional and national goals, non-wire solutions and environmental technologies. Technology roadmaps are created to support research and development (R&D) agendas that meet the strategic goals of industries and organizations with research needs. BPA's technology roadmaps are essentially a snapshot of current perspectives to inform a research agenda that will help BPA adapt to a new environment in which technology, regulation, generation resources, customer demands and power flows are changing dramatically.

This tutorial will review the technology roadmapping process at BPA and will introduce the most recent energy efficiency technology roadmap. Technology has played a central role in the Northwest's development, from the Federal Columbia River Power System to technology giants like Boeing, Microsoft and Intel; and it has impacted thousands of businesses, universities and laboratories. This savvy has allowed the region to meet half of its load growth through cost-effective investments in energy efficiency for more than 30 years. Through the leadership of the region's utilities, labs, universities, energy organizations and private businesses, the Northwest has been able to successfully deliver energy efficiency as a reliable resource.

The Northwest Power and Conservation Council's Sixth Power Plan calls for roughly 85 percent of the region's load growth to be met with energy efficiency by 2030. To meet these goals, we must find ways to increase the adoption rates of existing products and services. At the same time, we must also strategically target the region's research and development resources into efforts that will produce the technologies needed to enable the products of tomorrow. In December 2009, 35 experts from 20 organizations pooled their efforts to develop an energy efficiency technology roadmap portfolio that would define a research agenda for the Northwest. The results of the intensive 10-week effort have been expanded and refined through additional workshops and the integration of critical comments from experts beyond the region. Revised drafts of the National (formerly Northwest) Energy Efficiency Technology Roadmap Portfolio were released in March and July 2010; March 2011; March, August, and September 2012; and January 2013.

The Technology Executive Committee of the United Nations Framework Convention on Climate Change referenced the Energy Efficiency Technology Roadmap as an example of a "good practice" roadmap.

WE-07 Collaborations for Technology Management - 1

Wednesday, 7/31/2013, 16:00 - 17:30

Room: Guadalupe

Chair(s) Jing Hu; China Jiliang University

WE-07.1 [R] Collaboration to Success in Research

John S Liu; National Taiwan Univ of Science and Technology, Taiwan

Louis Lu; Yuan Ze University, Taiwan

Collaboration is an important theme in technology management, especially for the management of science and technology research. Many studies on the benefits of research collaboration have demonstrated that collaboration increases researchers' output as well as the quality of them. The purpose of this study is to examine the collaboration pattern of influential researchers through a quantitative method. We use the mainstream index, m-index for short, as the proxy for a researcher's long-term influence within a scientific field. The m-index expresses the level of association of a researcher's works with the mainstream of knowledge development in a specific scientific field. The value of researcher's m-index is tested with several parameters related to collaboration, which are embedded in the paper-author affiliation network. We select data envelopment analysis (DEA) as the scientific field of study. The analysis results show that the number of distinct collaborators and the extent to which a researcher co-publishes with the same collaborators on two or more papers are positively correlated with the m-index. The average number of each paper's co-authors is nevertheless negatively correlated with the m-index. All these results together suggest that

influential scientific researchers collaborate with many other researchers, yet each time do so only with a small number of collaborators who are mostly the partners they collaborate repeatedly with.

WE-07.2 [A] Bridging the Missing Link between 'Top-down' and 'Bottom-up': A Case Study of Thailand's International Collaboration in S&T

Pattharaporn Suntharasaj; Portland State University, United States

Dundar F Kocaoglu; Portland State University, United States

Success in international collaboration in science and technology (ICST) depends on various factors, different players and different perspectives. Governments participate in collaboration in order to meet their country's policy goals. Scientists and researchers establish their contacts through their personal channels or scientific networks in order to pursue their own academic interest. There are two significant approaches in ICST policy making which are "top-down" and "bottom-up" approaches. Both approaches are important. One approach cannot fit all. Each approach has its own advantages and disadvantages. A balance between these two approaches is necessary. The objective of this paper is to present the application of a strategic policy model for ICST that bridges the gap between "top-down" and "bottom-up" approaches. An example is given with the evaluation of four ICST proposals in Thailand. A strategic policy model was developed in which the characteristics of international collaboration projects in S&T and expert judgments are quantified to determine the relative importance of Thailand's national S&T vision and objectives and NSTDA's (National Science and Technology Development Agency) target sectors, and to evaluate the proposals accordingly. Four evaluation criteria are proposed in this paper: strategic importance (SI), potential impact (PI), human resource development (HRD), and matching fund from international partners (MF). Each proposal is evaluated with respect to each criterion and related sub-criteria. The value of each ICST proposal is then calculated by incorporating all of the elements at each level of the model. The output of this model is the ranking of the ICST proposals coming from the "bottom-up" approach that satisfy the national priorities and organizational requirements represented by the "top-down" approach. The model facilitates the national policymakers to make better decisions about participating in ICST research, and the researchers can have a better understanding of the entire international scientific collaboration system by identifying research opportunities to fit in.

WE-07.3 [R] An Analysis of Infrastructure Innovation in Corporate Collaboration

H.M. Belal; JAIST, Japan

Kunio Shirahada; JAIST, Japan

Michitaka Kosaka; JAIST, Japan

In a service economy, companies need to provide their customers with both goods and services that create value for customers and make sure of corporate success. A promising approach to creating customer value is innovation of infrastructure, i.e., make constructive changes to the business platform. One way to achieve infrastructure innovation is through collaboration with companies in different industries, which leads to improvements in the organizational knowledge creation process. However, there have been few studies on corporate collaboration in terms of infrastructure changes. There is a need to identify the mechanism of infrastructure change and its relationship with innovation. This study aims to create a model based on the analyzing of infrastructure innovation, which make continuous connection with users by providing fun and opportunity for satisfying self-determination. To achieve this goal, we conduct two case studies about successful corporate collaborations: Nike-Apple and Nissan-Renault Company. Our model will contribute to create business strategies for cultivating a new market.

WE-08 Science and Technology Policy - 3

Wednesday, 7/31/2013, 16:00 - 17:30

Room: San Carlos

Chair(s) William T Flannery; University of Texas at San Antonio

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WE-08.1 [R] The Challenges Facing Science Communication in China under the Current Situation

Xiaojun Xie; *China Research Inst. for Science Popularization, China*
Junping Li; *China Research Inst. for Science Popularization, China*

Science communication is regarded as a life-long education for all its citizens, whose aim is to enhance scientific literacy, to promote people's understanding of science, as well as to achieve the harmonious development among human-beings, society and nature. China has always been including science communication work into its national development of strategic significance. Based on the author's research in this regard over a long period of time, the paper summarizes and analyzes science communication in China. Science communication in today's China is facing a new situation and tasks in the following context: 1) The social harmony and development in China calls for much stronger requirements in the field of science communication, 2) the national innovative development calls for much stronger requirements in this regard, and 3) the new traits of the times such as the rapid development of new emerging media calls for much stronger requirements in this respect. Currently, a series of problems are still existing in the communication contents, communication channels, and supporting system in the field of science communication; this has severely restricted the continued improvement of science communication capabilities, and as a result, we are not quite able to cope with the challenges in the new situation; worse still, people's utilitarian demand in this regard has seriously impeded the development of science communication in China and simultaneously prevented us from the effective construction of social culture to such a highly expected level. Therefore, from that sense, the thesis is to put forward three proposals: 1) to innovate or reshape science communication philosophy, 2) to fully seize the opportunities brought about by the media revolution, and 3) to include science communication into the national culture development strategy.

WE-08.2 [A] Insigma's Blue Print of Chinese Smart City with Cisco

Zengjun Zhou; *Zhejiang University, China*
Jin Chen; *Zhejiang University, China*

In recent years, the Smart City business has attracted significant attention and become one of the heated market opportunities in China with enormous provinces implementing relevant business and policy. As one of the excellent IT service providers, Insigma, though witnessed by its profound progress in past 10 years, has been stuck with new potential business generators. On the other hand, Cisco has encountered strong competition by its major competitors like Huawei, IBM, etc. in the Chinese market, which triggers its strategy transmission from traditional router business to some promising aspects. Under this circumstance, Cisco and Insigma are exploring a prospective cooperation in Smart Connected Community (S+CC) business for Chinese market, given that Cisco has a well-established global footprint for S+CC offerings and solutions, while Insigma is an elite S+CC Solution Provider in China. The two companies both consider taking comparative advantage of each other in order to strengthen the respective market place. This article offers a case analysis that comprehensively describes Insigma's Smart City business strategy with its cooperator Cisco, especially focusing on the joint venture they have established by integrating quality resources of two companies in the hope of enlightening relative IT service business transformation in the near future.

