Table of Contents

Message from the President and CEO of PICMET 2-3

PICMET '18

Executive Committee 4
Acknowledgments..... 5
Advisory Council 5
Panel of Reviewers..... 6
Past LTM Award Recipients 7-8
Past Medal of Excellence Award Recipients 8-9
Past PICMET Fellow Award Recipients..... 9-10

PICMET '18 Awards

Student Paper Award..... 11-12
Medal of Excellence 14
LTM Awards..... 15

General Information

Conference Focus..... 16
Who Should Attend..... 16
Program..... 16
Publications..... 16
Registration Policy 17
Session and Paper Designations..... 17
Presentation Guidelines..... 17
Audio/Visual Equipment..... 18
Wireless Access..... 18
PICMET Volunteers..... 18

Hawaii

Airport Transportation..... 19
Weather..... 19
Climate..... 19
Attire..... 19
Rainfall 19
Water and Surf 20
Mountains and Volcanoes 20
Oahu 20
Windward Coast..... 21
Leeward Coast..... 21
North Shore..... 21
Central 21
Honolulu 21-22

Optional Tours

Pearl Harbor, AZ Memorial and Punchbowl 23
Pearl Harbor Circle Island Adventure..... 23
Mini-Circle Island with Scenic Shores Tour 23
Manoa Waterfall Adventure Hike 24
Helicopter Tour 24
Ko'olina Dolphin and Snorkeling Cruise..... 24

IEEE Hawaii Section Distinguished Lecture Seminar 25

Social Events

Reception / Buffet 26
Hawaiian Luau Dinner..... 26
Awards Banquet 26

Site Visit

Oceanic Institute Site Visit..... 27

Technical Program

Program Overview 28
The Papers..... 28
The Schedule 28
Monday Schedule 29
Tuesday Schedule 30
Wednesday Schedule..... 31
Thursday Schedule 32
Schedule of Sessions by Date..... 33-35
Schedule of Sessions by Room..... 36-38
Personal Schedule..... 39

Special Sessions

Country Representatives Meeting 40
PICMET '18 Debriefing and '19 Planning Session 40

Plenary Sessions..... 41-46

PhD Colloquium..... 47
Tutorial 48
Panel..... 49
Sessions..... 50-100
Author Index..... 101-106
Floor Layout of the Marriot Hotel 107

PICMET '18

PICMET

Dear PICMET Guests:

We are pleased to welcome you to the PICMET '18 Conference.

The general theme of PICMET '18 is "Managing Technological Entrepreneurship: The Engine for Economic Growth." Technological Entrepreneurship is at the heart of economic growth throughout the world now. Entrepreneurs are taking risks, learning from their mistakes, and starting new ventures one after another. This flurry of activities is resulting in the development of new technologies that were not conceivable even a decade ago. The theme is woven into the keynote speeches and several papers, but the Conference is not limited to it. Every aspect of technology management is addressed in the presentations.

There are eight keynote speeches:

Monday:
Dr. Kathleen Eisenhardt, Stanford University, "Superior Strategy in Entrepreneurial Settings"

Mr. John R. McDougall, President, Dalcor Innoventures, Ltd., and Former President, National Research Council, Canada, "Technology, Innovation and Entrepreneurship – Sharing the Wealth in an AI World"

Tuesday:
Dr. Melissa A. Schilling, New York University, "The Making of a Serial Breakthrough Innovator

Dr. Bulent Atalay, University of Mary Washington and the University of Virginia, "Recognizing Genius in the Age of Technology: Jobs and Musk"

Wednesday:
Dr. Elicia Maine, Simon Fraser University, "Invention to Innovation: The Role of Scientist Entrepreneurs"

Mr. Pliny Fisk III, Center for Maximum Potential Building Systems (CMPBS) Austin Texas, "Sustainable Environments and Technological Entrepreneurship in Small Island Development States (SIDS)"

Thursday:
Dr. Curtis R. Carlson, SRI International (1998-2014), USA, "Innovation for Impact: Value-creation as the Necessary Competitive Advantage"

Dr. Sadik Esener, Oregon Health and Sciences University, USA, "Enabling Projects Oriented Teams to Drive Innovation"

PICMET '18 received 651 submissions. After a double-blind refereeing process, 260 papers are included in the conference. The referees were from around the world. The authors represent 229 academic institutions, industrial corporations and government agencies in 36 countries.

The PICMET '18 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 45 sections, listed below. Each section contains several papers on the topic.

- **Technology Management Framework**
- **Strategic Management of Technology**
- **Science and Technology Policy**
- **Science and Technology Communication**
- **Collaborations for Technology Management**
- **Competitiveness in Technology Management**
- **Global Issues**
- **Environmental Issues**
- **Sustainability**
- **Educational Issues**
- **Convergence of Technologies**
- **Decision Making**
- **Leadership**
- **Disruptive Technologies**
- **Emerging Technologies**
- **Artificial Intelligence for Technology Management**
- **Internet of Things (IoT)**
- **Social Media**
- **Cyber Security**
- **E-Business**
- **Entrepreneurship/Intrapreneurship**

PICMET ’18

- **Intellectual Property**
- **Social Innovation**
- **Project/Program Management**
- **Innovation Management**
- **R&D Management**
- **New Venture Development**
- **New Product Development**
- **Manufacturing Management**
- **Productivity Management**
- **Quality Management**
- **Enterprise Management**
- **Knowledge Management**
- **Information Management**
- **Information Technology**
- **Technological Changes**
- **Technology Forecasting**
- **Technology Roadmapping**
- **Technology Assessment and Evaluation**
- **Technology Acquisition**
- **Technology Adoption**
- **Technology Diffusion**
- **Technology Management in the Energy Sector**
- **Technology Management in the Health Sector**
- **Technology Management in the Service Sector**

A large number of colleagues around the world contributed to the success of the PICMET ’18 Conference.

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, as the Executive Director Emeritus, edited the *Bulletin* and prepared the front-end materials; Liono Setiowijoso, as the Director of Operations, designed, maintained and managed the information systems and PICMET web site, with Hakan Kutgun’s assistance, under the guidance of PICMET CIO Bob Martin, and formatted the papers for the *Proceedings*; Byung Sung Yoon, as the Executive Director and Conference Coordinator, coordinated the overall planning of the conference. Caroline Mudavadi, as the Associate Executive Director, provided support throughout the planning and registration process; Sule Balkan managed finances as PICMET’s Chief Financial Officer; Scott Schaffer, as the Legal Counsel, provided continuous legal advice. Timothy Anderson was the Chief Technical Officer, Kiyoshi Niwa and Dilek Cetindamar Kozanoglu were Co-Directors of International Activities, Charles Weber was the Director of Awards, and Antonie Jetter was the Director of Student Activities. Byung-Sung Yoon and Songphon Munkongsujarit coordinated the on-site activities; Pei Zhang managed the documentation together with Hakan Kutgun; Ahmed Alibage prepared the signage; and Jeff Birndorf developed graphic arts for the conference. Antonie Jetter chaired the Student Paper Award Committee, whose members Kishore Erukulapati, Nathasit Gerdsri, Jonathan Ho, Songphon Munkongsujarit and Charles Weber evaluated more than 30 papers nominated for the award. Hakan Kutgun managed the PICMET page on LinkedIn.

Timothy Anderson, Kiyoshi Niwa, Dilek Cetindamar Kozanoglu, Harm-Jan Steenhuis and Gary Perman conducted the review process for the papers as Associate Editors; 119 colleagues from around the world reviewed up to 10 papers each. Papers submitted to PICMET ’18 were reviewed by two or more reviewers to assure high quality. Timothy Anderson did the scheduling of the accepted papers for presentation at the conference. Amir Shaygan, Saeed Alzahrani, Husam Barham, Edwin Garces, Abdulhakim Giadedi, Rafaa Khalifa, Momtaj Khanam and Pei Zhang were the Editorial Assistants to check and verify that the finalized papers had been revised as recommended by the reviewers.

Elizabeth Aubrey and Sherri Young of IEEE worked with PICMET from the beginning to the end of the conference planning effort. Their professionalism and expertise assured the high-quality production of the *PICMET Proceedings* on schedule.

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

The International Advisory Council gave advice and counsel for PICMET to provide leadership on addressing the strategic issues and critical directions of Technology Management.

The sponsors and supporters of PICMET ’18 made this conference possible. We extend special thanks to all of them: Portland State University Department of Engineering and Technology Management, IEEE TEMS (Technology and Engineering Management Society), Portland State University Foundation, InFocus Corporation, Search Technology/Vantage Point, IEEE Hawaii Section, Maseeh College of Engineering and Computer Science, Portland State University Office of Information Technology, and WHOVA Event Management.

We believe the PICMET ’18 *Bulletin* and *Proceedings* contain some of the best knowledge available on Technology Management for addressing the challenges and opportunities of technological entrepreneurship. We hope they will contribute to the success of technology managers and emerging technology managers, worldwide.

~ Dundar F. Kocaoglu, President and CEO

PICMET ’18

DEDICATION

PICMET ’18 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.

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Nathasit Gerdsri, Mahidol University-Thailand
Jonathan Ho, Yuan Ze University-Taiwan
Songphon Munkongsujarit, NSTDA – Thailand
Charles M. Weber, Portland State University

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Dilek Cetindamar Kozanoglu, Univ. of Technology Sydney
Kiyoshi Niwa, The University of Tokyo
Gary Perman, PermanTech
Harm-Jan Steenhuis, Hawai’i Pacific University

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COOPERATING SOCIETIES

IEEE Hawaii Section
INFORMS – Technology, Innovation Management and Entrepreneurship Section

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, Provost, Bilkent University, Turkey

Mr. Hamid Reza Amirinia, Head, International Innovation and Technology Exhibition, Iran

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

Dr. Guruduth S. Banavar, CTO, VIOME, USA

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

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

Dr. Hans-Jörg Bullinger, Former President, Fraunhofer-Gesellschaft, and Professor, University of Stuttgart, Germany

Dr. Robert Burgelman, Edmund W. Littlefield Professor of Management, Stanford University, USA

Dr. Curtis R. Carlson, Founder & CEO, The Practice of Innovation, USA

Dr. Youngrak Choi, S&T Policy Adviser, Korea

Dr. Kathleen Eisenhardt, Professor, Stanford University, USA

Dr. Steven Eppinger Professor, MIT, USA

Dr. Sadik Esener, Director, Center for Early Detection Research, Knight Cancer Institute, OHSU, USA

Mr. Pliny Fisk III, Co-Director, Center for Maximum Potential Building Systems; and Professor Emeritus, Texas A&M Univ, USA

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

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

Mr. Shinjiro Iwata, Advisor, Hitachi, Ltd., Japan

Mr. Michael Joseph, Managing Director, Mobile Money, Vodafone, USA

Dr. Jay Lee, Professor, University of Cincinnati, USA

Dr. Thomas L. Magnanti, President, Singapore University of Technology and Design, Singapore

Dr. Elicia Maine, Professor, Simon Fraser University, Canada

Mr. John McDougall, President, Dalcor Innoventures Ltd., Canada

Mr. Tetsuji Ohashi, President, Komatsu Ltd., Japan

Dr. Alan L. Porter, Professor Emeritus, Georgia Institute of Technology, USA

Dr. Michael Reardon, President, Eastern International University, Vietnam

Dr. Itti Rittaporn, Executive, Toyota Tsusho Electronics (Thailand) Co., Ltd., Thailand

Mr. Scott Roth, Chief Executive Officer, JAMA Software, USA

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Dr. Melissa Schilling, Professor, New York University, USA

Dr. Aaron Shenhar, Professor, Rutgers University, USA

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

Dr. Dietmar Theis, Honorary Professor, Technical University of Munich, Germany

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

Dr. Karl Hampton Vesper, Professor Emeritus, University of Washington, USA

Dr. Yuko Yasunaga, Deputy Director General, Industrial Science and Technology, and Standards and Conformity Assessment, METI, Japan

Dr. Oliver Yu, Executive in Residence, College of Business, San Jose State University, USA

PICMET ’18

PANEL OF REVIEWERS

Papers submitted to PICMET conferences are subjected to a double-blind review process. Each paper included in the PICMET ’18 conference was reviewed by two or more members of the Panel of Reviewers to assure a very high quality. The panel had 119 members from around the world. They are listed below in alphabetical order by last name.

Hitoshi Abe
Mark Ahn
Jose Albors-Garrigos
Joe Amadi-Echendu
Masami Asai
Jean-Pierre Auffret
Alfonso Avila-Robinson
Elif Baktir
Sule Balkan
Bridget Barnes
Caroline Benton
Frederick Betz
Jeffrey Butler
David Güemes Castorena
Ferhan Cebi
Kah Hin Chai
Leong Chan
Yu-Yu Chang
Yufen Chen
Byungchul Choi
Marina Dabic
Antonie de Klerk
Mark De Reuver
Ozgur Dedehayir
Glenn Dietrich
Brent Dixon
Toni Drescher
Alptekin Durmusoglu
William Eisenhauer
Kishore Erukulapati
Clare Farrukh
Kuo-Hao Feng
Janice Forrester
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Abram Hernandez
Paul Hong
Jing Hu
Nazrul Islam
Kazuhiko Itaya
Takayuki Ito
Hannu Jaakkola
Yuya Kajikawa
Gulgun Kayakutlu
Donald Kennedy
Ron Khormaei
Alisa Kongthon
Sigal Koral Kordova
David Kruger
Isak Kruglianskas
Beryl Kuo
Jan Kwakkel
Scott Leavengood
Chung-Shing Lee
Hai-Chen Lin
Justin Lin
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Saku Makinen
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Mary Mathew
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Fred Phillips
Alan Pilkington
Leon Pretorius
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Bharat Rao
Jamie Rogers
Ichiro Sakata
Leonardo Santiago
Yuriko Sawatani
Guenther Schuh
Lone Seboni
Takehisa Seino
Shintaro Sengoku
Marko Seppänen
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Nermin Sokmen
Woodie Spivey
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Fang-Pei Su
Hsin-Ning Su
Yalcin Tanes
Alfred Thal, Jr.
Harald Throne-Holst
Cherie Trumbach
Fang-Mei Tseng
Yuri Tukoff-Guimaraes
Andreas Udbye
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Thanaphol Virasa
Wayne Wakeland
Chun-Hsien Wang
Yuichi Washida
Charles Weber
David Wilemon
Dietmar Winzker
Nihan Yildirim
Man Hang Yip

PICMET ’18

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 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 Hambraeus, 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

2013
Dr. Robert JT Morris, VP Global Labs, IBM Research, USA
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

2014
Dr. Hans-Joerg Bullinger, Senator of the Fraunhofer-Gesellschaft, Germany
Mr. Michael Joseph, Director of Mobile Money, Vodafone Group Services Limited, UK; and Fellow, the World Bank
Dr. Thomas L. Magnanti, President, Singapore University of Technology and Design (SUTD), Singapore; and Institute Professor and former Dean of Engineering, Massachusetts Institute of Technology (MIT), USA
Mr. Takeshi Uchiyamada, Chairman of the Board, Toyota Motor Corporation, Japan

2015
Mr. John R. McDougall, President, National Research Council, Canada

2016
Mr. Shinjiro Iwata, Advisor to Hitachi Ltd., Japan

2017
Dr. Guruduth S. Banavar, Viome, USA
Dr. Robert A. Burgelman, Edmund W. Littlefield Professor of Management, Stanford University, USA

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 with their affiliations and positions at the time of the award are listed below.

2004
Dr. Daeje Chin, Minister of Information and Communications, 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 Massiah 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 (TÜBITAK)

2011
Mr. Alejandro Cruz, Minister of Science and Technology, Costa Rica

2013
Dr. Eliezer Geisler, Distinguished Professor, Stuart School of Business, Illinois Institute of Technology, USA
Dr. Hans Georg Gemuenden, Professor, Berlin University of Technology, Germany

2015
Dr. Steven Eppinger, Professor of Management Science and Innovation, Massachusetts Institute of Technology, USA
Dr. Alan L. Porter, Professor Emeritus, Georgia Institute of Technology; and Director of R&D for Search Technology, Inc., USA

2016
Dr. Jay Lee, Ohio Eminent Scholar, L.W. Scott Alter Chair, and Distinguished University Professor, University of Cincinnati, USA

2017
Mr. Scott Roth, Chief Executive Officer, Jama Software, USA
Dr. Karl Hampton Vesper, Foster School of Business, University of Washington, Seattle, USA

PICMET FELLOWS

The PICMET Fellow Award was established in 2011 to commemorate PICMET's 20th Anniversary. It is bestowed upon those who have excelled in the technology management field by making a significant impact in one or more of the following six areas:

1. **Technology Management Research** as demonstrated by the research conducted and supervised, research results published in refereed journals, and research grants received from funding agencies or industry.

2. **Technology Management Education** as demonstrated by technology management programs/courses developed, taught or managed, PhD students supervised, and new educational initiatives taken.

3. **Technology Management Implementation** as demonstrated by management of technology-based projects, programs and organizations in industry or government.

4. **Technology Management Consulting** as demonstrated by consulting activities with high impact on the improvement of technology management practice.

5. **Technology Management Policy Making** as demonstrated by the role played in policy making levels for effective utilization of technology management concepts and processes.

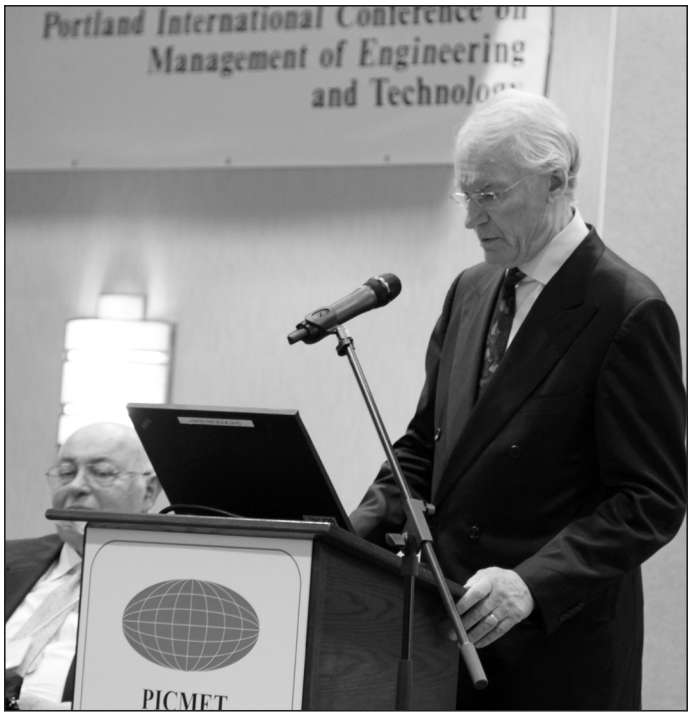
6. **Technology Management Leadership** as demonstrated by the book(s) published, journal(s) edited, technology management organization(s) established or managed.

PICMET ’18

The PICMET Fellows with their affiliations at the time of the award are listed below.

2011
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, Oregon University System, USA
Ms. Charmagne Ehrenhaus, Portland Community 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

2013
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 M. Steele, San Jose State University, USA



2014
Dr. Timothy R. Anderson, Portland State University, USA
Dr. Tugrul U. Daim, Portland State University, USA
Dr. Fred Phillips, Stony Brook - State University of New York, USA
Dr. David Probert, University of Cambridge, UK

2015
Dr. Oliver Yu, President and CEO, The STARS Group; Executive in Residence, Lucas College of Business, San Jose State University, California, USA

STUDENT PAPER AWARD

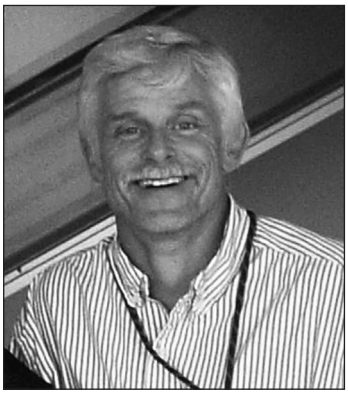
PICMET NAMES ITS OUTSTANDING STUDENT PAPER AWARD

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, 2016. 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 certificate for the student, as well as a certificate and complimentary registration for the nominating professor. The winner may not be nominated again for the same award in subsequent years.

ABOUT BRAD W. HOSLER



Brad Hosler passed away on August 31, 2007, at his home in Portland, Oregon, after several years of battling cancer. He received his undergraduate degree from Bucknell University and completed his graduate studies at Carnegie Mellon University. Brad joined Intel in 1980 to work on the architecture and implementation of the I/O subsystem and had key roles in the Plug & Play BIOS definition and its implementation on Intel's first PCI chipset, Saturn. He formed the Compliance Workgroup to establish the PC industry's first multi-vendor I/O compliance program. The innovative methods and practices that he architected and implemented have become the benchmark for the computer industry. Brad was among the pioneers recognized for his industry contributions at the 10-year anniversary of the PCI-SIG, which has a worldwide membership of about 900 companies.

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

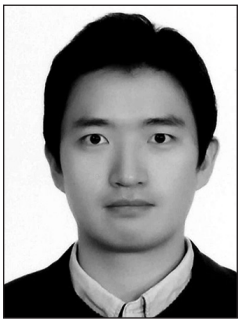
Brad was promoted to Principal Engineer in 2006 and was vested with the informal authority of Chief Technical Officer for the USB Implementers Forum.

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

STUDENT PAPER AWARD

BRAD W. HOSLER OUTSTANDING STUDENT PAPER AWARD

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



AUTHOR
Dr. Hyeokseong Lee

ADVISOR & CO-AUTHOR
Professor Wonjoon Kim

UNIVERSITY
Korea Advanced Institute of Science and Technology (KAIST)

PAPER TITLE
"Firm's Product Innovation Strategy and Product Sales in Convergent Product Markets"

ABSTRACT

Although product convergence became the prevailing paradigm, our understanding is limited because of the small number of studies. We examine how a firm's resource base and recombinant capability affect market performance for convergent products using mobile phone market data for the United States. We find that a firm's resource base explains why a firm whose resource base is related to the base product (mobile phone) achieves better market performance for the convergent product (camera phone) than a firm whose resource base is for the additional product (camera). Moreover, recombinant capability - defined as the ability to combine resources and capabilities previously distinct - is a significant factor that enables firms whose performance previously lagged to catch up to that of the leaders in the convergent product market.

SHARE THE PICMET EXPERIENCE

THE PICMET EXPERIENCE

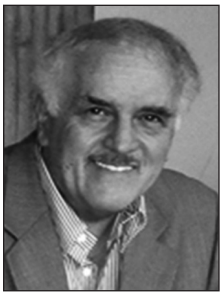
Joining the world's leading technology management experts from academic institutions, industrial corporations and government agencies for discussions on cutting-edge topics.

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.

PICMET '18 AWARDEES

Dr. Bulent Atalay
Professor, University of Mary Washington and the University of Virginia; Member, Institute for Advanced Study, Princeton, USA



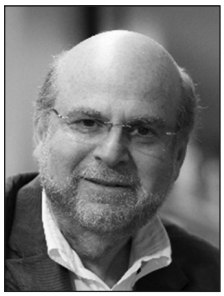
Dr. Bulent Atalay is a scientist, artist, and author. Described by NPR, PBS, Smithsonian and the Washington Post as a "Modern Renaissance Man," he is the author of two best-selling books on the intersection of art, science and mathematics, with Leonardo, the ultimate Renaissance man, serving as the foil.

Dr. Atalay's education in theoretical physics includes training and research at a number of universities – Georgetown, UC-Berkeley, Princeton and Oxford. He has spent the preponderance of his career teaching at the University of Virginia and Mary Washington.

Dr. Atalay's best-selling book, *Math and the Mona Lisa* (Smithsonian Books, 2004), has appeared in 14 languages. His last book, *Leonardo's Universe* (National Geographic Books, 2009), is in two languages, English and Japanese. His upcoming book is entitled *Creativity and Genius: Inside the Minds of Leonardo, Shakespeare, Newton, Beethoven, and Einstein*.

He travels around the world lecturing at academic institutions and on ships of the Crystal Cruise Line. For more details, see his website created at the behest of National Geographic, www.bulentatalay.com.

Dr. Sadik Esener
Chair, Biomedical Engineering Department at the School of Medicine, Oregon Health and Sciences University, Portland, Oregon, USA



Dr. Sadik Esener is the Wendt Family Endowed Chair at the Biomedical Engineering Department at the School of Medicine of The Oregon Health and Sciences University in Portland, Oregon. He is the Founding Director of the Cancer Early Detection Advanced Research Center at the Knight Cancer Institute. He is also a Professor in abstentia at the Electrical and Computer Sciences and NanoEngineering departments at the University of California, San Diego.

Born in Ankara in 1956, Prof. Dr. Sadik Esener received his BS degree in Electronic and Telecommunication Engineering from Istanbul Technical University in 1979 and MS degree from Michigan University in 1981. He joined the UCSD faculty in 1987, after receiving his PhD in Applied Physics and Electrical Engineering from UCSD the same year.

Dr. Esener is an internationally known expert in cancer nanotechnologies, photonics and opto-electronics, and he has been closely involved with many startup companies based on technology developed in his laboratories; he holds more than 20 issued patents in these areas. In the recent past he has served as the director of the Nano-Tumor Center, a Cancer Nanotechnology Center of Excellence funded by NCI, the DARPA-funded multi-university Center for Chips with Heterogeneously Integrated Photonics (CHIPS), the 3D-Opto-Electronic Stacked Processors industry/university consortium; and the Fast Readout Optical Storage (FROST) Industry consortium. He has authored more than 180 journal publications and 250 conference abstracts.

Dr. Esener is a member of IEEE, OSA, and SPIE, and co-founded San Diego-based Nanogen, Optical Micro-Machines, Parallel Solutions, Genoptix, Devacell, Cellix, Orimedix, Ziva and Call/Recall Inc's. Dr. Esener also serves as the co-chair of Sabanci University Board of Trustees.

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.

Dr. Kathleen Eisenhardt
W. Ascherman Professor, Stanford University, and Co-Director of the Stanford Technology Ventures Program, Stanford University, USA

Dr. Kathleen M. Eisenhardt is the Stanford W. Ascherman Professor of Strategy and Organization at Stanford University and co-director of the Stanford Technology Ventures Program. Her recent best-selling book (with Don Sull) is *Strategy as Simple Rules*, named a "top 10 summer read" by the *Wall Street Journal*. Dr. Eisenhardt's research sits at the nexus of strategy and organization theory where she focuses on high-velocity markets and technology-based firms. She is now studying strategy in distinct economic "games" and strategy as simple rules, particularly using multi-case methods. Her PhD is from Stanford's Graduate School of Business.

Dr. Melissa A. Schilling
Professor, Stern School of Business, New York University, New York, USA

Dr. Melissa Schilling is John Herzog Family Professor of Management at New York University Stern School of Management. She specializes in Strategic Management, Technological Innovation and Entrepreneurship. Her B.S. degree in Business Administration with majors in Finance, Marketing and Biology is from the University of Colorado, Boulder; her PhD in Strategic Management is from the University of Washington. She is the winner of the Best Paper Award for her paper in *Management Science* and *Organization Science,* and the recipient of numerous research grants from Kauffman Foundation, National Science Foundation and other funding agencies. Dr. Schilling is the author of more than 200 papers, book chapters, cases and conference presentations. Her most recent book, *Quirky: The remarkable story of the traits, foibles, and genius of breakthrough innovators that changed the world*, is a deep dive into the lives of Elon Musk, Steve Jobs, Marie Curie, Nikola Tesla, Thomas Edison, Benjamin Franklin, Albert Einstein and Dean Kamen. It shows the unusual things they had in common, how these characteristics led to innovation, and how we can nurture our own breakthrough innovation potential.

General Information

CONFERENCE FOCUS

The Technology Age is upon us. It is a challenge to think of any activity in any part of our lives that is not affected or driven by technology. PICMET '18 emphasizes the role of management in technological entrepreneurship.

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 to meet the world's needs.

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.

It is our expectation that by focusing on managing technological innovation, the PICMET '18 Conference will encourage researchers in academia, decision makers in industry, and policy makers in governments to engage in significant work to continue making technological innovation the engine of economic growth throughout the world.

WHO SHOULD ATTEND

Following the PICMET tradition, this high-impact conference will set the stage for innovation management for decades to come. The world's leading experts from academic institutions, industrial corporations and government agencies will participate in the discussions. PICMET '18 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 '18 program consists of

- Ph.D. Colloquium, "Getting Your PhD….and Beyond: Critical Stages and Career Paths for the Ph.D. Student," Sunday, August 19, 13:00 - 17:00, Waikiki Ballroom, Salon 3 (3rd floor of the Paoakalani Tower near the swimming pool)
- Plenary sessions by global leaders from industrial corporations, academic institutions and government agencies in the Kona Moku Ballroom (3rd floor of the Paoakalani Tower)
- Two special meetings:
  1. Country Representatives Lunch Meeting for the current PICMET Country Representatives and those who are interested in becoming Country Representatives, Wednesday, August 22, 12:00-14:00, Milo V Room (2nd floor of Paoakalani Tower).
  2. PICMET '19 & '20 Planning Session for everybody who would like to discuss strategies for future PICMET conferences, Thursday, August 23, 14:00-15:30, Kona Moku Ballroom, Salon A (3rd floor of Paoakalani Tower).
- Research papers by cutting-edge researchers
- Applications papers by researchers and practitioners working on industry applications
- A panel discussion with interactions between panelists and the audience

PUBLICATIONS

There will be two publications at PICMET '18:

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

The publications will be available to PICMET '18 attendees at the registration desk.

General Information

REGISTRATION POLICY

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

Name badges must be worn to all PICMET sessions, functions and events. If you attend the site visit 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 PhD Colloquium and site visit are not included in the registration fee. Tickets for these events may be purchased at the registration desk.*

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: Kona Moku Ballroom 01: Kona Moku Salon A 02: Kona Moku Salon B 03: Kona Moku Salon C 04: Waikiki Salon 1 05: Waikiki Salon 2 06: Waikiki Salon 3 07: Milo I 08: Milo II 09: Milo III 10: Milo IV 11: Milo V

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 Waikiki Salon 2.

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.

General Information

AUDIO/VISUAL EQUIPMENT

Milo VI on the 2nd floor of Paoakalani Tower is designated as the Authors' Room. The authors can work there with their laptops anytime they wish to do so.

There will be a computer, a projector and a screen in every break-out room. You can bring your presentation slides on a USB drive and use the computer provided. If you would like to use your own laptop, please be advised that you will need to bring the adapters that will fit into the VGA standard connection as all of our projectors will have the standard VGA port. Also, please make sure that you have an adapter to connect to USA electric port if your connection port is different. You can get more information and tips at http://www.usatourist.com/english/traveltips/electric-power-tips.html.

If you need information about anything else concerning the conference, volunteers in the registration area will try to help you.

WIRELESS ACCESS

Wireless access will be available in designated areas.

PICMET VOLUNTEERS

PICMET Volunteers wearing Aloha shirts with PICMET logo buttons 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.

HAWAII

GROUND TRANSPORTATION BETWEEN HONOLULU AIRPORT AND THE HOTEL

There are several options for transportation between Honolulu airport and the Waikiki Beach Marriott Resort and Spa where PICMET '18 is held.

- Taxis cost about $50 plus tip one way
- Roberts Hawaii Express Shuttle Service costs $16 per person one way (http://airports.hawaii.gov/hnl/getting-to-from/ground-transportation/robertshawaiishuttle/)

HAWAII

The following is from the Hawaii Tourism Authority (http://www.gohawaii.com/).

Hawaii is like no other place on earth. Home to one of the world's most active volcanoes and the world's tallest sea mountain. Birthplace of modern surfing, the hula and Hawaii Regional Cuisine.

Former seat of a royal kingdom and home to the only royal palace on US soil, Hawaii is one of the youngest geological formations in the world and the youngest state of the union. But perhaps Hawaii's most unique feature is its aloha spirit: the warmth of Hawaii's people that wonderfully complements the Islands' perfect temperatures.

There are six major islands to visit in Hawaii: Kauai, Oahu, Molokai, Lanai, Maui, and Hawaii Island. You'll find each island has its own distinct personality and offers its own adventures, activities and sights. We invite you to explore the Islands of Aloha to find your own heavenly Hawaii experiences.

Hawaii Weather
Weather in Hawaii is very consistent, with only minor changes in temperature throughout the year. There are really only two seasons in Hawaii: summer (called Kau in Hawaiian) from May to October, and winter (Hooilo) from November to April. The average daytime summer temperature at sea level is 85º F (29.4 C), while the average daytime winter temperature is 78º F (25.6º C). Temperatures at night are approximately 10º F. lower.

Temperature and Climate Zones
The islands are an incredible collection of diverse microenvironments, each with its own unique weather, plants, and animals. As a result of the shielding effect of volcanic mountains and the differences in weather found at various elevations, you can find tropical rain forests, cool alpine regions, arid deserts, and sunny beaches - all within the span of just a few miles.

What Should I Pack on My Trip to Hawaii?
It is warm in Hawaii, so pack your summer attire. You may want to bring a jacket or sweater for the evenings. Suits and ties are very rarely worn here. Bring some casual dress clothes or resort wear if you plan on experiencing Hawaii's nightlife. You can buy an aloha shirt and flip-flops (or slippers, as the locals call them) when you get here.

Rainfall and Trade Winds
Through most of the year, Hawaiian weather patterns are affected primarily by high-pressure zones in the north Pacific that pump cool, moist trade winds down onto the island's northeastern slopes. These winds are forced upslope by the mountain heights where their moisture condenses into clouds that produce rain. Most of the rain falls in the mountains and valleys on the windward (northeastern) side of the islands. It is this weather phenomenon that creates Hawaii's rich, green, tropical environment.

The wettest months are from November to March, but winter rains do not generally disrupt vacation plans, since the weather is very localized. This means that if it is raining where you are, there is almost always a sunny spot to be found around the coast.

Hawaii's trade winds mean there is almost always a cooling breeze here. Several times during the year the trade winds will stop completely and the wind will switch around to come out of the south or west, bringing stormy or hot sticky weather. Islanders sometimes call this "Kona" weather, because kona means leeward or south, and this points to the direction from which these weather systems arrive.

HAWAII

Water and Surf Conditions
Hawaii's near-shore water temperatures remain comfortable throughout the year. The average water temperature is 74º F. (23.3 C), with a summer high of 80º F. (26.7º C). Wave action varies dramatically between island coasts and seasons. Summer waters are typically gentle on all beaches. During the winter on many north shore beaches, Pacific storms drive ocean swells towards the islands, creating Hawaii's legendary big waves.

Wave conditions are often very localized, so if the waves are too big on your beach, you can usually find calmer water at a more sheltered beach. Strong currents can make any beach unsafe at any time during the year, particularly in the winter. Ask your hotel staff or a lifeguard about ocean currents or look for warning flags and posted beach conditions.

Hawaii's Mountains and Volcanoes
Many visitors are drawn to the natural beauty found in higher elevations such as Kokee on Kauai, Haleakala on Maui, or Kilauea on the Big Island. Temperatures in these higher locations drop 3.5 degrees for every 1,000 feet above sea level that you climb, so dress appropriately with pants and several layers of clothing. At an elevation of 10,023 feet, the summit of Haleakala can be as much as 30º F. cooler than resort areas on the coast. Also note that because of these high elevations, there is less protection from the sun's powerful UV rays, so come prepared with sun block and sunglasses.

ABOUT OAHU

Sometimes called "The Gathering Place," Oahu certainly lives up to its name. The third largest Hawaiian island is home to the majority of Hawaii's diverse population, a fusion of east and west cultures rooted in the values and traditions of the Native Hawaiian people. It is this fundamental contrast between the ancient and the modern that makes discovering Oahu so enjoyable.

Whether you are hiking atop iconic Leahi (Diamond Head), enjoying some of Hawaii's best shopping, or simply unwinding on the sands of the island's beautiful beaches, you'll find variety at every turn on Oahu.

HAWAII

Oahu Regions

Home to the majority of Hawaii's population and a wealth of activities and attractions, Oahu is separated into five distinct regions: Honolulu, the Windward Coast, Central Oahu, the Leeward Coast and the North Shore. World famous Waikiki is located on the south shore of Honolulu.

WINDWARD COAST, OAHU

Kailua Beach Park
Kailua Beach Park overlooks Kaneohe Bay and the Mokulua Islands and is a great spot for kayaking, windsurfing and other water sports.

Makapuu Point Lighthouse
Hike to this scenic point on Oahu's eastern most tip for incredible views and whale watching during the winter.

Nuuanu Pali Lookout
Nuuanu Pali Lookout is one of Oahu's most popular scenic spots with panoramic views of Windward Oahu and the Koolau mountain range.

Valley of the Temples
Valley of the Temples Memorial Park houses Byodo-in, a replica of a Japanese Buddhist Temple.

Kailua
Kailua Town is a buzzing beach community on the Windward Coast of Oahu, Hawaii, and is known for its turquoise water, crescent beach, unique shopping and dining.

LEEWARD COAST, OAHU

Kaena Point
Kaena Point is a sacred spot at the western most tip of Oahu accessible only by hike.

NORTH SHORE, OAHU

Haleiwa
This historic surf town is the gateway to the legendary North Shore.

Waimea Bay
Waimea Bay is a legendary surf spot influential in the birth of big wave surfing.

CENTRAL OAHU

Pearl Harbor
Five Pearl Harbor Historic Sites honor this National Historic Landmark where World War II both began and ended.

HONOLULU, OAHU

Waikiki
Once a playground for Hawaiian royalty, Waikiki is now a vibrant gathering place for visitors from around the world.

Leahi (Diamond Head)
Hike to the top of the iconic Diamond Head State Monument for panoramic views of Waikiki and Honolulu.

Aloha Tower
Aloha Tower is a historic Honolulu landmark and home to an outdoor shopping and dining marketplace.

Bishop Museum
Bishop Museum houses the largest collection of Hawaiian artifacts in the state and is a popular destination for the whole family.

Downtown Honolulu and Chinatown
Downtown Honolulu and Chinatown are Oahu's historic centers for government, business and the arts.

Hawaii

Duke Kahanamoku Statue
This iconic statue of "The father of modern surfing" welcomes visitors to Waikiki with open arms.

Hanauma Bay Nature Preserve
This Marine Life Conservation District is one of Oahu's most popular snorkeling destinations.

Honolulu Museum of Art and Shangri La
The Honolulu Museum of Art is Hawaii's largest fine-arts museum. Shangri La is one of Hawaii's most architecturally significant homes.

Iolani Palace
The only official state residence of royalty in the U.S., Iolani Palace's grounds and galleries are now open to the public as a museum.

Kapahulu
Kapahulu is a small neighborhood right next to Waikiki where you can find unique shops and some of Honolulu's best local food.

Kawaiahao Church
The historic Kawaiahao Church was the first Christian Church built on Oahu in 1842.

King Kamehameha Statue
The most famous Kamehameha Statue stands in front of Aliiolani Hale in Downtown Honolulu.

National Memorial Cemetery of the Pacific
One of the nation's prominent national cemeteries, the National Memorial of the Pacific honors the sacrifices of America's Armed Forces.

Queen Emma Summer Palace
The summer retreat of Queen Emma and King Kamehameha IV.

Washington Place
Visit Washington Place in Downtown Honolulu, the residence of Queen Liliuokalani, Hawaii's last reigning monarch. It is located in Hawaii's Capital Historic District and is open for private tours.

OPTIONAL TOURS

SIGHTSEEING TOURS IN "PARADISE"

Exciting sightseeing tours are offered by the Aloha Holidays company to PICMET '18 participants. A few of them in Oahu (the island where PICMET '18 will be held) are described below. You can tour many other places, including some in the three other islands (Hawaii, Maui and Kauai) and make reservations ahead of time at http://alohaholidayshawaii.com/tours_oahu.htm.

Aloha Holidays will respond with information and confirmation within 24 to 48 hours of a request. Payment can be made by credit card through Aloha Holiday's secured page. You will receive a voucher / ticket for each activity you have booked, along with the confirmed date, time, pick-up point, etc.

DISCLAIMER: All information presented on this page is intended for general guidance and information purposes only. PICMET is not affiliated with any service providers listed here and assumes no responsibility regarding the accuracy of information and delivery of services from Aloha Holidays or any other third party.

PEARL HARBOR, ARIZONA MEMORIAL AND PUNCHBOWL

Visit Pearl Harbor and the Arizona Memorial Visitors Center VIA AIR-CONDITIONED fully narrated coach tour. View a 20-minute film of the history of the famous battleship and board a Navy launch to visit the Memorial. Ride through the National Cemetery of the Pacific at beautiful Punchbowl Crater; the most dramatically located site of its kind in the world. Descend past the Governor's Mansion, the State Capitol Building, the Royal Palace, and the historic Kawaiahao Church, King Kamehameha Statue and finally on to Honolulu's Chinatown.

DATE: Daily
TIME: 9:00am - 3:00pm
COST: $51.00 Adult
$31.50 Child (Ages 3-11)

PEARL HARBOR CIRCLE ISLAND ADVENTURE

Tour through the Arizona Memorial then continue your trip to Dole Plantation and learn the history of pineapple in Hawaii, drive through the surfing town of Haleiwa, view surfing beaches of the North Shore, visit Byodo Inn Temple, stop for a breathtaking view of the Windward side from the Pali Lookout. A no-host lunch stop is made (lunch location subject to change).

DATE: Monday - Friday
TIME: 7:00am - 5:00pm
COST: $103.50 Adult
$63 Child (Ages 3-11)

MINI-CIRCLE ISLAND WITH SCENIC SHORES TOUR

A half-day tour departing on a fully narrated motor coach tour. See Diamond Head Crater, Nuuanu Rainforest, Hanauma Bay and some of Oahu's most famous beaches.

DATE: Monday/Wednesday/Friday
TIME: 1:00pm - 5:00pm
COST: $57.50 Adult
$34.50 (Ages 3-11)

OPTIONAL TOURS

MANOA WATERFALL ADVENTURE HIKE

This adventure will fulfill all your fantasies about Hawaii's lush rainforests, giant ferns, cascading tropical waterfalls, picturesque streams and unique species that can be found nowhere else on Earth. This trail, a hidden treasure that was used by Spielberg while filming *Jurassic Park*, leads to the tallest accessible waterfall on Oahu, deep within a prehistoric landscape. This four-hour tour includes walking time of 2-2.5 hours.

DATE: Monday - Friday
TIME: Morning Tour: 8:00am - 12:30pm
Afternoon Tour: 2:00pm - 6:30pm
COST: $52.50

HELICOPTER TOUR

Pali Makani Tour

Soar over ocean and mountains, past diamond Head, Honolulu, Waikiki, Hanauma Bay, and Punchbowl.

DATE: Daily
TIME: 30 minute tour
COST: $177 open seating
$191 first class seating

Sacred Falls Tour

Sacred Falls, North Shore, Sunset Beach, Pupukea, Pipeline, Waimea Bay + Falls, sugar cane, pineapple, and Pearl Harbor.

DATE: Daily
TIME: 60 minute tour
COST: $303 open seating
$343 first class seating

KO'OLINA DOLPHIN AND SNORKELING CRUISE - DELUXE MID-DAY

After an exciting ride up the coast to Ko'Olina on the west side of the island, you will experience a snorkel adventure of a lifetime with three different stops. The leeward shore is home to the Hawaiian Spinner dolphins year-round, and this area offers the best snorkeling on the island! Check-in snacks include assorted pastries, coffee, tea and sodas.

The first stop is a snorkel teeming with tropical fish. Our next stop is a viewing encounter with the wild dolphins, and the third stop is an incredible snorkel with sea turtles. After 3.5 hours on the water, return to shore for a grilled lunch including Teri chicken, hamburger, hot dog or veggie burgers; French fries, coffee, tea, soda and bottled water.

Included are round trip transportation, high quality snorkel gear, snorkel safety vests, instruction, and fresh water showers.

DATE: Daily
TIME: Pickup from hotel 10:30am
Return approximately 5:30pm
COST: $149.00 Adult
$129.00 Child (Ages 3-11)

IEEE SEMINAR

IEEE HAWAII SECTION DISTINGUISHED LECTURE SEMINAR

DATE: WEDNESDAY, AUGUST 22
TIME: 18:00-19:30
ROOM: WAIKIKI BALLROOM, SALON 2 (3RD FLOOR OF PAOAKALANI TOWER NEAR THE SWIMMING POOL)

SPEAKER:
Dr. Rainer Hasenauer, Vienna University of Economics and Business (WU Vienna), Austria

Dr. Rainer Hasenauer is Honorary Professor of Marketing with lectureship in Marketing of High Tech Innovation and Technology Marketing at the Institute for Marketing Management, WU Vienna. He is an entrepreneur, co-founder and business angel of high tech companies as well as business developer for innovative technologies. He is also the initiator and co-founder of HiTec Marketing Research Association in Vienna and initiator and senior advisor of the Cross Border HiTec Center.

His teaching and research interests are focused on market entry of high tech innovation in B2B markets, and measurement of innovation half-life and technology acceptance in B2B markets. He teaches at WU Vienna, TU Vienna and Campus02 in Graz. He has had guest lectureships at the Institute of Advanced Studies in Vienna, University of St. Gallen, University of Klagenfurt, and Economic University of Bratislava.

Dr. Hasenauer's research is mostly project driven for B2B markets and comprises community-based innovation, marketing testbeds for market entry, and multidisciplinary communication in high-tech innovation. Fields of application are satellite navigation and remote sensing, robotics, sensors, functional materials, flow batteries and remote power supply, threat analysis for safety and security systems of complex products and systems (road tunnel ventilation, power plants, etc.) and applied operation research with special consideration of multiple criteria decision models.

He is a member of advisory boards of high tech investment groups, chairman of an expert board for high tech start-up incubator, a member of the supervisory board of a world market leader of safety, and a member of the advisory board for national innovation and technology policy.

There is no fee for this event. It is open to all PICMET attendees.

SOCIAL EVENTS

To facilitate the informal interaction of the participants, several social events have been scheduled during PICMET '18.

RECEPTION/BUFFET

DATE: SUNDAY, AUGUST 19
TIME: 19:00—22:00
LOCATION: PUALEILANI TERRACE (3RD FLOOR OF KEALOHILANI TOWER)
DRESS: INFORMAL

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

HAWAIIAN LUAU DINNER

DATE: MONDAY, AUGUST 20
TIME: 19:00-22:00
LOCATION: PUALEILANI TERRACE (3RD FLOOR OF KEALOHILANI TOWER)
DRESS: INFORMAL

Enjoy the bounty of Hawaii at this buffet of delectable local dishes while you mingle and network with colleagues. A Hawaiian trio and two Hawaiian dancers will present a performance of local music and entertainment. Included in the regular registration fee.*

AWARDS BANQUET

DATE: TUESDAY, AUGUST 21
CASH BAR: 18:30—19:00 (IN THE KONA MOKU BALLROOM LANAI)
BANQUET: 19:00—22:00
LOCATION: KONA MOKU BALLROOM
DRESS: BUSINESS ATTIRE**

This is the premier social event of the conference. The PICMET '18 Leadership in Technology Management, Medal of Excellence, and Outstanding Student Paper awards will be presented at the banquet. Included in the registration fee.*

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

****"Business attire" in Hawaii is defined as either Aloha shirt or regular shirt with or without coat and tie.***

Site Visit

The following site visit is offered during PICMET '18. Seating is limited, so sign up early. The registration fee is $75.

The time below includes travel time. The return time is approximate and will depend on traffic.

Attendees will meet on Monday at 14:00 in the first-floor lobby of Paoakalani Tower by the main entrance, where a PICMET volunteer will guide you to the bus.

OCEANIC INSTITUTE SITE VISIT

MONDAY, AUGUST 20, 14:00 - 17:30

Oceanic Institute (OI), an affiliate of Hawaii Pacific University, is a not-for-profit research and development organization dedicated to marine aquaculture, biotechnology, and coastal resource management. Founded in 1960, the research facility is located on a 56-acre site at Makapuu Point on the windward coast of Oahu, Hawaii, with facilities on the Big Island of Hawaii as well. A year-round tropical climate provides ideal working conditions and allows for uninterrupted research.

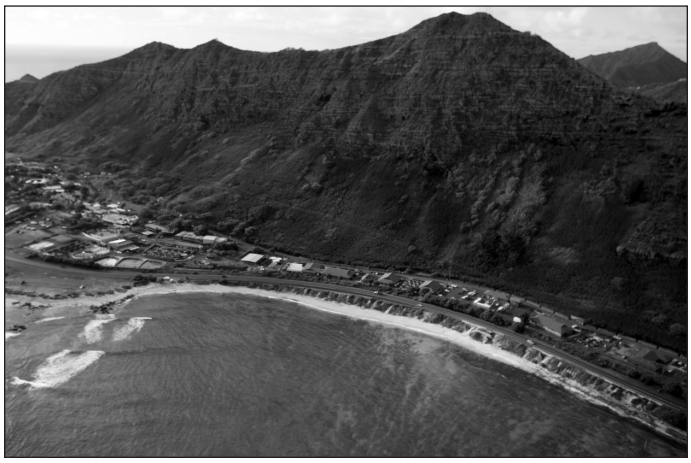
OI's mission is to develop and transfer economically

responsible technologies to increase aquatic food production while promoting the sustainable use of ocean resources. OI works with community, industry, government and academic partners, and non-governmental organizations to benefit the state, the nation, and the world.

The site visit will begin at the OI administration building followed by a walking tour to seven stations. Each station focuses on a different aspect of OI's research (shrimp aquaculture, aquaculture of fish for food, fish for the ornamental industry, sea urchins, aquatic animal feed, etc.).

Since the group will be walking outside most the time, visitors are asked to wear casual attire and shoes that can get dirty; we suggest that women avoid wearing high heels. For biosecurity reasons, visitors are asked not to visit another aquaculture facility within 72 hours prior to coming to OI for the tour. In addition, visitors must have showered and changed clothes after coming in contact with ocean water and after handling uncooked crustaceans or other seafood prior to visiting OI. These policies are in place to protect the valuable research and breeding animals maintained by the OI. More will be explained about why these stringent policies are in place during the tour.

For more information about the Oceanic Institute, please visit www.oceanicinstitute.org.



TECHNICAL PROGRAM

PROGRAM OVERVIEW

The PICMET '18 technical program consists of 92 sessions including 4 plenaries, 2 special sessions, 1 panel, 1 tutorial, and 84 paper sessions.

The plenaries are scheduled from 08:30 to 10:00 every morning, Monday, August 20, through Thursday, August 23, in the Kona Moku Ballroom on the 3rd floor of Paoakalani Tower. They are described in the "Plenaries" section of this Bulletin.

THE PAPERS

Research papers and applications-oriented papers are explicitly identified in this conference. Separate evaluation criteria were used, and different referees were selected for each category to make sure that appropriate papers were included in the conference for the "Research" and "Application" categories. We emphasized research methodology, the use of the research literature, the theory behind the paper, the sample size, and the impact on the research community 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 '18 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 77 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 11 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 three different formats for you.

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

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

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

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

We hope these will help you to take full advantage of the richness of the technical program at PICMET '18.

DAILY SCHEDULE

MONDAY, AUGUST 20, 2018

	00 Kona Moku Ballroom	01 Kona Moku Salon A	02 Kona Moku Salon B	03 Kona Moku Salon C	04 Waikiki Salon 1	05 Waikiki Salon 2	06 Waikiki Salon 3	07 Milo I	08 Milo II	09 Milo III	10 Milo IV	11 Milo V
MA 08:30-10:00	Plenary - 1											
MB 10:30-12:00		Innovation Management-1	E-Business	Enterprise Management-1	Technology Acquisition	Intellectual Property-1	R&D Management-1	Information Technology	Convergence of Technologies	Global Issues	Information Management-1	Emerging Technologies-1
MC 12:00-14:00	**LUNCH**											
MD 14:00-15:30		Innovation Management-2	New Venture Development	New Product Development-1	Technology Assessment & Evaluation-1	Intellectual Property-2	Artificial Intelligence for Technology Management	Productivity Management	Sustainability	Manufacturing Management-1	Knowledge Management: 1	Technology Management in the Health Sector-1
ME 16:00-17:30		TUTORIAL Tech Emergence	Entrepreneurship/ Intrapreneurship-1	New Product Development-2	Technology Assessment & Evaluation-2		Social Media	Cyber Security	Leadership	Manufacturing Management-2	Knowledge Management: 2	Technology Management in the Health Sector-2

DAILY SCHEDULE

TUESDAY, AUGUST 21, 2018

	00 Kona Moku Ballroom	01 Kona Moku Salon A	02 Kona Moku Salon B	03 Kona Moku Salon C	04 Waikiki Salon 1	05 Waikiki Salon 2	06 Waikiki Salon 3	07 Milo I	08 Milo II	09 Milo III	10 Milo IV	11 Milo V
TA 08:30-10:00	Plenary - 2											
TB 10:30-12:00		Innovation Management-3	Entrepreneurship/ Intrapreneurship-2		Disruptive Technologies		Decision Making-1	Project/Program Management	Science & Technology Policy-1	Collaborations-1	Educational Issues	Technology Management Framework-1
TC 12:00-14:00	**LUNCH**											
TD 14:00-15:30		Innovation Management-4	Entrepreneurship/ Intrapreneurship-3		Technological Roadmapping	Technology Adoption-1	Decision Making-2		Technology Management in the Energy Sector	Collaborations-2	Information Management-2	Technology Management Framework-2
TE 16:00-17:30		Innovation Management-5	Entrepreneurship/ Intrapreneurship-4	PANEL Meet the Editor's	Technological Forecasting	Technology Adoption-2	Decision Making-3			Strategic Management of Technology-1	Information Management-3	Technology Diffusion

DAILY SCHEDULE

WEDNESDAY, AUGUST 22, 2018

	00 Kona Moku Ballroom	01 Kona Moku Salon A	02 Kona Moku Salon B	03 Kona Moku Salon C	04 Waikiki Salon 1	05 Waikiki Salon 2	06 Waikiki Salon 3	07 Milo I	08 Milo II	09 Milo III	10 Milo IV
WA 08:30-10:00	Plenary - 3										
WB 10:30-12:00		Innovation Management-6	Entrepreneurship/ Intrapreneurship-5		Internet of Things (IoT)	Intellectual Property-3	R&D Management-2		Science & Technology Policy-2	Science and Technology Communication-1	Competitiveness
WC 12:00-14:00	**LUNCH**										
WD 14:00-15:30		Innovation Management-7	Entrepreneurship/ Intrapreneurship-6	New Product Development-3	Science & Technology Policy-3	Intellectual Property-4	R&D Management-3			Science and Technology Communication-2	
WE 16:00-17:30		Innovation Management-8	Entrepreneurship/ Intrapreneurship-7	New Product Development-4	Emerging Technologies-2	Intellectual Property-5	R&D Management-4		Strategic Management of Technology-2	Enterprise Management-2	

DAILY SCHEDULE

THURSDAY, AUGUST 23, 2018

	00 Kona Moku Ballroom	01 Kona Moku Salon A	02 Kona Moku Salon B	03 Kona Moku Salon C	04 Waikiki Salon 1
HA 08:30-10:00	Plenary - 4				
HB 10:30-12:00		Innovation Management-9	Entrepreneurship/ Intrapreneurship-8	Social Innovation	Science & Technology Policy-4
HC 12:00-14:00	**LUNCH**				
HD 14:00-15:30	PICMET '18 Debrief and Future PICMET Planning				

SCHEDULE OF SESSIONS

SCHEDULE OF SESSIONS BY DATE

MONDAY, AUGUST 20, 2018

Session	Number	Day	Time	Room	Session Title
MA	00	Monday	08:30 - 10:00	Kona Moku Ballroom	PLENARY: “Plenary - 1”
MB	01	Monday	10:30 - 12:00	Kona Moku Salon A	“Innovation Management-1”
MB	02	Monday	10:30 - 12:00	Kona Moku Salon B	“E-Business”
MB	03	Monday	10:30 - 12:00	Kona Moku Salon C	“Enterprise Management-1”
MB	04	Monday	10:30 - 12:00	Waikiki Salon 1	“Technology Acquisition”
MB	05	Monday	10:30 - 12:00	Waikiki Salon 2	“Intellectual Property-1”
MB	06	Monday	10:30 - 12:00	Waikiki Salon 3	“R&D Management-1”
MB	07	Monday	10:30 - 12:00	Milo I	“Information Technology”
MB	08	Monday	10:30 - 12:00	Milo II	“Convergence of Technologies”
MB	09	Monday	10:30 - 12:00	Milo III	“Global Issues”
MB	10	Monday	10:30 - 12:00	Milo IV	“Information Management-1”
MB	11	Monday	10:30 - 12:00	Milo V	“Emerging Technologies-1”
MD	01	Monday	14:00 - 15:30	Kona Moku Salon A	“Innovation Management-2”
MD	02	Monday	14:00 - 15:30	Kona Moku Salon B	“New Venture Development”
MD	03	Monday	14:00 - 15:30	Kona Moku Salon C	“New Product Development-1”
MD	04	Monday	14:00 - 15:30	Waikiki Salon 1	“Technology Assessment & Evaluation-1”
MD	05	Monday	14:00 - 15:30	Waikiki Salon 2	“Intellectual Property-2”
MD	06	Monday	14:00 - 15:30	Waikiki Salon 3	“Artificial Intelligence for Technology Management”
MD	07	Monday	14:00 - 15:30	Milo I	“Productivity Management”
MD	08	Monday	14:00 - 15:30	Milo II	“Sustainability”
MD	09	Monday	14:00 - 15:30	Milo III	“Manufacturing Management-1”
MD	10	Monday	14:00 - 15:30	Milo IV	“Knowledge Management: 1”
MD	11	Monday	14:00 - 15:30	Milo V	“Technology Management in the Health Sector-1”
ME	01	Monday	16:00 - 17:30	Kona Moku Salon A	TUTORIAL: “Tech Emergence”
ME	02	Monday	16:00 - 17:30	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-1”
ME	03	Monday	16:00 - 17:30	Kona Moku Salon C	“New Product Development-2”
ME	04	Monday	16:00 - 17:30	Waikiki Salon 1	“Technology Assessment & Evaluation-2”
ME	06	Monday	16:00 - 17:30	Waikiki Salon 3	“Social Media”
ME	07	Monday	16:00 - 17:30	Milo I	“Cyber Security”
ME	08	Monday	16:00 - 17:30	Milo II	“Leadership”
ME	09	Monday	16:00 - 17:30	Milo III	“Manufacturing Management-2”
ME	10	Monday	16:00 - 17:30	Milo IV	“Knowledge Management: 2”
ME	11	Monday	16:00 - 17:30	Milo V	“Technology Management in the Health Sector-2”

TUESDAY, AUGUST 21, 2018

TA	00	Tuesday	08:30 - 10:00	Kona Moku Ballroom	PLENARY: “Plenary - 2”

SCHEDULE OF SESSIONS

TB	01	Tuesday	10:30 - 12:00	Kona Moku Salon A	"Innovation Management-3"
TB	02	Tuesday	10:30 - 12:00	Kona Moku Salon B	"Entrepreneurship/ Intrapreneurship-2"
TB	04	Tuesday	10:30 - 12:00	Waikiki Salon 1	"Disruptive Technologies"
TB	06	Tuesday	10:30 - 12:00	Waikiki Salon 3	"Decision Making-1"
TB	07	Tuesday	10:30 - 12:00	Milo I	"Project/Program Management"
TB	08	Tuesday	10:30 - 12:00	Milo II	"Science & Technology Policy-1"
TB	09	Tuesday	10:30 - 12:00	Milo III	"Collaborations-1"
TB	10	Tuesday	10:30 - 12:00	Milo IV	"Educational Issues"
TB	11	Tuesday	10:30 - 12:00	Milo V	"Technology Management Framework-1"
TD	01	Tuesday	14:00 - 15:30	Kona Moku Salon A	"Innovation Management-4"
TD	02	Tuesday	14:00 - 15:30	Kona Moku Salon B	"Entrepreneurship/ Intrapreneurship-3"
TD	04	Tuesday	14:00 - 15:30	Waikiki Salon 1	"Technological Roadmapping"
TD	05	Tuesday	14:00 - 15:30	Waikiki Salon 2	"Technology Adoption-1"
TD	06	Tuesday	14:00 - 15:30	Waikiki Salon 3	"Decision Making-2"
TD	08	Tuesday	14:00 - 15:30	Milo II	"Technology Management in the Energy Sector"
TD	09	Tuesday	14:00 - 15:30	Milo III	"Collaborations-2"
TD	10	Tuesday	14:00 - 15:30	Milo IV	"Information Management-2"
TD	11	Tuesday	14:00 - 15:30	Milo V	"Technology Management Framework-2"
TE	01	Tuesday	16:00 - 17:30	Kona Moku Salon A	"Innovation Management-5"
TE	02	Tuesday	16:00 - 17:30	Kona Moku Salon B	"Entrepreneurship/ Intrapreneurship-4"
TE	03	Tuesday	16:00 - 17:30	Kona Moku Salon C	PANEL: "Meet the Editor's"
TE	04	Tuesday	16:00 - 17:30	Waikiki Salon 1	"Technological Forecasting"
TE	05	Tuesday	16:00 - 17:30	Waikiki Salon 2	"Technology Adoption-2"
TE	06	Tuesday	16:00 - 17:30	Waikiki Salon 3	"Decision Making-3"
TE	09	Tuesday	16:00 - 17:30	Milo III	"Strategic Management of Technology-1"
TE	10	Tuesday	16:00 - 17:30	Milo IV	"Information Management-3"
TE	11	Tuesday	16:00 - 17:30	Milo V	"Technology Diffusion"

WEDNESDAY, AUGUST 22, 2018

WA	00	Wednesday	08:30 - 10:00	Kona Moku Ballroom	PLENARY: "Plenary - 3"
WB	01	Wednesday	10:30 - 12:00	Kona Moku Salon A	"Innovation Management-6"
WB	02	Wednesday	10:30 - 12:00	Kona Moku Salon B	"Entrepreneurship/ Intrapreneurship-5"
WB	04	Wednesday	10:30 - 12:00	Waikiki Salon 1	"Internet of Things (IoT)"
WB	05	Wednesday	10:30 - 12:00	Waikiki Salon 2	"Intellectual Property-3"
WB	06	Wednesday	10:30 - 12:00	Waikiki Salon 3	"R&D Management-2"
WB	08	Wednesday	10:30 - 12:00	Milo II	"Science & Technology Policy-2"
WB	09	Wednesday	10:30 - 12:00	Milo III	"Science and Technology Communication-1"
WB	10	Wednesday	10:30 - 12:00	Milo IV	"Competitiveness"
WD	01	Wednesday	14:00 - 15:30	Kona Moku Salon A	"Innovation Management-7"

Schedule of Sessions

WD	02	Wednesday	14:00 - 15:30	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-6”
WD	03	Wednesday	14:00 - 15:30	Kona Moku Salon C	“New Product Development-3”
WD	04	Wednesday	14:00 - 15:30	Waikiki Salon 1	“Science & Technology Policy-3”
WD	05	Wednesday	14:00 - 15:30	Waikiki Salon 2	“Intellectual Property-4”
WD	06	Wednesday	14:00 - 15:30	Waikiki Salon 3	“R&D Management-3”
WD	09	Wednesday	14:00 - 15:30	Milo III	“Science and Technology Communication-2”
WE	01	Wednesday	16:00 - 17:30	Kona Moku Salon A	“Innovation Management-8”
WE	02	Wednesday	16:00 - 17:30	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-7”
WE	03	Wednesday	16:00 - 17:30	Kona Moku Salon C	“New Product Development-4”
WE	04	Wednesday	16:00 - 17:30	Waikiki Salon 1	“Emerging Technologies-2”
WE	05	Wednesday	16:00 - 17:30	Waikiki Salon 2	“Intellectual Property-5”
WE	06	Wednesday	16:00 - 17:30	Waikiki Salon 3	“R&D Management-4”
WE	08	Wednesday	16:00 - 17:30	Milo II	“Strategic Management of Technology-2”
WE	09	Wednesday	16:00 - 17:30	Milo III	“Enterprise Management-2”

THURSDAY, AUGUST 23, 2018

HA	00	Thursday	08:30 - 10:00	Kona Moku Ballroom	PLENARY: “Plenary - 4”
HB	01	Thursday	10:30 - 12:00	Kona Moku Salon A	“Innovation Management-9”
HB	02	Thursday	10:30 - 12:00	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-8”
HB	03	Thursday	10:30 - 12:00	Kona Moku Salon C	“Social Innovation”
HB	04	Thursday	10:30 - 12:00	Waikiki Salon 1	“Science & Technology Policy-4”
HD	01	Thursday	14:00 - 15:30	Kona Moku Salon A	PANEL: “PICMET ’18 Debrief and Future PICMET Planning”

SCHEDULE OF SESSIONS

SCHEDULE OF SESSIONS BY ROOM

Session	Number	Day	Time	Room	Session Title
MA	00	Monday	08:30 - 10:00	Kona Moku Ballroom	PLENARY: “Plenary - 1”
TA	00	Tuesday	08:30 - 10:00	Kona Moku Ballroom	PLENARY: “Plenary - 2”
WA	00	Wednesday	08:30 - 10:00	Kona Moku Ballroom	PLENARY: “Plenary - 3”
HA	00	Thursday	08:30 - 10:00	Kona Moku Ballroom	PLENARY: “Plenary - 4”
MB	01	Monday	10:30 - 12:00	Kona Moku Salon A	“Innovation Management-1”
MD	01	Monday	14:00 - 15:30	Kona Moku Salon A	“Innovation Management-2”
ME	01	Monday	16:00 - 17:30	Kona Moku Salon A	TUTORIAL: “Tech Emergence”
TB	01	Tuesday	10:30 - 12:00	Kona Moku Salon A	“Innovation Management-3”
TD	01	Tuesday	14:00 - 15:30	Kona Moku Salon A	“Innovation Management-4”
TE	01	Tuesday	16:00 - 17:30	Kona Moku Salon A	“Innovation Management-5”
WB	01	Wednesday	10:30 - 12:00	Kona Moku Salon A	“Innovation Management-6”
WD	01	Wednesday	14:00 - 15:30	Kona Moku Salon A	“Innovation Management-7”
WE	01	Wednesday	16:00 - 17:30	Kona Moku Salon A	“Innovation Management-8”
HB	01	Thursday	10:30 - 12:00	Kona Moku Salon A	“Innovation Management-9”
HD	01	Thursday	14:00 - 15:30	Kona Moku Salon A	PANEL: “PICMET ‘18 Debrief and Future PICMET Planning”
MB	02	Monday	10:30 - 12:00	Kona Moku Salon B	“E-Business”
MD	02	Monday	14:00 - 15:30	Kona Moku Salon B	“New Venture Development”
ME	02	Monday	16:00 - 17:30	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-1”
TB	02	Tuesday	10:30 - 12:00	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-2”
TD	02	Tuesday	14:00 - 15:30	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-3”
TE	02	Tuesday	16:00 - 17:30	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-4”
WB	02	Wednesday	10:30 - 12:00	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-5”
WD	02	Wednesday	14:00 - 15:30	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-6”
WE	02	Wednesday	16:00 - 17:30	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-7”
HB	02	Thursday	10:30 - 12:00	Kona Moku Salon B	“Entrepreneurship/ Intrapreneurship-8”
MB	03	Monday	10:30 - 12:00	Kona Moku Salon C	“Enterprise Management-1”
MD	03	Monday	14:00 - 15:30	Kona Moku Salon C	“New Product Development-1”
ME	03	Monday	16:00 - 17:30	Kona Moku Salon C	“New Product Development-2”
TE	03	Tuesday	16:00 - 17:30	Kona Moku Salon C	PANEL: “Meet the Editor’s”
WD	03	Wednesday	14:00 - 15:30	Kona Moku Salon C	“New Product Development-3”
WE	03	Wednesday	16:00 - 17:30	Kona Moku Salon C	“New Product Development-4”
HB	03	Thursday	10:30 - 12:00	Kona Moku Salon C	“Social Innovation”
MB	04	Monday	10:30 - 12:00	Waikiki Salon 1	“Technology Acquisition”
MD	04	Monday	14:00 - 15:30	Waikiki Salon 1	“Technology Assessment & Evaluation-1”

Schedule of Sessions

ME	04	Monday	16:00 - 17:30	Waikiki Salon 1	“Technology Assessment & Evaluation-2”
TB	04	Tuesday	10:30 - 12:00	Waikiki Salon 1	“Disruptive Technologies”
TD	04	Tuesday	14:00 - 15:30	Waikiki Salon 1	“Technological Roadmapping”
TE	04	Tuesday	16:00 - 17:30	Waikiki Salon 1	“Technological Forecasting”
WB	04	Wednesday	10:30 - 12:00	Waikiki Salon 1	“Internet of Things (IoT)”
WD	04	Wednesday	14:00 - 15:30	Waikiki Salon 1	“Science & Technology Policy-3”
WE	04	Wednesday	16:00 - 17:30	Waikiki Salon 1	“Emerging Technologies-2”
HB	04	Thursday	10:30 - 12:00	Waikiki Salon 1	“Science & Technology Policy-4”
MB	05	Monday	10:30 - 12:00	Waikiki Salon 2	“Intellectual Property-1”
MD	05	Monday	14:00 - 15:30	Waikiki Salon 2	“Intellectual Property-2”
TD	05	Tuesday	14:00 - 15:30	Waikiki Salon 2	“Technology Adoption-1”
TE	05	Tuesday	16:00 - 17:30	Waikiki Salon 2	“Technology Adoption-2”
WB	05	Wednesday	10:30 - 12:00	Waikiki Salon 2	“Intellectual Property-3”
WD	05	Wednesday	14:00 - 15:30	Waikiki Salon 2	“Intellectual Property-4”
WE	05	Wednesday	16:00 - 17:30	Waikiki Salon 2	“Intellectual Property-5”
MB	06	Monday	10:30 - 12:00	Waikiki Salon 3	“R&D Management-1”
MD	06	Monday	14:00 - 15:30	Waikiki Salon 3	“Artificial Intelligence for Technology Management”
ME	06	Monday	16:00 - 17:30	Waikiki Salon 3	“Social Media”
TB	06	Tuesday	10:30 - 12:00	Waikiki Salon 3	“Decision Making-1”
TD	06	Tuesday	14:00 - 15:30	Waikiki Salon 3	“Decision Making-2”
TE	06	Tuesday	16:00 - 17:30	Waikiki Salon 3	“Decision Making-3”
WB	06	Wednesday	10:30 - 12:00	Waikiki Salon 3	“R&D Management-2”
WD	06	Wednesday	14:00 - 15:30	Waikiki Salon 3	“R&D Management-3”
WE	06	Wednesday	16:00 - 17:30	Waikiki Salon 3	“R&D Management-4”
MB	07	Monday	10:30 - 12:00	Milo I	“Information Technology”
MD	07	Monday	14:00 - 15:30	Milo I	“Productivity Management”
ME	07	Monday	16:00 - 17:30	Milo I	“Cyber Security”
TB	07	Tuesday	10:30 - 12:00	Milo I	“Project/Program Management”
MB	08	Monday	10:30 - 12:00	Milo II	“Convergence of Technologies”
MD	08	Monday	14:00 - 15:30	Milo II	“Sustainability”
ME	08	Monday	16:00 - 17:30	Milo II	“Leadership”
TB	08	Tuesday	10:30 - 12:00	Milo II	“Science & Technology Policy-1”
TD	08	Tuesday	14:00 - 15:30	Milo II	“Technology Management in the Energy Sector”
WB	08	Wednesday	10:30 - 12:00	Milo II	“Science & Technology Policy-2”
WE	08	Wednesday	16:00 - 17:30	Milo II	“Strategic Management of Technology-2”
MB	09	Monday	10:30 - 12:00	Milo III	“Global Issues”
MD	09	Monday	14:00 - 15:30	Milo III	“Manufacturing Management-1”
ME	09	Monday	16:00 - 17:30	Milo III	“Manufacturing Management-2”

Schedule of Sessions

TB	09	Tuesday	10:30 - 12:00	Milo III	“Collaborations-1”
TD	09	Tuesday	14:00 - 15:30	Milo III	“Collaborations-2”
TE	09	Tuesday	16:00 - 17:30	Milo III	“Strategic Management of Technology-1”
WB	09	Wednesday	10:30 - 12:00	Milo III	“Science and Technology Communication-1”
WD	09	Wednesday	14:00 - 15:30	Milo III	“Science and Technology Communication-2”
WE	09	Wednesday	16:00 - 17:30	Milo III	“Enterprise Management-2”
MB	10	Monday	10:30 - 12:00	Milo IV	“Information Management-1”
MD	10	Monday	14:00 - 15:30	Milo IV	“Knowledge Management: 1”
ME	10	Monday	16:00 - 17:30	Milo IV	“Knowledge Management: 2”
TB	10	Tuesday	10:30 - 12:00	Milo IV	“Educational Issues”
TD	10	Tuesday	14:00 - 15:30	Milo IV	“Information Management-2”
TE	10	Tuesday	16:00 - 17:30	Milo IV	“Information Management-3”
WB	10	Wednesday	10:30 - 12:00	Milo IV	“Competitiveness”
MB	11	Monday	10:30 - 12:00	Milo V	“Emerging Technologies-1”
MD	11	Monday	14:00 - 15:30	Milo V	“Technology Management in the Health Sector-1”
ME	11	Monday	16:00 - 17:30	Milo V	“Technology Management in the Health Sector-2”
TB	11	Tuesday	10:30 - 12:00	Milo V	“Technology Management Framework-1”
TD	11	Tuesday	14:00 - 15:30	Milo V	“Technology Management Framework-2”
TE	11	Tuesday	16:00 - 17:30	Milo V	“Technology Diffusion”

Personal Schedule

	Sunday August 19, 2018	Monday August 20, 2018	Tuesday August 21, 2018	Wednesday August 22, 2018	Thursday August 23, 2018
08:00 – 08:30 Bright Start (Breakfast)					
08:30 – 10:00 (A)		Plenary - 1 (Kona Moku)	Plenary - 2 (Kona Moku)	Plenary - 3 (Kona Moku)	Plenary - 4 (Kona Moku)
10:00 – 10:30 Coffee Break					
10:30 – 12:00 (B)					
12:00 – 14:00 Lunch Break					
14:00 – 15:30 (D)					PICMET '19 Planning Session (Kona Moku Salon A)
15:30 – 16:00 Coffee Break					
16:00 – 17:30 (E)					
19:00 – 22:00	Welcome Reception (Pualeilani Terrace)	Dinner (Pualeilani Terrace)	Awards Banquet (Kona Moku)		

SPECIAL SESSIONS

COUNTRY REPRESENTATIVES LUNCH MEETING

DATE: WEDNESDAY, AUGUST 22
TIME: 12:00-14:00
ROOM: MILO V (2ND FLOOR OF PAOAKALANI TOWER)

PICMET has 132 Country Representatives in 60 countries. They provide the linkage between PICMET Headquarters and the different parts of the world by disseminating PICMET information in their regions, proposing locations for future PICMET conferences, and starting PICMET chapters in their countries. Three such chapters, PICMET - Japan, PICMET - Korea, and PICMET - Turkey, are already in operation.