WE-08.3 [R] The Importance of Basic Research for Chinese Industry to Build Core Technology Innovation Capability

Yubing He; *Fuzhou University, China*
An-bing Deng; *Fuzhou University, China*

The core strategy for Chinese industries constructing global leadership is to improve the international competitiveness based on core technological innovation. One of the main problems in Chinese indigenous innovation process is the relative low proportion of basic research in R&D resources input, compared with the rapid growth of the total economy amount and R&D investment. There is an obvious phenomenon that most resources of R&D have been invested in test and development and not in applied research or basic research. The paper gives a detailed analysis of the problem about the rule of resources

investment for basic research to promote industrial technology innovation in China through the statistics of history data, focusing on the resources investment in basic research and its structural changes in China. Then the paper discusses the main problem in Chinese resources investment for basic research, namely three structural imbalances, is the relatively low investment as well as the irrational resources allocation structure, especially the low level of enterprises to participate in basic research. In the conclusion, the paper suggests that the lack of industry-driven basic research could not help Chinese basic research construct a close connection with industrial technology innovation, which is making it difficult for Chinese companies to build industry leadership based on a strong knowledge base.

WE-09 Environmental Issues - 1

Wednesday, 7/31/2013, 16:00 - 17:30

Room: Willow Glen I

Chair(s) Mavis Tsai; Shih Hsin University

WE-09.1 [A] After Use Management of Mobile Phones: An Analysis of the Existing Take Back Initiatives in Rio Claro - Sp, Brazil

Mauro S Ruiz; *Nove de Julho University - Uninove, Brazil*
Maira R Ruiz; *Colegio Koelle de Rio Claro - SP, Brazil*
Luana I Rubini Ruiz; *Politechnical School of Sao Paulo State, Brazil*
Claudia T Kniess; *Nove de Julho University - Uninove, Brazil*
Pedro L Cortes; *Nove de Julho University - Uninove, Brazil*

Management of e-waste has been an issue of growing concern in the last decade. The EEC approved the RoHS directive setting up limits for hazardous substances (heavy metals and brominated flame retardants) used in the manufacturing of electrical and electronic devices exported to European countries. In Brazil this issue is regulated by the National Policy on Solid Waste that demands that e-waste encompassing hazardous substances are required to be returned to the manufacturer for further remanufacturing or recycling. This paper is aimed to analyze all the existing initiatives for mobile phone take back in Rio Claro city, Brazil, from the standpoint of their organization and efficiency in furthering these devices to remanufacturing and recycling industrial plants. Interviews were carried out with managers of three public ecopoints, four mobile phone stores (Vivo, Oi, Clar, Tim), the local Planning and Development Agency (Sepladema), one department store (C&A), one mobile phone servicing company (Gouveia and Gouveia), and a logistic company (GM&C) that transports and distributes the collected handsets and accessories to companies that perform remanufacture (Suzaquim) and recycling (Umicore, Belmont). The Brazilian Association of Electrical and Electronic Industry (ABINEE) that presently is starting an e-waste take back program in several states were also interviewed. As a result of this study, a bill on management of e-waste was submitted to the Board of Alderman, and an environmental education program is presently underway in public and private schools.

WE-09.2 [A] Reconfiguration of Industrial Structure to Reduce GHG Using an Input-Output Model

Xue Fu; *Shanghai Normal University, China*
Klaus Hubacek; *University of Maryland, United States*
Kuishuang Feng; *University of Maryland, United States*
Bo Meng; *IDE-JETRO, Japan*

China promises to decrease carbon intensity by 2020 to 40% -45% of the level in 2005. This research proposes industry structural adjustments for industrial sectors from the perspective of reducing carbon emission. To achieve this goal, first, an energy-carbon-economy input-output (ECEIO) table is designed; second, an optimal input-output model is established, considering international trade, carbon emissions by industry and output by industry to address industry adjustments for reducing carbon emission; third, this model is applied to China's ECEIO table. Results show that: (1) it is necessary to decrease the share of output of energy sectors (i.e., production of thermal power, heat, and gas) and heavy industry with high carbon intensity (i.e., smelting and pressing of ferrous metals and non-ferrous metals) by over 1%, and to increase the share of output of high-tech industries (i.e.,

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manufacture of communication equipment, computers and other electronic equipment by 0.41%) and services (i.e., real estate finance and other services by 1.07%) with low carbon intensity; (2) sector adjustment is sensitive to the energy mix, the speed of economic growth and the tightness of carbon constraints; and (3) assuming that the ratio of renewable energy increases, the increased range of industry adjustment will rise with the reduction of carbon emissions and decline in the speed of economic growth.

WE-09.3 [R] Research on the Green Niche of Manufacture Cluster in China

Yang Zhirong; Fuzhou University, China

Liu Huile; Fuzhou University, China

This passage makes a systematic research on green innovation activities of manufacturing cluster in China by using the concept of green niche. In a dynamic view, this passage begins with researching the multiple participants' behavior and relationships among the government, enterprise, and consumer. The author will simulate the mutual relations among them by using multiple-agent technique and establishing related valuation indexes which can be used to evaluate the development of the green innovation activities in the manufacturing cluster, and suggestions for improvement will be provided.

WE-10 Management of Technical Workforce - 1

Wednesday, 7/31/2013, 16:00 - 17:30

Room: Willow Glen II

Chair(s) Jeffrey Busch; Jeffrey S. Busch PMP

WE-10.1 [A] Directed Interaction Networks and Their Impact on Social Media

Nitin Mayande; Portland State University, United States

Charles M Weber; Portland State University, United States

This paper discusses how gossip propagates through modern social media. We simulate 80 random directed interaction networks to address three questions: 1) Does information propagation and consumption impact network structure? 2) Does network structure impact information propagation and consumption? 3) How do information propagation, information consumption and network structure affect the ability to synchronize innovation? We find that network structure and synchronization of innovation are distinct phenomena. Information flow influences network structure, and conversely. Thus, both virtuous and vicious cycles of innovation are possible. Furthermore, the ability to synchronize innovation goes up with network density, but the efficiency of the network decreases once the number of shortest paths decreases. These findings are of particular importance to marketing experts who want to propagate their messages through modern social media.

WE-10.2 [R] Creativity 2.0, Student Style

Mario Dubois; Ecole de Technologie Supérieure de Montreal, Canada

Mickael Gardoni; Ecole de Technologie Supérieure de Montreal, Canada

According to a survey made by IBM in 2010, more than 1,500 CEOs from 60 countries and 33 industries worldwide identify "creativity" as the most important leadership competency for the successful enterprise of the future. The fact that this survey was done after the last economic downturn indicates an important shift in attitude. Today's students are the future leaders of tomorrow. During their learning in school, they develop several leadership competencies including creativity. This study examines how students create in teamwork to find solutions to today's and tomorrow's problems. Since 2007, a creative contest named "The 24 hours of innovation" gathered around 3,500 students from 70 schools and universities of 40 countries. They were asked to find a creative solution in 24 hours to different technological problems submitted. We have analyzed the creative process of around 1,500 participants during those contests held from 2007 until now. In 2012, we invited high school students to participate. Results show some similar processes used to create for the university students but different creative patterns developed by high school students. Those different approaches could be the "creativity 2.0, student style" that could emerge from our future industry leaders.

WE-10.3 [R] Why Do Many Firms Still Miss the Competitive Advantage of Virtual Teams?

Philippe L Davidson; University of Nice-Sophia Antipolis, France

Organizations that embrace a virtual team organizational model involving distributed remote teamwork may develop an effective competitive advantage. Technologies allowing virtual team members to seamlessly work together are widely available, and the operational issues related to their proper management have been extensively studied. However, there are still many organizations that fail to exploit this model or to capitalize on it fully. The goal of this study is to identify the critical factors holding them back. The hypothesis was that getting co-located team members to collaborate with their remote colleagues in earnest required them first to understand the strategic significance of the model for the organization and then to sign on to developing it as a core competency. Also, distributed remote teamwork may address issues related to organizational changes. The research methodology involved the comparative analysis of two organizations, one in which the model was widely adopted, the other in which it was not; the researcher spent over two years embedded in each organization in similar roles. The study showed that, in the successful case, the model was ingrained into the organization's "genes," while, in the other case, it was simply viewed as a tactical technical enabler. Recommendations on how to train teams to overcome these obstacles are proposed.

WE-11 TUTORIAL: You're Entering the Analytics Zone...

Wednesday, 7/31/2013, 16:00 - 17:30

Room: Willow Glen III

Speaker(s) Tim O'Bryan; IBM

In this session, you will see an interactive demonstration of business and entertainment related applications developed in the personal analytics solution, IBM Cognos Insight. IBM Cognos Insight delivers outstanding data interactivity, analysis and visualization capabilities to individual desktop users. You will see how IBM Cognos Insight allows users to import, merge and analyze data on your desktop, build custom dashboards and applications without scripting, optimize outcomes through what-if analysis any time, create compelling visualizations to help you deliver insights in the most meaningful and understandable way for your role or organization, and support collaboration and action at the team or enterprise level.