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

Lunch will be provided.

PICMET '18 DEBRIEFING & '19 PLANNING SESSION

DATE: THURSDAY, AUGUST 23
TIME: 14:00-15:30
ROOM: KONA MOKU, SALON A

This session will provide an opportunity to give feedback on PICMET '18 and to get involved in the planning for the PICMET '19 Conference that will be held in Portland, Oregon, USA, August 25-29, 2019, at the Hilton Portland Downtown. The theme will be "Technology Management in the World of Intelligent Systems."

PLENARIES

PLENARY SESSION-1

DATE: MONDAY, AUGUST 20
TIME: 08:30-10:00
ROOM: KONA MOKU BALLROOM

Session Chair: Dr. Timothy R. Anderson, Portland State University, USA

WELCOME

The Honorable Kirk Caldwell, Mayor of Honolulu

Mayor Kirk Caldwell studied Urban Planning and Economics at Tufts University, earned an M.A. from the Fletcher School of Law and Diplomacy, and received his law degree from the University of Hawaii William S. Richardson School of Law. He was Managing Partner at the law firm of Ashford and Wriston and began his public service career in 2002, when he was elected to the Hawaii State House of Representatives where he quickly rose to become the House Majority Leader. In January 2009, Kirk was appointed Managing Director for the City and County of Honolulu, and later served as Acting Mayor in 2010. During his tenure at the City, Caldwell was the primary point person for O'ahu's biggest issues, transit and homelessness, and successfully expedited $150 million in road repaving. He was elected Mayor of the City and County of Honolulu in 2012.

KEYNOTE-1

Dr. Kathleen Eisenhardt, W. Ascherman Professor, Stanford University, and Co-Director of the Stanford Technology Ventures Program, Stanford University, USA

"Superior Strategy in Entrepreneurial Settings"

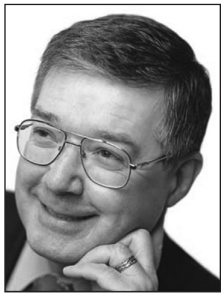
How do entrepreneurs and executives form superior strategies in new and growth markets? Understanding this strategy formation is theoretically intriguing because it pushes beyond the boundary conditions of the traditional logics of position and leverage to the less-understood opportunity logic where advantage is precarious and often short-lived. It is also practically relevant, especially for technology-based firms. Strategically successful firms in these settings like Google, Tencent, and Spotify are primary motors for economic growth, but their strategists are challenged by the "high velocity" of their markets and opportunities. Two intertwined themes are at the core of superior strategy: (1) broad view of the strategic playing field enabling better and smarter understanding of opportunities (thinking) and (2) action organized at the "edge of chaos" enabling flexible yet efficient capture of opportunities (doing). Bottlenecks link the two.

Dr. Kathleen M. Eisenhardt *is the Stanford W. Ascherman Professor of Strategy and Organization at Stanford University and co-director of the Stanford Technology Ventures Program. Her recent best-selling book (with Don Sull) is* Strategy as Simple Rules*, named a "top 10 summer read" by the* Wall Street Journal*. Dr. Eisenhardt's research sits at the nexus of strategy and organization theory where she focuses on high-velocity markets and technology-based firms. She is now studying strategy in distinct economic "games" and strategy as simple rules, particularly using multi-case methods. Her PhD is from Stanford's Graduate School of Business.*

KEYNOTE-2

Mr. John R. McDougall, Hon Col (ret), B.Sc. (Alberta) 1967, P.Eng., CD, CStJ, C.Dir., FCAE, FEC, FGC (Hon), Fellow PICMET, Canada

"Technology, Innovation and Entrepreneurship – Sharing the Wealth in an AI World"



Traditionally, increased productivity and innovation meant automating routine practices to replace manual labor. As artificial intelligence, driven by vast reams of data gathered from the installation of sensors, is added to the mix, gains are potentially enormous.

Similarly, the utility of capital assets, especially those which have been largely owned by individuals, are being monetized through communication and networks which allow them to be shared and utilized by others. These changes could conceivably lead us to a world in which conventional work, as we have known it, largely disappears.

However, as this occurs, our social and political systems are being challenged and need to evolve and find ways to identify, value and fund the contributions of large

PLENARIES

numbers of citizens who will reside outside the wealth-generating portions of the economy. Keeping them engaged as motivated participants in the new economy will be imperative to maintain social license for technology developments and innovations. And technological entrepreneurs will need to consider and mitigate the social dislocations associated with their new initiatives.

Mr. John McDougall *has 50 years of experience in 75 countries in the natural resource, IT, manufacturing, consulting, real estate and investment industries as well as research and development and academia. He retired from Canada's National Research Council after six years as President, a position he accepted after 12 years as CEO of the Alberta Research Council. He was the inaugural Chair in Management for Engineers at the University of Alberta from 1991-97, and he initiated Innoventures Canada Inc. in 2006 to bring together Canada's leading research and technology organizations providing technology development, demonstration and deployment services as centers of excellence for commercialization and research.*

In the private sector, after eight years with a multinational, he managed and founded firms in real estate, investment and development, frontier exploration and logistics, project management, technology development, economics and economic development, financial and business planning, data processing and custom software development and natural gas brokerage. He has also served as an outside director or advisor to several public and private firms.

Mr. McDougall is an active volunteer in business, professional and not-for-profit organizations where holding leadership positions in local, national and international organizations such as The Edmonton Chamber of Commerce and World Trade Centre, Capital Care Foundation, Engineers Canada, St. John's Ambulance, Eureka and the G8 Heads of Research Organizations. He has also served on dozens of academic and government committees and agencies.

He has received medals and recognition including the 2015 PICMET award for Leadership in Technology Management, Honorary membership in the Mexican College of Civil Engineers and the Queen's Jubilee Medal.

PLENARY SESSION-2

DATE: TUESDAY, AUGUST 21
TIME: 08:30-10:00
ROOM: KONA MOKU BALLROOM

Session Chair: Dr. Dilek Cetindamar Kozanoglu, University of Technology Sydney, Australia

KEYNOTE-1

Dr. Melissa A. Schilling, Professor, Stern School of Business, New York University, New York, USA

"The Making of a Serial Breakthrough Innovator"

What makes some people so spectacularly innovative? Throughout history, some people have become widely recognized for introducing one world-changing innovation after another. In this keynote, I develop case studies of eight such serial breakthrough innovators: Elon Musk, Marie Curie, Steve Jobs, Albert Einstein, Nikola Tesla, Dean Kamen, Benjamin Franklin and Thomas Edison. By examining the stories of their childhoods, their work experiences, their beliefs and motives, I identify those things they have in common with each other yet simultaneously make them unusual from the "average" person. I then examine these commonalities through the lenses of innovation and creativity research to examine the potential mechanisms linking these characteristics and experiences to their exceptional innovation. The result is inspiring: The innovators do have unusual traits and characteristics, and each benefited from situation advantages; however, we can tap many of the same mechanisms to nurture innovation in ourselves and others.

Dr. Melissa Schilling *is John Herzog Family Professor of Management at New York University Stern School of Management. She specializes in Strategic Management, Technological Innovation and Entrepreneurship. Her B.S. degree in Business Administration with majors in Finance, Marketing and Biology is from the University of Colorado, Boulder; her PhD in Strategic Management is from the University of Washington. She is the winner of the Best Paper Award for her paper in* Management Science *and* Organization Science*, and the recipient of numerous research grants from Kauffman Foundation, National Science Foundation and other funding agencies. Dr. Schilling is the author of more than 200 papers, book chapters, cases and conference presentations. Her most recent book,* Quirky: The remarkable story of the traits, foibles, and genius of breakthrough innovators that changed the world*, is a deep dive into the lives of Elon Musk, Steve Jobs, Marie Curie, Nikola Tesla, Thomas Edison, Benjamin Franklin, Albert Einstein and Dean Kamen. It shows the unusual things they had in common, how these characteristics led to in-*

PLENARIES

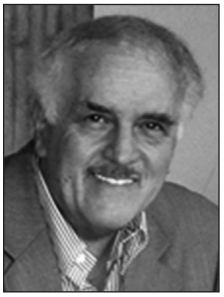
novation, and how we can nurture our own breakthrough innovation potential."

KEYNOTE-2

Dr. Bulent Atalay, Professor, University of Mary Washington and the University of Virginia; Member, Institute for Advanced Study, Princeton, USA

"Recognizing Genius in the Age of Technology: Jobs and Musk"

"Talent hits a target no one else can hit; Genius hits a target no one else can see."
— Arthur Schopenhauer



Genius, in the broadest sense of the word, refers to individuals who display extraordinary intellectual ability or surpassing levels of creativity, the former quality frequently complementing the latter. But what good is soaring intelligence or lofty creativity if there is no achievement that is universal and lasting.

Our modern age has seen the emergence of a number of brilliant and imaginative individuals, young heroes of the Age of Technology. Their contributions have been crucial to contemporary life: science, business, engineering, medicine, education, publishing, information-sharing, communication, transportation, self-driving cars, robotics, automation, artificial intelligence (AI), entertainment, art, and social media.

Although none of the innovators or entrepreneurs of the present Information Revolution could ever claim levels of creativity in the arts and sciences comparable to a Leonardo or an Einstein, they are, nonetheless, undeniable visionaries inventing the future.

The two men on whom we will focus are Steve Jobs and Elon Musk, already legends, who created a pair of companies that are already defining the future. What are their shared attributes and their dissimilarities? What are the battles they have waged, and as entrepreneurs of undeniably of the highest caliber, what can they teach us?

***Dr. Bulent Atalay** is a scientist, artist, and author. Described by NPR, PBS, Smithsonian and the Washington Post as a "Modern Renaissance Man," he is the author of two best-selling books on the intersection of art, science and mathematics, with Leonardo, the ultimate Renaissance man, serving as the foil.*

Dr. Atalay's education in theoretical physics includes training and research at a number of universities – Georgetown, UC-Berkeley, Princeton and Oxford. He has spent the preponderance of his career teaching at the University of Virginia and Mary Washington.

Dr. Atalay's best-selling book, Math and the Mona Lisa *(Smithsonian Books, 2004), has appeared in 14 languages. His last book,* Leonardo's Universe *(National Geographic Books, 2009), is in two languages, English and Japanese. His upcoming book is entitled* Creativity and Genius: Inside the Minds of Leonardo, Shakespeare, Newton, Beethoven, and Einstein.

He travels around the world lecturing at academic institutions and on ships of the Crystal Cruise Line. For more details see his website created at the behest of National Geographic, www.bulentatalay.com

PLENARY SESSION-3

DATE: WEDNESDAY, AUGUST 22
TIME: 08:30-10:00
ROOM: KONA MOKU BALLROOM

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

KEYNOTE-1

Dr. Elicia Maine, Professor, Innovation & Entrepreneurship and Academic Director, Science & Technology Commercialization, Beedie School of Business, Simon Fraser University, Vancouver, Canada

"Invention to Innovation: The Role of Scientist Entrepreneurs"

The importance of university spin-offs in the commercialization of highly uncertain, early stage scientific inventions is increasing. While there is a growing body of literature on academic entrepreneurship, not much is known about the role of star scientists in university spin-off emergence. We argue that replicable entrepreneurial capabilities developed by scientist entrepreneurs can translate inventions from the scientists' lab into well-resourced university spin-offs. We inductively develop a model of the key role played by a star scientist entrepreneur

in four interdependent entrepreneurial capabilities: technology-market matching, claiming and protecting the invention, assembling the founding team, and the strategic timing of firm formation. We compare and contrast 30 science-based university spinoffs – controlling for star scientist entrepreneur – to provide evidence suggesting that these entrepreneurial capabilities contribute to success. From this analysis, we draw recommendations for scientist-entrepreneurs, university leadership, and innovation policymakers.

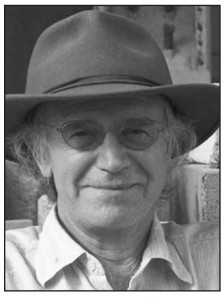
***Dr. Elicia Maine**, who is specializing in technological innovation and science entrepreneurship, has used her expertise at home and abroad to guide innovation policy and strategy and to mentor emerging talent. Founding educational coordinator for New Ventures BC, and Academic Director of "Invention to Innovation," a novel graduate program in Science & Technology Commercialization, Prof. Maine was awarded the 2017 TD / Canada Trust Distinguished Teaching Award and was a finalist for BC TECH's 2016 "Person of the Year" award. An interdisciplinary scholar and engaged educator, she holds a PhD in Technology Management & Materials Engineering from Cambridge University and master's degrees in Technology & Policy and Materials Engineering from MIT. Prof. Maine teaches "Managing Technological Innovation" and "Lab to Market" at SFU's Beedie School of Business and has published her research on innovation management in* Research Policy*,* R&D Management, Nature Nanotechnology *and* Nature Materials*. She serves on the Boards of Directors of the Foresight Cleantech Accelerator and of BC Innovation Council's New Ventures BC.*

KEYNOTE-2

Mr. Pliny Fisk III, Co-Director CMPBS Austin Texas, and Professor Emeritus, Texas A&M University, College Station, Texas, USA

"Sustainable Environments and Technological Entrepreneurship in Small Island Development States (SIDS)"

ARK (adaptation, resilience, knowledge) is a 'think and do' collaboration of academic, business, and non-profit entities formed to foster sustainable economic development while protecting marine and terrestrial environmental diversity of SIDS worldwide given challenges of escalating climate change (CC). The current focus is on Belize and the Caribbean to develop transformative activities and models for CC mitigation and adaptation through two main projects for capacity-building and sustainable regional development. Project #1 is to build an Interactive Working Atlas (IWA) that provides comprehensive baseline environmental assessment data to monitor and evaluate CC along mountain to reef river corridors. Project #2 is to construct a state-of-the-art Ecology (Eco) Research Park that includes an Eco Research and Testing (ERT) Lab and Eco Business Incubator (EBI) to foster regional entrepreneurship and economic development. Both projects involve regional government, business, and academic participants to establish best practices for Caribbean-wide dissemination through the Open Campus of the University of West Indies.



Given the recent and looming hurricane threat, The Center for Maximum Potential Building Systems (CMPBS) in now most concerned with related LandARK and SeaArk initiatives. The focus is on "resilient off-grid construction" using regional resources and material, entrepreneurial talent, and innovative building technologies and methods. LandARK construction includes economically conceived mitigation modules or "PODs" that are implemented as publicly accessible hurricane resistant safe housing. SeaARK is a related sea-based reef research/ecotourism facility that incorporates repurposed submersible (floating) oil rig platforms. A resulting pyramid shaped POD-City creates an ecotourism as a reef habitat. This temporarily submersible and self-propelled movable structure constantly adjusts for water temperature and light and water quality to become a satellite directed sustainable floating reef city. The LandARK and SEAark projects and innovative practices are meant to inspire regionally-based ecosystems for sustainable value-added technology-based entrepreneurship and development.

***Mr. Pliny Fisk III** is the Co-Founder and Co-Director of the Center for Maximum Potential Building Systems in Austin, Texas, and Professor Emeritus in the College of Architecture at Texas A&M University. His bachelor's and master's degrees in architecture are from the University of Pennsylvania.*

With a background in architecture, landscape architecture, and the systems sciences, Pliny Fisk III has made pivotal contributions in the areas of policies, protocols, and prototypes. His prototypes challenge conventional wisdom about building system design, engineering, and materials, and have been implemented for a range of clientele and in iconic architecture: The State Demonstration Farm in

PLENARIES

Laredo; The State Green Builder Demonstration Building in Austin, recognized as one of the top 10 green buildings since 1980 in Architect Magazine; and the 2002 UT School of Architecture Solar Decathlon and the 2007 Texas A&M Solar Decathlon.

Mr. Fisk's work has earned several national and international awards including the Lewis Mumford Award, the United Nations Earth Summit Award, the U.S. Green Building Council's Sacred Tree Award, and the Passive Solar Pioneer Award from the American Solar Energy Society. He has served as an advisor to the MacArthur, Gates, and Enterprise Foundations and has been chosen to serve on the GSA's National Registry for Design Excellence peer review program. He also works as an inventor. His biography, Pliny Fisk III: Creating a Maximum Potential Future*, was recently published by Ecotone Publishing, a division of the International Living Future Institute, as part of their Green Masters Series.*

PLENARY SESSION-4

DATE: THURSDAY, AUGUST 23
TIME: 08:30-10:00
ROOM: KONA MOKU BALLROOM

Session Chair: Dr. Harm-Jan Steenhuis, Hawaii Pacific University, USA

KEYNOTE-1

Dr. Curtis R. Carlson, Founder and CEO Practice of Innovation LLC, President and CEO SRI International (1998-2014), USA

"Innovation for Impact: Value-creation as the Necessary Competitive Advantage"

We are in the global innovation economy. There are abundant unmet opportunities in large markets, but technology often improves at exponential rates and global competition is increasingly fierce. Unfortunately, today innovative success is often poor. S&P 500 companies last for less than 15 years before going away. Experience shows that most R&D has little or no value. Most university "technology transfer" programs lose money. The application of value-creation best practices significantly improves innovative output. Remarkably, few professionals have the value-creation perspectives and skills required to systematically identify and develop major new opportunities.

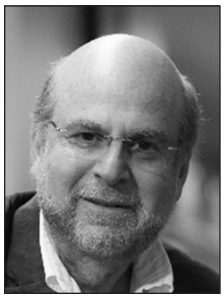
This talk reviews the innovative practices used at SRI International when I was CEO. These practices took SRI from 20 years of failing to tripling in size and creating tens of billions of dollars of new market value, including HDTV, Intuitive Surgical, and Siri, now on the iPhone. Similar practices are described in a 2017 National Academy of Engineering report on value-creation best practices. Based on these concepts, we have created an "Innovation for Impact" value-creation guidebook for use by the NSF. The ability to use these practices and systematically create important new R&D programs and high-impact innovations are among the most important skills a professional can have.

Dr. Curtis R. Carlson *served as SRI International's CEO from 1998 to 2014. Dr. Carlson's new company, Practice of Innovation, LLC, works with companies, governments, and universities to improve innovative performance. During his time at SRI its revenue tripled, and SRI became a model for the systematic creation of high-value innovations, such as HDTV, Intuitive Surgical, Siri, and many other world-changing advances. Before joining SRI, Dr. Carlson worked at RCA, GE, and the Sarnoff Corporation. In 1977, he started and helped lead the high-definition television (HDTV) program that became the U.S. standard. In 1997, the Sarnoff team won an Emmy. In 2000, another team started by Dr. Carlson won an Emmy for satellite broadcast quality.*

KEYNOTE-2

Dr. Sadik Esener, Chair, Biomedical Engineering Department at the School of Medicine, Oregon Health and Sciences University, Portland, Oregon, USA

"Enabling Projects Oriented Teams to Drive Innovation"



The study of "wicked" problems suggests that multidisciplinary teams can accelerate innovation to solve complex and intractable challenges such as the early detection of cancer. Detecting cancer early radically increases the chances of survival after a cancer diagnosis, making the concept of team-based innovation potentially essential to decreasing suffering from cancer. The Knight Cancer Institute Cancer Early Detection Advanced Research (CEDAR) Center seeks to actively

PLENARIES

implement and enable team-based science to accelerate breakthroughs. Our center brings together researchers and entrepreneurs with a range of expertise, experience and perspective to create novel solutions that can be translated to the marketplace. We have created a project driven, flat hierarchy where the best ideas rise to the top and are funded. Putting a true team-based model into place requires intention around incentives, staffing, team development, and output measurement. We will discuss the implementation of this operational model using case studies from active and terminated projects.

Dr. Sadik Esener *is the Wendt Family Endowed Chair at the Biomedical Engineering Department at the School of Medicine of The Oregon Health and Sciences University in Portland, Oregon. He is the Founding Director of the Cancer Early Detection Advanced Research Center at the Knight Cancer Institute. He is also a Professor in absentia at the Electrical and Computer Sciences and Nanoengineering departments at the University of California, San Diego.*

Born in Ankara in 1956, Prof. Dr. Sadik Esener received his BS degree in Electronic and Telecommunication Engineering from Istanbul Technical University in 1979 and MS degree from Michigan University in 1981. He joined the UCSD faculty in 1987, after receiving his PhD in Applied Physics and Electrical Engineering from UCSD the same year.

Dr. Esener is an internationally known expert in cancer nanotechnologies, photonics and opto-electronics, and he has been closely involved with many startup companies based on technology developed in his laboratories; he holds more than 20 issued patents in these areas. In the recent past he has served as the director of the Nano-Tumor Center, a Cancer Nanotechnology Center of Excellence funded by NCI, the DARPA-funded multi-university Center for Chips with Heterogeneously Integrated Photonics (CHIPS), the 3D-Opto-Electronic Stacked Processors industry/university consortium; and the Fast Readout Optical Storage (FROST) Industry consortium. He has authored more than 180 journal publications and 250 conference abstracts.

Dr. Esener is a member of IEEE, OSA, and SPIE, and co-founded San Diego-based Nanogen, Optical Micro-Machines, Parallel Solutions, Genoptix, Devacell, Cellix, Orimedix, Ziva and Call/Recall Inc's. Dr. Esener also serves as the co-chair of Sabanci University Board of Trustees.

PhD Colloquium

GETTING YOUR PHD… AND BEYOND

Critical Stages and Career Paths for the PhD Student

DATE: SUNDAY, AUGUST 19
TIME: 13:00-17:00 (COFFEE BREAK AT 15:00)
ROOM: SALON 3, WAIKIKI BALLROOM (3RD FLOOR OF PAOAKALANI TOWER)
REGIST: $40

CHAIR:
Dr. Nasir Sheikh, University of Bridgeport, USA

SPEAKERS:
Dr. Kishore Erukulapati, IEEE Hawaii Section and IEEE Computer Society Hawaii Chapter, USA; **Dr. Scott Cunningham**, Technical University of Delft, Netherlands, and Associate Editor, *Technology Forecasting and Social Change*

This interactive session will give PhD candidates an excellent opportunity to learn how to successfully defend their dissertation and how to become confident in searching for jobs in academia and industry after obtaining the PhD degree. In addition, the PhD candidates will be able to meet peers and colleagues, share experiences, and network with scholars from many countries.

The invited speakers and the participants will share experiences in the following areas:

- Critical stages in the PhD process and how to successfully master them
- The PhD process and career paths in different countries
- Coping with possible problems while pursuing the PhD degree
- Entering the job market – academia, government or industry (tips/tools for job searching)
- Publishing PhD research

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

TUTORIAL

TECH EMERGENCE

DATE: MONDAY, AUGUST 20
TIME: 16:00 - 17:30
ROOM: KONA MOKU, SALON A

SPEAKERS: Dr. Scott Cunningham, Delft University of Technology; Dr. Alan Porter, Georgia Institute of Technology

This tutorial session covers three important questions.

1. What is technology emergence?
2. Why does a place become a nexus for the emergence of a technology?
3. How can technology emergence be detected at the earliest of stages?

What is Technology Emergence? A Micro-Level Definition for Improving Tech Mining Practice

There has been much research concerning emergence in technology, ever since knowledge was accepted as the engine of economic growth. However, even though there are a growing number of publications, the concept remains ambiguous. Especially, 150 years of literature on emergence is largely neglected while interpreting and understanding the nature of technology emergence. In this study, we propose a new definition of technology emergence with its aspects by considering philosophy of science, complexity science, and evolutionary economics discussions. We combine such theoretical findings with scientific change models. We believe our definition will be more applicable for micro-level studies. Moreover, we create and propose a multi-dimensional, hierarchical research model for applying our definition with respect to the "tech mining" process to elicit tech emergence indicators. We look forward to rich discussion to guide our empirical analyses, as introduced in the companion papers.

Places as a Nexus for Technological Emergence

Why are specific places so often the nexus for new inventions? For instance, San Jose, California, well outpaces other U.S. cities in absolute and even relative numbers of patents. This presentation uses ideas from the geography of technology to better understand technology emergence. Features of the physical, social and institutional environment provide strong clues. Nonetheless, strongly innovative regions rarely persist over time. And other technologies, including general-purpose technologies, lack any strongly regional focus at all. These elements of geography and emergence present both a challenge and opportunity for measuring emergent technologies using science and technology indicators.

R&D Emergence Indicators

We present our approach to detect emerging research thrusts within target technological domains. We highlight our approach that starts with a technological domain of interest (e.g., nanotechnology, microneedles). We search for and download abstract records covering that domain from global databases (e.g., Web of Science; Derwent patents). We then extract and clean terms, enabling calculation of emergence scores for those terms. Our algorithm applies filters to assure a degree of novelty, persistence, community, and rapid growth. We thus distinguish terms at the cutting edge of R&D in the domain under study. In a second phase, we identify "players" (countries, organizations, or individuals) especially actively publishing (or patenting) on the technology in question.

We share results for the case of nanotechnology. We see promise in applying these R&D indicators to distinguish players most active on frontier topics – i.e., to measure "prominence." The emerging topics additionally appear to offer "predictive" value as well, distinguishing likely hot topics for the coming couple of years. The R&D emergence indicators thus offer potential value to researchers, technology managers, and science policymakers.

We also introduce a "Tech Emergence Challenge" – an upcoming contest to devise more effective indicators.

Dr. Scott Cunningham *studies urban science and analytics at the Delft University of Technology, where he is an associate professor. He uses tweets and other texts to understand the political motivation of citizens, their concerns and well-being, and their stances on complex issues of science and technology. He works with municipal governments in the Netherlands to design safer, more livable cities. Prior to joining TU Delft he worked for AT&T. He received a Ph.D. from the Science Policy Research Unit in Science, Technology and Innovation Policy in 1996.*

Dr. Alan L. Porter *is Director of R&D for Search Technology, Inc., Norcross, Georgia. He is also Professor Emeritus of Industrial & Systems Engineering, and of Public Policy, at Georgia Institute of Technology, where he remains Co-director of the Technology Policy and Assessment Center. He is author of some 240 articles and books, including Tech Mining (Wiley, 2005). Current research focuses on generating technological emergence indicators.*

PANEL

MEET THE EDITORS

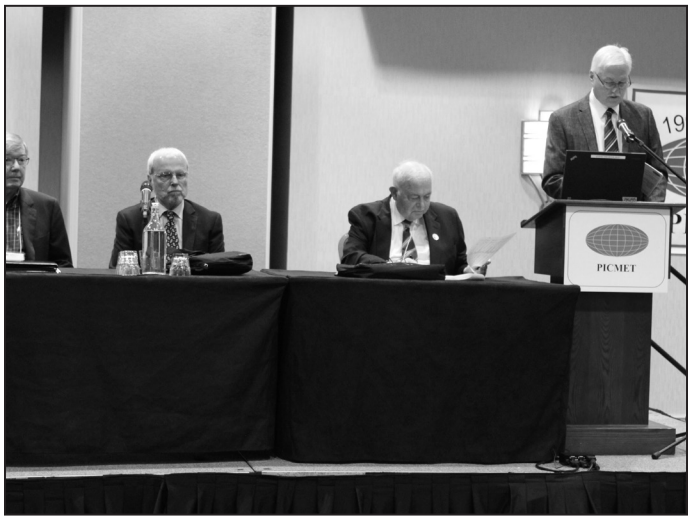
DATE: TUESDAY, AUGUST 21
TIME: 16:00 - 17:30
ROOM: KONA MOKU, SALON C

PANELISTS: Barry Bozeman, Arizona State University; Scott W. Cunningham, Delft University of Technology; Tugrul U. Daim, Portland State University; Kathleen Eisenhardt, Stanford University, Nathasit Gerdsri, Mahidol University; Elicia M. Maine, Simon Fraser University; Harm-Jan Steenhuis, Hawaii Pacific University; Steven T. Walsh, University of New Mexico

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

The following journals are represented by the panelists:

- ***Journal of Technology Transfer***, Dr. Barry Bozeman, Arizona State University, USA; Editor
- ***Technological Forecasting and Social Change***, Dr. Scott Cunningham, Delft University of Technology, Netherlands; Associate Editor
- ***IEEE Transactions on Engineering Management***, Dr. Tugrul U. Daim, Portland State University, USA; Editor
- ***International Journal of Technology Transfer & Commercialization***, Dr. Kathleen Eisenhardt, Stanford University, USA; Member of the Editorial Board
- ***International Journal for Innovation & Technology Management***, Dr. Nathasit Gerdsri, Mahidol University, Thailand; Associate Editor
- ***Technovation***, Dr. Elicia Maine, Simon Fraser University, Canada; Area Editor - Commercialization
- ***Journal of Manufacturing. Technology Management and International Journal of Information & Operations Management***, Dr. Harm-Jan Steenhuis, Hawaii Pacific University; Editor
- ***Journal of Small Business Management***, Dr. Steven T. Walsh, University of New Mexico; Associate Editor



SESSIONS

MA-00 PLENARY - 1

DATE: MONDAY, 8/20/2018
TIME: 08:30 - 10:00
ROOM: KONA MOKU BALLROOM
CHAIR: TIMOTHY R ANDERSON; PORTLAND STATE UNIVERSITY

MA-00.1 [K] Superior Strategy in Entrepreneurial Settings

Kathleen Eisenhardt; Stanford University, United States

How do entrepreneurs and executives form superior strategies in new and growth markets? Understanding this strategy formation is theoretically intriguing because it pushes beyond the boundary conditions of the traditional logics of position and leverage to the less-understood opportunity logic where advantage is precarious and often short-lived. It is also practically relevant, especially for technology-based firms. Strategically successful firms in these settings like Google, Tencent, and Spotify are primary motors for economic growth, but their strategists are challenged by the "high velocity" of their markets and opportunities. Two intertwined themes are at the core of superior strategy: (1) broad view of the strategic playing field enabling better and smarter understanding of opportunities (thinking) and (2) action organized at the "edge of chaos" enabling flexible yet efficient capture of opportunities (doing). Bottlenecks link the two.

MA-00.2 [K]Technology, Innovation and Entrepreneurship – Sharing the Wealth in an AI World

John McDougall; National Research Council, Canada

Traditionally, increased productivity and innovation meant automating routine practices to replace manual labor. As artificial intelligence, driven by vast reams of data gathered from the installation of sensors, is added to the mix, gains are potentially enormous. Similarly, the utility of capital assets, especially those which have been largely owned by individuals, are being monetized through communication and networks which allow them to be shared and utilized by others. These changes could conceivably lead us to a world in which conventional work, as we have known it, largely disappears. However, as this occurs, our social and political systems are being challenged and need to evolve and find ways to identify, value and fund the contributions of large numbers of citizens who will reside outside the wealth-generating portions of the economy. Keeping them engaged as motivated participants in the new economy will be imperative to maintain social license for technology developments and innovations. And technological entrepreneurs will need to consider and mitigate the social dislocations associated with their new initiatives.

MB-01 Innovation Management-1

Monday, 8/20/2018, 10:30 - 12:00
Room: Kona Moku Salon A
Chair(s) Ronald Vatananan-Thesenvitz; Bangkok University

MB-01.1 [R] A Systematic Literature Review of Dynamic Capabilities, Strategic Foresight and Organizational Learning

Nonthapat Pulsri; Bangkok University, Thailand
Ronald Vatananan-Thesenvitz; Bangkok University, Thailand

The systematic literature review (SLR) presented in this paper analyzes the relationships among dynamic capabilities, strategic foresight and organizational learning. The purpose of the SLR on dynamic capabilities (DC), strategic foresight (SF) and organizational learning (OL) is to advance the academic perspective on dynamic capabilities by analyzing how SF and OL integrate into the DC framework. This advancement is necessary since the pace of changes in an organization's environment is increasing, causing competitive pressure to rise. An organization needs to address such changes by adjusting existing capabilities or acquire new ones and thus strengthen its competitiveness. SF provides information and insights about future developments or changes of an organization's business environment, after which OL integrates the obtained information into the strategic planning process. It is important to include the concepts of SF and OL into the DC framework, because an organization without learning cannot integrate information into the organizational decision-making process. The results of the SLR present a triangle relationship among DC, SF and OL that can help to operationalize the DC framework. A practical application of dynamic capabilities facilitates the long-term performance and sustainability of an organization.

MB-01.2 [R] A Framework and Evaluation Model to Determine Industry Velocity

Krip Metanantakul; Bangkok University, Thailand
Ronald Vatananan-Thesenvitz; Bangkok University, Thailand
Dongcheol Heo; Bangkok University, Thailand

An important skill for any organization to secure their survival is an ability to match their internal capabilities with external demands of their business environment. Unfortunately, most firms fail to understand what is really a factual demand of their business environment, since changes occur unexpectedly and ambiguously. As a result, numerous researchers are trying to build theories and models that can evaluate changes in the business environment of an organization. Environmental velocity is one theory that can help both academics and practitioners to understand changes in the industry an organization operates in. Environmental velocity assesses the rate and direction of change for a given industry, to classify it into low, medium or high velocity. Understanding the velocity of an organization's business environment will help management to develop a suitable strategy that can effectively handle the changes in their industry. The purpose of the research proposed in this paper is to develop a quantitative measurement tool for environmental velocity. At present, most of the existing assessment models are qualitative in nature, where the judgment of velocity is based on opinion. To build a velocity assessment model, the proposed research examines relevant criteria and their relative effect on environmental velocity across industries with different velocities. With such an assessment model, organizations are able to prepare themselves for changes in their business environment and thus reduce some of the uncertainties and risks associated with them.

MB-01.3 [R] Diverse Ties with Service Intermediaries and Established Firms' Service Innovation: The Moderating Role of Technological Capability

Lin Wang; Chongqing Technology and Business University, China
Yuelong Zheng; Chongqing Technology and Business University, China
Zhongyi Huang; Chongqing Technology and Business University, China

In this study, we examine the relationship between established manufacturing firms' diverse ties with service intermediaries and their service innovation. Because service intermediaries continuously produce knowledge and act as channels that provide access to external knowledge, thereby diverse ties with service intermediaries grant the firms to extensive heterogeneous and non-local knowledge sources in a way that firms with primarily redundant ties do not. We propose that established manufacturing firms' diverse ties with service intermediaries enable the firms to access the external knowledge and contribute to the firms' service innovation by broadening the scope of search as well as facilitating the non-local search. Moreover, we argue that the positive relationship between diverse ties with service intermediaries and established firms' service innovation will become stronger when firms possess more technological capability. Based upon a sample of established firms in China, our results support these arguments.