HA-00 PLENARY: Plenary - 5

Thursday, 8/1/2013, 08:30 - 10:00

Room: Salon III-IV

Chair(s) Jin Chen; Tsinghua University

HA-00.1 [K] Students for a Smarter Planet

James C Spohrer; IBM University Programs World Wide, United States

The best way to predict the future is to inspire the next generation of students to build it better. The management of engineering and technology (MET) is a field that helps prepare student to build a smarter planet. Closely related to MET, IBM is encouraging the development of new tightly interconnected fields such as service science, data science, and urban science. The common characteristic of all these emerging fields is their boundary spanning nature. This talk will review the IBM Smarter Planet strategy, the rise of these new boundary spanning fields, and the transformation of education towards a challenge-based curriculum in which student teams guided by faculty from multiple disciplines, working with industry and government, are re-defining professional development in the 21st Century, and giving rise to more T-shaped service innovation professionals who understand the benefits of complex service system platforms for scaling the benefits of new knowledge globally and rapidly. In addition, this talk will describe 11 innovation trends that will transform all major industries and the planet over the next two decades.

HA-00.2 [K] Managing Immersive Technology: A Shared Responsibility

Francoise D Roure; French High Council for Economy, Industry, Energy, France

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Immersive Technology (Im-Tech) may be defined as a set of technologies and systems creating a persistent, individual and shared, 4D perception of reality in cyberspace, whose main added-value is to produce radical, potentially unlimited innovation. Im-Tech gives access to powerful tools for design with applications along the value chains from the conception to the end of the product life cycle. Already used in the car and aircraft industries as well as in the energy sector, Im-Tech also paves the way for "safer by design" products and systems, with the possibility to include, at a very early stage, the societal issues brought in by consumers and citizens. This powerful tool may also be subject to misuse and create actual societal concerns. Societal engineering enhanced by immersive technology may deliver low hanging fruits like shaping the energy demand in areas where smart grids are implemented; but misuses of Im-Tech, by error or by will, must be avoided to ensure their ability to keep aligned with stakeholders' trust. This is where the shared responsibility appears. The presentation will provide options for managing immersive technology and its induced innovations in a shared, responsible way.

HB-01 Strategic Management of Technology - 1

Thursday, 8/1/2013, 10:30 - 12:00

Room: Salon I

Chair(s) James K Chen; Asia University

HB-01.1 [R] The Patent Information, Strategic Patent Deployment Thinking, and Technology Strategies of Small and Medium-Sized Enterprises

Shu-Jung Chen; National Yunlin Univ. of Science and Technology, Taiwan

Fang-Pei Su; Shu-Te University, Taiwan

Kuei-Kuei Lai; National Yunlin Univ. of Science and Technology, Taiwan

Ming-Tsung Yang; National Yunlin Univ. of Science and Technology, Taiwan

Ping-Chun Chang; National Yunlin Univ. of Science and Technology, Taiwan

How to assist technology-based small- and medium-sized enterprises (SMEs) in establishing a deployment strategy for patents with future development potential that can respond to an environment with frequent patent lawsuits using patent information and strategic patent deployment thinking (SPDT) is an important topic of research. In this study, we developed a SPDT logic model from a theoretical perspective and conducted a case study of an SME, Company H, to implement and assess the logic model. We also examined the United States Patent and Trademark Office (USPTO)'s patent database and patent data relevant to the technology field of the case company, focusing on its technology expertise and future development needs. Patent co-citation analysis (PCA) and cluster analysis were conducted to establish 11 technological clusters. These clusters provided important sources of technological information to Company H for performing SPDT. Finally, we present three R&D strategy proposals and six patent deployment models based on the resources of Company H to provide the company decision makers with a reference for establishing technology R&D strategies.

HB-01.2 [R] On Emergency Management: Tools Used for Analyzing Findings of a Delphi Study

Kimmo Laakso; Ahma Engineers Ltd. and University of Turku, Finland

Ira Ahokas; University of Turku, Finland

Emergency managers need to make decisions, often with important consequences, under stress and time pressure. When dealing with disasters, identifying hazards, analyzing risks, developing mitigation and response plans, maintaining situational awareness, and supporting response and recovery are complex responsibilities. To implement adequate mitigation measures, emergency managers must make sense of the situation, although information may be lacking, uncertain or conflicting. In order to take effective actions in a disaster, actors are expected to work smoothly together, thus the flow of information is crucial. In this paper we describe a Delphi study on the topic and present two tools used for analyzing the findings of the study. We also discuss computer-assisted qualitative data analysis and the findings of the study, focusing on the better flow of information and interoperability of information systems and organizations.

HB-01.3 [R] Positional Structure Analysis of Information Technology Industry in Taiwan

Calvin S Weng; Takming University of Science and Technology, Taiwan

Wen-Goang Yang; Chaoyang University of Technology, Taiwan

Fang-Pei Su; Shu-Te University, Taiwan

Kuei-Kuei Lai; National Yunlin University of Science and Tech., Taiwan

The purpose of this research was to examine the interactions between the focal firm and its technological alliance, and to inquire into the technological alliance network in shaping the firm position from innovative dynamics environment. 2-mode network analysis was employed to explore the question of how technological position emerged from alliance interact. Specifically, we looked at the network structure of the sample by examining the interactions of technological alliance. Our empirical data was from the "Strategic Alliance Database" established by the National Science Council (NSC) in Taiwan. We identified technological position of firms from the 2-mode network analysis and to resolve the highlighted question. Some results that we found were as following: 1) The alliance network of IT technology approximated an ideal core/periphery structure. 2) The network structure apparently demonstrated that a focal firm with higher centrality has better opportunity to locate in the central position of focal firms or in the core position in the technological network.

HB-02 TM in Health - 3

Thursday, 8/1/2013, 10:30 - 12:00

Room: Salon II

Chair(s) Masanori Akiyama; The University of Tokyo

HB-02.1 [R] Measuring Method of Energy Requirement for Home Health Care

Yuki Sasaki; The University of Tokyo, Japan

Masanori Akiyama; The University of Tokyo, Japan

In advanced nations including Japan, health care has shifted to home health care due to the aging of the population and tight medical finances, and providing home care for the elderly in the terminal phase is becoming increasingly important. However, there is presently no standard for optimal energy intake in terminal-phase patients. Herein, we investigated energy intakes for terminal-phase elderly patients receiving home care and examined management methods.

HB-02.2 [R] The Successful Implementation of an Enterprise Content Management System within the South African Healthcare Services Sector

Richard V Weeks; University of Pretoria, South Africa

The research study was directed at determining the factors that contributed to the successful implementation of an enterprise content management (ECM) system at the Khayelitsha Hospital in the Western Cape, South Africa. Electronic medical record (EMR) systems form a very vital component of any national healthcare information technology infrastructure. The successful implementation of an ECM system at the Khayelitsha Hospital in the Western Cape therefore assumes definite relevance, as it would appear from the literature that the successful implementation, management, and utilization of EMR systems are extremely difficult to achieve in practice. A multidisciplinary literature study and analysis was undertaken to gain an understanding of EMR systems and their deployment. An empirical study was then undertaken to learn from the practical, successful implementation, utilization and management of such a system at the Khayelitsha Hospital. The empirical study constituted a narrative enquiry to learn from the first-hand experiences of the relevant people involved. As such the research study was therefore essentially qualitative and analytically descriptive in nature. An important finding of the research study was that the ability to integrate a traditional healthcare culture of paper-based clinical records with an electronic medical record access system was one of the key determinants that gave rise to the successful deployment of the ECM system.

HB-02.3 [R] Stakeholder Engagement in Early Stage Product-Service System Development for Healthcare Informatics

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Man Hang Yip; University of Cambridge, United Kingdom
Robert Phaal; University of Cambridge, United Kingdom
David Probert; University of Cambridge, United Kingdom

This paper presents the findings from four case studies on stakeholder engagement in new health information and communication technology (ICT) product-service system (PSS) development. The degree of connectivity between the new health ICT PSS and its intended operating environment has emerged to be an important contextual factor that may impact the decision of stakeholder engagement in the early stage development process. Along with the proposition of a four-level framework to guide stakeholder identification for new PSS development, three stakeholder engagement propositions that are based on the degree of connectivity are developed. Analysis has shown that there can be two types of connectivity: data and process. Moreover, each connectivity type can be characterized by how much the new PSS is connected with its environment: independent if there is no linkage, linked if it interfaces with, or incorporated if it is embedded into. Furthermore, depending upon whether and to what extent the PSS has data and process connectivity with its intended operating environment, the stakeholder engagement needs in early stage development vary. The propositions presented in this paper provide important directions for future work exploring PSS characterization and stakeholder engagement decision in early stage new PSS development in the healthcare industry.