MB-02 E-Business

Monday, 8/20/2018, 10:30 - 12:00
Room: Kona Moku Salon B
Chair(s) H.Y. Lam; The Hong Kong Polytechnic University

MB-02.1 [R] Design of an Enhanced Logistics Service Provider Selection Model for e-Commerce Application

C.C. Luk; The Hong Kong Polytechnic University, Hong Kong
King-lun T Choy; The Hong Kong Polytechnic University, Hong Kong
H.Y. Lam; The Hong Kong Polytechnic University, Hong Kong

With the increasing popularity of online shopping, customers' purchasing habits are gradually changing in that they often prefer to buy goods online instead of visiting a physical retail store. Hence, the business-to-customer (B2C) e-commerce concept has emerged to bring convenience and flexibility to customers. By shifting the traditional business model to e-commerce, the seller, e.g., supplier or retailer, not only concentrates on directly selling goods to customers online, but also needs to manage the whole business process, including product delivery to customers within a short period of time. To focus on the core business, the logistics function in the B2C market is usually outsourced to a logistics service provider (LSP). However, sellers who are new to the e-commerce market may find it difficult to select an appropriate LSP to fulfill their needs. In this paper, an enhanced logistics service provider selection (ELSPS) model is proposed for selecting an appropriate partner for providing delivery services under the e-commerce environment. A double fuzzy analytical hierarchy processing (FAHP) approach is applied for multi-criteria decision analysis in LSP selection and follow-up action prioritization. A pilot study is conducted, and the results provide a systematic approach and guidelines for newcomers to enter into the e-commerce market.

MB-02.2 [R] Mobile Payment in Taiwan: Taking Apple Pay as an Example

Hung-An Wu; Minghsin University of Science & Technology, Taiwan
Yi-Hsien Tu; Minghsin University of Science & Technology, Taiwan
Xing Wang Lee; Minghsin University of Science & Technology, Taiwan

Mobile payment, which was a convenient, efficient, easy-to-use tool that was not limited by area, increased our life quality. Since Apple pay got into the Taiwan market in 2017, the mobile payment was becoming the newest tool and was focused on by the financial market in Taiwan. As a result, it was urgent to understand Taiwanese consumers' purchase behavior in using a mobile payment service. A questionnaire was used to collect data, and there were 222 samples in this research. According to the literature review, the technology acceptance model, perceived risk, perceived convenience, and use intention were proposed to analyze the Taiwanese consumers' behavior in using mobile payment service. The demographic analysis, reliability analysis, t-test, one-way ANOVA, and regression analysis were used in statistical analysis, and the results of the research indicated: 1. Perceived usefulness (PU) and perceived risk (PR) significantly contribute to the model. The perceived usefulness positively influenced the users in Taiwan. Perceived risk negatively influenced users. 2. For gender differences, there was no statistical differentiation. The gender differences seem to not have significantly influenced the consumers' PEU (perceived ease of use), PU (perceived usefulness), PR (perceived risk), PC (perceived convenience), and UI (use intention). 3. The frequency of consumers using mobile payments is having obvious differentiation on perceived useless, perceived ease of use, perceived risk, perceived convenience and use intention, which indicated that the people who never used the mobile payment service had higher risk perception, and lower perceived ease of use, perceived usefulness, perceived convenience, and use intention than those who had experienced mobile payment service.

MB-02.3 [A] Using Crowdfunding in an Innovative Way: A Case Study from a Chinese Crowdfunding Platform

Xuefeng Liu; Xiamen University, China
Zhao Wang; Xiamen University, China

In this study we try to suggest a new model of crowdfunding platform based on the description and analyses of several innovations made by a Chinese platform enterprise engaging in crowdfunding for hostels, cafes and so forth. Firstly, different from traditional crowdfunding models, this emerging platform enterprise combines reward-based crowdfunding with equity-based crowdfunding (or lending-based crowdfunding). Such kinds of crowdfunding models make the transitions that the roles of backers are not merely customers, stockholders, or creditors but a dual role as being customers and stockholders (or creditors) at the same time. Secondly, to further motivate the communication among backers and fundraisers, the Chinese platform enterprise tried to create the community of stockholders and the membership system which make it possible that even backers and fundraisers of different projects could make connections with each other. Thirdly, the platform creating is the first step adopted by the enterprise to create a comprehensive business ecosystem, consisting of operational supporting, institutional investors, entrepreneurship service, intelligent hotel management service, content service, as well as famous OTAs. Such a comprehensive ecosystem offers more connectivity and promotes the distribution of information. We focus on the model development and try to provide insights for the growth and development of crowdfunding.

MB-03 Enterprise Management-1
Monday, 8/20/2018, 10:30 - 12:00
Room: Kona Moku Salon C
Chair(s) Xiao Han; Beijing Institute of Technology

MB-03.1 [R] Exploring the Relationship between Relevance of Coalition Loyalty Programs and Loyalty

Hong Wang; Beijing Institute of Technology, China
Daniela Corsaro; Catholic University of the Sacred Heart, Italy
Xiao Han; Beijing Institute of Technology, China
Xin Qi; Beijing Institute of Technology, China
Di Kuang; Beijing Institute of Technology, China

Coalition loyalty programs are on the rise around the world. This paper proposes the construct of Relevance of Coalition Loyalty Programs. The construct comprises two dimensions: convenience of redeem points and product fit. We developed the scale of Relevance of Coalition Loyalty Programs. Further, a structural equation modeling was used to examine the effect of convenience of redeem points and product fit on customer satisfaction and customer loyalty. The results show that convenience of redeem points and product fit have a significant impact on customer satisfaction. Product fit has a significant relationship with customer loyalty, but convenience of redeem points has no significant effect on customer loyalty. In addition, customer satisfaction partly mediates the relationship between product fit and customer loyalty. This article provides a theoretical guidance on designing a coalition loyalty program and enhancing customer loyalty for enterprise managers.

MB-03.2 [R] The Influence Factors on Young Consumers' Green Purchase Behavior: Perspective Based on Theory of Consumption Value

Hong Wang; Beijing Institute of Technology, China
Xiao Han; Beijing Institute of Technology, China
Di Kuang; Beijing Institute of Technology, China
Zhichen Hu; Beijing Institute of Technology, China

With the rise of green consumption, green products gradually have become a part of people's lives. Studies on green consumption behavior have become a focus for enterprises and scholars. To verify the assumptions of this paper, questionnaires were carried out among young consumers who have purchased green products. The present research studies the influence factors of green purchase behavior based on the theory of consumption value and examines whether there are significant differences in consumption values and green purchase behavior between male consumers and female consumers. The results show that conditional value and epistemic value have a positive effect on green purchase behavior, but functional value, social value and emotional value have no effect on green purchase behavior. Compared with male consumers, female consumers place higher conditional value and epistemic value on green products. In marketing practice, this study would be helpful for government and enterprises to take effective measures to promote green purchase behavior.

MB-03.3 [A] The Effectiveness and Problems of Talent Policy Implementation in China: Taking Major Talent Project as an Example

Jianquan Ma; Tsinghua University, China
Xuan Liu; National Academy of Innovation Strategy, China

HongWei Wang; National Academy of Innovation Strategy, China
YingJie Li; Tsinghua University, China

In 2010, China released National Medium and Long-Term Talents Development Plan (2010-2020) and proposed 12 major talent projects. Based on the goals of these talent projects, this paper divides 12 major talent projects into 40 sub-tasks and 56 task objectives. Through the logical framework method and statistical analysis, this paper compares the objectives with actual completion, and finds that although the major talent project as a whole is promoted in an orderly manner under the impetus of the ministries and commissions, there are still obstructions in policy implementation such as follows: document implementation, conflict of policies among various departments, lack of systematic design, etc., which means the policy lacks of systematic, persistent and stability. These reasons lead to the results that the less the leading departments are, the better the projects performed; the less complex the object talents are, the better the projects performed; some of the talent projects are even reduced as political achievement. The implementation of talent projects needs to be further optimized and improved.

MB-04 Technology Acquisition
Monday, 8/20/2018, 10:30 - 12:00
Room: Waikiki Salon 1
Chair(s) Yuichi Washida; Hitotsubashi University

MB-04.1 [R] How Should Japanese Companies Build Absorptive Capacity at the Team Level?

Xiang Yu; Hitotsubashi University, China
Yuichi Washida; Hitotsubashi University, Japan

Absorptive capacity (ACAP) has been defined as a set of dynamic organizational routines and processes, by which firms acquire, assimilate, transform, and exploit knowledge. Since open innovation, especially inbound open innovation and coupled open innovation, needs teams to absorb external knowledge, ACAP is a prerequisite for open innovation. However, a multitude of Japanese companies have difficulty in building ACAP and there is little conceptual framing and empirical effort to find out the reason for a team's level. Therefore, this paper investigates what Japanese companies' teams should do to build ACAP for open innovation, with a focus on two key factors that influence ACAP: gatekeeper and combinative capabilities. Based on an empirical study which focuses on a project team's business context in one of Japan's largest IT service companies, this paper examines the actual conditions of gatekeeper and combinative capabilities, as well as the level of PACAP and RACAP in one project team of this company. The results suggest that a project team that has enough combinative capabilities and gatekeepers with sufficient ability and authority will likely have a high level of ACAP. This paper also suggests what Japanese companies' teams should do to develop combinative capabilities and how to support their gatekeepers.

MB-04.2 [R] A Technological Return to Originating Firms from Knowledge Spillovers

Tohru Yoshioka-Kobayashi; The University of Tokyo, Japan
Toshiya Watanabe; The University of Tokyo, Japan

This paper empirically examines one of the benefits of outbound technology; i.e., technological returns to originating firms which revealed, licensed, or simply spilled over their technologies. Most open technological innovation literature has focused on inbound innovation, with few papers mentioning the value of outbound technological innovation. These papers found the phenomena of learning-by-exposure or recipient-guided unfamiliar knowledge exploration, which entails technological learning by an original technology holder from those who had learned from the originator. Although this discovery is unique, they left one question: Can outbound technology be used as a strategic tool to learn from technological alliance partners? We examined this by using patents from 114 research consortia with the assumption that citations of patents with certain time-lags represent knowledge flows between two parties. We analyzed 913 backward and forward citation pairs that share the same applicant. Our quantitative test illustrates the positive effect of technological knowledge spillovers and subsequent absorption of the focal technology. Patents indirectly citing patents from originating firms via patents from others show significantly high technological value; however, this effect is only observed in spillovers to third parties of research consortia. In other words, recipient-guided exploration is an almost-uncontrollable side effect. At the same time, our analysis revealed that knowledge spillovers are not always negative for originating firms.

MB-04.3 [R] Identifying the Core Knowledge Domains of Emerging Technologies: The Case of New Energy Vehicles

Hailong Wang; Dalian University of Technology, China
Kaikai Liu; Dalian University of Technology, China
Shixiang Long; University of Toyama, Japan

Basic research plays a key role in delivering technological and industrial innovation, especially in the emerging industries. Therefore, how to identify the core knowledge domains in cutting-edge technologies presents important strategic implications for both researchers and practitioners. This paper aims to explore the core knowledge domains and their evolutionary dynamics in such an emerging technology as the new energy vehicle. Collecting data of research papers from Web of Science as samples, it firstly constructs a field citation network of main research domains. Secondly, it uses the input-output method to measure the knowledge frontiers and the knowledge bases, with scientific sensitivity coefficient and scientific influence coefficient as measurement indicators, respectively. Finally, it explores the evolutionary dynamics of the frontier and core knowledge domains from 1991 to 2015. Results show that core knowledge fields in the new energy vehicles consist of energy fuels, electrochemistry, chemistry, transportation, environment sciences, etc., and they had different pushing and pulling effects on the research of the new energy vehicle during different development phases.

MB-05 Intellectual Property-1
Monday, 8/20/2018, 10:30 - 12:00
Room: Waikiki Salon 2
Chair(s) Yaeko Mitsumori; Tsukuba University

MB-05.1 [R] An Analysis of the Impact of TRIPS' Special Exemption for LDCs on the Bangladesh Pharmaceutical Industry

Yaeko Mitsumori; Osaka University, Japan

Following the enforcement of the WTO's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), all WTO members were required to introduce a "TRIPS compatible patent law (including product patents)" in their countries. However, a grace period was granted to LDCs, including Bangladesh, in this regard. Today, Bangladesh is exempted from introducing product patents until 2033 owing to TRIPS' special treatment. Different from other LDCs, Bangladesh has a strong pharmaceutical industry, and domestic pharmaceutical companies occupy the majority of Bangladesh's pharmaceutical market. This study will analyze the impact of TRIPS' special treatment for LDCs on the Bangladesh pharmaceutical industry. The special exemption of TRIPS allows Bangladesh's pharmaceutical companies to imitate brand name drugs that are patent-protected in other countries, and to sell these drugs in both domestic and overseas markets. However, the level of technology in many Bangladesh pharmaceutical companies is not advanced. Only a few of Bangladesh's firms can export their products to advanced markets. Moreover, rapid economic development of the Bangladesh economy might cause a reconsideration of LDC status of Bangladesh in the future. Based on statistical data analysis and a series of interviews with stakeholders in Bangladesh, this study will first observe the current status of Bangladesh's pharmaceutical industry, and thereafter analyze the impacts of TRIPS on the market.

MB-05.2 [R] Assessing 'Start-up Readiness' for Research Topics and Researchers: Case Studies of Research-Based Start-Ups in the Biopharmaceutical Domain

Tomotaka Goji; The University of Tokyo, Japan
Yuki Hayashi; The University of Tokyo, Japan
Hiroko Yamano; The University of Tokyo, Japan
Takanari Matsuda; The University of Tokyo, Japan
Ichiro Sakata; The University of Tokyo, Japan

This paper presents an assessment, using global databases of start-up finances and academic research papers of "start-up readiness" of research topics and researchers related to commercialization-oriented fundamental research. For research domains such as life sciences that pursue fundamental scientific understanding and applications intended for immediate use, academic entrepreneurship has played a pivotal role in commercialization. Case studies of start-ups in the biopharmaceutical research domain suggest that the biopharmaceutical field has abundant opportunities stemming from scientific research, commercialization, and entrepreneurship in life sciences. This assessment method sorts specific industry segments by which financing activities are active, and by which related growing research topics attract increased academic attention. We constructed networks of author citation and co-authorship from paper citation networks related to research topics in industry segments in the biopharmaceutical domain. Results obtained across all the research topics we surveyed demonstrated that authors in the top 10% of degree centrality ranking in both networks are far more likely to be start-up participants than other authors. More than conventional research methods, our computational approach might provide convenient, dynamic comprehensive, global and real-time understanding of "start-up readiness" of research topics and researchers in user-inspired fundamental research.

MB-05.3 [R] Forensic Analysis of Inventor Qualifications using Social Media Data

Joseph C Edmondson; Portland State University, United States

Inventorship is required for patent validity. This paper provides a data collection and analytical process to forensically evaluate the issue of inventorship. This paper proposes a metric, the Inventor Quality Factor (IQF), as a baseline measurement tool. This analytical process for the determination of the IQF is straightforward and may be automated by using data obtained from the Internet. Application of this forensic method can be done in a relatively low-cost manner by using automated search tools directed at social networks where people "post" their qualifications.

MB-05.4 [R] Questionnaire Survey at Universities on Utilization of Patent Information for Academic Science and Technology Researches

Yoshitoshi Tanaka; Tokyo Institute of Technology, Japan
Toshiyuki Inui; IPNJ International Patent Office, Japan
Suzuka Yoshida; Tokyo Institute of Technology, Japan

It seems that, currently, patent information is not fully utilized for academic research at university. What kind of consciousness do university researchers have about patent information? In response to this question, we designed a questionnaire aimed at clarifying its actual condition and consciousness based on a preliminary hearing of university researchers. This questionnaire was sent to 319 laboratories of the top 35 Japanese universities, where their number of patent applications are positioned as top ranking. In addition to clarifying the situation of utilization of patent information for their own science and technology research, we visualized the consciousness of university researchers concerning basic research and commercial research, extracted the issues in patent information utilization, and, finally, we suggested important factors to utilize patent information for science and technology research. Also, we suggested the transition of basic research to commercial research along with the processes of research progress. This paper aims to derive hints for science and technology research at universities to be able to more efficiently contribute to society launching a startup company or a venture company utilizing patent information in the future. We expect this to be an important message in the field of managing technological entrepreneurship.

MB-06 R&D Management-1

Monday, 8/20/2018, 10:30 - 12:00
Room: Waikiki Salon 3
Chair(s) La-or Kovavisaruch; National Electronics and Computer Tech. Center

MB-06.1 [R] The Factors Affecting Joint R&D in the Service Industry: Focusing on Organizational Innovation and Defense Mechanisms

Do Bum Chung; KISTI, Korea, South
Hye-Jeong Jang; KISTI, Korea, South
Byungil Kim; Andong National University, Korea, South

Today, technological innovation activities are very important for the survival and competitive advantage of firms, and then many firms are doing joint R&D. In particular, the size and proportion of the service industry have been increasing steadily in recent years, and the interest in technological innovation is also increasing. However, since the previous studies have dealt with the manufacturing industry, this study focuses on the factors affecting joint R&D in the service industry. For the analysis, we use the data from the Korean Innovation Survey (KIS) in 2016 conducted by the Science and Technology Policy Institute (STEPI). Among the data of the service industry, only those firms that have performed actual R&D activities are selected. As a result of the analysis, it is found that the firms that performed organizational innovation positively influence joint R&D for technological innovation activities. In addition, firms with defense mechanisms such as securing intellectual property and confidentiality within the firm have positive effects on joint R&D. It is very important for firms to acquire new knowledge while protecting their knowledge, because the service industry is a knowledge-intensive industry. The results of this study will do much for setting up firms' strategies for joint R&D.

MB-06.2 [R] Conceptual Approach to the Development of Technology Evolution Network Based on Structural and Semantic Analysis

Ho-Joon Lee; U1 University, Korea, South
Youngjung Geum; Seoul National University of Science & Technology, Korea, South

Since technology plays a key role in new product/service development, many techniques have been developed to analyze technology evolution. Among the many techniques, citation network analysis has been actively used for identifying technological trajectory. Even if there have been numerous studies to employ citation network to analyze technological evolution, it still remains a void in the literature how to differentiate each citation's role in the technology evolution network. Generally, a paper or patent cites 20 to 30 references. However, most studies consider the importance of these citations as homogeneous, with less consideration on the importance of each individual citation. This can cause significant misleading for technological evolution analysis. Even if some studies tried to employ content-based citation analysis, these still remain conceptual. In response, this study suggests a new approach to analyzing the technology evolution network by reflecting on the role of each citation, considering both structural and semantic perspectives. For this purpose, we use natural language processing and machine learning techniques to identify the importance of each citation by analyzing descriptive styles and semantic meanings. Thus, how each citation differs in terms of mediating technological knowledge flow can be measured, considering the frequency, structural position, and descriptive styles of each citation. Using a different weight for each citation, a new way of network analysis is suggested to analyze technology evolution.

MB-06.3 [R] Internationalization of Research Activities of Thai Researchers: A Case Study

Sineenat T Watanavisit; National Electronics and Computer Tech. Center, Thailand
La-or Kovavisaruch; National Electronics and Computer Tech. Center, Thailand

The main purpose of the study is to examine the main factors of internationalization of research activities of Thai researchers at a research and development (R&D) organization in electronics and computer technology in Thailand. The study is based on an internationalization approach focusing on three aspects of organizational environment and support for research activities: internationally-oriented research, foreign researcher employment, and international academic

activity support. Data were collected through an online questionnaire that is adapted from the two survey questionnaires by Daizen (2015) and by Kwiek (2015) involving 100 Thai researchers at the R&D organization. With a 30% response rate to the survey, the key findings from statistical analysis show that two of three components of organizational environment and support, which are internationally-oriented research and international academic activity support, positively relates to internationalization of research activities of Thai researchers at the R&D organization. On the other hand, the factor of foreign researcher employment doesn't affect the internationalization of research activity for this case. The major practical contribution of the study is that it provides some important factors of internationalization of research activities to R&D organizations for designing their research activities and developing a strategic plan for international research collaboration in order to enhance a level of internationalization of both the individual and organization.

MB-07 Information Technology
Monday, 8/20/2018, 10:30 - 12:00
Room: Milo I
Chair(s) Naoshi Uchihira; Japan Advanced Institute of Science and Technology

MB-07.1 [R] The Evolutionary Process of IT Concept Words: A Case Study on IoT

Rieko Kataoka; Japan Advanced Institute of Science and Technology, Japan
Naoshi Uchihira; Japan Advanced Institute of Science and Technology, Japan
Yasuo Ikawa; Japan Advanced Institute of Science and Technology, Japan

In information technology, new concept words appear every few years and affect the business environment. In several cases, the core technologies and architectures have remained the same despite minor changes in concepts. For example, Bigdata was succeeded by the IoT (Internet of Things). The trend in concept words reveals an evolutionary pattern. In this study, we applied a text mining approach to analyzing all the articles in several popular IT magazines for 15 years, and we proposed a new model of IT concept words transition. The model shows that there are three phases of concept evolution. Some related concepts appeared together in the first phase. In the second phase, such a group of words integrates to form a new concept. Finally, the concept develops into a general word and gains recognition in each industry as a completely specialized concept. This is the third series of research since our papers for PICMET 2014 and 2016 focused on Cloud Computing. In this paper, we re-analyze the articles by expanding two more years focusing on Bigdata and IoT in addition to Cloud Computing. As a result, we show that the confidence level of the model is further increased.

MB-07.2 [R] An IT Service Development Model Based on a Service Ecosystem: Case Studies of Cloud Service Companies

Kenichiro Banka; Japan Advanced Institute of Science and Technology, Japan
Naoshi Uchihira; Japan Advanced Institute of Science and Technology, Japan

In recent years, information technology (IT) companies as IT providers have developed not only IT systems but also related services for users. These providers aim to standardize IT services to reduce development costs and improve quality. However, IT service requirements differ for each user; therefore, the providers cannot completely meet the users' requirements. Furthermore, the business environment of users is changing rapidly, and accordingly, the IT services should change as well. Therefore, IT providers cannot manage a continuous IT service development process very well. To address this challenge, we propose a new IT service development model based on a service ecosystem. This model suggests building a service ecosystem and defining the requirement phase before IT service development. Furthermore, it recommends that IT providers develop IT services and create value with partners in the service ecosystem. Consequently, there are diverse IT services in the service ecosystem. Compared with traditional IT development models, the IT providers can manage their services more effectively with the implementation of the proposed model.

MB-07.3 [R] Opportunities and Challenges of Embracing Smart Factory in South Africa

Anup Prodhan; University of Johannesburg, South Africa
John Francis Agwa-Ejon; University of Johannesburg, South Africa

The fourth industrial revolution combines cyber-physical systems with manufacturing processes, enabling industries to automate and maintain their production in real time. Smart technologies open new global markets and increase global economy; however, there are some challenges associated with the implementation such as lack of skilled manpower, social inequality, potential disruption in the labor market, cyber-risks, etc. This paper investigates the opportunities and challenges associated with the adoption and implementation of smart factory in South Africa using extensive review of available literatures, which is verified using a single South African case study. It was observed that the current adoption of smart technologies is low. South African manufacturing industry and existing workforce will require upgrades to match skills required for smart factory. Smart factory may displace a specific labor force with automation; however, it will also create new types of jobs. Some industries are already using flexible production and producing customer-specific goods, which indicates that these industries will easily transform to mass customization. Cyber-risks and privacy issues of the digital revolution provide a platform for existing ICT professionals to engage in R&D, as well as create new jobs related to development of security systems and software. Industries and people are showing certain level of acceptance; however, they are yet to fully engage in smart factory.

MB-08 Convergence of Technologies
Monday, 8/20/2018, 10:30 - 12:00
Room: Milo II
Chair(s) Marina Dabic; Nottingham Trent University & University of Zagreb

MB-08.1 [R] Anticipating Industry Convergence in the Context of Industry 4.0

Svetlana Okara; University of Muenster, Germany
Stefanie Broering; University of Bonn, Germany
Nathalie Sick; University of Technology Sydney, Australia

The merger of the digital and physical world in the context of Industry 4.0 is about to disrupt value chains and markets in almost every industry sector. In this context, the Internet of Things (IoT), enabling linkages and communication between physical and virtual objects, is the technological foundation of implementing Industry 4.0. In such a fast-paced environment, it is vital for companies to react quickly and exploit new business opportunities. One critical example is the interplay between logistics and information and communications technology (ICT) industries, where IoT has the potential to align goods and information flows in an unprecedented manner. The arising new functionalities, services and products show potential to blur the industries' boundaries and give birth to a whole new industry segment. Therefore, the present study strives to anticipate industry convergence between logistics and ICT industries in the realm of IoT. The empirical patent analysis is based on IPC co-classification and assignee structure. The analyses are refined along the different levels of IoT to provide detailed insights for companies where new technological and market competences need to be acquired.

MB-08.2 [A] Third Mission Goings-On and Academic Entrepreneurs in Europe

Marina Dabic; Nottingham Trent University & University of Zagreb, United Kingdom
Ivana Kovac; University of Zagreb, FEB, Croatia
Davor Labas; University of Zagreb, Croatia
Ivan Novak; University of Zagreb, FEB, Croatia
Mile Bosnjak; University of Zagreb, FEB, Croatia

Academic entrepreneurship and the process of establishing new firms are rooted in technologies and knowledge resulting from the research carried out at universities. Thus, they have served as engines of growth in the USA since the Bay-Dole Act, and presently Europe and China are trying to catch up. The article aims at recommending a research agenda at the intersection of the functions of knowledge transfer from universities from the perspective of academic entrepreneurship and the role of universities' third mission. Talent management teams are crucial to managing knowledge and technology transfer successfully in today's global world. Hence, research on this intersection should endeavor to find out antecedents,

consequents and the processes of how the talented people clustered in detached teams, the human capital of spin-offs and born global organizations can become the source of competitive advantage as regards managing entrepreneurship within the university. The literature review search was conducted in SSCI-Web of Science Core Collection databases focusing on journal articles and review with the limitation that conference papers, books and other scientific contributions not abstracted there were not included.

MB-08.3 [R] Ingredients of Successful Emerging Business Ecosystems: Case of Industrial IoT Adoption

Ranjit Gupta; Tokyo Institute of Technology, Japan
Kumiko Miyazaki; Tokyo Institute of Technology, Japan
Yuya Kajikawa; Tokyo Institute of Technology, Japan

An emerging business ecosystem presents a future new value creation opportunity for firms that choose to collaborate effectively in a timely manner. This paper combines innovation diffusion, systems transition, innovation systems and business ecosystem literature to identify ingredients in ecosystem-dependent firms. These insights are applied to the case of Industrial Internet of Things (IoT) adoption from an ecosystem actors' perspective. Two contrasting engagement models are presented based on this guidance that possess a higher likelihood of success.

MB-08.4 [R] Study on the Impact of Internet Development on Talent Transformation

Yuanxi Huang; China Association for Science and Technology, China
Guang Yang; China Association for Science and Technology, China

Over the past 50 years, the Internet has continuously created new production modes and consumption patterns, deeply affecting the living vision of human society, impacting the transformation of talent as well. The development of the Internet has significantly improved the interconnection and intercommunication capability of human and introduced the world to a brand-new digital economy. Meanwhile, it has also intensified a new round of global talent competition. Internet talents widely exist in every industry and level of social production and living, which means the knowledge structure, quality, ability of talent have been continuously updated with the fast-changing Internet technology and business model. Internet mode evolution triggers new transformation for talent supply and demand. Internet development enriched the values of talent cultivation. Internet impacts on talent development in various ways and comprehensively. All countries in the world should try to construct a positive and good environment to face the talent transformation.

MB-09 Global Issues
Monday, 8/20/2018, 10:30 - 12:00
Room: Milo III
Chair(s) Hung-Chun Huang; National Chi Nan University

MB-09.1 [A] Re-imagining Green Supply Chain Management (GrSCM) Implementation Strategies in a Globalized World

Abednico L Montshiwa; Tohoku University, Japan

Green supply chain management implementation strategies in disaster prone regions are limited; the paper presents supply chain cooperation as an economic, social and political implementation tool in an effort to fill this gap. In exploring this, the study introduces supply chain cooperation in a three-phase competitive advantages model adopted from the Barney 1995 model (with slight differences). Smart PLS 3.0 software package was adopted to carry out multi-variable data analysis. The study's assumption is a capital economic system and bases its argument of analysis on stockholder theoretical lenses. The study established that company size does not significantly affect supply chain cooperation, suggesting that companies of all sizes can organize and enhance their network to be cooperative. Results also showed that companies with a cooperative supply chain network tend to have competitive advantages compared to non-cooperative ones. The study concluded by proving that supply chain cooperation is a viable way to manage business risks, be they internal or external.

MB-09.2 [R] Exploring Asia-Pacific Technology Diffusion and Technological Change

Hung-Chun Huang; National Chi Nan University, Taiwan
Hsin-Yu Shih; National Chi Nan University, Taiwan
Tsung-Han Ke; National Chi Nan University, Taiwan

Global outsourcing and global supply chains carry out international science and technology diffusion. International technology diffusion is an important channel to acquire advanced technology. The countries in Southeast Asia have been highlighted in global economic development. ASEAN has potentially demonstrated as a third largest common market. On the base of the connection between ASEAN and Asia-Pacific development, precisely positing the regional technological embeddedness of ASEAN in Asia-Pacific is a critical issue for policy initiation as well as the multilateral cooperation and mutual reciprocity. Thus, this study utilizes the technological network to investigate international technology diffusion in the Asia-Pacific region. The study result indicates the rapid development of ASEAN and South Asia, which can provide authorities to strategize the technological influence in these areas.

MB-09.3 [R] Modeling and Identifying the Network of International Top Talent Migration

Yinqiu Wang; National Academy of Innovation Strategy, China
Hui Luo; National Academy of Innovation Strategy, China
Zhengfeng Li; Tsinghua University, China

This paper investigates international top talent migration with two kinds of big data analysis: complex network theory and system identification. First, the international top talent migration is modeled as a kind of complex network, the relationship between talent migration and complex network is discussed, and edge weights are viewed as unknown parameters which should be identified. Next, the definition of top talents and the method of collection and process of historical data about the amount of international top talent migration between countries are introduced. Furthermore, by employing the least squares method, this paper proposes an approach to identify the unknown parameters, and the obtained identification results are testified based on statistics theory. To show the effectiveness of the proposed theories, we give an example and discuss the experiment results.

MB-10 Information Management-1
Monday, 8/20/2018, 10:30 - 12:00
Room: Milo IV
Chair(s) Nataly J Flores Marca; University College of Southeast Norway

MB-10.1 [R] Fintech Puzzle: The Case of Bitcoin

Tin-Chang Chang; Asia University, Taiwan
Yung-Lin Chen; Asia University, Taiwan

The recent increase in research on financial technology has resulted in transactions receiving considerable research attention. With the increasing importance of bitcoin, many related topics require further clarification. Because bitcoin is a popular financial asset, determining whether the price information is fully circulated among trading platforms has been the focus of many studies in recent years. The method for verifying the efficient market hypothesis relates to whether the price series is a random walk; that is, whether a unit root exists. According to the literature, whether the price of bitcoin satisfies the efficient market hypothesis remains controversial; however, these studies have not considered nonlinear data structures. To deal with the structural change of data, this study employed different unit root tests, namely the Zivot-Andrews unit root test and Kapetanios-Shin unit root test, to investigate bitcoins' relationship to the efficient market hypothesis. If the efficient market hypothesis is validated, the price formed by the bitcoin trading platform is close to a perfectly competitive mechanism, and the information can be quickly and completely reflected in the price, with information of different trading platforms having mutual influence. Therefore, this study applied the threshold vector autoregressive model to explore price information transmission between various trading platforms. The contribution of this research is its exploration of the financial tools derived from the highly developed fields of financial science and technology.

This is helpful for providing new methods for completing financial transactions or a platform for speculators to engage in arbitrage.

MB-10.2 [R] Basic Methodology for Cyber Physical System Modelling

Anne Bernardy; RWTH Aachen University, Germany
Felix Jordan; RWTH Aachen University, Germany
Gunther Schuh; RWTH Aachen University, Germany
Volker Stich; RWTH Aachen University, Germany
Violett Zeller; RWTH Aachen University, Germany

Nowadays, the market for information and communication technologies used for IOT-applications grows daily. Since companies need technologies to transform their business processes corresponding to the digital revolution, they need to know which technologies are available and fit the best for their use case. Their inertial issue is the lacking overview of technologies suitable to connect their production or logistics. Hence, this paper presents a methodology to select technologies (and combinations) based on their functions. It differentiates between information and communication technologies, digital technologies and connecting technologies by the physical function and its role in a cyber-physical system. Depending on the use case, the applicability of every technology varies. Due to that reason, the paper illustrates a ranked qualification of the technologies for typical use cases, focussing tracking and tracing issues in the intralogistics of producing companies. The evaluation is performed upon a literature research, a market study to identify suitable technologies, and various expert interviews to assess the applicability of the technologies.

MB-11 Emerging Technologies-1
Monday, 8/20/2018, 10:30 - 12:00
Room: Milo V
Chair(s) Leong Chan; Portland State University

MB-11.1 [R] Exploring the Co-evolution of Inter-industry Technological Innovation: Case of 3D Printing

Yuanyuan Shi; Shanxi University of Finance and Economics, China
Leong Chan; Pacific Lutheran University, United States
Renzhi Cao; Pacific Lutheran University, United States
Chung-Shing Lee; Pacific Lutheran University, United States

Co-evolution occurs when two or more species reciprocally affect each other's evolution in the natural biological ecosystem. It is also an important evolutionary mechanism for inter-industry technological correlation systems. As technological interaction emerges and develops among related industries, some common characteristics can be observed in various industrial phases. This article builds a conceptual model on the co-evolution mechanism based on the causal relationships, processes, and results of inter-industry technological interactions. A five-stage collaborative evolution model and its evolutionary path are proposed. According to the intensity and direction of the technological interactions among industries in various stages, the process of synergetic development and its rules are revealed. Through the case study of 3D printing and related industries, it can be found that both the stage and level of correlated development are different during the technological innovation process. The roles and positions in the correlation are different among related industries. The findings of this research provide insights for technology policy in different high-tech industries. Decision makers can develop more effective innovation strategies and promote the co-evolution of new technologies in different development stages of high-tech industries.

MB-11.2 [R] Strategy in 3D Printing of Food

Harm-Jan Steenhuis; Hawaii Pacific University, United States
Xin Fang; Hawaii Pacific University, United States
Tolga Ulusemre; Hawaii Pacific University, United States

Additive manufacturing was developed in the 1980s and for a long time, it had limited applications. In recent years additive manufacturing has found increasing uses in a variety of industries such as the medical field and the construction industry. One industry in particular that has received increasing attention is that of 3D printing food. One of the parties that is interested in this is NASA as 3D printing improves the ability for space exploration. In this study, we examine the current technological developments in the 3D food printing industry. The focus is on describing the main technologies that are applied in this industry, the materials that are being printed, and the main companies and business strategy. It is concluded that the industry is very young and that most of the commercialization is based on the application of only one of the seven additive manufacturing technologies.

MB-11.3 [R] The Geography of 3D Printing

Harm-Jan Steenhuis; Hawaii Pacific University, United States
Xin Fang; Hawaii Pacific University, United States
Tolga Ulusemre; Hawaii Pacific University, United States

Additive manufacturing, also known as 3D printing, has existed since the 1980s. Since then, the innovation has spread and many companies are working on new applications or new 3D printing machines. In some ways, 3D printing is flexible because the machines can produce items in almost any location, and this has been considered an advantage that can reduce logistics cost. Linked to this, one might also expect that 3D printers can be developed in different environments. This study is focused on the geography of 3D printing by examining the location of 3D printing companies. The analysis focuses on the main industrial 3D printing companies and examines where companies are located and whether some countries have a higher concentration of companies. It is found that the main companies that produce industrial 3D printers are located in only 12 countries, that the majority of companies is relatively young, and that about 20% were academic spin-offs.

MD-01 Innovation Management-2
Monday, 8/20/2018, 14:00 - 15:30
Room: Kona Moku Salon A
Chair(s) Manabu Eto; Hitotsubashi University

MD-01.1 [R] Structural Analysis for Diffusion Using Simulation in Agent-Based Modeling with Multi Micro Factor

Kazuhide Namba; FP Technician, Japan

This paper introduces analysis of structure for diffusion, because diffusion as individual level agent-based modeling and multi-agent simulation about diffusion are effective. Previous research shows the factor related agent are the consumer behavior and the information network. In this research the other factor was added. As a result of the addition, the factor is multi. The factor is micro not macro. Micro means the factor is changed in the diffusion process. The factor both multi and micro are reflected to agent-based modeling. Multi-agent simulation by agent-based modeling was done. As a result of simulation, we could produce the diffusion phenomenon. Because of the multi micro factor, complicated phenomenon could be produced. An example of complicated phenomenon is chasm or inverse chasm. Complicated phenomenon depends on the factor. Originality about this research is that the structure for diffusion was revealed by consideration of the simulation result. The structure for diffusion consists of the consumer behavior and the information network.

MD-01.2 [R] A Comparative Study of the Effects of Different Industry Technology Innovation Performance Factors

Jinwei Zhu; Jiangnan University, China
Yangyang Wang; Jiangnan University, China

This paper constructs a semi-parametric model to study the effects of six different factors of innovation performance in different industries based on the relevant data of Growth Enterprise Market (GEM) listed companies. The empirical results show that: (1) R&D expenditures on innovation performance in most industries have a significant positive impact; (2) R&D personnel investment and government subsidies have a significant positive impact on technology innovation performance of knowledge-oriented industries; (3) technology diversity has a significant positive impact on innovation performance of technology-oriented industries; (4) the proportion of exports and company size show an inverted U-shaped

relationship with technological innovation performance in some industries; and (5) the effect of semi-parametric model fit is superior to the general parameters model.

MD-02 New Venture Development
Monday, 8/20/2018, 14:00 - 15:30
Room: Kona Moku Salon B
Chair(s) Joanne Scillitoe; California State University Northridge

MD-02.1 [R] Technological Innovation Investments Influence on the Strategic Orientation of Socio-Tech Ventures

Joanne Scillitoe; California State University Northridge, United States
Latha Poonamallee; Michigan Technological University, United States
Simy Joy; University of East Anglia, United Kingdom

The technological innovation literature has widely considered the technological innovation process and outcomes of market driven, for-profit firms. However, research on the technological innovation process and outcomes of socio-tech ventures, those that are formed to create social value via employing technology, is lacking. Drawing from the adoption of innovation and strategic orientation literature, we present a conceptual model of how technological innovation investments by socio-tech ventures made during the innovation adoption process influence changes in its market versus social strategic orientation. These innovation investments are viewed across four relevant levels of analysis: founders, innovation, organization, and external environment. The conceptual model presented suggests that the tenure and innovation stance of venture leaders, the complexity and trialability of the technological innovation, the legal structure of the venture, and the social network interconnectedness can cause changes in the social-market strategic orientation balance of socio-tech ventures.

MD-02.2 [A] Ethical Confrontations at Mbloom Ventures LLC: Hawaii's First Early-Stage Technology Fund

Prescott C Ensign; Wilfrid Laurier University, Canada

This case study examines the inaugural venture capital financing effort by mbloom Ventures, LLC (mbloom), a $10 million early-stage technology investment partnership between the Hawaii Strategic Development Corporation (HSDC) and Rosemont Seneca Technology Partners (Rosemont), a private hedge fund. Following an announcement of the two recipients of funding - $500,000 each to Flikdate and Ozolio - information circulated that these two startups had been established by mbloom's two general partners. Allegations of conflict of interest and lack of transparency soon surfaced.

MD-02.3 [R] A Process Model Integrated to Innovation Management Tools to Support Technology Entrepreneurship

Matheus L Pontelo de Souza; Federal University of Minas Gerais (UFMG), Brazil
Leonel D Melo Filho; Pontifical University of Minas Gerais (PUC-MG), Brazil
Raoni B Bagno; Federal University of Minas Gerais (UFMG), Brazil
Wesley C Souza Junior; Federal University of Minas Gerais (UFMG), Brazil
Lin C Cheng; Federal University of Minas Gerais (UFMG), Brazil

Technology entrepreneurship (TE) has gained increasing importance over the last decades. Therefore, a multidisciplinary research field was formed around research on technology-based innovation and entrepreneurship. However, despite the managerial and technological skills required in the challenge of new venture creation and development, little attention has been paid to the product/service and business levels of analysis of this phenomenon. Based on technology entrepreneurship, innovation management and new product development literatures, this research proposes a seven-step process model integrated to innovation management tools to support entrepreneurs in the context of startup creation and development. An in-depth longitudinal study was conducted with four startups over 27 months. And then, some theoretical and practical aspects of the proposed model are discussed. In particular, the paper brings concerns on how the process and integrated tools helped TE management, how they were created and adapted to the startup context throughout the research, and which were the real contributions and limitations of well-known approaches, such as Lean Startup and other tools and processes.

MD-03 New Product Development-1
Monday, 8/20/2018, 14:00 - 15:30
Room: Kona Moku Salon C
Chair(s) Kazuo Hatakeyama; Entrepreneur Consultant Office

MD-03.1 [R] Methodology for Determining Agile Product Scopes in Development Projects

Gunther Schuh; RWTH Aachen University, Germany
Christian Doelle; RWTH Aachen University, Germany
F. Diels; RWTH Aachen University, Germany
Maximilian Kuhn; RWTH Aachen University, Germany

In today's fast-paced and unpredictable business environment, manufacturing companies are exposed to increasingly dynamic market conditions and volatilely changing customer expectations. Therefore, a complete definition of requirement specifications is often not possible, as customer needs in early development phases may strongly differ from needs in advanced phases. One way to encounter these challenges is the application of agile methods from the software industry to the development of physical products. However, companies face high barriers during the implementation of agile methods in physical product development. This paper introduces a methodology to determine the application suitability of agile methods for highly interconnected physical products by using agile indicators. Agile indicators are metrics that support the decision-making process for or against agile development methods at the level of individual product scopes. In order to do so, a classification of different types of development questions derived from uncertain requirements is presented. Subsequently, product scopes are determined in accordance with the existing development questions. In a next step, the derived product scopes are evaluated with agile indicators and the interdependencies between product scopes are analyzed. Based on this analysis, a final selection of product scopes for agile development can be conducted.

MD-03.2 [R] Methodology for Business Model Related Product Design

Gunther Schuh; RWTH Aachen University, Germany
Christian Doelle; RWTH Aachen University, Germany
Manuel Ebi; RWTH Aachen University, Germany

In times of digitalization and Industrie 4.0, business model innovation becomes increasingly important. Studies show that business model innovators are earning a higher average premium than product or process innovators. Consequently, companies are developing a wide variety of innovative business models. Intelligent service offerings appear to be a promising way to create competitive advantages and therefore attract increasing attention in theory and praxis. Considering the trend towards business model innovation as given, the resultant challenge is to develop products or product-service systems that are purposefully aligned with this business model in order to maximize the corporate success. The literature review revealed that existing approaches do not consider the specific business model when developing the conceptual design of products. This paper introduces a methodology for an improved design of products by configuring business model related product design features. Based on the definition of product and business model describing elements that determine the direction of product design during the conceptual phase, the paper compiles design guidelines for products that are used in service-related business models.

MD-03.3 [R] The Impact of Fuzzy Front End Activities and Changes in Project Execution on New Product Development Project Success in Japanese Manufacturing Firms: Comparative Study between B2B and B2C Projects

Akio Nagahira; Tohoku University, Japan
Ko Yamasaki; ABeam Consulting Ltd., Japan
Sumie Ishihara; Tohoku University, Japan
Shuichi Ishida; Ritsumeikan University, Japan

In this study, a comparative study was carried out to investigate the direct and indirect impacts of fuzzy front end (FFE) activities and changes in project execution on new product development (NPD) projects success of business-to-business type (B2B) and business-to-consumer type (B2C) projects respectively in Japanese manufacturing firms. Structural equation modeling (SEM) analysis was used to analyze the data. The following conclusions were obtained from analysis results. The ideal activities during the FFE and the project execution were changed according to the situation such as product and period. Following the contingency theory, managers should adapt to external and internal circumstances. Results revealed that problems were found in the B2B and B2C respectively. B2B projects should intensify the reduction of market uncertainty, and changes in the project execution phase were kept to a minimum. B2C projects should activate the reduction of technical uncertainty and make the project execution phase flexible. In further studies, it seems beneficial to analyze the data from another perspective such as company size or industry. It can offer more practical result and be applied for real business. These results contribute to NPD project management according to types of the products of firms.

MD-04 Technology Assessment & Evaluation-1
Monday, 8/20/2018, 14:00 - 15:30
Room: Waikiki Salon 1
Chair(s) Alan L Porter; Georgia Institute of Technology

MD-04.1 [R] How is Data Science Involved in Policy Analysis?: A Bibliometric Perspective

Yi Zhang; University of Technology Sydney, Australia
Alan Porter; Georgia Institute of Technology, United States
Scott Cunningham; Delft University of Technology, Netherlands
Denise Chiavetta; Search Technology Inc., United States
Nils Newman; Search Technology Inc., United States

What are the implications of big data in terms of big impacts? Our research focuses on the question, "How are data analytics involved in policy analysis to create complementary values?" We address this from the perspective of bibliometrics. We initially investigate a set of articles published in Nature and Science, seeking cutting-edge knowledge to sharpen research hypotheses on what data science offers policy analysis. Based on a set of bibliometric models (e.g., topic analysis, scientific evolutionary pathways, and social network analysis), we follow up with studies addressing two aspects: (1) we examine the engagement of data science (including statistical, econometric, and computing approaches) in current policy analyses by analyzing articles published in top-level journals in the areas of political science and public administration; and (2) we examine the development of policy analysis-oriented data analytic models in top-level journals associated with computer science (including both artificial intelligence and information systems). Observations indicate that data science contribution to policy analysis is still an emerging area. Data scientists are moving further than policy analysts, due to technical difficulties in exploiting data analytic models. Integrating artificial intelligence with econometrics is identified as a particularly promising direction.

MD-04.2 [R] Text Mining Medical Device Guidelines to Explore Classification of Technologies

Sayaka Itoh; the University of Tokyo, Japan
Shingo Kano; the University of Tokyo, Japan

Regulation is an essential element for the industrialization of technologies, and the first and most basic step to facilitate the regularity of regulations is to classify the regulations. Classification of regulations helps both the regulated and the regulating parties. Regulatory agencies will be able to structure regulations for the appropriate users or challenges; the regulated citizens or companies will be able to know the appropriate rules and regulations they must abide by. This research aims to detect the relationship between technology and regulation in the medical field with text-analysis of medical device guidelines. In the past, we conducted a simple dichotomization according to whether they contained disease-related terms (e.g., disease name, body part) or not. The dichotomization was experimented on a set of medical device guidelines in Japan and technologies listed in the preceding technology forecast which lead to the patterning of the relationship between technology forecasts and guideline formulation. In this research, we utilize the classification we explored in our past research and use available text mining tools on medical device guidelines in Japan to detect the relationship between technology and regulation within guideline documents.

MD-04.3 [R] Return on CPS (RoCPS): An Evaluation Model to Assess the Cost Effectiveness of Cyber-Physical Systems for Small and Medium-Sized Enterprises

Peter Burggraf; RWTH Aachen University, Germany
Matthias Dannapfel; RWTH Aachen University, Germany
Matthias Bertling; RWTH Aachen University, Germany
Tingni Xu; RWTH Aachen University, Germany

This paper addresses the challenge of evaluating the cost effectiveness of cyber-physical systems (CPS) for small- and medium-sized enterprises (SMEs) in manufacturing industries. CPS are key technologies to implement the digitalization and interlinking of production processes with the advantage of increasing production efficiency and flexibility. However, it is difficult to evaluate properly how much CPS can contribute to profit growth because of various costs of complex CPS components and ambiguous estimation of potential CPS benefits. For SMEs, the investment decision on CPS is especially difficult due to the lack of human resources with CPS competence and limited financial resources. Thus, an evaluation model for assessing the economic effectiveness of CPS aimed at SMEs is developed in this paper. To assess the effectiveness, different cost types of implementing CPS are identified and classified. Furthermore, potential benefits of CPS utilization are analyzed comprehensively and calculation rules for monetization of benefits are suggested. The metric "return on CPS" (RoCPS) is defined to value the profit based on the invested capital. The RoCPS will facilitate the selection of economically efficient CPS solutions, supporting SMEs with economic growth by reasonable technology management. Finally, the evaluation model is validated by a use case of an electric vehicle start-up.

MD-05 Intellectual Property-2
Monday, 8/20/2018, 14:00 - 15:30
Room: Waikiki Salon 2
Chair(s) Joseph C Edmondson; Portland State University

MD-05.1 [R] Assessing Patents Based on Their Structural Significance in Patent Citation Network

Chung-Huei Kuan; National Taiwan Univ. of Science and Technology, Taiwan
Dar-Zen Chen; National Taiwan University, Taiwan

This study proposes a patent assessment method based on a patent's structural role within a patent citation network. The proposed method includes two major steps: (1) assigning a weight to each citation of the patent citation network according to its traversal count within the network, and (2) obtaining a pivotalness value for each patent by summing the weights of its citations. A patent's pivotalness value is, therefore, the patent's traversal count within the network. If a citation may be deemed as a flow of knowledge or a step of technology evolution from the cited to the citing, the pivotalness value reflects a patent's significance in knowledge dissemination or technology evolution within the field. To observe this measure, this study selects for empirical analysis patents in the field of carbon dioxide capture, storage, recovery, delivery, and regeneration and collects a total of 34,083 US utility patents issued between 1976/1/1 and 2017/3/31 by the United States Patent and Trademark Office database.

MD-05.2 [R] Evaluation Method of Patent Scope Based on Semantic Information of Words and Dependency Structure of Patent Claims

Hiroaki Tanaka; Tokyo Institute of Technology, Japan
Yuko Nakashio; Tokyo Institute of Technology, Japan
Yuya Kajikawa; Tokyo Institute of Technology, Japan

In patent documents, the "claim" is the most important section because the patent scope is interpreted based on the description of claims. However, because claims are expressed as sentences, the scope and boundaries of patents tend to be ambiguous. Prior studies have not been able to visualize the scope of a claim because they did not include the semantic range of words. Therefore, we develop a method to visualize the description of claims and the patent scope using natural language processing. Specifically, in order to visualize patent claims, we introduce the semantic range of words using the hierarchical structure of words provided by WordNet. Then, we apply the proposed method to two patents included in "PageRank" technology. The results show that parent patents are wider than child patents.

MD-05.3 [R] Research for Reuse of Unused Patents by Analysis of Transferred Patents

Yosuke Towata; Tokyo Institute of Technology, Japan
Yoshitoshi Tanaka; Tokyo Institute of Technology, Japan

Intellectual property rights must be acquired at the stage of R & D and product planning, without guarantee that the invention will be used in the future. It is difficult to decide about this investment. From the viewpoint of effectively utilizing capital, it is preferable to monetize a patent that has not been finally commercialized, by assigning or licensing it. In practice, however, it tends to be handled by abandonment or keep on holding. As a result, the number of unused patents owned by companies continues to increase. On the other hand, sharing services via the Internet have become widespread in recent years. Various assets such as houses and cars are not owned but utilized by sharing, and items that are no longer needed are transferred to those who need it. In other words, if a patent that is not in use is also transferred to the person who needs it, it will show new value. Therefore, it is the significance of this research to analyze the transferred patents, to know what type and characteristic rights are transferred, and to use it for reuse of unused patents.

MD-06 Artificial Intelligence for Technology Management

Monday, 8/20/2018, 14:00 - 15:30
Room: Waikiki Salon 3
Chair(s) Martin G Moehrle; University of Bremen

MD-06.1 [R] Resolving Asymmetry of Medical Information by Using AI: Japanese People's Change Behavior by Technology-Driven Innovation for Japanese Health Insurance

Kunitoshi Yamasaki; Hitotsubashi University, Japan
Ryuichi Hosoya; Hitotsubashi University, Japan

The advancement of the artificial intelligence (AI) technologies in recent years has enabled new technology-driven innovation in many fields in our society. The medical sector is one of the application fields of AI that has high expectations for salient outcomes by directly influencing people's life-and-death matters. On the other hand, ethical problems pertaining to AI-based massive utilization of human health and biological data have risen as a new issue. In this paper, we report on the current status of Japan's medical policies and a case study of a project for building an AI-based medical knowledge creation and information retrieval system aiming at achievement of change in people's health-related behavior.

MD-06.2 [R] Measuring Technology Diffusion for the Case of RFID Technology

Huseyin Caferoglu; University of Bremen, Germany
Martin G Moehrle; University of Bremen, Germany

When an emergent technology is brought to market, different possibilities regarding its diffusion arise. While some technologies spread quickly across an entire market, other technologies are first established in one market segment, and then move on to further segments. Knowledge about the diffusion of a technology can help managers with their assessment and is therefore of major importance. Recently, [1] suggested a method to measure diffusion by means of an informetric approach, namely the tf-lag-idf. Nevertheless, shortcomings such as a high degree of manual effort and subjective coding decrease the reliability of this method. As an alternative, we develop a method based on topic modeling in accordance with [2] and test our method by using the same dataset as [1]. Applying our method to the case of RFID technology produces application fields such as logistics, payment & finance, or medicine. Comparing the results of topic modeling and tf-lag-idf based on input and output criteria sheds some light on both methods. As a consequence, both approaches enable a semi-automated analysis of diffusion based on text-mining.

MD-06.3 [R] Artificial Intelligence on Job-Hopping Forecasting: AI on Job-Hopping

Nathan Kosylo; Pacific Lutheran University, United States
John Smith; Pacific Lutheran University, United States
Matthew Conover; Pacific Lutheran University, United States
Leong Chan; Pacific Lutheran University, United States
Hongtao Zhang; Hiretual Inc., United States
Hanfei Mei; Hiretual Inc., United States
Renzhi Cao; Pacific Lutheran University, United States

Artificial Intelligence (AI) technologies have been successfully applied to many fields, such as object detection and speech recognition. Among these applications, few consider cases where some feature values are missing or unreliable, such as in the prediction of job-hopping patterns where many profiles are incomplete, even though these missing features may be important for businesses (e.g., human resources and management). In this paper, we propose a novel AI technology, Sequential Optimization of Naive Bayesian (SONB), which not only makes predictions, but also learns the underlying pattern and automatically estimates missing or unreliable feature values. We analyzed several important job-hopping features and applied it to predict job-hopping patterns on many incomplete profiles. Our experiment shows SONB accurately estimates missing values and achieves state-of-the-art performance. In addition, the accuracy of deep learning is improved by 3% on the new dataset generated by SONB over the raw data. In summary, we introduce a novel AI technology for forecasting, which could also be used to estimate missing values in the input data. It is applied to a large (20,185,365 employee profiles) dataset and successfully predicts job-hopping patterns for employees based on their profiles, which could be a valuable resource for businesses.

MD-06.4 [R] Analyses of the Technological Accumulation over the 2nd and the 3rd AI Boom and the Issues Related to AI Adoption by Firms

Kumiko Miyazaki; Tokyo Institute of Technology, Japan
Ryusuke Sato; IBM, Japan

Although AI was proposed by J. McCarthy back in 1956, 60 years later we are beginning to witness a surge of interest in the practical applications of AI in many sectors. However, the actual adoption rate of AI in businesses has been quite low. The current 3rd AI boom follows the 2nd AI boom in the 1980s which focused mainly on expert systems. In this paper, an attempt is made to analyze the technological accumulation process from the 2nd to the 3rd AI boom and to identify forthcoming key application areas. The methodology is based on a three-step approach. In the first step, a bibliometric analyses of artificial intelligence was carried out to analyze the technological accumulation during the 2nd and the 3rd AI boom. Having done the desk work and interviewed several experts in AI, we decided that 2013 was the year which marked the boundary between the two AI booms. A bibliometric analyses based on countries and institutions over the two periods was followed by co-occurrence analyses of the author keywords in the two periods, before and after 2013. In the third stage, interviews were carried out with some corporate members to do a qualitative analysis on the possible application areas of AI, and issues to be solved for adopting AI were identified. The results showed that in the 3rd AI boom, machine learning, deep learning, and genetic algorithm have been identified as the key technologies. Furthermore, prediction, forecasting, data mining, fault diagnosis, and pattern recognition were identified as important areas in the 3rd AI boom. It was also revealed that firms' R&D has been changing to focus more on AI applications.

SESSIONS

MD-07 Productivity Management
Monday, 8/20/2018, 14:00 - 15:30
Room: Milo I
Chair(s) Makoto Hirano; The University of Fukuchiyama

MD-07.1 [R] Strategy for Sustainable Economic Growth of Small Scale Mining Operations in South Africa

Nirdesh Singh; Mintek/University of Johannesburg, South Africa
Antoine F Mulaba-Bafubiandi; University of Johannesburg, South Africa
Jan-Harm C Pretorius; University of Johannesburg, South Africa

For a number of years, artisanal and small-scale mining (ASM) was seen as a means of survival, and in some cases, a way of enrichment for many in South Africa especially in rural areas where job opportunities are scarce. The sector has faced a number of challenges. The first challenge has been in terms of the definition and the distinction between what is considered an artisanal operation as opposed to a small-scale mining operation. The other critical challenge has been in terms of a lack of a strategy for ensuring sustainability of these operations within the sector. While artisanal mining is often associated to illegal activities, small-scale operations in general comply with national legislative requirements. The methodology used to develop a scientific definition for small-scale mining was to firstly identify from literature the main criteria that differentiate artisanal from small-scale mining operations. The pairwise comparison was then used as the decision-making tool of choice. A survey was developed and submitted to experts and specialists in the field to determine the importance and the weights of the selected criteria. A strategy for sustainability and economic growth was developed by using a case-study approach which involved visiting selected legal small-scale mining and processing operations. A questionnaire was developed to gather information using a structured interview process. The data gathered was then compared with literature to identify focus areas. The four areas found were management, skills, chemical analysis and technology. An integrated management model for improving productivity and ensuring the sustainability of small-scale mining operations in South Africa was successfully developed.

MD-07.2 [R] Strategy and Technology Models in Small Scale Mining of Sandstone to Facilitate Community Based Economic Development and Growth

Seun Mokwalo Monareng; University of Johannesburg, South Africa
Antoine F Mulaba-Bafubiandi; University of Johannesburg, South Africa
John Francis Agwa-Ejon; University of Johannesburg, South Africa

Artisanal small-scale mining (ASM) activities are a global phenomenon, carried out mainly by individuals or groups within communities. Artisanal and small-scale operators mine a range of minerals, dimension stones and metals available at their disposal. While artisanal operations are often looked at as illegal activities, small-scale operators directly depend on these mining activities for survival, with some forming cooperatives within their respective markets. Most ASM activities are labor intensive and lack modernized technologies to optimize mining productivity. Sandstone operators in QwaQwa South Africa often have to work long hours to collect as much raw material as possible. This paper discusses strategical technologies which can be applied in small-scale mining to aid community development and growth. Literature shows that small-scale mining of sandstone in the Free-State province (South Africa) can provide a sustainable livelihood for communities where ASM activities are undertaken. Although some government assistance has been provided, it has not reached the majority of the operators, and most of these mine operators still lack technological interventions, basic business and numerical competence. This paper will further present basic business models which can be adopted by small-scale miners and thus advance the urgent need for rural economic development and growth.

MD-07.3 [R] Usage of Energy Efficient Furnace as Technology Transfer Concept to Rural Foundries

Kulani Mageza; University of Johannesburg, South Africa
Antoine F Mulaba-Bafubiandi; University of Johannesburg, South Africa
Clever Banganayi; University of Johannesburg, South Africa

In South Africa, public institutions of higher learning and government agencies are funded with tax payers' money. They are encouraged, through the use of science and technology, to help and assist in the development of small and medium enterprises by contributing in addressing their challenges be it technological, business management related, or quality of production and productivity inclined. Rural foundries are enterprises at the remote areas commonly known for casting three-legged aluminum pots from aluminum metal scraps. Most of these rural foundries have been found struggling with a lack of green production process and lack of sustained improved productivity mainly due an inefficient heat energy generation and conservation within the furnace. Technology transfer aspect was used to look at intervention to improve the status quo of the rural foundries. The technology transfer aspect was used as proof of concept to improve the energy efficiency of the furnace, which resulted in reduced melting time and usage of coal as input material. In conclusion, the use of science and technology is critical in terms of proof of concept of heat transfer, and engineering skills play a vital role in developing technologies which will have technical capabilities of meeting the end user's requirement.

MD-08 Sustainability
Monday, 8/20/2018, 14:00 - 15:30
Room: Milo II
Chair(s) Nathasit Gerdsri; College of Management Mahidol University

MD-08.1 [R] Pavement Infrastructure Sustainability Assessment: A Systematic Review

Joseph Acai; University of Pretoria, South Africa
Joe Amadi-Echendu; University of Pretoria, South Africa

Road transport infrastructures are highly valuable assets designed for long periods of use and play a major socio-economic role. Conformity of road infrastructure development to the triple bottom line (TBL) of sustainability requirements of social, economic and environmental has gained immense debate in the construction industry in recent years. The rapid population increase worldwide coupled with demand for services and widespread use of the planet's finite resources has resulted in the generation of waste associated with the construction, utilization, rehabilitation and reconstruction of pavement infrastructure, raising great concern of stakeholders in the road transportation sub-sector because of the environmental impacts of the associated activities. However, attempts have been made to address sustainability concerns in the road infrastructure programs to meet both internal and external (environmental) sustainability, but most of this have been in Europe and America, leaving developing economies in Africa and Asia struggling with meeting the sustainability challenges. Tools and methodologies have been developed to evaluate sustainability of road infrastructures from the quantitative (life cycle assessments), qualitative (sustainability rating systems) and climate change perspective. Through a descriptive and exploratory approach, this paper delves into the documentary advancement in achieving sustainable development of road transport infrastructure.

MD-08.2 [A] Integration of Community Preference in Energy Planning

Adiphol Tannirandon; College of Management Mahidol University, Thailand
Nathasit Gerdsri; College of Management Mahidol University, Thailand

The increasing population has influenced the need to expand energy production and planning. Energy planning changes from a simple single-criteria approach focusing only on economics to multi-criteria, which involves balancing impact on social and environment. Existing energy planning approaches, especially in developing economies, tend to face many challenges on public acceptance. This study reviews existing problems and gaps in Thailand Power Development Plan (PDP) and proposes energy planning which integrates the view of stakeholders at the first step and minimizes personal bias. A mapping model with least square method equation will be used to compare characteristics of selection of energy and stakeholder preferences. It is expected that by using this integration, sustained energy planning will be obtained, resulting in effective long-term energy planning and development.

MD-08.3 [R] Innovative Urban Environments in Sustainable Cities: The Brazilian Case of Curitiba

Roberto S Bichueti; Federal University of Santa Maria, Brazil
Clandia M Gomes; Federal University of Santa Maria, Brazil
Isak Kruglianskas; University of Sao Paulo, Brazil
Jordana M Kneipp; Federal University of Santa Maria, Brazil
Carlos Rafael R Da Costa; Federal University of Santa Maria, Brazil
Kamila Frizzo; Federal University of Santa Maria, Brazil

Cities are a central part of the debate in the search for sustainable development. The accelerated urbanization that occurred over the last decades created several challenges regarding urban sustainability. Within this context, adopting management practices for a sustainable urban development allows the creation of certain urban conditions, such as improved quality of life and welfare of the population, reduced environmental impacts and the possibility of adopting a sustainable lifestyle. This differentiated urban environment is capable of, among other aspects, attracting qualified people, enabling a greater social interaction among them, and attracting investments. Such factors may be associated with the creation of positive externalities, capable of promoting economic development and increasing the capacity to produce innovations. In that sense, the aim of the study is to analyze the importance of management practices for sustainable urban development in the creation of favorable urban conditions to allow innovative urban environments in sustainable cities. An in-depth study was conducted involving the city of Curitiba (Brazil), considering its representativity in relation to urban sustainability. The results allowed us to get to know the characteristics of the municipality and the main management practices for the sustainable urban development used for this city. Above all, urban conditions resulting from these practices were pointed out, promoting the creation of an innovative urban environment. A stricter association of these conditions to the activities associated to the service sector was also noticed, and creative economy is one example.

MD-08.4 [R] Strategic Management of Sustainable Innovation of Brazilian Industrial Companies

Jordana M Kneipp; Federal University of Santa Maria, Brazil
Clandia M Gomes; Federal University of Santa Maria, Brazil
Isak Kruglianskas; University of Sao Paulo, Brazil
Roberto S Bichueti; Federal University of Santa Maria, Brazil
Kamila Frizzo; Federal University of Santa Maria, Brazil
Francies D Motke; Federal University of Santa Maria, Brazil

This study aimed to examine the relationship between strategic management for sustainable innovation and the corporate performance of industrial companies. The study was characterized as quantitative and consisted of a survey with Brazilian industrial companies. The results allow saying that strategic management for sustainable innovation is related with the organizational performance, given that positive associations between the independent and dependent variables dimensions were found. According to the data, all corporate performance categories have at least one association with some dimension of the independent variables, which means that the adoption of strategic management for sustainable innovation is related to the performance of the companies studied. The main limitations of the study were the theoretical choices, the understanding of the phenomenon on the basis of the respondents' perception, and the number of companies surveyed, which was small because of the small number of responses returned in relation to the target sample population. The study is relevant to understand the interrelationship between the strategic management of sustainable innovation and its relation with the performance of emerging industrial companies, thematic ones and of recognized importance in the academic and business scope.

MD-09 Manufacturing Management-1
Monday, 8/20/2018, 14:00 - 15:30
Room: Milo III
Chair(s) Manocher Djassemi, California Polytechnic State University

MD-09.1 [R] Problems and Gaps of Family SMEs in Japan

Sayaka Tokita; Hitotsubashi University, Japan

The purpose of this paper is to verify the problems facing family SMEs and to identify the gap between existing research and reality. Family SMEs have various problems, but due to high specificity of these, its problems have not been much focused. However, family SMEs are very important, because they contribute to the world economy. So, to focus family SMEs are particularly meaningful. Some economic theories consider the family firm to be an organization with a beneficial organizational structure. Unification of ownership and management and more personal human capital was recognized as a strength of family businesses. However, in my opinion, family business believes that it has an organization with many problems while having such excellent features. Therefore, we interviewed two family business companies in the manufacturing industry. By interviews in this paper, its problems and gaps between existing research and reality are clarified specifically. There are many problems related to human capital, successor and innovation. And a potential problem is that family SMEs managers and family members have little knowledge about management also exist. In this paper, we believe it is necessary to compare between family SMEs and non-family SMEs and further investigate in order to understand the problem more deeply about such a problem and to find solutions for problems of family SMEs.

MD-09.2 [A] A Literature Review of South African Automotive Industry Global Competitiveness

John M Ikome; Vaal University of Technology, South Africa
Grace Kanakana; Tshwane University of Technology, South Africa

Nowadays, manufacturing industries are faced with increasing pressure to improve productivity in order to survive within the global competition. This requires industries to reduce production costs while maintaining product quality and also decision makers to make the right decision to support and improve the various processes. Looking at the complex nature of globalization today, it encompasses a holistic approach in order to stay competitive at the international level for both developing and developed countries. This in general requires a high level of competitiveness and rational policies from decision makers in order to cope with global risks. In industrialized countries, the key contributor to the national economy in particular is the automotive industry, which manufactures all types of vehicles that are needed or used in different sectors of the government and nation including tourism, transportation, road construction and agriculture. Therefore, any improvement or disruption of the automotive industry can deeply affect the economy of the nation either in a positive or negative way. In this research paper, we have analyzed previous research work done in addressing the global competitiveness of the South African automotive industry, and our findings show that more still needs to be done in order to improve the global competitiveness of the automotive industry in South Africa.

MD-09.3 [R] Selecting High Tech Production Machines: A Guide for Entrepreneurs and Small Manufacturing Businesses

Manocher Djassemi; California Polytechnic State University, United States

This study presents a set of practical criteria and guidelines for small manufacturing business entrepreneurs who are looking for starting or growing a business through the addition of multifunctional computer numerical controlled (CNC) technology. Even though adopting this advanced technology can be costly in terms of initial investment and training, recently-developed equipment may have a positive long-term effect by simplifying production methods or providing the means to accomplish tasks that were once considered impractical. The multifunctional CNC machines are capable of meeting several production goals including faster processing, minimizing non-value added times, concurrent processing of multiple parts and flexibility in processing high mix of products. This technology has become increasingly sophisticated and expensive capital equipment. This study entails a framework of technology selection and discussion of critical selection criteria such as product design features, impact of material type on processing power requirement and production goals. Technical and cost data from several suppliers as well as practical examples are provided to assist small manufacturing business entrepreneurs in selection of this multifunctional

technology.

MD-10 Knowledge Management: 1
Monday, 8/20/2018, 14:00 - 15:30
Room: Milo IV
Chair(s) Yasuo Sasaki; JAIST

MD-10.1 [R] A Decision Model for Data Mining Techniques

Maoloud Dabab; Portland State University, United States
Mike Freiling; Conceptrics AG, United States
Nayem Rahman; Portland State University, United States
Daniel Sagalowicz; Portland State University, United States

Data mining is the process of extracting useful information from very large data sources. Data mining techniques have proven to be very useful in many domains. However, there is no single algorithm or technique that works best across all types of datasets and problems, and it remains "an art" to decide what data mining technique to use for a specific situation. This paper surveys several data mining techniques that can be applied to different business problems and presents a decision model in the form of a series of 15 - 20 questions that help identify the best approach or approaches to a specific problem at hand. For some sets of answers, a small number of techniques are dominant. The decision model is based on a review of the current literature, as well as expert experience. The fraud detection problem is adopted as a case study and applied the data mining techniques to draw the insights. We also discuss the applicability of specific techniques to common business in finance, marketing, and business operations.

MD-10.2 [R] Through Open Innovation Concept Integrating Information Technology Resource into Instruction of School

James K Chen; Asia University, Taiwan
Benson S Sun; Asia University, Taiwan

This study aims to construct a planning model for integrated information technology (IT) resource on instruction of school. The proposed model utilizes the open innovation concept to integrate IT into instruction resource allocation. The empirical case study demonstrates that loosening department resource constraints and utilizing De Novo programming technical assistance to gain the optimal resource allocation. Results show that the schools should have important priority for cultivating IT professional teachers of higher grades and teachers should share teaching materials with others, and how to avoid the resources duplicated of different classes or grades. This IT resource allocation planning model is applicable to universal educational institutions.

MD-10.3 [R] Comparing the Role of Knowledge Creators in the Ecosystems of China and the UK: A Case of 3D Printing

Guannan Xu; Beijing University of Posts and Telecommunicatios, China
Yuan Zhou; Tsinghua University, China
Yuchen Wu; Peking University, China

In general, policy makers stimulate S&T (science and technology) knowledge creation to cultivate the emergence of innovation ecosystem within the national boundaries. It is implicitly assumed that the knowledge can be translated into business values for growing this ecosystem. However, some opponents argue that local knowledge creation may not necessarily contribute to the prosperity of the business ecosystem, especially in latecomers, due to the weak links between science and industries. This paper, therefore, proposes a framework to compare the emerging innovation ecosystems between the developed countries and emerging economies. China and the UK are selected as the two exemplar ecosystems for the comparative studies, as the former is representative of leading-edge basic research, and the latter one is renowned for fast catching-up in both science and industrial competence. This study finds that China's 3D printing may have a unique edge in S&T knowledge ecosystem, but it may be inherently flawed when local universities play too many roles in the emergence of an innovation ecosystem; by contrast, the UK has better settings for the growth of keystone firms for business platforms. This study will contribute to the innovation ecosystem literature and will be of interest to 3D printing and emerging industry researchers.

MD-11 Technology Management in the Health Sector-1
Monday, 8/20/2018, 14:00 - 15:30
Room: Milo V
Chair(s) Chipo Mugova; Mancosa Graduate School of Business

MD-11.1 [A] Socially Assistive Robots Diffusion in Elderly Care

Belviso Carlotta; Universita Luigi Bocconi, Italy
Rainer P Hasenauer; WU-Wien, Austria
Ulrike Bechtold; Austrian Academy of Sciences, Austria

This paper investigates social assistive robots' acceptance and diffusion in eldercare from dependent-living seniors' perspective by combining data science with the agent-based model of cellular automata, able to unveil the emergence of behavioral patterns in a complex system, as a result of individual agent interactions. The ratio behind this methodology is that, while social dynamics are often underestimated, they are determinant for the success of an innovation, especially in a pre-market context, in which users do not know the product. In this way, by looking at how opinions are formed and word of mouth circulates among social agents, this paper identifies a cluster of enthusiast seniors, which, if properly addressed, could behave as social hub and influence innovation success. At the same time, however, this work unveils the presence of extremism and negative word of mouth, which, in turn, can lead to innovation rejection.