HB-03 Innovation Management - 9

Thursday, 8/1/2013, 10:30 - 12:00

Room: Salon III

Chair(s) Yuriko Sawatani; Waseda University

HB-03.1 [R] Flexible Strategic Framework for Managing Innovation and Technology from Perspective of Continuity and Change: A Study of Auto Ancillary SMEs in India

Vijay K Gupta; IMT Ghaziabad, India
Bindu Gupta; IMT Ghaziabad, India

This research study identifies the underlying forces influencing innovation and technology management in Indian manufacturing SMEs with focus on auto ancillary sector. The study further investigates the sources of innovation and their impact on business performance. The aim of the research is to come out with a flexible strategic framework for managing innovation and technology in SMEs from a perspective of continuity and change. The data on which this study is based were generated through secondary research using published sources and primary research. The study was done through focused discussion with industry experts, personal interviews with over 80 entrepreneurs from SMEs selected using a structured questionnaire. The study brings out that more innovating SMEs show higher performance levels as compared to less innovating companies. More innovating SMEs are significantly different from less innovating firms from the perspective of underlying change forces. This research paper represents one of the few efforts to study innovation and technology management in SMEs and comes out with a flexible strategic framework for managing forces of continuity and change for guiding this sector for its long-term survival and growth. The flexible framework suggested and the C-C Matrix can be of interest to researchers and practicing managers to validate the applicability for other sectors. The framework suggested can be adapted for application in the global context.

HB-03.2 [R] Crossing the Barrier of Service Innovation in Hotel Industry: An Integrating Process View

Yen Yu Huang; National Tsing Hua University, Taiwan

Even though innovations are desirable, the customers and organization may resist them. This paper explores how the firm crosses the barrier of service innovation and discusses the organizational management issue. This study uses the hotel industry as an empirical setting and takes the service-oriented approach. From the case study, it finds out that the radical and incremental innovation is integrated. While radical innovation can be viewed as a market driving idea which comes from the leader's vision of market opportunity, the in-

cremental innovation from the service team is a sufficient material. The integrating process is supported by the entrepreneurial management which includes both control system and inducement system. Control system is a well-developed innovation process. However, considering service is a combination of processes, people skills, and materials, the inducement system of service entrepreneurship is important. It makes the firm overstep the service standard operation procedure (SOP) and pursue sustainability.

HB-03.3 [R] How to Measure Technological Distance in Collaborations?: The Case of Electric Mobility

Nicole vom Stein; University of Muenster, Germany
Nathalie Sick; University of Muenster, Germany
Jens Leker; University of Muenster, Germany

Innovation collaborations experienced a substantial growth during the last decades, so that the research interest in factors contributing to successful collaboration increased. An appropriate technological distance, which determines the probability of receiving new knowledge from a partner as well as the ability of absorbing it, appears to be one of the success factors. The methodology for measuring this distance received massive attention in the latest literature. Therefore, we compare well-established measuring methods with the recently introduced method of the min-complement distance. We focus on selected electric mobility collaborations between the chemical and automobile industry as they represent an emerging research field that aims to overcome deficiencies associated with battery development for electric mobility. Considering findings for intra-industry collaborations that show diminishing effects on innovation outcomes after exceeding a certain technological distance leads to questions concerning the success of such cross-industry collaborations. We show that the methodology used influences the approximation of technological distance in the examined collaborations. The use of the min-complement distance seems to be reasonable. Therefore, our work contributes to a better understanding of measuring technological distance from a methodological point of view as well as to its meaning for cross-industry collaborations.

HB-04 TM in Education - 1

Thursday, 8/1/2013, 10:30 - 12:00

Room: Salon IV

Chair(s) Hiroshi Suzuki; Japan University of Economics

HB-04.1 [R] When Digital Native Meets Analogue Reality: A Case Study of ICT Skills in First Year University Students

Matthew Gray; Queensland University of Technology, Australia

Recently, claims have been made that all universities will in coming decades merge to become just a few mega-institutions offering online degrees to the world. This assumes a degree of literacy with ICT (information and communication technology) amongst potential students, who are often regarded as "digital natives." Far from being digital natives, many students have considerable trouble using ICT beyond the ubiquitous Facebook. While some students are computer literate, a substantial proportion lack the skills to prosper under their own devices in an online tertiary education environment. For these students a blended learning experience is needed to develop skills to effectively interact in the virtual environment. This paper presents a case study that specifically examines the ICT capabilities of first-year university students enrolled in the School of Civil Engineering and the Built Environment at Queensland University of Technology (QUT) through the lens of the theory of planned behavior. Empirical data are presented and curriculum strategies articulated to develop ICT skills in university undergraduates.

HB-04.2 [R] The Maturity of Information Technology Competencies: A Professional Accountants' Perspective

Ku Maisurah Ku Bahador; University of South Australia (UNISA), Australia
Abrar Haider; University of South Australia (UNISA), Australia

An increase in the pace of technological change has revolutionized the way accountants

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perform their jobs. This paper presents the results of a study which analyzes the maturity level of IT competencies among professional accountants in Malaysian accounting organizations. These IT competencies were examined under four major dimensions: technical skills, organizational skills, people skills and conceptual skills. In doing so, this study employs a qualitative interpretive research methodology with exploratory case study method. It uses diverse data collection strategies and relies on triangulation of evidence to resolve the research questions in this study. This study, thus, makes a significant contribution to academic and professional bodies and provides a theoretical base for developing IT-related competencies for knowledge workers in general and professional accountants in particular.

HB-04.3 [R] Reinforcing Science Education Using Virtual Museums in China

Zhaohui Li; *China Research Inst. for Science Popularization, China*

In the information era, the requirements of personal ability, especially scientific literacy, in dealing with their social life will be higher than ever before. People will be required to learn more knowledge and skills about science and technology. A convenient and easy model of science education will be more and more important to the citizens. But in the developing countries, physical facilities of science education accessible to people are in disadvantageous condition. With the rapid development of internet technology (IT), services based on IT will be more and more in use, such as virtual museums (including virtual science and technology museums, virtual nature museums, and so on). Virtual museums could be developed as a feasible way for science education in developing countries. In China, people who are measured as having basic scientific literacy accounts for only 3.27% of the respondents, according to the eighth civic scientific literacy survey in 2010. The rate is far below that of the developed countries such as the USA, and some others. In order to improve people's scientific literacy at large and help producing leapfrog, virtual museums will be an additional channel alongside with more input in formal education of science in class. According to the 31th Statistics of Internet Development, up to December, 2012, China has 564 million net citizens, 420 million mobile net citizens, and 156 million of them living in rural areas; dozens of virtual museums and digital museums are operating in the country. Since 2000 the Chinese government has supported the construction of many e-infrastructure facilities, which laid the base for further development and stipulated the motivation and demands for using virtual museums to facilitate science education. If the virtual museums for science education are wisely used and effective, people's scientific rationality, consciousness and literacy may be improved by a big margin.

HB-05 Entre/Intrapreneurship - 1

Thursday, 8/1/2013, 10:30 - 12:00

Room: Salon V

Chair(s) W. Austin Spivey; University of Texas at San Antonio

HB-05.1 [R] Dystechnia: A Model of Technology Deficiency and Implications for Entrepreneurial Opportunity

McDonald R Stewart; *George Washington University, United States*

Elias G Carayannis; *George Washington University, United States*

Disconnects among system components preempt technology adoption by the diminution or absence of potential user's perceptions—a state of second-order ignorance (ignorance of ignorance). The condition of flawed or failed efficacy in the use, deployment, or logistics of technology we term dystechnia. Dystechnia is ubiquitous, and its origin in second-order ignorance implies entrepreneurial opportunity. Entrepreneurship is the recognition and exploitation of economic potential by shifting the established means of economic creation and control, strategically reappointing economic resources from established pathways to innovative pathways. The technology acceptance model (TAM) is a theoretical construct of the relationship between the perceptions of potential users and the behavioral intentions leading to actual technology adoption and acceptance. The lens of TAM presumes an existing, workable technology or technological system, the perceived usefulness and perceived ease of use of which determine the intention to use, which in turn mediates actual adoption. It is the inception of entrepreneurial solutions as alternatives to the dystechnic

status quo upon which TAM operates. A technology must be ventured before usefulness and ease of use can be perceived. This paper examines the phenomenon of dystechnia, the entrepreneurial action that predicates TAM, and entrepreneurial mechanisms whereby dystechnia is remedied.

HB-05.2 [R] Obsessed Maniacs and Clairvoyant Oracles: Empirically Validated Patterns of Entrepreneurial Behavior

Elias G Carayannis; *George Washington University, United States*

McDonald R Stewart; *George Washington University, United States*

Diverse and complex challenges in new venture formation demand rare and exceptional entrepreneurial acumen, particularly in technology-driven environments where disrupted markets amplify the factors and magnitude of uncertainty and risk. The successful Technology Entrepreneur [term of art for enactors of SKARSE™ (Strategic Knowledge Arbitrage and Serendipity)] is focused yet flexible, demonstrating relentless intensity of purpose while adapting that purpose under changing conditions. The distinguished entrepreneur accurately predicts events and conditions in advance for superior strategic positioning. We find that two terse descriptors—obsessed maniacs and clairvoyant oracles—encapsulate critical attributes conducive to superlative entrepreneurial posture, propensity and performance to anticipate and recognize challenges and convert them into opportunities. In so doing, the entrepreneurs leverage strategic knowledge serendipity factors and practice strategic knowledge arbitrage competences. To investigate our premise, we conduct comprehensive surveys and interviews with 33 founding entrepreneurs, comparatively analyzing their experiences against complementary data sources to develop personal profiles of critical attributes and behavioral characteristics. Employing qualitative analytic techniques, we find the data rich in empirical evidence to support a perspective of entrepreneur as obsessed maniac and clairvoyant oracle, plus many other intrinsic characteristics of personality, motivation, intention, and action that constitute the entrepreneurial actor.

HB-05.3 [R] Integrated Utilization of Production System Models for Scenario-Based Environmental Assessment of Energy Technology Promotion Strategies: A Case in Electric Vehicles in Taiwan

Yasuhiro Fukushima; *National Cheng Kung University, Taiwan*

Ning-Yi Wu; *National Cheng Kung University, Taiwan*

Pi-Shan Chuang; *National Cheng Kung University, Taiwan*

Wu-Chi Chiu; *Institute of Nuclear Energy Research, Taiwan*

Fu-Kuang Ko; *Institute of Nuclear Energy Research, Taiwan*

In this paper, a prototype of scenario-based environmental assessment framework of energy-related technology roadmaps is demonstrated using a case study with particular focus on introduction of electric vehicles (EV). Taiwan plans to promote EV-related industries, setting a quantitative target for introduction to its domestic market. Replacement of vehicles powered by internal combustion engines by EVs will increase electricity demand, which is closely coupled with emission of greenhouse gases and other pollutants. On the other hand, it can contribute positively in removing mobile source of pollutants as well as in load balancing of the power grid. Concurrently, introduction of EV reduces gasoline demand, which requires a shift in the operation of the petrochemical industry. The power mix optimization model, a consequential model for the petrochemical industry, and scenario models for vehicles' use and replacement are used in an integrated manner to comprehensively assess the above-mentioned contributions together with other major factors such as nuclear reactor operation, and promotion of renewable energy and other energy saving technologies. Findings from conducting this case study are summarized for the further development of this framework that aims at providing a common platform for evaluating roadmaps for an integrated picture to discuss their effectiveness in being aware of interactions among the technologies.

HB-07 Collaborations for Technology Management - 2

Thursday, 8/1/2013, 10:30 - 12:00

Room: Guadalupe

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Chair(s) Herindrainy Olivier Rakotomalala; University of Antananarivo

HB-07.1 [R] Interfirm Alliances Networks in Nanotechnology: The Roles of Network Position and Technological Uncertainty

Chun-Hsien Wang; National Chiayi University, Taiwan
Chih-Cheng Lo; National Changhua University of Education, Taiwan
Huei-Mei Liang; National Sun Yat-sen University, Taiwan
Pei-Yu Chien; National Sun Yat-sen University, Taiwan
Hung-Ming Chen; National Chiayi University, Taiwan
Shu-Yueh Lo; National Chiayi University, Taiwan

The emerging nanotechnology has attracted much attention with respect to its potential economic growth. Interdisciplinary collaboration is a key mechanism for accessing different domains' technology and knowledge for developing nanotechnology commercialization opportunities. The need for effective inter-firm collaboration is of particular importance in emerging nanotechnology domains. Thus, the present study explores interfirm alliance networking behavior in nanotechnology firms to determine fully what types of factors drive interfirm nanotechnology alliance activities. In this study we proposed theoretical frameworks to fill the gap in knowledge regarding emerging nanotechnology alliance behavior and to explore the alliance decisions driving inter-firm alliances that are grounded in deeper nanotechnology of interfirm alliances. The primary focus of nanotechnology alliance for nanotechnology-based firms confirms that interfirm alliances in nanotechnology are influenced directly by inter-firm R&D ties and by joint interactions among inter-firm R&D ties, network positions, and technological uncertainty. Specifically, we propose that a nanotechnology-based firm is highly likely to engage in alliances regarding decision-making activity. Using an original dataset of nanotechnology-based firms in the emerging nanotechnology alliance activity, we found that the joint effect of a position of high network centrality and a high level of technological uncertainty weaken inter-firm nanotechnology alliances.

HB-07.2 [A] Improve Brainstorming Via the Cloud

Alan Hyman; Polytechnic Institute of New York University, United States
Joseph Nadan; Polytechnic Institute of New York University, United States

We describe a new method of using multi-sensory electronic brainstorming to encourage and enable experts to participate in brainstorming with assured attribution of their contributions. This was alpha tested using a customized cloud-based brainstorming tool implemented in Google Hangouts to support synchronous sessions of the I.D.E.A.S. brainstorming method. Participants were trained in using the system in less than ten minutes. Using real-time document sharing combined with visual and auditory inputs, we demonstrated the viability to capture ideas and then the identification of both the "direct" and "causal" ideas to correct participant. Assignment of attribution was done immediately after the brainstorming session via a group discussion with all of the participants based on the time-stamps of the contributions. A screen capture tool was used to document the experience. Managers may use this technique to evaluate the effect of training on the improvement of the benchmarking ability of their employees. The next step is to integrate the I.D.E.A.S. method more fully into an application so that it may be used for beta testing with more subjects, and then improving the causality determination algorithm and other metrics of the system.

HB-07.3 [A] Bio-Based Plastics Evolution and the Challenges to Achieve Dominance

Mayra F Fernandez; EP - Universidade de Sao Paulo, Brazil
Maria Luisa V Ozkalustyan; FEA - Universidade de Sao Paulo, Brazil
Alceu S Camargo Jr; FEA - Universidade de Sao Paulo, Brazil
Paulo Tromboni; FEA - Universidade de Sao Paulo, Brazil
Abraham Yu; FEA - Universidade de Sao Paulo, Brazil

Oil prices and availability and the investment cycle heavily influence innovation in petrochemical industries. New feedstock is thus strategic to these industries [9]. The concerns on environmentally friendly processes, on another hand, further increase the interest of renewable feedstock in the countries with attractive production costs. R&D on these renew-

able inputs reveals great opportunities in the bio-based plastics market. The objective here is to present the current bio-based plastics development situation and to identify the main factors which affect innovation on these technologies as well as their adoption and diffusion. The analyses are structured through the integrative framework proposed by Suarez [3]. An important dependency on the feedstock availability has been identified as critical, and Brazil seems to have competitive advantages due to its strong knowledge of sugar cane production and ethanol processing. The Brazilian industry has already launched commercial products, but none has emerged so far as a clear front runner in the world market. Following the framework proposed by Suarez, the possible reasons for this barrier are discussed.

HB-09 TUTORIAL: Regions 2.0 - A Living-Lab For Management Engineering and Technology Progress

Thursday, 8/1/2013, 10:30 - 12:00

Room: Willow Glen I

Speaker(s) James C Spohrer; IBM University Programs World Wide

This will be an engaging and interactive tutorial hosted by Jim Spohrer, who will guide you through a series of steps to articulate your expectations or hopes for what industry, students and faculty should be doing to create and maintain an upward spiral of capabilities in regions around the world. You will be organized into groups with representatives from each constituency and taking on a role, and you will compose a manifesto for industry, students or faculty. How might we deploy apprenticeships? There are the old ways of doing things, but then there are new and better, faster, and cheaper ways to be invented. However, what if they are disruptive and displace labor (people from jobs), and therefore people will need to find new jobs and new skills and new productive activities as this goes faster and faster. What kind of system can young people be part of? You will capture your assertions and ideas, and we will publish them on one of our platforms. It is possible that this output could be the basis for a new white paper!

HB-10 Intellectual Property - 4

Thursday, 8/1/2013, 10:30 - 12:00

Room: Willow Glen II

Chair(s) H.M. Belal; JAIST

HB-10.1 [R] A Taxonomy of Utility Model Patents Application Strategy

Chao-Chih Hsueh; National Pingtung Univ. of Science and Tech., Taiwan
Yi-Cheng Luo; National Pingtung Univ. of Science and Tech., Taiwan

The utility model technology with a short life-cycle and easy to copy characteristics grant rights without going through a substantive examination and are promoted for small and medium enterprise (SMEs) by some countries such as Germany, Japan, Korea or China. The purpose of this paper is to understand how people adopted the utility model to protect their innovation by investigating the types of application strategies of 179,349 utility model patents and 16,234 technology evaluation reports during 2004 to 2011 in Taiwan. Two variables make up the construct of patent application strategy. The taxonomy result identifies three categories of patent application strategy—analysis pattern, combination pattern and focus pattern—by using two variables, the ratio of patent and utility model and the ratio of technology evaluation report and utility model, and using three variables—the number of utility patent, the number of utility model patent and the number of technology evaluation report—to validate the naming of cluster. Besides, the results showed that although utility models have lower technical and economic value than patents, they are still applied by many companies, especially for SMEs and personal inventors.