MD-11.2 [R] Evaluation of the Effectiveness of the ISO 9001 Quality Management System on Business Processes of Laboratory Information System at a Healthcare Solutions Company

Portia Sejake; Mancosa Graduate School of Business, South Africa
Chipo Mugova; Mancosa Graduate School of Business, South Africa

The purpose of this study was to evaluate the effectiveness of ISO 9001 Quality Management System (QMS) on business processes of a laboratory information system (LIS) of a healthcare solutions company in Johannesburg, South Africa. The evaluation of data obtained from helpdesk records shows that there is a high volume of calls logged related to slowness of the application system that the LIS oversees for the client. It is important that the application system performs optimally at all times due to the critical decision making that contributes to diagnosis of patients. A successfully implemented QMS should be able to highlight problem areas and seek to achieve optimal performance. Therefore, the evaluation of its effectiveness will help identify shortfalls. The qualitative research approach was used and data was collected by means of interviews using non-probability purposive sampling to select the sample of participants directly involved with the QMS implementation. The findings derived from interviews and review of documentation revealed that a successful ISO 9001 certification seems to be associated with adequate awareness, feedback from customers and measurement of process outputs. It emerged that there is a need to engage all employees from the beginning and to have continuous feedback sessions on the performance of the QMS to derive optimal benefits.

MD-11.3 [R] Blockchain in Healthcare: A New Technology Benefit for Both Patients and Doctors

Le Nguyen; University of Economics and Finance, Vietnam

With the underlying technology of Bitcoin or other crypto-currencies and its rapid growth nowadays, many places have begun accepting Bitcoin payments in hot debate. It is hard to deny the emerging success of the creation Blockchain platform behind Bitcoin in the fields of mathematics, finance, banking, and healthcare. The paper aims to create a diagrammatic conceptual model of medical app using Blockchain technology to manage all databases of patients and doctors when they have a surgery. The model is built based on the gap of previous models which are mostly using Blockchain in banking and finance sectors. Focusing on the development of mission space conceptual models, this paper will continue to propose

simulation space conceptual models in current studies, especially in the context of very few models having applied blockchain in healthcare. After the creation of this model, an app on smartphone using Bitcoin in payment could be created to facilitate doctors' management of all their patients directly and effectively as well as helping patients have a good comparison of cost, procedure or preparation of pre- and post-surgery. Hopefully, this paper will contribute to the given field the conceptual model for medical stakeholders including researcher, public health authorities, etc., to participate in the network as Blockchain "miners", to synthesize anonymous data as mining rewards, in return for sustaining and securing the network via Proof of Work.

ME-01 TUTORIAL: Tech Emergence
Monday, 8/20/2018, 16:00 - 17:30
Room: Kona Moku Salon A
Speaker(s) Alan Porter; Georgia Institute of Technology
Scott Cunningham; Delft University of Technology
Serhat Burmaoglu; Izmir Katip Celebi University
Arho Suominen; VTT Technical Research Centre, Finland

This tutorial session covers three important questions. 1. What is technology emergence? 2. Why does a place become a nexus for the emergence of a technology? 3. How can technology emergence be detected at the earliest of stages?

ME-02 Entrepreneurship/ Intrapreneurship-1
Monday, 8/20/2018, 16:00 - 17:30
Room: Kona Moku Salon B
Chair(s) Sebastian Allegretti; Ulm University of Applied Science

ME-02.1 [R] Entrepreneurial Environment of the University: Opportunities for Technological Spin-Offs

Cornelia Zanger; Chemnitz University of Technology, Germany
Mario Geissler; Chemnitz University of Technology, Germany

This empirical study examines the impact of entrepreneurial opportunities on the formation of entrepreneurial intention. Thereby, the study considers the specific university environment and research commercialization via university spin-offs in two ways. First, it focuses on entrepreneurial opportunities which emerge from present research results or students' studies. Second, it includes the entrepreneurial environment of the university by introducing the concept of a university's entrepreneurial climate. The results show that for research commercialization via spin-offs, attitude is the main driver in the intention creation process. Furthermore, opportunity identification influences intention creation as well. Moreover, it came to light that opportunity identification mediates the relationship between self-efficacy and intention. Entrepreneurial climate has two effects, directly by influencing attitude creation and indirectly by moderating the intention behavior relationship.

ME-02.2 [R] Disruption or New Order?: The Emergence of the Unicorn Bike-Sharing Entrepreneurship in China

Alicia Say; National Taiwan University, Taiwan
R. Guo; National Taiwan University, Taiwan
C. Chen; National Taiwan University, Taiwan

The most significant and successful technological entrepreneurship in Asia in 2017 is perhaps the start-up and diffusion of the bike-sharing service in China. While the bike-sharing system has long been an initiative taken primarily by city governments to improve the city transport, the top-two private start-up businesses, ofo and Mobike from China, swept the market with unprecedented bike penetration and user growth, despite the social disorder of chaotic bike-parking and deserted bikes. This paper examines how this innovative technological entrepreneurship fulfills the users' needs, fills the market gap and revamps the game rules by new business models. Furthermore, the challenges faced by the start-ups in profit generation and business sustainability will also be discussed. The case study approach is adopted where secondary data were analyzed and face-to-face interview with the executive was conducted to identify the factors driving the innovation diffusion and the new business model. This paper aims to fill the research gap in the technological entrepreneurship with the new business model in the emerging sharing economy start-ups, as well as to provide insights into sharing economy business management, especially in China context.

ME-02.3 [R] Can the Technological Background of Professionals Influence Their Entrepreneurship Intentions?: An Investigation in the Pearl-river Delta of China

Munan Li; South China University of Technology, China
Wenshu Wang; South China University of Technology, China
Yanqun Chu; South China University of Technology, China

As one of the most vigorous areas in global economic development, the Pearl River Delta of China, which includes Shenzhen, Guangzhou, Foshan, Dong-guan, etc., has attracted more attention from the world for the active technological entrepreneurship in high-tech industries during the past two decades. However, the entrepreneurial intention and activities of professionals recently declined based on the third-party social investigation. The reasons or influence factors on entrepreneurial intentions of professionals in cities are definitely complex and entangled. Therefore, to further investigate the professionals' barriers of entrepreneurship hidden in the level of psychological cognition, an empirical investigation was designed and implemented in the Pearl River Delta of China. In the investigation and survey, the cognitive differences are compared, which involve the two types of professionals: those who have entrepreneurial intentions and those who do not. The data used in the empirical analysis is from a survey, and exploratory factor analysis (EFA) and a logistic regression model are conducted to build the model and visualize the survey data. The results show that the entrepreneurs' biggest obstacles are personal factors (character, ability, etc.). Meanwhile, family factors also significantly affect entrepreneurial intention. However, technological background may not be a mediator between entrepreneurial barriers and entrepreneurial intention.

ME-02.4 [R] How Entrepreneurs Utilize Social Interactions and Lead Companies to Success: A New Research Perspective to Open Innovation

Yu Song; North China University of Technology, China
Jixin Zhao; North China University of Technology, China
Xiaobo Tao; North China University of Technology, China

Taking start-up technology companies as research objects, the purpose of this paper is to discover how entrepreneurs' social interactivities can potentially lead to their successes. The research methodology of this paper is qualitative analysis based on a series of interviews to start-up companies from one incubator. All records and documents will be coded before proceeding to analysis. This paper presents a three-dimensional model for analyzing social interactions. Further, three potential enhancing processes are pointed out. The most significant contribution of this paper is that it introduces a new research perspective for entrepreneurship management and open innovation, which is social interaction.

ME-03 New Product Development-2
Monday, 8/20/2018, 16:00 - 17:30
Room: Kona Moku Salon C
Chair(s) Johan de Lange; RWTH Aachen University

ME-03.1 [R] Deriving Requirements for the Organizational Structure of Corporate Incubators

Gunther Schuh; RWTH Aachen University, Germany
Felix S Lau; Fraunhofer Institute for Production Technology, Germany
Charlotte Dyba; Fraunhofer-Institute for Production Technology, Germany
Florian Vogt; Fraunhofer Institute for Production Technology, Germany

As conventional R&D often fails at achieving radical innovation in the context of increasingly uncertain environments, corporate incubators are established to provide a separate development path for innovation. Startup teams are integrated or internal projects teams

are provided with office space, independence and resources. Corporate incubators have become a promising solution for companies that aim at achieving structural ambidexterity, i.e., organizational ambidexterity that is embedded in corporate structure. While the current business practice shows that many different configurations of corporate incubators exist, the underlying requirements remain unclear. This paper therefore addresses the research gap by deriving a model describing the requirements for the organizational structure of corporate incubators. The authors draw from organization theory in order to derive requirement dimensions. Then, current literature on ambidexterity research is used to infer requirement parameters for each requirement dimension. From a practitioner's perspective, the developed model allows a systematic planning process that helps in achieving a consistent configuration of corporate incubators, which reduces failure rates. From an academic perspective, the proposed model elaborates on the organizational requirements that underlie structural ambidexterity strategies.

ME-03.2 [A] Disruption-Oriented Product Planning: Towards a Framework for a Planning Process for Disruptive Products

Gunther Schuh; Fraunhofer IPT, Germany
Tim Wetterney; Fraunhofer IPT, Germany
Felix Lau; Fraunhofer IPT, Germany
Tim Schmidt; Fraunhofer IPT, Germany

Established companies are unmatched in developing sustaining innovations, but when it comes to disruptive products, new entrants often outperform them. Despite the implementation of "agile methods" to enable shorter development cycles and continuous customer feedback, the success score of most corporates still lacks market-changing innovations. Disruption is a continuous process that should start with niche products focusing on insufficiently addressed customer needs and - given a positive market feedback - continue with new variants to gain market share step-by-step. Hence, a needs-oriented definition of the initial product offer followed by a need-based planning of future product variants are essential for a disruptive product strategy. Yet, companies' failure rates of ~40% for new products show that the need-based definition of minimum viable products and the planning of later product generations is insufficient. In this paper, the authors present a framework for a disruption-oriented product planning process. Based on a literature analysis focused on methodologies supporting the development process of potentially disruptive innovations, basic criteria are derived and deficits of existing approaches are identified. The framework will help companies as a guideline to understand the overall process of how to develop disruptive innovations. It further explains the essential activities and their interactions.

ME-03.3 [R] Integration of Tool Making into Agile Product Development Using Industry 4.0 Technologies and Additive Manufacturing Technologies

Gunther Schuh; RWTH Aachen University, Germany
Michael Salmen; RWTH Aachen University, Germany
Christoph Kelzenberg; RWTH Aachen University, Germany
Johan de Lange; RWTH Aachen University, Germany

Producing companies face new challenges to cope with the shortening of the product life cycles and the increasing of product individualization. The development and manufacturing of a series of production tools have a crucial position between product development and production. Therefore, the mentioned trends force tool-making companies to improve lead times of tool development and manufacturing. Innovative technologies can be enablers to catalyze the product development process by reducing the time to market. Industry 4.0 technologies in combination with additive manufacturing technologies are considered highly relevant for tool-making companies in order to accelerate product development time. By means of Industry 4.0 technologies, data from past product-development projects, manufacturing and the utilization phase can be used to support decisions in tool development. Additive manufacturing technologies can be applied to manufacture early prototypes (rapid prototyping) or prototype tools (rapid tooling) for securing the feasibility of products, tools and processes. In order to successfully introduce and use these new technologies, a targeted technology management is of great importance for tool-making companies. In this context, a methodology for technology management of Industry 4.0 technologies and additive manufacturing technologies to integrate the overall process of tool making into product development has been developed.

ME-04 Technology Assessment & Evaluation-2
Monday, 8/20/2018, 16:00 - 17:30
Room: Waikiki Salon 1
Chair(s) Saeed Alzahrani, Portland State University

ME-04.1 [A] An Assessment of the Factors Influencing the Selection of the Best Carsharing Alternative in Portland Area Using Hierarchical Decision Modeling (HDM)

Saeed Alzahrani; Portland State University , United States
Ahmed Alzahrani; Portland State University, United States
Xuran Dai; Portland State University, United States
Wei-Chen Hsu; Portland State University, United States
Rashi Tiwari; Portland State University, United States

Carsharing is a business model of car rentals that allows consumers to benefit from a private vehicle for short periods while being relieved of the costs of the purchase and maintenance. Carsharing is a growing industry and some players are trying to get a hold in the already competitive market. The current transportation market offers consumers many options for buying a vehicle, but fewer practical options for using a vehicle occasionally. Carsharing provides the benefits of allowing easy access to vehicles spread across the city that are rented per an hour or day. It is an increasingly common option for locals and tourists who want to get from one place to another without spending too much time on public transports. These have the added benefit of convenience and comfort of four-wheelers without paying much extra, as in the case of conventional rental cars, taxi, or cabs. This paper uses hierarchical decision model (HDM) to evaluate the factors influencing the selection of the best carsharing alternatives around the Portland area by analyzing different perspectives and criteria that influence the selection. This paper addresses which criteria are most important to renters and provides recommendations for renters and carsharing businesses. The findings suggest that the most essential criteria for the consumers are insurance coverage, reliability, rental cost, drop-off options, and gas cost.

ME-04.2 [A] The Social Return on Investment of Young Scientist Competition (YSC): Thailand Case Study

Jintana Pattanatornchai; NECTEC, Thailand
Sinrintorn Insawat; NECTEC, Thailand
Panita Lamsam; NECTEC, Thailand

National Electronic Computer and Technology Center (NECTEC) has established the Young Scientist Competition (YSC) project that is an annual among science and technology student projects in Thailand for 10 years. Over 600 projects per year are submitted to the competition. It focuses on development of young Thai students as it motivates their interests in science and technology, allows them to create innovation and engages them into learning science and technology outside classrooms. The young Thai scientists have been given opportunities to use scientific methods to solve real problems and learning based on team management. It expects an increase in the number of Thai scientists and the values of the research in the future. This paper aims to study the comprehensive impact evaluation for that project. We selected the social return on investment (SROI) to evaluate the impact of the Young Scientist Competition project. The methods of study are based on in-depth interview, survey and brainstorming with stakeholders, including students and teachers. Data are also provided by the organizer of the project. The result of the paper demonstrates for every Baht invested effective in The Young Scientist Competition, there is a return of 11.04 Baht. This positive return on investment reflects projected income from values of the improving skills such as science and technology and management including to social skills. Finally, this paper offers the comprehensive social impact evaluation framework that includes a design of social outcome and financial proxy from the stakeholder and the secondary data sources.

ME-04.3 [R] The Study of the Consumers' Satisfaction and Behavior Attention of Amusement Park in Taiwan

Yi-Hsien Tu; Minghsin University of Science & Technology, Taiwan
Hung-An Wu; Minghsin University of Science & Technology, Taiwan
Xing Wang Lee; Minghsin University of Science & Technology, Taiwan

Due to nations' income and living standard rising, people's consumer behavior and values are different. Most Taiwanese pay attention to leisure activity. However, visitors to amusement parks are slightly decreased in Taiwan. Therefore, how to attract new consumers and maintain the existing consumers are the first priorities of the corporation. This research target is using 7Ps marketing research method to discover a consumer's behavior and purchase intention in the amusement park. This research is focused on "Lihpao Land" amusement park. The researcher's conclusion would be an advice to amusement park operators in Taiwan. The research proposed 7 variables according to 7ps model, which were product, price, promotion, place, process, people and physical evidence, to discuss the consumer's purchase intension and behavior. The research method is a questionnaire to collect information at Lihpao Land There was a total of 280 questionnaires in this research. The statistics method used was chi-square test, ANOVA, t-test, and regression analysis method. The result indicated that most variables which are proposed in this research were not significantly related to consumer demographic information. That indicated the gender, income, and occupation were not influences on the consumer's satisfaction and purchase intention. However, the age and education significantly influenced the result.

ME-06 Social Media
Monday, 8/20/2018, 16:00 - 17:30
Room: Waikiki Salon 3
Chair(s) Charles M Weber; Portland State University

ME-06.1 [R] Product Popularity versus Size of Conversation in Social Media: An Analysis of Twitter Conversations about YouTube Product Categories

Nitin Mayande; Portland State University, United States
Charles M Weber; Portland State University, United States

It has always been assumed that a large conversation about a topic on social media implies that the topic is popular. However, an empirical study of Twitter conversations about a variety of YouTube product categories, which is described in this paper, has shown that this is not necessarily the case. Popularity as measured by distribution volume is not necessarily a reliable indicator of the size of a community or conversation that is associated with a product category. This suggests that current online marketing practices are not nearly as effective as has been assumed to date. Novel, potentially more effective approaches to online marketing are suggested in the paper.

ME-06.2 [R] The Direction and Adherence of the WeChat Official Account of China Association for Science and Technology System for Popularization of Science in the New Media Era

Xiaolei Zhang; China Research Institute of Science Popularization, China
Kangyou Wang; China Research Institute of Science Popularization, China

Under the current circumstances, as the authorized and official popular science platform, should it comply with the public's preferences to do drastic adjustments in its content or insist on positioning? We choose the latter. Because we believe that scientific communication is not to gain gimmick or a point interest rate, our ultimate goal is to gradually promote the scientific spirit and cultivate public scientific thinking on the basis that ensuring the content is correct and the language can be understood by the public.

ME-06.3 [R] Identifying the Development Trends of Emerging Technologies: A Social Awareness Analysis Method Using Web News Data Mining

Xin Li; Beijing University of Technology, China
Qianqian Xie; Beijing University of Technology, China
Lucheng Huang; Beijing University of Technology, China

How to identify the development trends of emerging technologies with disruptive potential as early as possible is crucial for enterprise research and development (R&D) investment planning, and government R&D strategic planning. To avoid the weakness of using scientific papers or patents to study the development trends of emerging technologies, this paper proposed a research framework to identify the development trends of emerging technologies based on social awareness analysis. Firstly, we applied the Hierarchical Dirichlet Processestopic (HDP) model to study the changes of topics of social public concern to emerging technologies. Secondly, we used an improved sentiment analysis method to analyze the changing pattern of social publics' expectations and emotions for emerging technologies over time. Then, we identified the development trends of emerging technologies based on the social awareness analysis. Finally, the perovskite solar cells technology is given as a case study to analyze the effectiveness and feasibility of the research model.

ME-07 Cyber Security
Monday, 8/20/2018, 16:00 - 17:30
Room: Milo I
Chair(s) Robert H Martin; Software Management Consulting

ME-07.1 [R] Exploratory Strategic Roadmapping Framework for Big Data Privacy Issues

Maoloud Y Dabab; Portland State University, United States
Rebecca Craven; Portland State University, United States
Husam Barham; Portland State University, United States
Elizabeth Gibson ; University of Colorado Boulder, United States

The applications of Big Data continue to expand, due to the many possibilities and unprecedented insights it offers to people, organizations, and communities. However, Big Data poses serious challenges as well, including challenges to the privacy and security of individuals and their data. This paper considers how to best address one concern related to Big Data: the social problems that the pervasiveness of data collection, analysis, and storage create with regard to individuals' ability to control their own data. The paper uses quality function deployment (QFD) and technology roadmapping analysis methods to assess the social problems, technologies, resources, and industries that are most relevant to data privacy, and what should be done to address it. The findings indicated that the healthcare industry is one of the most important industries to consider concerning data privacy because of the nature of the data generated through medical processes and technologies. Furthermore, it was found that enforcement mechanisms, specifically in the form of federal enforcement agencies, are the most effective approach to ensure compliance by actors. It was also realized that there are extenuating political circumstances and increased costs that make the implementation of those policies challenging in the United States.

ME-07.2 [A] Time to Discover and Fix Software Vulnerabilities in Open Source Software Projects: Notes on Measurement and Data Availability

Steven M Muegge; Carleton University, Canada
S. M. Monzur Murshed; Carleton University, Canada

Reducing the time taken to discover and fix vulnerabilities in open source software projects is increasingly relevant to technology entrepreneurs and technology managers at all levels of industry. Rigorous research requires access to valid and reliable data on when vulnerabilities were introduced, discovered, and closed. This article offers three contributions about measurement and data availability: (1) an approach to measuring the time to discover and time to fix vulnerabilities in open source software projects, (2) evidence that combining project release histories and metrics from two online databases can provide reliable proxy dates for vulnerability introduction and fix, but not discovery, and (3) possible technical and open collaboration solutions to the data availability limitations of current databases. These results were part of a larger mixed-method study on the relationship between open source project and community attributes and software vulnerabilities with a data set of 1268 vulnerabilities affecting the software produced by 60 open source projects.

SESSIONS

ME-08 Leadership
Monday, 8/20/2018, 16:00 - 17:30
Room: Milo II
Chair(s) Jeffrey Busch; Jeffrey S. Busch PMP

ME-08.1 [R] Organizational Project Management (OPM): Exploring Its Need in Organizations

Yaser Alnasri; Portland State University, Saudi Arabia
Jeffrey Busch; Jeffrey S. Busch PMP, United States

Organizational project management (OPM) is not a "thing" or a "procedure," rather, it can almost be described as a "state of being" or "harmony" in the alignment of what an organization does and how it gets there. OPM has the responsibility to enhance and improve how an organization achieves its strategic goals. It provides organizations with an intelligent approach to deal effectively with the various projects and programs required by the market, its organizational stakeholders, and regulatory agencies, all within the organization's limited resources. OPM has the responsibility to support the alignment between the organization's business strategy and its projects to achieve the organization's goals. It is also responsible for managing risks and dealing with the uncertainty that may prevent the organization from achieving its objectives. In addition, it enables the organization to measure its capabilities, then plan and implement improvements to seek the systematic achievement of best practices. Moreover, it ensures organizational learnings from both knowledge management and lessons learned. The purpose of the research is to illustrate the important role that OPM must or needs to play within the organization. This research utilizes the current knowledge base in the project management environment to answer the question of "Why does an organization need to establish OPM?" In addition to describing OPM's responsibility in the organization, the paper will briefly explore four categories - portfolio management, project sponsor, effective programs and projects management, and strategic project management office (PMO) - for establishing OPM in an organization.

ME-08.2 [A] Digital Workplace Management: Exploring Aspects Related to Culture, Innovation, and Leadership

Abubaker Haddud; Eastern Michigan University, United States
Dorothy K McAllen; Eastern Michigan University, United States

The digitization of businesses is continuing to take place at a rapid pace as a result of key influences such as integrated technologies and digital transformation strategies. Such adoption is changing the way organizations conduct their business and it is crucial that this impact is fully understood in order to maximize its potential. This paper presents key elements of a digital workplace and how to build it. The paper also highlights a number of possible benefits and challenges related to digital workplaces including the workforce's productivity and innovation. Furthermore, the paper will examine crucial skills needed by business leaders when managing or leading digital workplaces. Finally, the paper will evaluate a number of key success factors for the effective management of digital workplaces. The paper will serve as a valuable source of information regarding how organizations best manage workforce culture related aspects when digital workplace settings are adopted.

ME-08.3 [R] Cross-Level Effect of Team Paternalistic Leadership and Team Challenge Stressor on Employee's In-Role Performance

Yang Qiu; Harbin Institute of Technology, China
Li Zhang; Harbin Institute of Technology, China
Eryue Teng; Harbin Institute of Technology, China
Taisi Lai; Harbin Normal University, China

Most previous studies investigated the impact of paternalistic leadership and challenge stressor on employee's in-role performance at the individual level. In this study, we focused on the impact at the group level. Data were collected from 208 employees within 35 research and design work teams of a real estate company and architecture design institute in seven cities of mainland China. Team paternalistic leadership and team challenge stressor were rated by employees, whereas in-role performance was assessed by their immediate supervisors. We found that team paternalistic leadership had a cross-level positive effect on employee's in-role performance which was mediated by team challenge stressor. Specifically, in terms of three dimensions of team paternalistic leadership, only team benevolence leadership and team moral leadership showed indirect effects on employee's in-role performance mediated by team challenge stressor.

ME-09 Manufacturing Management-2
Monday, 8/20/2018, 16:00 - 17:30
Room: Milo III
Chair(s) John M Ikome; Vaal University of Technology

ME-09.1 [R] Successive Innovations in Global and Local Markets: Strategies of Global Niche Top Enterprises in Japan

Makoto Hirano; The University of Fukuchiyama, Japan
Daiki Tobino; J.Morita Tokyo Mfg. Corporation, Japan

For many manufacturing small and medium enterprises (SMEs), it is very important to produce successive innovations for surviving in the recent hard competition in the global market. This research introduces some cases of so-called global niche top (GNT) enterprises as best practices of producing successive innovations. Through the research, their efforts to produce successive innovations were discussed and the key factor of success (KFS) was analyzed. One effort was to combine technical innovation and service innovation, and another was to combine local business and global business. Both efforts completely depended on aggressive entrepreneurship of the enterprise top managers. Solidarity and loyalty of the employees were also important for accumulating tacit knowledge in technology and gaining credibility for customers as their competitive competence.

ME-09.2 [R] Analysis of the Vulnerabilities of the Supply Chain Network of a Manufacturing Company Using the Network-Science Approach: S-Electronics Case

Kyounghwan Chin; SungKyunKwan University (SKKU), Korea, South
HeeSang Lee; SungKyunKwan University (SKKU), Korea, South

A steady, consistent, and continual supply of gases and chemicals is very important for the production of the semi-conductors of S-Electronics, one of the largest semiconductor manufacturers in the world. The demand is very high for the various gases and chemicals of S-Electronics, due to the manufacturer's need for rare gases and chemicals and its advanced technology. During the global sourcing process, the production and shipping in each region and country are subject to disruption by natural disaster and executive incidents including earthquakes, hurricanes, and factory explosions. In this article, we try to analyze the vulnerabilities of the supply chain network (SCN) of gases and chemicals by using network science, which studies complex networks in consideration of distinct elements that are represented by nodes and inter-elemental connections in the form of links. We describe the gas and chemical SCN of S-Electronics, which consists of 150 gas and chemical producers and distribution agents worldwide. In recent years, demand for gases and chemicals has increased with increasing demand for semiconductors. Since current production capacity might be not able to meet this demand, supply must be diversified and capacity-up. In this situation, a stable production and the supply of existing receivers are urgently needed. Further, we analyzed the characteristics and weaknesses of the SCN by classifying the gas types, gas companies, and the geographic locations of the companies. Subsequently, we are now analyzing the SCN to overcome the weak links and nodes. We also expect to predict not only the loss-control events (risks), which have already occurred and are known, but also the unexpected risks based on a combining of the network-science approach with forecasting techniques.

ME-09.3 [R] A Study of Factors Contributing to High Raw Material Wastage in Manufacturing Organisations: The Case of an Automation Company in KZN, South Africa

Shivaar Dukhi; Mancosa Graduate School of Business, South Africa

Chipo Mugova; Mancosa Graduate School of Business, South Africa

From a business perspective, maximum efficiency leads to maximum profits, hence the reason many businesses seek methods to minimize material wastage. This study aimed to identify the factors contributing to high material wastage in a Durban-based automation company in South Africa. The study sought to evaluate the effectiveness of current waste minimization strategies and the challenges experienced to identify possible solutions for recommendation to address material wastage in the manufacturing sector. The study used the quantitative research methodology using structured surveys to collect data from a sample of 100 individuals who are directly linked to and employed by the automation company, selected using simple random probability sampling. Data gathered from the questionnaires was analyzed using Excel spreadsheets and the SPSS data analysis software package to determine critical and significant patterns. The results revealed that the high material wastage at the automation company is a result of low skill levels, little years of experience, low staff retention, poor-quality material, and inefficient manufacturing processes and techniques used. Recommendations presented to management consist of skills development in the factory, training and monitoring of staff, implementation of staff retention strategies and the implementation of advanced manufacturing processes to improve production efficiency.

ME-10 Knowledge Management: 2
Monday, 8/20/2018, 16:00 - 17:30
Room: Milo IV
Chair(s) Kazuya Tanaka; The University of Tokyo

ME-10.1 [R] Systems Intelligence and Organizational Knowledge Creation

Yasuo Sasaki; JAIST, Japan
Jader Zelaya; JAIST, Japan
Naoshi Uchihira; JAIST, Japan

Since we live immersed in organizational systems, understanding the set of competencies that are required for individuals to behave successfully in such systems is of primordial importance. The concept of systems intelligence (SI), developed in the field of systems thinking, puts forth a set of competencies in such settings. The relationship between SI and knowledge management has already been discussed conceptually in a previous study, particularly in the context of the SECI model, a well-known framework of organizational knowledge creation (KC). The present study is the first attempt to provide empirical evidence on the relationship between these two constructs, namely SI and KC. By means of a questionnaire survey using established scales, we collected data from employees of various organizations. We then investigated statistically how each SI competency can affect each KC process. The results show that, among several SI competencies, both a spirit of discovery and positive engagement have the most predominant influence on diverse KC activities in organizations. These findings could be helpful for managers to design mechanisms to involve people in KC activities in their groups or organizations.

ME-10.2 [A] GridaMed: A Tool for Pubmed Search and Research Trend Map Generation

Heyoung Yang; Korea Institute of Science Technology Information, Korea, South
Hyuck Jai Lee; Korea Institute of Science Technology Information, Korea, South
Sung Wha Hong; Korea Institute of Science Technology Information, Korea, South

PubMed is the most frequently used search tool for the professionals in biomedical domain. Many auxiliary tools to PubMed have been proposed to help the users with searching and acquiring knowledge from electronic literatures. However, they are insufficient to overcome the challenge from drastic increase in the size of the literature, which triggered the need for a new tool. The authors introduce a new tool, GridaMed, to visualize the recent research trend based on the retrieved documents corresponding to a user's simple search query to PubMed. GridaMed utilizes the Medical Subject Headings (MeSH) tagged in the PubMed documents, which are extracted from the documents, and generates the MeSH map (or MeSH network) by calculating the correlations of every MeSH term pairs based on the similarities of the keywords from the document titles. GridaMed provides a feature called "click-and-link," which provides the list of documents containing a specific MeSH represented as a node in the MeSH map. The MeSH map can be used as a "guide map for travelers" for an easy acquisition of the knowledge on the research trend. The combination of PubMed and MeSH map is expected to be an effective complementary system for biomedical professionals who find it difficult to search and analyze information due to the explosive increase in the literature.

ME-10.3 [R] Recategorizing Interdisciplinary Articles Using Natural Language Processing and Machine/Deep Learning

Kazuya Tanaka; The University of Tokyo, Japan
Riku Arakawa; The University of Tokyo, Japan
Yasuaki Kameoka; The University of Tokyo, Japan
Ichiro Sakata; The University of Tokyo, Japan

Interdisciplinarity has become popular due to the novel approaches in academic research and papers as well as solutions to various social problems. Thus, research into interdisciplinary research itself and into interdisciplinarity has also become popular. However, it is difficult to identify a research discipline precisely, which is necessary for the evaluation of "interdisciplinarity." For example, in general, research disciplines are categorized in accordance with the journals that cater to them. Thus, an important multidisciplinary science journal, such as Nature or Science, does not belong to the category of "general research disciplines." Hence, a new category of "multidisciplinary science" is required for the fundamental evaluation of interdisciplinarity." In this research, a new method of classification is conducted by analyzing the abstracts of research papers using machine learning and deep learning. All the data used is gathered from the Web of Science (PY: 2016). The new classifier identifies research disciplines including "multidisciplinary science," in contrast to other current methodologies.

ME-11 Technology Management in the Health Sector-2
Monday, 8/20/2018, 16:00 - 17:30
Room: Milo V
Chair(s) Rainer P Hasenauer; WU-Wien

ME-11.1 [R] Structural Characteristics of Venture Companies Network in Japanese Biotech Industry

Keigo Takai; Kyoto University, Japan
Naoki Wakabayashi; Kyoto University, Japan

Bio-tech venture companies which have a broad alliance network tend to grow and to be listed (=IPO). In addition, it is necessary for venture companies to accumulate internal resources and capability. That is, both structural characteristics of the network and internal resources are important for the venture growth in the pharmaceutical industries. As an analysis target, we covered 186 pharmaceutical manufacturing and reagent manufacturing venture companies established in Japan, from 1995 to 2015. Then we classified our collection of data mainly into three groups: IPO ventures, subsidiaries and others. With our data, analysis of variance was conducted. As a result of analyzing partnerships, IPO ventures have different positions from other companies in "betweenness." That is, IPO ventures partly have the function as the bridge of the research and development group in the network.

ME-11.2 [R] An Intelligent Service Planning System for Effective Home Care Service Scheduling

Paul K.Y. Siu; The Hong Kong Polytechnic University, Hong Kong
King-lun T Choy; The Hong Kong Polytechnic University, Hong Kong
H.Y. Lam; The Hong Kong Polytechnic University, Hong Kong

Due to the increasing aging population over the world, it is challenging to take care of the large number of elderly people who are weak and living alone. In order to assist them to remain part of the community, home care services are being focused on enabling elderly people to receive nursing and care services in their familiar home and community environment.

However, with the increasing need for home nursing care services, there is an insufficient number of nursing staff to provide service to these elderly people. Further, nursing staff may need to work on tight schedules to fulfill the extra needs of the elderly, and that may affect their working performance and result in poor service satisfaction. In this paper, an intelligent service planning system (ISPS) is designed for facilitating decision making in effective home care service scheduling. The genetic algorithm (GA) approach is applied in the system to formulate the service schedule for each nursing staff by considering the estimated time for serving the elderly. In order to validate the feasibility of the proposed system, a case study was conducted in a healthcare center. The results show that the service satisfaction from the elderly and the work satisfaction of the nurses are both increased.

ME-11.3 [R] The Influence of Physician-Patient Interaction on Patients' Perceived Healthcare Quality: Evidence from the Chinese Mobile Medical Consultation Section

Hongying Tan; Beijing University of Posts and Telecommunications, China
Mengling Yan; Beijing University of Posts and Telecommunications, China
Yanni Hu; Peking University, China

Improving patients' perceived healthcare quality in the mobile context is a vital challenge faced by the mobile healthcare practitioners. Although extant literature on perceived healthcare quality suggests system and interactive factors, it is limited in the interpretation of interactive factors and corresponding empirical evidence. This work integrates literature on perceived service quality and physician-patient interaction, and proposes an interaction effect of patients' expectation and physicians' support on patients' perceived healthcare quality based on expectation-confirmation theory. We validated the theoretical model based on 50,256 detailed communication records from 1,210 pediatricians collected from a leading Chinese mobile consultation service provider. Our results show that physician's informational and emotional support both positively affect patient's perceived service quality and that patient's expectation negatively moderates the relationships between physician's support and patient's perceived service quality. Theoretical and practical implications are discussed.

TA-00 PLENARY - 2

DATE: TUESDAY, 8/21/2018
TIME: 08:30 - 10:00
ROOM: KONA MOKU BALLROOM
CHAIR: DILEK CETINDAMAR; UNIVERSITY OF TECHNOLOGY SYDNEY

TA-00.1 [K]The Making of a Serial Breakthrough Innovator

Melissa A Schilling; New York University, United States

What makes some people so spectacularly innovative? Throughout history, some people have become widely recognized for introducing one world-changing innovation after another. In this keynote, I develop case studies of eight such serial breakthrough innovators: Elon Musk, Marie Curie, Steve Jobs, Albert Einstein, Nikola Tesla, Dean Kamen, Benjamin Franklin and Thomas Edison. By examining the stories of their childhoods, their work experiences, their beliefs and motives, I identify those things they have in common with each other yet simultaneously make them unusual from the "average" person. I then examine these commonalities through the lenses of innovation and creativity research to examine the potential mechanisms linking these characteristics and experiences to their exceptional innovation. The result is inspiring: The innovators do have unusual traits and characteristics, and each benefited from situation advantages; however, we can tap many of the same mechanisms to nurture innovation in ourselves and others.

TA-00.2 [K]Recognizing Genius in the Age of Technology: Jobs and Musk

Bulent Atalay; Scientist, Artist and Author, United States

"Talent hits a target no one else can hit; Genius hits a target no one else can see." — Arthur Schopenhauer Genius, in the broadest sense of the word, refers to individuals who display extraordinary intellectual ability or surpassing levels of creativity, the former quality frequently complementing the latter. But what good is soaring intelligence or lofty creativity if there is no achievement that is universal and lasting. Our modern age has seen the emergence of a number of brilliant and imaginative individuals, young heroes of the Age of Technology. Their contributions have been crucial to contemporary life: science, business, engineering, medicine, education, publishing, information-sharing, communication, transportation, self-driving cars, robotics, automation, artificial intelligence (AI), entertainment, art, and social media. Although none of the innovators or entrepreneurs of the present Information Revolution could ever claim levels of creativity in the arts and sciences comparable to a Leonardo or an Einstein, they are, nonetheless, undeniable visionaries inventing the future. The two men on whom we will focus are Steve Jobs and Elon Musk, already legends, who created a pair of companies that are already defining the future. What are their shared attributes and their dissimilarities? What are the battles they have waged, and as entrepreneurs of undeniably of the highest caliber, what can they teach us?

TB-01 Innovation Management-3

Tuesday, 8/21/2018, 10:30 - 12:00
Room: Kona Moku Salon A
Chair(s) Dimitrios Salampasis; Swinburne University of Technology

TB-01.1 [R] Hierarchical Differences in Supervisor Support and Coworker Support

Yasutaka Hashigami; Tokyo Institue of Technology, Japan
Masaharu Tsujimoto; Tokyo Institue of Technology, Japan

Reference [1]stated that when supervisors act as agents of the organization, then employees develop global views concerning the degree to which supervisors value their contributions and care about their well-being. Reference [2] indicated that strength of influence on the perceived organizational support (POS), follows to the status of supervisors. Reference [3] reported coworkers' influence on POS through social networking. However, there are few studies on PSS according to hierarchy and PCS. This study investigated the strength of employees' perceptions of support from coworker and from supervisors, and the correlation between perceived coworker support, supervisor support with affective commitment, and citizenship behavior. Research subjects included are 83 technical employees working in two factories belonging in a steel manufacturing group located in the region in Japan. We analyzed the data using regression analysis and covariance structure analysis. We found that (1) perceived support from coworkers had greater influence than that from the factory manager and immediate supervisors. (2) Perceived support from upper manager influence more than that from the factory manager and immediate supervisors. (3) Affective commitment (AC) mediated between perceived coworkers and supervisor support and citizenship behavior. The study suggested that the perceived support of coworkers and upper managers has a strong influence on employees.

TB-01.2 [R] Profit Expansion Method by Outbound Open Innovation

Manabu Eto; Hitotsubashi University, Japan

Among open innovations, standardization activities that do not cause a drop in profits, such as issuing standard essential patents for standardized technologies, can be said to be offering-type outbound open innovations. Technology providers require a careful strategy to make a profit from standardization activities. The core of this is to determine in what state the technology in the target product itself will be kept, which is the technology control strategy. What is particularly important is to determine what information will be proactively disclosed based on the theory, utility, and implementation of the technology, and what information will be kept secret; furthermore, if multiple technologies are used in one product, it is also important to have a strategy for the proper use of each technology, such as which technology should be kept secret in order to secure profits, and which technology should be

disseminated in order to expand the market. In this paper, several cases of standardization are examined and, by focusing on those that earned profits, technology management strategies are presented that generate profits using standardization without standard essential patents.

TB-01.3 [A] Service Innovation in the Cloud: Implications for Strategy Development

Robert R Harmon; Portland State University, United States
Enrique G Castro-Leon; Intel Corporation, United States

Cloud enterprises have shifted from linear to networked business models through a value transformation process centered on the development of multisided service platforms. These platforms facilitate service exchange and value cocreation by enabling three essential transitions: 1. from control to orchestration of enterprise resources, 2. from internal optimization to external interactions, and 3. from customer value to ecosystem value. Innovative service transformation is most in evidence with enterprises that are native cloud companies or companies that have more rapidly and effectively adopted ecosystem-based service platforms such as Netflix, Google, Facebook, Uber, and Airbnb. Service ecosystems enable the critical processes for value cocreation that is foundational to the continuous development of innovative user experiences. However, many developers and adopters of cloud service business models fail to innovate. This is usually blamed on inappropriate business strategy and/or insufficient technological solutions. However, the root cause is often more basic; specifically, it is the lack of service thinking that is necessary for the development of cloud-based service innovation models. This paper explores the service science foundations of cloud computing and the dimensions of service thinking that inform the service transformation process for cloud-based companies. A framework for the development of cloud-based service transformation is proposed with evidence from three case examples.

TB-02 Entrepreneurship/ Intrapreneurship-2
Tuesday, 8/21/2018, 10:30 - 12:00
Room: Kona Moku Salon B
Chair(s) Alicia Say; National Taiwan University

TB-02.1 [R] Development of Organizational Capability from Entrepreneurial Identity

Yasuto Ishitani; Kochi University of Technology, Japan

Entrepreneurs' identities affect how they do business. These identities also become ingrained into the organizations led by entrepreneurs and affect the organizational behavior of their members. If members' organizational behavior in the workplace encourages organizational learning and fosters formation of organizational capabilities, a competitive advantage may develop. Drawing on the Observe, Assess, Design, Implement - Shared Mental Model theoretical framework that clarifies the relationship between individual and organizational learning, this study examined the mechanism by which entrepreneurs' identity formation causes organizational behavior and learning, thereby influencing competitive advantage. The example of Yamamoto Precious Metal Co., Ltd.'s successful establishment of a competitive advantage in the dental precious metals field provides a detailed description of the mechanism. As co-founder, Chief Executive Officer Hirohisa Yamamoto led Yamamoto Precious Metal to hold the top share in the Japanese market of dental alloys for metal-ceramic restoration. This study examined the mechanism by which the entrepreneurial identity of Hirohisa Yamamoto formed the organizational capability of Yamamoto Precious Metal and ultimately led to its competitive advantage.

TB-02.2 [R] Assessment of Water Purification Technologies in Developing Countries

Danielle Bradley; Pacific Lutheran University, United States
Jennifer Vegh; Pacific Lutheran University, United States
Chung-Shing Lee; Pacific Lutheran University, United States
Renzhi Cao; Pacific Lutheran University, United States
Leong Chan; Pacific Lutheran University, United States

According to the United Nations, there has been a drinking water crisis in many developing countries. Aside from the direct impact of diminishing health and living condition, there are secondary impacts on poor education. To combat these issues, there are multiple technological innovations to solve this crisis. This research has identified six candidate technologies that are utilizing different methods for filtration and disinfection of harmful agents to create safe drinking water. In order to effectively choose and weight the criteria, we utilized both research and industry articles that we leveraged in the gap analysis. Multi-criteria decision analysis approach has been applied to evaluate the identified technologies. The findings of this research can assist communities in developing countries to select the appropriate water purification technologies to improve people's health conditions. The research also provides decision support for organizations and governments on which technology to choose for water purification.

TB-02.3 [A] Economic Growth through Business Model Innovation and Technological Entrepreneurship

Sebastian Allegretti; Ulm University of Applied Science, Germany
Sven Seidenstricker; Baden-Wuerttemberg Cooperative State University, Germany
Andreas Kasseckert; Ulm University of Applied Science, Germany

To give managers insights into the controllable factors of product and process development, the identification and validation of the critical success factors have been in the focus of many researchers in the last decades. While exploring the field of business model innovation, it can be seen that there is a lack of quantified empirical studies, which investigate these factors, in this context. This paper aims to identify the success factors for business model innovation, evaluate the theoretical hypotheses statistically with partial least squares (PLS), and give recommendations for managerial actions on the basis of a cluster analysis. A cross-industry management survey was done to collect the sample data. The study consists of 10 constructs, which are defined as follows: innovation culture, innovation competence, business model innovation process, network and partner collaboration, acquisition of technology and knowledge, clear product advantage, clear value proposition, customer orientation, customer retention and price management. To assess the complex nature of business model innovation, we choose a second-order SEM-model. The contribution of this paper to the management literature is achieved by providing concrete and validated entrepreneurial action strategies for superior economic growth.

TB-04 Disruptive Technologies
Tuesday, 8/21/2018, 10:30 - 12:00
Room: Waikiki Salon 1
Chair(s) Thorsten Lammers; University of Technology Sydney

TB-04.1 [R] Company Data in the Blockchain: A Juxtaposition of Technological Drivers and Potential Applications

David Holtkemper; RWTH Aachen, Germany
Simon Wieninger; RWTH Aachen, Germany

The potential of Blockchain technology has long been recognized outside the financial sector. Wherever data need to be stored and kept decentralized, tamper-resistant, and realtime-capable without involving a trusted intermediary, applications based on Blockchain technology promise to create opportunities for innovations of cross-company processes. In the presented paper, the technical possibilities of Blockchains are analyzed and classified according to their suitability to address specific challenges. This makes it possible to identify those technological drivers that are particularly promising for applicability in a corporate context. This includes, for example, tamper-resistance and security from forgery, which can be achieved without intermediaries with the help of data encryption methods using hash functions. Another technological capability of Blockchains is to provide a high degree of data

security, which can be realized using public-key cryptography. The technological drivers will be juxtaposed with data as typically generated in manufacturing companies (orders and order confirmations, production data, quality-related data, etc.). Subsequently, the prerequisites that these data must meet with regard to storage capacity and transferability will be identified. By linking the results to the identified technological drivers and functions, it becomes possible to determine what types of company data have the potential to be successfully stored and managed in a Blockchain.

TB-04.2 [R] Genomics, Rare Diseases, and Disruptive Innovation in the Biopharmaceutical Industry

Mark J Ahn; Portland State University, United States
Amir Shaygan; Portland State University, United States
Charles Weber; Portland State University, United States

The multinational biopharmaceutical industry has to deal with significant financial pressures due to its being a very cost-constrained industry. To add to that are the finite patent expirations on financially successful drugs and the vying nature of the biotech industry due to new innovations. There has been an increase of smaller markets due to the proliferation of molecular segmentation patient populations in fields such as personalized medicine. Particularly, due to the significant cost reducing impacts of the development of "next-generation" sequence platforms on DNA sequencing in the last decade, molecular diagnostics are being considered as cost-effective candidates to be used as a standard medical test, in terms of risk assessment, confirmation of diseases, and therapeutics. Biopharmaceutical companies need to reassess their drug development strategies and choose among alternative prospective business models in order to remain relevant amid the new innovations and developments. Using a dynamic capabilities lens, this paper examines the impact of genomics generally and gene therapy specifically on the rare disease sector of the biopharmaceutical industry by analyzing the public data from 24 genomics-based rare disease focused biopharmaceutical companies. This study shows that growing rates of cumulative returns are dependent upon the accumulation of knowledge-based employees and expanding product portfolios of disruptive genomics-based technologies for treating rare diseases. Further, this study stresses the significance of structuring the capability and capacity to absorb expertise and accrue knowledge for new product innovations and viable competitive advantage.

TB-04.3 [R] What Causes Companies to Transform Digitally?

Thorsten Lammers; University of Technology Sydney, Australia
Laura Tomidei; University of Bologna, Italy
Alberto Regatierri; University of Bologna, Italy

Business leaders and entrepreneurs are facing new challenges in the rapidly transforming digital economy. The benefits obtained by the employment of digital technologies are broadly acknowledged. However, decisions need to be made about which technologies to acquire and how to integrate them into the business. In order to do this efficiently, organizations and disruptors all over the world need to understand the key drivers of digital transformation that affect their operations and industries. In this paper, the outcomes of a systematic literature review are presented which identify the drivers for digital transformations across key industries - using the example of Australia and its five core industries of services, mining, manufacturing, agriculture and construction. Outcomes indicate that drivers for digital transformation vary significantly across different industries. However, some drivers such as "environmental sustainability" were found to be important across most industries. The results contribute to current research in this field by providing a comprehensive overview of industry-specific transformation drivers. This will support decision-making for technology managers and provide the foundation for similar studies in other countries.

TB-06 Decision Making-1
Tuesday, 8/21/2018, 10:30 - 12:00
Room: Waikiki Salon 3
Chair(s) Nasir J Sheikh; University of Bridgeport

TB-06.1 [R] Assessment of Electronic Authentication Policies Using Multi-Stakeholder Multi-Criteria Hierarchical Decision Modeling

Wonbae Son; SUNY Korea, Korea, South
Nasir J Sheikh; University of Bridgeport, United States

Standards allow society to be efficient and interconnected. For expediency, a country may adopt a policy of domestic standards which may require reconsideration to conform to international ones to support global markets. However, the policy reform process is complex because adopting standards involves not only technological, but also political, economic, and social perspectives. Also, there may be conflict and dissent between the transition winners and losers. An effective method to rationally assess and rank policy alternatives is with a hierarchical decision model (HDM) that includes competing perspectives and their respective criteria. In the early 2000s, the South Korean government standardized and mandated electronic authentication technologies to mitigate technological gaps in e-commerce. However, this standardization also created problems causing Korea to lag in online security and being limited to a Microsoft-specific monoculture. Internationally, other de facto standards have been adopted such as secure sockets layer (SSL), and blockchain is being considered. In 2015, the Korean government eventually changed its policy by eliminating the e-commerce mandate to enable banks and other institutions to adopt different standards. This policy reform took 16 years because of its pervasiveness. In this study, an HDM is developed specifically for Korea to assess the post-reform policy options.

TB-06.2 [A] A Study on the Prioritization of Policy Instruments Regarding Gendered Innovations in STI and R&D Using AHP Method

Wonju Hwangbo; Ewha Womans University, Korea, South
Young Il Park; Ewha Womans University, Korea, South

The objective of gendered innovations in science technology is to implement better science and promote human welfare through gender characteristics analysis. Recently, gender characteristics analysis has emerged as an important issue in the holistic process and results of gendered innovations in science technology. The leaders in science technology innovation (STI) like the European Union and Stanford University in the United States have placed an emphasis on gender as a factor in systemic analysis method and case studies in scientific research and process development. For instance, EU Horizon 2020 has mandated that all research plans integrate gender as an element in all research proposals. As such, there are efforts to enhance gendered innovations in science technology. Republic of Korea is not an exception. Korea adopted an affirmative action based on the Act on Fostering and Supporting Women Scientists and Technicians in 2002. Among other efforts by the South Korean government are the adoption and operation of the Ministry of Gender Equality in 2001, Gender Sensitive Budget in 2006, and Gender Impact Assessment in 2011. This study focuses on prioritizing certain aspects of the South Korean policy instruments and around STI and research and development (R&D) which can be enhanced by integrating gendered innovations. The results of such study are expected to be reflected and factored into making suggestions to amend the laws on science and technology. This study is expected to propose important measures to adopt S&T gendered innovations in the national R&D management system. It has great significance because it tries to build a basis of effective S&T policy execution using the AHP technique to set the priority in gendered innovations policy adoption.

TB-06.3 [R] Assessing Key Factors Impacting the Performance of Offshore Hydrocarbon Projects

Abdulhakim Gaidedi; Portland State University , United States
Tugrul Daim; Portland State University, United States

Offshore hydrocarbon projects have many different and unique characteristics, such as a larger project size, higher number of scopes, higher complexity, etc. In fact, offshore hydrocarbon projects described as mega projects are ones that require significant assessment and acquisition methods in order to reduce risks and failures. This paper emphasizes the critical and challenging factors that affect the successful implementation of O&G offshore projects and their overall performance. Four perspectives have been identified in order to

assess these factors. These perspectives are financial, technical, geopolitics and geographic. Under each perspective, there are multiple criteria that are linked to each other with complex processes and unique challenges.

TB-07 Project/Program Management
Tuesday, 8/21/2018, 10:30 - 12:00
Room: Milo I
Chair(s) Jeffrey Busch; Jeffrey S. Busch PMP

TB-07.1 [A] Elements of Sharing Economy in a Public-Private Partnership: A Case Study of a Company in Miyako, Iwate Prefecture, Japan

Kengo Miyamoto; Japan Advanced Institute of Science and Technology, Japan
Youji Kohda; Japan Advance Institute of Science and Technology, Japan
Rihyei Kang; Japan Advance Institute of Science and Technology, Japan

This research focuses on elements shared between local governments and private companies in public and private partnership projects. In the conventional bidding system, there is a relationship between local governments and private companies. In that relationship, the local government had an authoritative position. However, in public-private partnership projects, the relationship between public and private bodies are more equal, as both provide capital for the business. The bodies conduct business as partners sharing a public project. The situation is similar to the relationship between lenders and borrowers in sharing economies. During the Great East Japan Earthquake, local government infrastructure was damaged. Private partners were sought to help with repairs. Elements of sharing were verified in two consecutive cases in Miyako, Iwate Prefecture, a setting heavily damaged by the earthquake. The current study considered how partnerships in shared public projects were established. The results of the interview survey were analyzed revealing that "relationship," "communication" and "presence" for sharing were key elements.

TB-07.2 [R] Resource Mobilization by 'Strange Bedfellows': A Case Study of 'Biomass Nippon Strategy'

Ryo Taniguchi; Hitotsubashi University, Japan

This study investigates when multiple frames can coexist within a given project. Existing literature shows that actors create a state where multiple frames or meanings coexist, in order to mobilize the necessary resources from diverse stakeholders. However, there is limited knowledge on the conditions suitable for such coexistence. To address this issue, this study examined the case of "Biomass Nippon Strategy." The results suggest that multiple frames can coexist when (1) there is no perceived contradiction between each frame, and (2) all project participants need the others' frame.

TB-07.3 [A] Implementation Challenges and Handling Project Management Complexities in China-Pakistan Economic Corridor

Tahire Sarmmad; COMSATS Institute of Information Technology, Pakistan
Muhammad Choudhary; NAMAL, Pakistan

China-Pakistan Economic Corridor (CPEC) is a component of One Belt-One Road (OBOR) initiative of Chinese government to connect the globe with rail, road and sea links. CPEC comprises 968 KM road, 1830 KM Rail Link, energy, infrastructure, special economic zones, industrial parks, mass transit, and social sector development projects stretching from Pak-China boarder to Pakistan's port city of Gwadar. The US$ 64 billion program is under active implementation. The goal of our research was to identify key program implementation challenges and identification of resolution strategies while executing projects in CPEC portfolio. We used expert purposive sampling because our research required fetching firsthand knowledge from the key personnel at various Government institutions who have been involved in planning and implementation of these projects. We identified authorities who are part of the Joint Cooperation Committees involved in execution, problem solving and decision making process, and their assignments covered relevant portfolios. The identified challenges/barriers were classified into financial, technical, political, social equity and human resource categories and used in personal and/or Skype interviews. The challenge/barrier classes passed content and response validity tests. The identified challenges that fall in high probability-impact grid area are political instability, cultural impact (the nature of the initiative is transnational), delays in starting the projects, agreement on equitable sharing, and security to social values of people in the cultural context. From the economic perspective, private-public partnerships should be evolved with clear agreements and the need is to grow our economy in the form of exports. CPEC is not only a transport or logistics corridor but an economic corridor having industrial zones, quality with safety to societal factors and the uplift to the standard of life style of the people. The NVivo Plus and SPSS were used for data analysis. The research outcomes are applicable to manage technology infrastructure projects in other developing countries as well.

TB-07.4 [A] An Approach on Monitoring Evolution of Projects by Professional Performance Assessment: A Case Study at the Amazon Regional Center of The National Institute for Space Research

Marck Silva; Foundation for Science, Tech. & Space Application, Brazil
Marcia Barros; Foundation for Science, Tech. & Space Application, Brazil
Lucyana Santos; Foundation for Science, Tech. & Space Application, Brazil
Marcos Adami; National Institute for Space Research, Brazil
Alessandra Gomes; National Institute for Space Research, Brazil

This work investigates strategic management processes of projects involved in the Brazilian aerospace field, addressing the Regional Center of the Amazon of the National Institute of Space Research. It proposes an approach in the monitoring of the evolution of projects by evaluation of professional performance, showing results in graphs and the need to survey and follow the most evident and significant technological advances in the mapping environment of land use and land cover in the Amazon. It addresses the main difficulties faced in the process of managing projects and people to achieve goals, needing to know the Geographic Information System tools used by employees, such as Terramazon, and their respective times consumed in this type of software. The work intends to serve as a basis for investigating, developing and implementing new management options that will reduce the efforts required by managers and administrators during the process of monitoring the evolution of projects. The methodology of Project Management Institute (PMI) and its Guide to the Project Management Body of Knowledge (PMBOK Guide) was used in this research work, ensuring an international quality.

TB-08 Science & Technology Policy-1
Tuesday, 8/21/2018, 10:30 - 12:00
Room: Milo II
Chair(s) Junhee Bae; Korea Institute of Geoscience and Mineral Resource

TB-08.1 [R] Pathways for the Co-creation of Service in Academia: An Ethnographic Analysis of Epistemic Cultures in Japanese Public Shared Core Facilities

Takashi Onoda; JAIST, Japan
Yasunobu Ito; JAIST, Japan

Japanese public research establishments have played a crucial role as academic-industrial alliances, so-called "innovation hubs" where, since 2015, shared core-facilities have functioned as research infrastructure under the 5th Science and Technology Basic Plan. Innovation hubs encourage service in academia, including collaborations between industry and academia in shared facilities owned by public research establishments. Prior research has highlighted already that shared core facilities in Western countries emphasize efficiency and usability for external users. However, little attention has been paid to the academic service of scientists and coordinators, almost all of who have PhDs and aim to contribute to their academic communities. In particular, this article examines pathways for enhancing scientists' and coordinators' incentives to academic service activities, analyzing the epistemic culture of service activities in shared facilities, and using ethnographic data obtained in Japanese public establishments such as Nuclear Magnetic Resonance (NMR) facilities, Synchrotron Radiation facilities, and a Neutron source facility.

TB-08.2 [R] The Strategic Choice for Applying Government Subsidized R&D: The Relationship among Organizational Resources and Capabilities, Strategy, and Performance

Chung-Jen Chen; National Taiwan University, Taiwan
Ruey-Shan Guo; National Taiwan University, Taiwan
Yung-Chang Hsiao; National University of Tainan, Taiwan
Kae-Kuen Hu; National Taiwan University, Taiwan

Government subsidized R&D projects have been widely employed to promote innovation and R&D activities in most OECD countries. From the firms' perspective, the strategic choice to participate or not to participate in government subsidized R&D projects affects its performance. Given the much-debated nature and in-practice importance, this study attempts to investigate the relationships among organizational resources and capabilities, strategic choice, and firm performance. The empirical study employs data from the Taiwan Economic Journal (TEJ) for its timely verified financial data of listed companies in Taiwan. We analyze the behavior of Taiwanese high-tech firms in electronics and biotechnology industries while they consider applying for the R&D subsidy from the Industrial Technology Development Program (ITDP) sponsored by the Taiwanese government. We examined the relationship between organizational resources and capabilities and the inclination towards the strategic choice of participating in the ITDP, and evaluated their respective performance with a control of endogeneity bias by implementing Heckman's two-stage estimation procedure. Our findings suggest that the tendency of the strategic choice to participate in a government subsidized R&D project is strongly correlated with a firm's absorptive capabilities. The strategic choice of participating or not participating in ITDP in theoretically appropriate conditions is able to enhance firm performance.

TB-08.3 [R] Analysis of Social and Economic Impacts of a Community Revitalization Program Using Renewable Energy

Yaeko Mitsumori; Osaka University, Japan

In the wake of the Great East Japan Earthquake of March 2011 (called 3/11 in Japan), the government of Japan drastically changed its energy policy, and the use of renewable energy is an urgent matter in Japan today. Among the variety of renewable energy sources, small hydropower plants are gaining attention because they do not require the construction of a large dam, do not emit greenhouse gases, do not require any raw materials, produce energy continuously, and are suitable for many potential sites in Japan. This study focused on the Futagawa Small Hydropower Plant in the town of Aridagawa, Wakayama Prefecture, Japan, and analyzed the impacts of a community revitalization program utilizing revenues from the small hydropower plant. Aridagawa constructed this small hydropower plant to utilize discharge water from Futagawa Dam (0.7 tonnes per second). By utilizing a feed-in-tariff scheme, Aridagawa will sell electricity produced at the hydropower plant to the local utility company (Kansai Electric Power Co.). The town is scheduled to recover the entire construction cost of the plant within seven years, an unusually short amount of time. The town plans to utilize the revenues from the sale of electricity to fund renewable energy education programs for citizens and to develop renewable energy promotion activities.

TB-09 Collaborations-1
Tuesday, 8/21/2018, 10:30 - 12:00
Room: Milo III
Chair(s) Matti Majuri; Tampere University of Technology

TB-09.1 [R] The Development of Alternative Powertrain Technologies within Automotive Innovation Networks

Marie Gabel; Muenster University, Germany
Bastian Neyer; University of Muenster, Germany
Philipp Borgstedt; Muenster University, Germany
Gerhard Schewe; Muenster University, Germany

The current simultaneous development of different alternative powertrain technologies is a complex and expensive challenge for the whole automotive industry. As high risks and costs can be shared and complementary core competencies can be combined, innovation networks gain importance. Since little is known about these networks, we address the following research question: What are the structural and strategic characteristics of innovation networks regarding the different powertrain technologies? Based on our PICMET 2016 Conference paper, our study contributes to the scientific discussion on patent and network analyses in different ways: (1) We show an elaborate search strategy using IPC classes and keywords in order to generate a valid patent dataset for the four major powertrain technologies: BEV, FCEV, HEV, and ICEV. The dataset consists of 3,140 bilateral connections between OEMs, suppliers and companies from other industries for the years 1990 - 2013. (2) We apply a rigorous methodological approach within a two-stage network analysis using a multitude of network measures. Within this analysis, we assess both the macro-perspective of the four technologies' networks (stage 1) and the micro-perspective of central and important companies within each network (stage 2). By differentiating the network structures, we highlight different approaches used by the companies and thereby extend the understanding of cooperation within the automotive supply chain. On the macro-level, the main results show significant structural differences between the analyzed networks. On the micro-level of company activities, we find strong vertical, horizontal and lateral cooperation. Furthermore, we identify the central network positions of key players.

TB-09.2 [R] Identification of Factors to Promote Interdisciplinary Research: A Trial at COINS

Shogo Katoh; Tokyo Institute of Technology, Japan
Giancarlo Lauto; Universita degli Studi di Udine, Italy
Tomohiro Anzai; The University of Tokyo, Japan
Shintaro Sengoku; Tokyo Institute of Technology, Japan

Due to the complexity of modern science and growing need for innovative breakthrough, interdisciplinary research (IDR) is expected and widely promoted to solve complex social problems by integrating knowledge from multiple academic fields. However, conventional indicators such as the impact factor and the number of citations are not fully applicable for the evaluation of IDR. Furthermore, publications and patents are ex-post output that can be obtained as a result of research, owning a fatal time lag when conducting R&D management. To address these issues, the present study aims to explore activity-based leading measures that indicate the performance of IDR and can be utilized for the real-time management of IDR. A survey-based empirical study at an institute for IDR as a case revealed that researchers who prefer IDR represented significantly higher degrees of (i) relational skills and (ii) a satisfaction with resources provided by the institute. These findings were verified with a subsequent qualitative observation and an organizational design of an institute to promote IDR was discussed.

TB-09.3 [R] Managing Collaborative Strategy in 3D Bioprinting Technology

Keun Hwan Kim; Korea Institute of Science & Tech. Information, Korea, South
We Shim; Busan Institute of S&T Evaluation and Planning, Korea, South
Dae Sup So; Korea Institute of Science&Technology Information, Korea, South
Seung-Pyo Jun; Korea Institute of Science&Technology Information, Korea, South

The potential of a three-dimensional bioprinting (3DBP) technology in core applications of the healthcare sector has been paid attention for managing global aging. Currently, this technology area is situated in the embryonic stage. Therefore, it is essential to recognize the crucial factors in the early stage of the industry life cycle which allow firms to increase the rate of survival and the capabilities. Due to the scarce resources in young and inexperienced firms, establishing collaborative strategy plays a vital role in supplement such shortcomings. However, as the technological development process has been complicated by converging among heterogeneous technologies, it is difficult to find the potential strategic partners for new entrants. In this study, we suggest the framework to search the technologically suited partners readily and provide detailed information to manage relationships among participants. In addition, it is the first exploration to provide insights from the strategic perspective rather than technological one for the entire 3DBP technology industry.

TB-10 Educational Issues
Tuesday, 8/21/2018, 10:30 - 12:00
Room: Milo IV
Chair(s) Cheryl Hanewicz; Utah Valley University

TB-10.1 [R] Managing Complex Systems: An Educational View

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

The aim in this paper is to explore the major issues involved in managing complex systems and their relation to university-level education. The subject matter is presented from a systems thinking perspective, concentrating on the modeling and managerial control aspects. First, some general aspects of complexity and complexity management are reviewed. The review is conducted within the body of general systems theory (GST) and systems thinking, in general terms, but then focused on the discussion of modeling and managerial control from the perspective of three major trends in GST: soft cybernetics, system dynamics and science of complexity. The discussion shows that there still are some questions to be answered in the use of systems thinking in complexity management. The paper is concluded by an elaboration of the discussion as related to university-level education, to industrial engineering and business administration education in particular.

TB-10.2 [R] A Five-Year Study of Core Competencies by Students in a Technology Management Undergraduate Program

Dorothy K McAllen; Eastern Michigan University, United States
Abubaker Haddud; Eastern Michigan University, United States

Effective technology management programs support students in their knowledge related to skills and competencies required in the workforce. When developing a curriculum relevant to the needs of the students and today's technology industries, it is important to identify the prior knowledge and experience that students bring into the program. For this study, an online survey was utilized to collect primary data from 2013 to 2017 from 289 newly enrolled technology management students. The study examined their entry level of knowledge through multiple questions focused on four competencies: strategic management of technology, management of technological change, quality management of technology, and assessment and evaluation of technology. The study found that while two competencies showed an increase in the first-year students' knowledge over the five-year period, two competencies consistently showed a low level of knowledge throughout the same timeframe. The results also highlighted gaps in students' competencies when they initially entered a technology management undergraduate program. The significance of this study will help academic institutions improve their curricula, which ultimately will better equip students with core competencies that contribute positively to their academic and professional success.

TB-10.3 [A] Full-time Professors Dislike Distance Learning: What Can be Done?

Stephen Ruth; George Mason University, United States

For over a decade the annual Babson reports have indicated that only about 30% of full-time professors approve of distance learning, and several other more recent reports echo that finding. Since about one third of all college students in the United States are currently taking at least one course at distance, this means that the pool of teaching talent available to them is likely to exclude some of the most significant resources at each institution of higher learning. This paper examines the problem from the perspective of perceived difficulties that inhibit otherwise suitable and acceptable instructors, especially full-time faculty, from greater participation in online courses. These perceived difficulties are: threats to an academic career, confusion about costs and benefits, introduction and proliferation off MOOC's, higher cost of online courses, lower student evaluations and response rates for online teaching, past faculty boycotts and disagreements concerning online teaching, the role of adjuncts versus full-time faculty, and unfavorable comparisons with "successful" online programs. While much of the emphasis on distance learning research lately has concentrated on massive open online courses, MOOC's, the vast majority of online offerings are not done in the MOOC format. Instead, they are unique, proprietary local offerings developed by an individual faculty member or team and presented using traditional learning management systems like Blackboard, Canvas and Moodle. So, the individual faculty member is most likely teaching in an individualized modality, not in MOOC format. What can be done to induce more full-time faculty to participate in online courses? Several options are proposed to improve the situation, including inducements to the involvement of more tenured faculty, revising the top management and faculty governance paradigms to include positive awareness of the strategic importance of distance learning, and taking advantage of the insights from institutions which have been able to leverage online learning advantageously.

TB-10.4 [R] Maintaining the Relevance of Technology Management Programs in an Entrepreneurial Environment

Cheryl Hanewicz; Utah Valley University, United States
Pamela Becker; Eastern Michigan University, United States
Pauli Alin; Utah Valley University, United States

Technology Management programs in universities need to keep current with the needs of businesses to remain viable. While it is important for faculty members to remain up-to-date in their areas of expertise, feedback from professionals in the industry is also critical. To collect such feedback, two undergraduate Technology Management programs - one in the Midwest and one in the West - sent out surveys to over 1,700 national and international technology management professionals. Over 350 surveys were completed by respondents from 30 different countries. Almost 86% of these respondents were employed full-time in sectors such as education, computers and information technology, manufacturing, and research and development. Respondents were asked about the importance of topics such as organizational and technological change; project, quality, and strategic management; information and knowledge management; and management of innovation and product development. This paper will explore what elements technology professionals believe are important to managing technological entrepreneurship of the future. It will also specifically report how the responding professionals view skills in areas like launching new products, understanding patent laws, designing processes, and predicting new product success. The findings will provide useful insights into how to design tomorrow's Technology Management curricula that produces professionals capable of managing technological entrepreneurship.

TB-11 Technology Management Framework-1
Tuesday, 8/21/2018, 10:30 - 12:00
Room: Milo V
Chair(s) Ronald Vatananan-Thesenvitz; Bangkok University

TB-11.1 [R] Improving Systematic Literature Review with Automation and Bibliometrics

Nonthapat Pulsri; Bangkok University, Thailand
Ronald Vatananan-Thesenvitz; Bangkok University, Thailand

The foundation of a good research paper is the literature review. But with the vast amount of research papers available today, it has become more challenging to search and screen for appropriate papers to include in the review. This paper has analyzed different approaches to a literature review and explains the evolution from the traditional literature review to a more modern systematic literature review. The systematic literature review (SLR) can be classified into four key stages: planning, conducting, analysis & synthesis, and reporting. The purpose of this paper is to propose a modified SLR process that includes automation and bibliometrics. Automation is a method that can operationalize the manual tasks of the SLR by using specific tools and computer systems. Bibliometrics is a method to analyze the bibliographic data of published literature to provide an overview of the body of knowledge for a given field of inquiry. The proposed modified SLR process improves the previous versions, which rely only on manual search and extraction, by combining the strength of both methods and integrating them into the stages of the SLR process. This addition to the traditional SLR will facilitate the process to produce a faster and more effective literature review.

TB-11.2 [R] Proposal of Five Frameworks for Constructing Keystone Strategy

Hiroshi Kubo; Chiba Institute of Technology, Japan
Hiroko Tanaka; Chiba Institute of Technology, Japan
Takashi Kakimoto; Infiswift Inc., Japan

"The Keystone Advantage" was presented by M. Iansiti and R. Levien as a strategic pattern of the "business ecosystem" to sustain innovation. However, the concrete construction framework of that strategy is still not fully shown. Therefore, the authors propose unique construction frameworks, based on the keystone strategy that consist of "system theory," "architecture," "standardization," "modified Utterback-Abernathy model," and a "platform" based on the "Project and Program theory." Furthermore, its effectiveness is validated by the case study of photovoltaic power generation business.

TB-11.3 [R] A Framework for Building Integrative Scenarios of Autonomous Vehicle Technology Application and Impacts, Using Fuzzy Cognitive Maps (FCM)

Pei Zhang; Portland State University, United States
Antonie Jetter; Portland State University, United States

Currently, autonomous vehicle (AV) technology is considered a potentially life-changing new technology that brings science fiction to life and can fundamentally impact how and where people live and work. As is the case with any new technology, it is unknown how the future will unfold. Instead, ideas about the future can be captured through scenario planning and used to develop a range of plausible, alternative futures (or scenarios). These scenarios can be used for strategic decision-making in technology and urban planning, transportation and business. Because policy makers, technology developers, and end-users all need to make assumptions about future AV technology, there is a growing number of research on possible future developments, that each represent the unique perspective of the different stakeholder groups. However, an integration of these pieces of the puzzle into a holistic view of alternative futures (i.e., scenarios) is still lacking. We propose a framework for scenario planning that leverages the insights from existing work on AV technology and integrates the many perspectives with the system-modeling technique of fuzzy cognitive maps (FCM). We apply the framework in a case study. The work thus introduces a new approach to tackling the challenging problem of scenario planning for emerging technologies with many impacts. It also provides a review of the current status of AV technology.

TD-01 Innovation Management-4
Tuesday, 8/21/2018, 14:00 - 15:30
Room: Kona Moku Salon A
Chair(s) Robert R Harmon; Portland State University

TD-01.1 [R] Diffusion of Innovations and Personal Network

Mariko Tsutsui; Kindai University, Japan

In this research, we will consider knowledge creation and knowledge sharing of the recruiters in the process of dissemination of innovation and analyze the innovation adaptor's network. Specifically, in the course of adopting new medicines to doctors, we will examine the knowledge created by doctors and clarify the researcher network which is the mother of knowledge creation.

TD-01.2 [R] Creating Value through Complexity: Partial Compatibility as a Sustaining Strategy in Japan's Contactless Integrated Circuit Payment System

Masaharu Tsujimoto; Tokyo Institute of Technology, Japan
Fredrik Hacklin; Eidgenossische Technische Hochschule Zurich, Switzerland

The challenge of managing platforms has recently gained widespread attention. Even though there are various concepts focusing on building, managing, and sustaining platform ecosystems, the question of how to capitalize on a platform from the perspective of a focal firm - the platform leverage - remains an unexplored area. This study proposes the notion of partial compatibility as a novel mechanism of platform leverage. Partial compatibility consists of intra-platform envelopment by complementors and platform involvement of end users by connecting with the different platforms owned by complementors. The complementors maintain semi-compatibility to the widely diffused install base of the creator's leading platform, but end users are bound to the followers' platform. We argue that partial compatibility enables the follower to establish a sustainable competitive advantage following a winner-takes-all strategy, even though the install base might be smaller. We investigate the case of the FeliCa-based contactless integrated circuit payment system in Japan. Our empirical analysis is based on a longitudinal historical dataset from 1988 to 2015 and interviews with 29 executives involved in the ecosystem. We contribute to the platform literature by highlighting a dynamic functional mechanism resulting from partial compatibility as a rational strategic choice for achieving platform leverage.