HB-10.2 [R] Uses Unexpired Patent to Re-evaluate Innovation Performance by h-index and h-core Indicators

Chun-Chieh Wang; National Taiwan University, Taiwan
Yung-Ta Li; National Taiwan University, Taiwan
Dar-Zen Chen; National Taiwan University, Taiwan

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Mu-Hsuan Huang; National Taiwan University, Taiwan

The main objective of this study is to assist scholars and practitioners by proposing a practical and replicable approach to extract substantial patent count and patent's cited times without abusing the data to re-evaluate productivity and impact of innovation performance. There have been few quantitative patent indicators concerning the validity of patent; therefore, the study discusses the methodological issues in interpreting h-index and h-core indicators with a normalized weighting score of rate of valid patents and rate of valid patent cited that can be used to weight the innovation performance. Our results show that valid patents have obtained higher rates compared to expired patents in average times of cited by whole patents, times of cited by valid patents and times of cited in 2012. The older valid patents in semiconductor are, the more valuable the patent may be. The impact of older valid patents is reflected on their average of times cited. After adjusting the weighted factors, the study further updates the ranking of the leading companies in semiconductor and reveals that Micron and Semi. Energy Lab have achieved much better performance in innovation productivity and impact as the leading company in innovation. TI, AMD, Samsung, TSMC, Hitachi, Panasonic, Sony, and Seiko Epson are seen as innovation-growing companies; and IBM, Toshiba, Intel, NEC, Mitsubishi, UMC, Fujitsu, Infineon, Renesas, and Hynix Semi can be categorized as innovation-declining companies.

HD-01 Cultural Issues in Technology Management - 1

Thursday, 8/1/2013, 14:00 - 15:30

Room: Salon I

Chair(s) Antonie J Jetter; Portland State University

HD-01.1 [R] Designing for Diversity in Online News Recommenders

Engin Bozdag; Delft University of Technology, Netherlands

Ibo van de Poel; Delft University of Technology, Netherlands

Information diversity has a long tradition in human history. Recently, there have been claims that diversity is diminishing in information available in social networks. On the other hand, some studies suggest that diversity is actually quite high in social networks such as Twitter. However, these studies only focus on the concept of source diversity. Further, personalization algorithms such as online news recommenders, if designed incorrectly, can decrease information diversity. In this paper, we study different dimensions of the value information diversity. Later, using the value sensitive design methodology, we translate this value into norms, which can be used as design requirements.

HD-01.2 [R] Solution Based Business as Virtually Vertical Integration

Mariko Shiromura; Japan University of Economics, Japan

Hiroshi Suzuki; Japan University of Economics, Japan

Economic growth is stalling globally. New business schemes and/or new industrial architectures must be created to resolve this situation; innovation is necessary. Conventional innovation has been created mainly by technologies. Future innovation or new industries, however, will be born through non-technology fields. The authors propose a cultural study approach to create new industrial architectures. Recently almost all Otaku-based anime characters and games are actually combinations of earlier characters and plots, which constitute a database. This kind of sub-culture, postmodern culture, is a world of reference and remixes. Neither grand narratives nor objectives are necessary. What comes from the database, grand non-narrative, is designated as a "simulacre" or secondary creation from originals. The authors applied this "simulacre" model to industrial architecture. More than 30 years ago, industry sought and achieved vertical integration. Large computer companies served all sectors of computer production and merchant such as IC chips, OS, and applications. Modern architecture has become horizontally integrated, where IC chip OEMs provide only chips, and OS suppliers serve the OS business. The postmodern culture suggests that the new industrial architecture is based on a "simulacre" of these conventional sectors. This model is verified to explain recent innovations such as i-Phones and cloud computing businesses.

HD-01.3 [R] Som Da Cidade: A Reflection on the Contribution of User-Centered Design Tools in Projects for the Cultural Industry

Andre L Fleury; Universidade de Sao Paulo, Brazil

Gabriel S Garbulho; Universidade de Sao Paulo, Brazil

The complexity that emerges from the combination of psychological, social and economical considerations involved in the experience of listening and consuming music results in several new products and services that attend to different needs of distinct customer segments. This paper analyzes the relevance of the results obtained with the application of user-centered design tools in a project that aimed to develop innovative technology-based products and services for a cultural industry in a context of similar complexity. The applications of these tools originated the "Som da Cidade" project, a web-based service that combines cultural flows in an urban space with the virtual world to characterize their different points of contact and provides a new experience of musical interaction. Obtained results reveal that the application of user-centered design tools can generate relevant results in contexts where product development phases are not completely understood before the project approaches its end.

HD-02 Decision Making - 5

Thursday, 8/1/2013, 14:00 - 15:30

Room: Salon II

Chair(s) Frederick Betz; Portland State University

HD-02.1 [R] Managerial Decision Making Regarding the Allocation of Project Manager Resources to Projects: The Case of Botswana

Lone Seboni; University of Leeds, United Kingdom

Apollo Tutesigensi; University of Leeds, United Kingdom

Denise A Bower; University of Leeds, United Kingdom

This paper empirically demonstrates the nature of current project manager assignment practices and their impact on important performance variables in the context of Botswana's multi-project settings. The research design is composed of country and company layers. This paper reports on fieldwork 1 of 3 stages, which involved questionnaires and interviews of 53 project managers and 20 project heads from 12 companies in the public and private sector. The results indicate compelling evidence to conclude that the current practices are informal, not objective, not comprehensive and lack a good match between project managers and projects. Significant correlations were found between the following variables: 1) extent of formality and project manager rewards, 2) extent of objectivity and project manager performance, 3) extent of comprehensiveness and project success, 4) correspondence level between project manager and project and the performance variables - project manager rewards, project manager performance and project success. Contributions: 1) empirical justification for problem existence that gives an indication of the state of practice in Botswana, currently unknown, 2) data from a "new" country, industries and project types compared to existing empirical studies on this topic, 3) development of a conceptual model that adds to the theory behind matching project managers to projects in a multi-project setting.

HD-02.2 [R] Developing a Strategic Policy Choice Framework for Technological Innovation: A Case Study on the Biopharmaceutical Industry in China

Leong Chan; Portland State University, United States

Tugrul Daim; Portland State University, United States

Dundar Kocaoglu; Portland State University, United States

In this research, a technology policy choice framework is developed to link prospective high-tech areas, technology development strategies, and various innovative resources. The research approach is to develop a hierarchical decision model. Experts are invited from diverse sources to provide a balanced perspective representing different stakeholders. This research focuses on the fast developing Chinese biopharmaceutical industry as a case study. The results of this research have identified 13 biotech areas, four strategies and eight types of innovation resources to achieve industrial competitiveness in the biophar-

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maceutical industry. The research outcomes serve as guidelines in resource allocation and policy making for technology development.

HD-02.3 [R] Decision Model for Selecting a Sedan Car

Bahareh Saatchi; Portland State University, United States
Larry Pham; Portland State University, United States
Harry Pham; Portland State University, United States
Chun-Fan Pai; Portland State University, United States
Yen Tran; Portland State University, United States

There is a large variety of sedan cars available in the market in the US, and deciding on what sedan car suits a person best is difficult. This paper presents a hierarchical decision model (HDM) to help make that decision. HDM has been chosen for this purpose because it allows the users to easily visualize how decision elements at each level of the decision hierarchy impact the final decision. It also provides information to the manufacturers to determine what characteristics of the car need to be improved. This paper uses the following six selection criteria: fuel economy, overall crash test rating, costs, features, performance, and dependability. Although there are other factors that go into a sedan car, these six are considered the most important criteria for selecting a sedan car. The authors of the paper provided their quantified judgments using pairwise comparisons to demonstrate the model. The use of the HDM with pairwise comparisons resulted in weighted values for each element at each level of the decision hierarchy. The model was applied to the top five best-selling sedans of 2012, and Honda Accord LX 2012 was selected as the best among them.

HD-03 Tracking technological emergence: Nano-Enhanced Drug Delivery

Thursday, 8/1/2013, 14:00 - 15:30

Room: Salon III

Chair(s) Alan L Porter; Search Technology, Inc.

HD-03.1 [R] Analyzing Research Publication Patterns to Gauge Future Innovation Pathways for Nano-Enabled Drug Delivery

Xiao Zhou; Beijing Institute of Technology, China
Alan Porter; Georgia Institute of Technology, United States
Douglas Robinson; teQnode Limited, France
Ying Guo; Beijing Institute of Technology, China

With the global emphasis on the development of nanotechnology ("nano"), nano-enabled drug delivery ("NEDD") systems are rapidly emerging as a key nano application area. NEDD offers promise in addressing pharmaceutical industry challenges concerning solubility, cost reduction, cell and sub-cellular targeting, and patent lifecycle extension. A combination of factors promotes nanoparticle-enhanced and other nano-facilitated drug and gene delivery systems. To get a grip on this vast, varied, and highly promising area of nano application, researchers devised a multi-component search strategy, detailed here, to generate a NEDD dataset from the Web of Science (WOS). They then analyzed these scientific and biomedical research publication records to profile R&D activity, gauge evolving research foci, and forecast NEDD research trends. Such "tech mining" can help to address a wide array of further technology management questions concerning this important biomedical arena. The aim of this research is to build a family of analytical tools to facilitate the forecasting of innovation pathways.

HD-03.2 [R] A Comparative Analysis of China vs. US: Two Important Players in the Nano-Enhanced Drug Delivery (NEDD) Race

Ying Guo; Beijing Institute of Technology, China
Alan L Porter; Georgia Institute of Technology, United States
Xiao Zhou; Beijing Institute of Technology, China
Douglas Robinson; teQnode Limited, France

With the global emphasis on the development of nanotechnology ("nano"), nano-enabled drug delivery ("NEDD") systems are rapidly emerging as a key nano-application area. NEDD

offers promise in addressing pharmaceutical industry challenges concerning solubility, cost-reduction, disease and organ targeting, and patent lifecycle extension. This study compares NEDD research patterns for the US vs. China by profiling data compiled by a multi-component search strategy in the Web of Science. We present a range of analyses to address research activity trends, concentration differences, and collaboration networks corresponding to three characteristics of "new and emerging science and technologies," for which NEDD represents a consequential case. Such "tech mining" can reveal to what extent these two countries have developed competency in this high technology area and help to address a wide array of further technology policy and management questions concerning this important biomedical arena. Our further aim is to build a family of analytical tools to facilitate efforts to forecast innovation pathways.

HD-04 Technology Acquisition - 1

Thursday, 8/1/2013, 14:00 - 15:30

Room: Salon IV

Chair(s) Richard V Weeks; University of Pretoria

HD-04.1 [R] The Impact of Relative Centrality and Technology Diversity on Inter-Firm Technological Alliances

Chun-Hsien Wang; National Chiayi University, Taiwan
Chih-Cheng Lo; National Changhua University of Education, Taiwan
Pei-Yu Chien; National Sun Yat-sen University, Taiwan
Hung-Ming Chen; National Chiayi University, Taiwan
Shu-Yueh Lo; National Chiayi University, Taiwan

This study develops an inter-firm alliance network based on understanding of technological embeddedness and inter-firm technological alliances in the biomedical-based industry. Interfirm alliance technological networks are strategic decisions to help focal biomedical firms access the technology resources that they need. Specifically, we consider exploration learning capability as a primary driving force for the advanced scientific knowledge and technology acquisition and alliance. We demonstrate that the relative centrality position and technology diversity are contingent on interfirm technology alliances. We thus further explore how the moderating roles of relative centrality positions and technology diversity separately and jointly affect inter-firm technology alliances. More importantly, this study examines whether exploration learning in inter-firm collaboration benefits a firm's technology alliances and whether those benefits depend on how such learning fits the firm's relative centrality position and technology diversity. The empirical results show that relative centrality positions and technology diversity are significantly positively and negatively associated with successful inter-firm technology alliances, respectively. The empirical findings show that firms in inter-firm technology alliances not only depend on exploration learning capability but are also contingent upon relative network positions and technology diversity. Our results indicate the need for focal biomedical firms to assess their technological alliances that are based on network positions and technology diversity. We discuss the implications of these findings for research on inter-firm technology alliance.

HD-04.2 [R] Deriving Factors Influencing the Acceptance of Pad Phones by Using the DNP Based UTAUT2 Framework

Chi-Yo Huang; Dept. of I.E., National Taiwan Normal Univ., Taiwan
Yu-Sheng Kao; Dept. of I.E., National Taiwan Normal University, Taiwan
Ming-Jenn Wu; Dept. of I.E., National Taiwan Normal University, Taiwan
Gwo-Hshiung Tzeng; Kainan University, Taiwan

The factors influencing acceptances of novel information technology (IT) devices can serve as the basis for product development strategy definitions. However, it is always not an easy job to predict consumer behaviors versus novel technology in general, and disruptive or radical innovation products in particular. The Pad Phone, a disruptive innovative consumer electronic device integrating both a tablet personal computer (PC) as well as a smart phone, is a typical disruptive innovative device for which consumer behaviors are difficult to predict based on mass customers' opinions. In order to derive key factors influencing users' acceptance of Pad Phones, the second generation Unified Theory of Acceptance and Use of

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Technology (UTAUT2) will be introduced as the theoretic framework. Based on opinions being derived from lead users, the Decision Making Trial and Evaluation Laboratory (DEMATEL) based Network Process (DNP) will be introduced for constructing the influences between the factors in UTAUT2; and then weights being associated with the factors can be derived accordingly. Based on the empirical study results, the social influence plays the dominant role in facilitating conditions. The habit and hedonic motivation are essential factors influencing customers' acceptance of Pad Phones. The empirical study results can serve as a basis for R&D and marketing strategy definitions for IT companies. Moreover, the UTAUT2 based analytic framework can be used for deriving factors influencing users' acceptances of disruptive innovations in the future.

HD-04.3 [R] The Importance of Technology Management in the ICT Requirements Definition Process

Ari Linden; Tampereen Teknillinen Yliopisto, Porin Yksikko, Finland

The research will concentrate on the importance of technology management in the ICT (information and communications technology, especially telephony technology) requirements definition process, focusing on the words (terms and features) occurrence in requirements specifications. The importance of technology management among companies has grown. Technology terms are still very poorly understood and features behind the terms cause confusion and difficult situations for the people concerned. Very technical terms and features are difficult to handle, present, understand, or discuss because the vocabulary is not the common language of the people in the organization. Requirements specifications, if they occur, are offered in formats, with language, terms, and features, which it may take time to really understand the purpose of or to deal effectively with. This lack of knowledge or information may cause major misunderstandings. While there are very complex technical services or products, the importance of features are very significant items to solve and discuss, to avoid the possibility that participants do not understand each other. Technology has grown so complex that we need external consultants and experienced specialists to cooperate with the people from the procurement unit to solve the terms, features, needs, and requirements. Our focus is on researching public procurement units that use very complex technology procurements. The main focus is on the national level, but as we can read from articles and other informative channels, the importance of the whole procurement market is a worldwide issue.

HD-05 Entre/Intrapreneurship - 2

Thursday, 8/1/2013, 14:00 - 15:30

Room: Salon V

Chair(s) Charles M Weber; Portland State University

HD-05.1 [R] Technology Maturity and High Tech Venture Attractiveness: A Model for Emerging Technology Based Economic Development

Jonathan Linton; University of Ottawa, Canada

Steven Walsh; University of New Mexico, United States

Exceptional regional economic development is fueled by the Schumpeterian cycle. Further, Schumpeter's economic growth cycles are initiated by emerging technologies. However, as the name implies, emerging technology-based products are often not fully developed. Moreover, they are often sponsored by small firms seeking to disrupt a current industry standard technology product paradigm. These are the firms that when successful generate economic job and wealth creation in the regions where they reside. These firms need resources to initiate and sustain, but they are typified by lower technology readiness level (TRL) technology product paradigms targeted at ambiguous markets. Such firms are often eschewed by today's funders and other resource providers. Yet, if emerging technologies are the wellspring of new Schumpeterian driven cycles of economic development and the firms that underpin that development cannot be sustained, then there is cause for concern. Here, we investigate if regional economic development efforts have generated any resource support for firms which focus on emerging technology-based commercialization. We do this using the case study method. We seek to understand how different regions are improving the financial entrepreneurial environment. We use secondary data research techniques to

find the activities those regions are performing that assist entrepreneurial and intrapreneurial efforts in their region. We provide a first-ever model for economic development based on emerging technology and technology entrepreneurship. We find to our surprise some pervasive techniques but overall little commonly in the ways regions assist these firms' efforts.

HD-05.2 [A] Fostering Innovation Commercialization at Research Institute and University: Strategy and Policy Implications

Cheng-Mei Tung; Industrial Technology Research Institute, Taiwan

Ta-Yu Tseng; Industrial Technology Research Institute, Taiwan

Wan-Chang Yen; Industrial Technology Research Institute, Taiwan

Global economic development is moving towards a new era with knowledge as its foundation. Enterprises will be able to succeed in the competitive markets only if they can apply the knowledge and technology quickly in the innovation of the industries and the commercialization of products. Research institutions and universities are important sources of innovation and development, and they are also charged with the important mission of providing support for economic development. However, the development of the commercialization of research results and formation of new startup companies have not been as active and market oriented in Taiwan. The purpose of this study is to explore the current status and issues of technology development activities among the industrial, academic and governmental sectors to promote the research results commercialization (or start-ups) in Taiwan. This study evaluates the policy implication of the results commercialization including National Science Council and Small and Medium Business Agency in Taiwan. The results found the commercialization development is not active because of less market oriented in the early-stage of R&D. Besides, the technology is weak correlated with industry development needs. The suggestions of this study are 1) using the industry information map to be the base of technology R&D investment, and 2) enhancing the early stage germination activities to make the R&D project success.

HD-05.3 [A] Collaboration Management by Smart Voice Messaging for Physical and Adaptive Intelligent Services

Naoshi Uchihiro; JAIST, Japan

Sunseong Choe; JAIST, Japan

Kunihiko Hiraishi; JAIST, Japan

Kentaro Torii; Toshiba Corporation, Japan

Tetsuro Chino; Toshiba Corporation, Japan

Yuji Hirabayashi; Shimizu Corporation, Japan

Taro Sugihara; Okayama University, Japan

In light of the ongoing transformation from a traditional industrial society to a post-industrial society as a service society, it is unquestionably required to improve efficiency and quality of services. Especially, we focus on physical and adaptive intelligent services (PAI services) like nursing and caregiving where efficiency and quality are critical for an aging society. In these PAI services, several people have to collaborate to provide services, and a collaboration support system would be necessary. This paper proposes an information supervisory control model for a collaboration support system; furthermore, we have developed a smart voice messaging system based on this model. This model has a hypothesis that appropriate information sharing based on awareness of a client's situation and task processes can be utilized and effective for improving efficiency and quality of services. We then formulate several hypotheses including the above one to be examined through field tests, virtual field tests, and simulation from the perspective of information supervisory control, and show some preliminary experimental results.

HD-07 PANEL: Immigrant Entrepreneurs in Silicon Valley

Thursday, 8/1/2013, 14:00 - 15:30

Room: Guadalupe

Panelist(s) Xiaohong "Iris" Quan; San Jose State University

Anuradha Basu; San Jose State University

Immigrants have played a key role in the growth of entrepreneurship in Silicon Valley, hav-

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ing founded more than half of all Silicon Valley startups between 1995 and 2005. Recent studies indicate two major trends. Firstly, most immigrant entrepreneurs in Silicon Valley have established “global start-ups” (Oviatt and McDougall 1994) or “born globals” (Knight and Cavusgil, 1996) that operate in multiple countries from inception. However, the precise ways in which these operate and the underlying success factors of global start-ups have yet to be fully understood. A second, more recent trend, identified by Wadhwa (2012), suggests a slowdown in immigrant entrepreneurship in Silicon Valley and, more generally, in the U.S., with entrepreneurial and highly skilled immigrants from China and India returning to their home countries to start new companies or take up senior positions in multinational companies. The latter is attributed to U.S. immigration laws that have compelled many immigrants to return home, but it is also indicative of the growing market opportunities in China and India. This phenomenon merits further research to understand the role played by returnees in founding and funding new businesses and contributing to the growth of global startups by virtue of their transnational experience. This panel will discuss both of these important aspects of immigrant and transnational entrepreneurs, and the ways in which they contribute to their home country and the U.S./Silicon Valley economy.

HD-09 Sustainability - 1

Thursday, 8/1/2013, 14:00 - 15:30

Room: Willow Glen I

Chair(s) Mauro S Ruiz; Nove de Julho University - Uninove

HD-09.1 [R] Proposition of an Eco-Design Approach for an Easy Appropriation by Companies

Ahmed Cherifi; Ecole de Technologie Supérieure, Canada

Mickael Gardoni; Ecole de Technologie Supérieure, Canada

Abdelaziz Tairi; Université M'hamed Bougara, Algeria

Today, in the context of product innovation, the environmental dimension takes a special place of choice and cannot be separated from the other requirements of the product which make it competitive. Tools are available but, unfortunately, proficiency levels required for their use are at the level of an expert; moreover, the tool must be able to clearly identify the benefits arising from its use, with its strengths and weaknesses. We have adopted an approach that consists of proposing a qualitative evaluation matrix including no less important parameters related to the comfort factors of the product and organizational preparation for the appropriation of an eco-design approach, in addition to the standard factors of eco-efficiency. The operation will determine the environmental profile of a product. In order to help the designer to make a decision, the TRIZ (theory of inventive problem solving) method was proposed. This way of proceeding can help the designer and encourage the company to choose an approach and attain a degree of eco-design at the level of the resources available to it.

HD-09.2 [R] Indicators of Urban Underground Space Development for Implementing Sustainability

Hwayeon Song; Korea Institute of S&T Evaluation and Planning, Korea, South

Sang Hyun Lee; Korea Institute of S&T Evaluation and Planning, Korea, South

Hak Mu Heo; Korea Institute of S&T Evaluation and Planning, Korea, South

Sustainable development (SD) has become a guideline and value to be pursued for few decades. However, it is difficult to balance the development of economic, social and environmental sectors at the same time, especially in urban cities. Recently, underground development has been suggested as a solution to problems caused by rapid urbanization. In this study, the role of underground space in urban areas is evaluated as an effective method towards SD and 22 appropriate indicators are proposed as results. The use of underground structures can contribute to sustainability in four ways: by (a) creating additional open spaces above the ground, (b) consuming energy efficiently, (c) providing strong protection from severe weather or natural hazards, and (d) enhancing overall environmental quality. Among the conventional approaches, measuring overall sustainability, indicators associated with underground development were identified, and also weights between them were calcu-

lated. Data were collected from interviews and the analytic hierarchy process conducted by experts including professionals and researchers in related fields. These research findings offer an alternative strategy considering underground space to achieve sustainable development as well as to provide an analysis tool for ongoing projects.

HD-09.3 [R] Integrated Population Health and Environment for a Sustainable Development of Madagascar

Diamondra H Razaivaovololoniaina; University of Antananarivo, Madagascar

Elise Raveloson; University of Antananarivo, Madagascar

Herindrainy Olivier Rakotomalala; University of Antananarivo, Madagascar

Franck Razafindrabe; University of Antananarivo, Madagascar

An integrated population, health, and environment approach contributes to ecosystem and biodiversity conservation while at the same time improving access to critical resources for local populations. However, the implementation was influenced by several factors, which served to influence the viability of the project. Thus, factors other than population, health, and environment should be considered. People who live and/or intervene in the corridor and who sometimes have conflicting interests should find common ground to achieve a rational valorization of the protected areas. Whether or not one uses an integrated project approach, now the challenge is to conserve the forest corridor while providing a means for people to benefit from its continued existence and for the sustainable development. This communication proposes some reflection approach on this subject and a model of community-based project for a sustainable development.

HD-10 Management of Technical Workforce - 2

Thursday, 8/1/2013, 14:00 - 15:30

Room: Willow Glen II

Chair(s) Gita Mathur; San Jose State University

HD-10.1 [R] An Assessment of Competency Requirements of Design Engineers in Pakistan and Development of a Framework for Improvement

Aisha Abbas; National University of Science and Technology, Pakistan

Muhammad A Choudhary; University of Engineering and Technology, Pakistan

Nawar Khan; National University of Science and Technology, Pakistan

The core competencies of design engineers are specific skills, attributes and behavior patterns that are required for successful performance of design engineers' jobs and/or their roles. A meticulous literature review was carried out to develop a thorough understanding of design, design process, engineering design, and an exhaustive list of competencies. The identified 87 competencies were classified in seven categories, i.e., personal attributes, behavior attributes, interpersonal skills, cognitive skills, management competencies, technical competencies, and contract administration skills. The identified/classified competencies were modeled into a survey questionnaire, which was then pilot tested, modified and used for the survey. The research also investigated reasons of design success and failure and sought suggestions for the improvements. The 401 valid responses from a total of 437 responding engineers from 12 specializations, employed by four types of organizations throughout Pakistan, were analyzed and documented. The research also looked at the education of engineering design in Pakistan's engineering universities and the role they play in developing core competencies in the engineers they produce. The results were checked for response validity, and the response groups having Cronbach Alpha greater than 0.7 were included in the analysis. The studied 87 competencies were re-classified into three groups, i.e., core/required, good to have and add-on based on the cumulative score which present the good blend of hard core engineering skills as well as soft skills in all three categories. A framework to develop/improve the competency profile of engineers is also presented.

HD-10.2 [R] The Influence of Workplace Friendship on Work Values: Taiwan and China

Chun-Te Lin; Yu Da University, Taiwan

Chun-Ling Lu; Yu Da University, Taiwan

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According to a literature review, we know work values have significant influence on workplace friendships. But some research paper results showed that as workplace friendship emerged, employees would like to share their value on work. Does it influence workplace friendship? The answer is ambiguous. Drawing on two regions, from enterprises comprising 700 effective questionnaires, we examined workplace friendship on work values and compared those differences between Taiwan and China. Results show the workplace friendships have significant influence on work values. In both Taiwan and China, workplace friendship significantly affects work values and those influences are more strong in Taiwan than in China.

HD-10.3 [R] The Effect of Autonomy on Team Creativity and the Moderating Variables

Kai Wang; Stevens Institute of Technology, United States

Autonomy, the freedom to choose how to accomplish tasks, is shown to have positive impact on individual creativity. The literature suggests that this positive effect is mediated by intrinsic motivation. It seems reasonable to assume that autonomy would benefit team creativity as well. However, the literature does not provide consistent support for this latter notion. In this conceptual paper, individual autonomy and team autonomy are differentiated. Task interdependence and team level creative self-efficacy are proposed to be moderating variables.

HE-03 PANEL: PICMET '14 and '15 Planning Session

Thursday, 8/1/2013, 16:00 - 17:30

Room: Salon III

Panelist(s) PICMET '13 Organizing Committee

This panel session will provide an opportunity to give feedback on PICMET '13 and to get involved in the planning for PICMET '14 and '15 conferences. PICMET '14 will be held July 27-31, 2014, at the ANA Crowne Plaza in Kanazawa, Japan. PICMET '15 will be held August 2-6, 2015, at the Hilton Portland & Executive Tower in Portland, Oregon, USA.



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