TD-01.3 [R] Meaningful Innovation in Corporate Activities from the Viewpoint of Financial Data

Yuji Matsuno; Hitotsubashi University, Japan

A meaningful innovation in corporate activities is not a mere discovery or inventions but a series of corporate activities that create effective economic effects for business activities. Effective economic effects for business activities are increases in sales, operating profit, productivity, current assets, fixed assets, total assets, and surplus profits. From the financial data of the listed companies of the Tokyo Stock Exchange (TSE) first and second section between 1956 and 2016 and the listed companies of Japanese Association of Securities Dealers Automated Quotations (JASDAQ) and Market of the high-growth and emerging stocks (Mothers) between 1987 and 2016, the rate of change of these indices was determined. When the rate of change of these indices of a company were continuously increased, meaningful innovation should have occurred in the company. Next, the author collected some case studies on companies that judged that meaningful innovation had occurred, classified them according to indicators that showed an increasing trend, and organized the causes of innovation by type. By doing this, the author generalizes the causes of innovation obtained from case studies of individual companies and clarifies the cause of each type of innovation. In addition, the direction of the case study for companies that have not been subject to research will be clarified.

TD-02 Entrepreneurship/ Intrapreneurship-3
Tuesday, 8/21/2018, 14:00 - 15:30
Room: Kona Moku Salon B
Chair(s) Yasuto Ishitani; Kochi University of Technology

TD-02.1 [R] Technopreneurial Characteristics Rising from the Ashes of Creative Destruction

Matti A Sommarberg; Tampere University of Technology, Finland
Saku Makinen; Tampere University of Technology, Finland

This paper uses the grounded theory building method to investigate the differences and similarities in the evolutionary paths of three entrepreneurial ventures. Theory-based reasoning was used to select cases representing different technopreneurial business models, namely product, expert service, and integrated product-service business models. Our cases emerged from a disrupted global technology corporation and they represent the economic activity emerging from classical creative destruction. We investigate the evolutionary paths of these ventures from their start-up by employing the resource-based view (RBV) approach to determine the critical change points and watershed events that guide the path of the cases. With these analyses, we are able to differentiate the performance differentials and evolutionary trajectories of the cases. The cases suggest that while the strength of the original path is strong, it is possible to change the course despite path dependencies. We outline the mechanisms that facilitated these transitions (e.g., finding a suitable equity fund as a catalyst to make the change). Hence, we find that entrepreneurial ventures are not as path dependent as previous studies suggest; rather, there is managerial discretion to change the evolutionary trajectories. Our study suggests that the capabilities acquired over a long period of time in

a global technology corporation contribute to the ability to change the path. We discuss the theoretical and practical implications of the critical decision points during the evolutionary trajectories of ventures.

TD-02.2 [R] Acceleration of a Social Entrepreneurship Through Federation of Equity-Based Crowdfunding

Aki Tomita; Toyo University, Japan

Equity-based crowdfunding, featuring globally-spread Internet use, a small amount of investment from each backer and the public involvement, has a potential for raising a big amount of money from a long-term perspective. Many countries, including Japan, are aiming for economic growth by promoting entrepreneurship, reformed regulations to allow equity-based crowdfunding, open calls on the Internet. Leveraging the Internet of Things to create a new social infrastructure needs a large investment, which is revealed in the GE Industry Internet. For addressing social issues such as energy, environments and longevity using IoT technologies, this paper proposes a federated crowdfunding structure where complementary campaigns operate cooperatively by using a common IoT platform. Also, this paper analyzes application of this proposal to previous renewable energy projects. It is concluded that a federated and IT-augmented equity-based crowdfunding platform could contribute to keeping a startup that aims to solve social problems going.

TD-02.3 [R] Academic Entrepreneurship: Commercialization of University Research and Entrepreneurship Education at an Entrepreneurial University

Zong-Tae Bae; KAIST, Korea, South

The concept of entrepreneurship has been recognized and developed in the various context such as commercial entrepreneurship, corporate entrepreneurship, social entrepreneurship, and academic entrepreneurship. Many research-centered universities have been sources of spin-off companies and technology commercialization. Now they are transforming into entrepreneurial universities. The purposes of this paper are (1) to develop the model of an entrepreneurial university, (2) to analyze activities of some entrepreneurial universities, (3) to design a system to promote technology commercialization and entrepreneurship education, and (4) to suggest a further research agenda for academic entrepreneurship. KAIST has been a leading research-centered university in Korea and has played a key role in promoting R&D commercialization and university spin-off. To cope with social demands on new roles of universities, KAIST is accelerating the innovation on education, research and commercialization system. This paper reviews the activities, strategies and performance of technology commercialization and university spin-off, and presents a new model of an entrepreneurial university. Many leading universities have their own strategies and systems and are facing many challenges. This paper will discuss the challenges ahead and suggest a research agenda for university entrepreneurship. This study could provide the groundwork for discussions on specific issues related to academic entrepreneurship.

TD-04 Technological Roadmapping

Tuesday, 8/21/2018, 14:00 - 15:30
Room: Waikiki Salon 1
Chair(s) Tugrul Daim; Portland State University

TD-04.1 [R] Reference Architecture Model in Medicine

Shingo Kano; The University of Tokyo, Japan

Reference Architecture Model in Industry 4.0 (RAMI4.0) aims to map existing standards, identify lack or overlap of standards, and clarify the relationships among standards. In the medical field, technology standards and regulations for one product or medical treatment consist of complex combinations and cause difficulties in understanding current settings and finding the opportunities to form new technology standards or regulations. The Reference Architecture Model in medicine would be a useful tool to solve this type of issue. This study evaluates parameters of RAMI4.0 using DNA microarray diagnosis as a case based on existing regulations and technology standards and examines the possibilities of a Medical RAMI.

TD-04.2 [A] Data-driven Roadmapping Turning Challenges into Opportunities

Ummaraporn Pora; Chulalongkorn University, Thailand
Natcha Thawesaengskulthai; Chulalongkorn University, Thailand
Nathasit Gerdsri; Mahidol University, Thailand
Sipat Triukose; Chulalongkorn University, Thailand

A number of organizations are struggling with roadmap implementation. While some companies implement it successfully, many cannot effectively apply the roadmap to their strategic operations. Keeping an up-to-date roadmap to reflect changes in the business environment is considered a major challenge in the field. The main focus of this explorative study extends the understanding of roadmap implementation and addresses the opportunities and challenges for future research by illustrating four case studies from both the private and public sectors. Semi-structured interviews with top management were conducted to obtain common critical components. The findings from this study highlight and confirm the major challenges involved in keeping the roadmapping process alive, as represented in previous studies. The results of case studies reflect the challenges and opportunities with integrating big data and transforming existing processes into data-driven roadmapping. This paper proposes a conceptual design for a system to help keep the roadmap alive - accurately reflecting current economic and business conditions, based on insights constantly obtained from various streams of information sources. Comprehensive analyses of existing data could help to detect the ongoing changes and indicate economic, social, and technological tendencies. Supervised learning, unsupervised learning, time series, and text mining are suggested techniques for providing useful insight and substantial information from the multitude of data. This approach can be integrated into the decision support system, based on an algorithmic, semi-automatic evaluation of roadmap status.

TD-04.3 [R] Technology Planning for Aligning Emerging Business Models and Regulatory Structures

Kelly R Cowan; Portland State University, United States
Tugrul U Daim; Portland State University, United States

Smart Grid has the potential to produce over $2 trillion of benefits in the US utility sector over the next 20 years, according to a study by the Electric Power Research Institute. However, the study also projects significant costs of up to $476 billion to achieve these returns. Therefore, while smart grid represents an enormous opportunity, with a benefit-to-cost ratio of nearly 6 to 1, given the enormous financial sums at stake, it is crucial that the planning process for smart grid be done with extreme care. Planning the deployment of smart grid technology in the electric utility sector can be a complex and difficult process due to regulatory frameworks that have evolved to protect consumers, the need for development of standards regarding numerous emerging technologies, and the need for emerging business models which can fit with these evolving technology and regulatory frameworks. Technology roadmapping provides a number of useful tools which can help with the planning of smart grid development, but a highly integrated approach is needed to accommodate the full range of factors mentioned.

TD-04.4 [R] Business Model Innovation Roadmapping: A Structured Approach to a New Business Model

Amaury Schaller; Bangkok University, Thailand
Ronald Vatananan-Thesenvitz; Bangkok University, Thailand
Stefania Mariano; Bangkok University, Thailand

Roadmapping is a structured approach to analyze an organization's business environment for potentially disruptive changes. Traditionally termed technology roadmapping (TRM), the approach is used as a management tool for planning, forecasting and administration. More recently, firms apply the technique with a more general mindset to formulate business strategies for innovation that can address such disruptive changes. As part of their business strategy and to survive the intense competitive market environment, an organization also needs to have an appropriate business model in place. However, to incorporate constantly changing market dynamics, an organization needs to evolve and change its business model. This paper introduces a structured approach to business model innovation roadmapping that defines the

transition path from a current to a desired business model. The purpose of the paper is to describe the process of developing a business model innovation roadmap and identify what structure (layers, components and time horizon) should be incorporated. The business model innovation roadmapping approach is proposed to serve an organization as a forecasting and planning tool that can identify potential gaps, and also to recognize and act on events that require a change of direction in the actual (customer) value proposition.

TD-05 Technology Adoption-1
Tuesday, 8/21/2018, 14:00 - 15:30
Room: Waikiki Salon 2
Chair(s) Kunio Shirahada; Japan Advanced Institute of Science and Technology

TD-05.1 [R] Impact of External Stimuli on Social Media Engagement: A SME Perspective

Olumide Adebayo; University of Bridgeport, United States
Elif Kongar; University of Bridgeport, United States
Nasir J Sheikh; University of Bridgeport, United States

This paper aims to define and analyze the factors contributing to the frequency and rate of social media platform utilization. The focus of the research is on social media big data and weather as an external force. Juxtaposing weather-related data, Twitter metadata and various data mining algorithms are used to determine the relationships between an external condition and the level of user engagement on social media. The research findings indicate that weather attributes alone and in combination with others have direct influence on the level of user engagement. While there are several leading social media platforms in the USA, the research utilized Twitter considering data over a one-month period. The highlights of this research will help organizations that run social media platforms estimate resource utilization based on provided weather forecasts. The paper illustrates the drivers of social media engagement while providing data sourcing and social media platform organizations with directions for resource allocation and provisioning.

TD-05.2 [R] Assessing the Determinants of ERP-Enabled Shared Platforms across Multi-Business Organizations: An Empirical Investigation

Samuel Fosso Wamba; Toulouse Business School, France

This study focuses on the adoption and acceptance of an enterprise resource planning (ERP)-enabled shared platforms by semi-autonomous firms. ERP systems have become almost ubiquitous in large organizations. In this paper, we develop and test a research model that links technology acceptance model and top management involvement to outcomes performance. We look at the effects of various ERP attributes, along with behavioral intentions and usage of ERP-enabled shared platform on their outcomes performance. The study uses a mixed methodological approach, and the hypotheses that are developed and tested in the model can serve as a starting point in future studies for further development while providing important insights that may better support ERP system adoption decisions. The literature about ERP is quite mature and diverse. However, ERP-enabled shared platform across multi-business organizations remains an emerging topic that is still to reach its full development.

TD-05.3 [R] Effects of Future Connected Autonomous Vehicles on Freeway Congestion Using Fuzzy Cognitive Mapping

Hakan Kutgun; Portland State University, United States
Vivian Du Pont; Portland State University, United States
Henry Jenzen; Portland State University, United States

Continuing population growth and urbanization are projected to add 2.5 billion people to the world's urban population by 2050. It is evident that this will increase traffic congestion, especially in the urban areas, which will bring economic, safety, environmental and quality of life challenges. There are various organizations looking for possible solutions to reduce the impact of future congestion by long-term planning, but most of these studies do not take into account emergence of disruptive technologies. The concept of vehicles with autonomous driving and online connectivity capabilities, namely, connected autonomous vehicles (CAVs), is an emerging technology which may contribute to the solution of this problem through adoption. This paper aims to shed light on the effect of different levels of CAV adoption on congestion through scenario planning with fuzzy cognitive mapping. Different future scenarios on CAV adoption based on research and development being done on CAV technology are run through a fuzzy cognitive model of congestion developed through a detailed literature review. Results indicate CAV adoption provides an opportunity for reducing congestion, therefore suggesting that investing in CAV enabling upgrades of existing roads and giving incentives for CAV adoption are viable options for city planners' and local governments' project portfolios to reduce congestion.

TD-06 Decision Making-2
Tuesday, 8/21/2018, 14:00 - 15:30
Room: Waikiki Salon 3
Chair(s) Young Il Park; Ewha Womans University

TD-06.1 [A] A Cloud-Based Fuzzy Multi-Criteria Decision Support System for Procurement Process in Facility Management

K.P. Pun; The Hong Kong Polytechnic University, Hong Kong
King-lun T Choy; The Hong Kong Polytechnic University, Hong Kong
H.Y. Lam; The Hong Kong Polytechnic University, Hong Kong

Procurement in facilities management is a complex process for linking different stakeholders together to form an integrated service; it is a crucial process for identifying the best sources of supplier and best suited contractor in improving the efficiency of resources allocation, maintaining equipment reliability and availability to enhance facilities conditions in order to reduce business risks, attract tenants, and increase asset and building value. Hence, a building's return of investment (ROI) and payback can be incredibly beneficial by enabling the procurement decision to meet its strategic objectives in an economic, efficient and effective manner. However, in the current process, procurement is financially consuming and expensive as it requires high demand of manpower and involves an enormous amount of paper work for managing requests, quotations, bid requirements and evaluations. Also, there is lack of quantitative measures by incorporating linguistic selection criteria from domain experts in the procurement selection process for improving competitive advantage. Even though applications of digitalization for conveying information to digital format in streamlining internal process have been considered, competitiveness and capabilities assessment of current supply base, quantitative and qualitative data analysis on contractor selection and relevant performance feedback are lacking to support the decision-marking. Therefore, in this paper, a cloud-based fuzzy multi-criteria decision support system (CFMDS) is proposed for integrating with the procurement process for performing award analytics to identify the best suited supplier and contractor. The procurement officer can then formulate a follow-up plan based on the recommended results.

TD-06.2 [A] Investigation of Corporate Entrepreneurship in South African Mining Companies

Charmaine Bilankulu; University of Pretoria, South Africa
Elma Van der Lingen; University of Pretoria, South Africa

Corporate entrepreneurship (CE) implementation is seen as one of the solutions to ensure competitive advantage, especially in adverse economic times. The current economic state will require mining companies to be innovative. This study aimed to investigate the presence of CE in South African mining companies. The objective of the research was to investigate entrepreneurial behavior / activity and conduct a gap assessment for the successful implementation of CE. The results showed that mining companies do have entrepreneurial activity, administered at the corporate and business unit level, whose main reason is to remain competitive. Prominent entrepreneurial activity is through external and joint corporate venturing in order to consolidate markets and to diversify. The mining companies investigated do not have a dedicated CE framework. A specific CE framework should be decided on and embedded from top management down to the rest of the company. The mining companies

currently operate on the CE opportunistic model; a shift to the CE producer model could be advantageous. Mining companies could place greater emphasis on remaining competitive through employing organizational rejuvenation, whereby they sustain and improve their competitive standing by modifying internal processes, structures, and capabilities.

TD-06.3 [R] An Algorithm for Supporting Decision Making in Stock Investment through Opinion Mining and Machine Learning

Yujin Jeong; Dongguk University, Korea, South
Sunhye Kim; Dongguk University, Korea, South
Byungun Yoon; Dongguk University, Korea, South

This paper suggests an algorithm for supporting decision making in stock investment through opinion mining and machine learning. Within the framework of supporting decision making, this research deals with (1) fake information filtering to accurate foresight, (2) credit risk assessment, and (3) prediction based on critical signal detection. At first, financial data, including news, SNS, and the financial statements, is collected and then, among them, fake information such as rumors and fake news is refined by author analysis and the rule-based approach. Second, the credit risk is assessed by opinion mining and sentiment analysis for both social data and news in the form of sentimental score and trend of documents for each stock. Third, a risk signal in stock investment is detected in accordance with the credit risk derived from opinion mining and financial risk identified by the financial database. Consequently, the possibility of credit events such as delisting and bankruptcy will be forecast in the near future based on the risk signal. The proposed algorithm helps investors to monitor relevant information objectively through fake information filtering as well as to make correct judgments in stock investment.

TD-08 Technology Management in the Energy Sector
Tuesday, 8/21/2018, 14:00 - 15:30
Room: Milo II
Chair(s) Chung-Huei Kuan, National Taiwan University of Science & Technology

TD-08.1 [R] A Study of Determination of Energy Performance Indicator for Applying Energy Management System in Industrial Sector

Hong Souk Shim; Korea Energy Agency, Korea, South
Sungjoo Lee; Ajou University, Korea, South

Establishing an energy management system (EnMS) is a useful approach for improving energy efficiency. The International Energy Agency (IEA) recommended that the EnMS is a key policy for achieving energy performance, particularly in the industrial sector, which consumes large amounts of fossil fuels. Previous studies suggested numerous energy performance indicators (EnPIs), which are based mainly on two models: 1) energy intensity (i.e., kWh per ton) and 2) the statistical model (i.e., linear and nonlinear regression). The selection of appropriate EnPIs is context specific, with various factors involving organizational, industry, and energy source-related characteristics affecting it. Although having the right EnPIs is essential for achieving effective energy management, few researchers have attempted to provide guidelines for their application. Therefore, the aim of this study was to present a framework for investigating alternative EnPIs and to choose the best one based on the application context. The Delphi method and the analytic hierarchy process were adopted to integrate relevant expert knowledge in a systematic manner. The research findings indicated that six factors - data collection, the consideration of relative variables, the choice of analytic methodology, reliability, an understanding of the analysis results, and practice and training - are regarded as significant selection criteria for EnPIs, and the two approaches of linear regression and energy intensity were preferred regardless of the context.

TD-08.2 [R] Offshore Wind Energy Research Trajectory and Trends

Chih-Hung Hsieh; Yuan-Ze University, Taiwan
Louis Y Lu; Yuan Ze University, Taiwan
Chien Huei Lin; Yuan Ze University, Taiwan
John S Liu; National Taiwan University, Taiwan

Offshore wind power (OWP) is an important green technology owing to its stability, and sites for OWP projects (wind farms) are easily obtainable. The authors reviewed 2,217 papers collected from Scopus and used main path analysis (a citation analysis method) to determine the trends in OWP studies. Based on their analysis, they categorized some OWP concepts, including wind farm model, wind farm monitoring, wind speed measurement and analysis, cost and economic analysis, and floating OWP. Furthermore, they found that OWP can be combined with a wave energy unit to generate stable electric power. It is important to monitor the wind turbines of large OWP plants, and OWP plants should be located far from the shore. In this case, floating OWP is more economical than fixed OWP. In addition, high-voltage direct current (HVDC) is more feasible then high-voltage alternating current (HVAC) in terms of cost and stability. However, the magnetic effect of OWP on fishes, plants, and fishermen is uncertain. The European Union plans to install OWP capacity of 40 GW by 2020 and 150 GW by 2030. The results of this study can guide policy making and investment decisions.

TD-08.3 [R] Energy Management and Sustainability In The Brazilian Mining Industry

Ana Paula Perlin; Federal University of Santa Maria, Brazil
Clandia M Gomes; Federal University of Santa Maria, Brazil
Kamila Frizzo; Federal University of Santa Maria, Brazil
Jordana M Kneipp; Federal University of Santa Maria, Brazil
Francies D Motke; Federal University of Santa Maria, Brazil

Corporate sustainability is based on the company's efforts to minimize the negative impacts caused by industrial activities, aiming to preserve the environment, the society's wellbeing and the business economic prosperity. Energy management and its effective use have been a major focus in the sustainability scenario, once energy efficiencies in goods production may have a significant impact on sustainable performance and are considered a key factor in business competitiveness. In this regard, the study aimed to examine energy management practices and their relation with sustainable performance in the Brazilian mining sector. The study adopted the descriptive and quantitative method and was conducted through a survey with member companies of the Brazilian Mining Institute (IBRAM). Results indicated that the mining industries tend to adopt practices such as energy apportionment and demand by sectors as well as incentives to employees to save energy. On the other hand, the industries less often tend to adopt practices relating to certification and the Internal Commission of Energy Conservation (CICE). In general, it was possible to identify significant correlations, which indicates that energy management is a practice that is positively associated with the industry' sustainable performance.

TD-08.4 [R] Exploration or Exploitation?: The Impacts of Renewables in Future Energy Demands

Oludare Olorunniwo; Obafemi Awolowo University, Nigeria

The global energy outlook projects renewable energy on a 6.6% growth increase per annum, estimated by 2016 fuel shares. This trend has supposed a change in the evolving energy landscape toward cleaner energy, improved energy efficiency, and a lower-carbon economy. However, declines in the energy market alongside unprecedented global economy recession showed that the expected cost reduction footprints are yet from achievable. What technology innovations are necessary to guarantee sustainable developments in renewables? How could paradigm shifts in climate policies revive and retain a renewable energy path? This paper elaborates on the case for sustainable energy market reforms via global initiatives and synergies associated with emerging renewable energy technologies. The techno-economic evaluation outlines the leadership roles of technology in future energy demands and capacity growth targets.

TD-09 Collaborations-2
Tuesday, 8/21/2018, 14:00 - 15:30
Room: Milo III

Chair(s) Gerhard Schewe; Muenster University

TD-09.1 [A] Data Exchange across Museum Platforms in Thailand

La-or Kovavisaruch; NECTEC, Thailand
Taweesak Sanpechuda; NECTEC, Thailand
Krisada Chinda; NECTEC, Thailand
Sodsai Wisadsud; NECTEC, Thailand
Thitipong Wongsatho; NECTEC, Thailand
Anuwat Chaiwongyen; NECTEC, Thailand

The concept of aggregating museum data to be shared amongst organizations and museum visitors is not novel one; however, it has historically been difficult to sell. Within the United States, the development of a shared network amongst nine art museums took 40 years to complete. As most museums in Thailand still operate on a paper-based catalog, we are a long way from even transitioning Thai museum catalogs into the digital era. However, the National Electronics and Computer Technology Center (NECTEC) has initiated two platforms to begin progress towards modernizing our museum experience; e-Museum, a collection management system, and Museum Pool, a content management tool. With funding from Thailand Research Funding, we were able to implement these two platforms on six museums in Northern Thailand. To increase the success rate of this project, a standard communication protocol was required to facilitate the exchange of information between two platforms. We proposed the data exchange project and launched pilots in the aforementioned sites. After implementation, curators completed a survey regarding their experience with our web application, resulting in an average review score of 4.5 out of a 5-point scale. A particular point of note is that our model is not limited to two platforms - it is scalable with standardized metadata and standardized communication protocols. Although the concept described is quite straightforward, we encountered some complications in deployment which will need to be adapted for diverse environments.

TD-09.2 [R] Social Capital Characteristics in R&D Project Networks

Matti Majuri; Tampere University of Technology, Finland
Minna Lanz; Tampere University of Technology, Finland

Network research has multiple approaches that offer knowledge related to multiple network types. This article identifies and discusses social capital characteristics in the context of government-funded R&D project networks. Previous literature on this context has typically focused on collaboration between universities and firms while our interest is solely on interfirm relationships. Secondly, the previous literature on interfirm collaboration typically concerns other types of networks such as strategic alliances. We argue that to understand the dynamics of inter-firm collaboration in R&D project networks, the research needs to be conducted in a coherent environment. Data for this qualitative research was collected by interviewing 18 firm representatives who had experience participating in government-funded R&D projects. We recognized social capital characteristics in R&D projects and organized these findings under structural, cognitive and relational dimensions of social capital. Results indicate that project networks' social capital characteristics differ in many parts from strategic alliances and thus support our argument. The results can be exploited by project coordinators, innovation officers and project network members to facilitate the interfirm collaboration in R&D project networks.

TD-09.3 [R] A Study of the Factors Influencing Industry-Academia Collaboration Activities in Private Universities

Yoshikazu Yamaguchi; Chiba Institute of Technology, Japan
Jun Fujimoto; Chiba Institute of Technology, Japan
Akira Yamazaki; Chiba Institute of Technology, Japan
Takehiko Koshiyama; Chiba Institute of Technology, Japan

It is imperative that industry-academia collaboration activities are implemented successfully to achieve open innovation , and such awareness has grown in recent years. Private companies and universities are organizations with very different purposes and characteristics; it is therefore generally difficult for them to cooperate with each other. We focused on industry-academia collaboration activities and factors influencing them in private universities. This study aims to reveal which factors influence industry-academia collaboration activities in private universities and to what extent. Based on the case of Japanese private universities, the data on industry-academia collaboration activities and candidates for influencing factors of 136 private universities, including 62 private universities with engineering faculties, were collected, and individual and comprehensive relationships were analyzed. As a result, the positive factors influencing the 136 universities and 62 universities were identified as follows: number of graduate students, and number of research papers or amount for grants-in-aid for scientific research. On the other hand, the negative factor influencing the 62 universities was number of undergraduate students. Consequently, it is necessary to expand graduate schools, reinforce basic research, and increase the number of researchers corresponding to the number of undergraduate students. We hope these results are useful for considering university management and for planning policy measures.

TD-10 Information Management-2

Tuesday, 8/21/2018, 14:00 - 15:30
Room: Milo IV
Chair(s) Yung-Lin Chen; Asia University

TD-10.1 [A] Data Storage Cost Reduction by Decluttering Image and Video Data: Case Study of Video File Decluttering

Takanari Matsuda; The University of Tokyo, Japan
Tomotaka Goji; The University of Tokyo, Japan
Ichiro Sakata; The University of Tokyo, Japan

Big data growth does not stop. Companies are forced to store data without knowing its value or usage because data has potential to become next revenue opportunity. Since the cost for storing data increases as the amount of data grows, efficient data storage methods are required. We introduce a method to reduce the cost of data storage by partial decluttering of image and video data. In our method, only the portions of image or video files containing recognized objects are extracted. This is based on the assumption that images of objects of interest may be used in the future, but other image data, such as the background, can be discarded. We use the neural network computer stick from Intel Corporation to accelerate the computation. In the case study of a video file, our method successfully reduced the data size by approximately 50% on average. In addition to that, we realized a low-cost method that can be applied not only to large companies but also small to medium companies by using a low-cost hardware accelerated implementation. We interviewed experts in corporate IT data management and qualitatively demonstrated that our method is valuable and effective. Our research has contributed to IT managements' decision-making support to resolve their data storage vs. cost problem.

TD-10.2 [A] A Customized Procedure for Product Knowledge Flow Across a Firm's Internal Value Chain

Nataly J Flores Marca; University College of Southeast Norway, Norway
YangYang Zhao; University of Oslo, Norway

An effective internal value chain for a firm is to gain competitive advantage, which a large set of resources circulate to add value to the final product or service. Knowledge, as a key resource, can circulate across the internal value chain for a firm's better performance. However, there is a lack of a systematic mechanism for a sustainable flow of knowledge across a firm's internal value chain. This study develops a customized procedure to ensure an efficient knowledge flow across the firm's internal departments. Based on the literature review and best practices from the case study, a four-step customized procedure is outlined.

TD-10.3 [R] Topical Analysis of Scientific and Technical Reports Based on Topical N-Grams Model

Shengmei Du; ISTIC, China
Shuo Xu; Beijing University of Technology, China
Lijun Zhu; ISTIC, China

Haodong Zhang; NAIS, China

As one of the important carriers of scientific & technical (S&T) intelligence, S&T reports can reflect the line of S&T development, recover the latest news of S&T fronts, and even provide insight into the trends of S&T development. Researches on developing and utilizing S&T reports in our Chinacountry mainly focuses on the following: publication and distribution of S&T reports in the form of book and electrical publication, database construction, service mode, intelligent property and so on. The deep data mining on S&T reports remains largely under-studied. This work tries to discover the domain latent topics of S&T reports with the topical n-grams model. In order to determine the number of topics of S&T reports for some specific domain, the calculation method of perplexity of the topic n-grams model is put forwarded with the dynamic programming in this study. Finally, 70 domain topics are discovered from 1,357 S&T reports in the tumor domain, such as "molecular mechanisms/tumor cells,", "system biology/key methods" and so on. Experimental results show that it is feasible and efficient to discover the latent topics from S&T reports with the topical n-grams model.

TD-11 Technology Management Framework-2
Tuesday, 8/21/2018, 14:00 - 15:30
Room: Milo V
Chair(s) Takao Nomakuchi; Wakayama University

TD-11.1 [R] A Case Study on Fintech in Japan Based on Keystone Strategy

Takao Nomakuchi; Wakayama University, Japan

Japanese Digital Consumer Electronics Manufacturer declined and collapsed. It is said that the cause is the modularization of technology in architecture theory. There is a Japanese industry that is similarly undergoing modularization, which is the financial industry. This paper clarified that FinTech modularizes financial technology. For that purpose, we analyzed the function and structure of FinTech. Also, although it is possible that FinTech could change the existing financial industry structure in Japan, the objective was to propose from the case consideration that the management strategy in that environment is Keystone Strategy. As a conclusion, FinTech was found to be modularized because it has increased its added value after fragmenting financial services technology and breaking it apart. In addition, even if it continues to stay in the integral part, its comprehensive financial services part is inferior to FinTech, so it was expected that it cannot stay in the integral.

TD-11.2 [R] Dynamics of Competition and Strategy: A Literature Review of Strategic Management Models and Frameworks

Mohammadsaleh Saadatmand; Portland State University, United States
Maoloud Dabab; Portland State University, United States
Charles Weber; Portland State University, United States

This research reviews a comprehensive and somehow chronological literature in the models and frameworks of competition and strategy. Strategic management research is shaped around a core question: Why do some firms outperform others? Several significant lines of work have emerged in the strategic management field since its infancy. These include industrial organization, the resource-based view and dynamic capabilities. Also, competition essentially has been the focal point of scholars with diverse perspectives such as industrial economics and structural analysis, strategic groups, game theory, and competitive dynamics. In this research, we represent and summarize different perspectives of scholars in framing competition and strategy that are related to theory of the firm and differential firm performance; also, we show that there is a trend from static to dynamic frameworks of strategy and competition which have tried to find an answer to differential firm performance. Finally, we conclude by addressing the potential for utilizing new dynamic and systemic perspectives regarding theorizing dynamics of strategy and competition.

TD-11.3 [A] Unified Business Intelligence Ecosystem: A Project Management Approach to Address Business Intelligence Challenges

Bhavana Ramesh; Connective DX, United States
Akash Bali Ramakrishna; Portland State University, United States

The purpose of this paper is to explore a concept that improves the success rate of business intelligence (BI) projects by looking at it as an ecosystem rather than standalone project. This paper discusses the importance of business intelligence initiatives and today's challenges in implementing them. The concentration is on using proven practices of project management to reduce the failure rates of the BI projects by evaluating the currently existing information technology (IT) project process, BI frameworks and a project vulnerability process in order to adopt some of the best project management practices that work for business intelligence projects. The paper studies currently existing processes and introduces a new concept which henceforth will be termed as "Unified Business Intelligence Ecosystem" framework (UBIE). This research is based on various project management frameworks, those that are proven to increase the efficiency of projects, and far-ranging sources of research on the nature of BI projects, personal observations and real-world BI consulting experience. Research limitations/implications: BI is a constantly developing field. Partial standardization and extensive availability and access to BI resources have created many definitions and buzz words in the industry. The assumptions described in this research might seem arguable given the reader's experience in this field. Originality/value: The paper presents a different perspective to view and manage BI projects. It encourages one to interpret BI projects as an ecosystem by combining technical, business and management aspect rather than separate, standalone entity. The aim of this research paper is to achieve BI success by customizing project management (PM) practices to fit the unique need of BI projects.

TE-01 Innovation Management-5
Tuesday, 8/21/2018, 16:00 - 17:30
Room: Kona Moku Salon A
Chair(s) Mariko Tsutsui; Kindai University

TE-01.1 [R] Efficient Project Portfolio Management: Avoiding Value Destruction by Promoting Social Returns on R&D

Bonginkosi R Ngqulunga; University of Pretoria, South Africa
David Walwyn; University of Pretoria, South Africa

Changes in the external and internal business environment may induce a redirection of company strategy, which can result in the destruction of a company's valuable intellectual assets (people and knowledge), generated through formal R&D investment. These intellectual assets may be of value to both the company and society, and their termination of projects as a consequence of the re-shaping of company R&D portfolios may result in the destruction of knowledge useful to society. This study investigates four main aspects: 1) What is the likelihood of a change in business strategy that will impact negatively on an R&D project portfolio value? 2) What is the extent of the impact of changing business strategy on R&D portfolio value? 3) What steps are being taken by companies to avoid destruction of shareholder value and maximize social return on investment in the event of R&D portfolio changes, and; 4) What portfolio management methodology can be used to mitigate the risk of portfolio value destruction as identified in the questions above? This research paper deals with steps being taken by companies to avoid and or minimize destruction of shareholder value and maximize social return on investment in the event of R&D portfolio changes.

TE-01.2 [R] Analysis on Technology Convergence Mechanism Using Weighted Gene Co-expression Network

Hong Miao; Beijing University of Technology, China
Yan Wang; Beijing University of Technology, China
Lucheng Huang; Beijing University of Technology, China
Feifei Wu; Beijing University of Technology, China
Xin Li; Beijing University of Technology, China

Technology convergence is a hot research topic within a challenging field. It is of great significance to analyze the fusion mechanism and mine the key technologies that affect technology convergence, which can guide the development of technology fusion and improve the independent innovation capability of enterprises. It is a novel idea to introduce genetic engineering into the process of technological innovation and convergence as the similar

recombination process they both have. In this study, weighted gene co-expression network analysis (WGCNA), which is based on the similarity measure of a topological overlap structure, was utilized in the analysis of the International Patent Classification (IPC) of patents. In this analysis, the gene with a high correlation was identified as a "technical gene module" using the dynamic tree cut algorithm. Furthermore, hub technology genes, which are highly related to technology fusion and have high connectivity in the module, could be obtained. This study revealed the internal relationships present in technologies and provided novel ideas for researching the fusion mechanism of technology convergence.

TE-01.3 [R] Cluster Analysis of ICT Companies Based on Innovation Ambidexterity Dimensions

Nima G Mokhtarzadeh; University of Tehran, Iran
Mehdi Mohammadi; University of Tehran, Iran
Pedram Pourasgari; University of Tehran, Iran
Mohammadreza Zarefard; University of Tehran, United States

The concept of innovation ambidexterity has been used in many researches in order to describe the levels of exploitation and exploration activities in companies. Even though balanced dimension (BD) and combined dimension (CD) of exploitation and exploration activities have been employed in some recent researches to measure innovation ambidexterity, the calculation of BD and CD is still based on levels of exploitation and exploration scores. In this paper, we elicited the characteristics of BD and CD and measured them as a new variable called integration capability. After clustering Iranian ICT companies based on BD, CD and integration capability, using the k-means algorithm, the characteristics of these clusters were investigated regarding their innovation output and R&D characteristics. The results indicate that in the cluster with greater innovation ambidexterity level, a higher percentage of companies are engaged in product and marketing innovation and conduct internal and continuous R&D.

TE-02 Entrepreneurship/ Intrapreneurship-4
Tuesday, 8/21/2018, 16:00 - 17:30
Room: Kona Moku Salon B
Chair(s) Aki Tomita; Toyo University

TE-02.1 [R] Establishing Entrepreneurship Ecosystems Based on Digital Technologies: A Policy Roadmap Approach at the City Level

Dilek Cetindamar; University of Technology Sydney, Australia
Thorsten Lammers; University of Technology Sydney, Australia
Nathalie Sick; University of Technology Sydney, Australia

The last decade has witnessed the rise of technology-based entrepreneurs who managed to build companies based on the use of emerging digital technologies. However, the pure availability of digital technologies in a particular country does not guarantee the establishment of successful companies and economic growth. Companies are located in certain regional or urban environments with varying contextual factors. Cities have been a popular unit of analysis for technological development and economic activities due to their high dependency on immediate local environmental factors. Nevertheless, the literature offers a limited view on the relationship between technological developments and entrepreneurial activities at the city level to identify feasible frameworks to support a digitally competitive entrepreneurial ecosystem. By combining the previous literature on entrepreneurship and digital technologies within a particular urban context, this paper offers a conceptual approach that might help policy makers to plan the future competitiveness of their cities.

TE-02.2 [R] Trust in Entrepreneur - Venture Capitalist Relationships: A Bilateral Perspective

Kristina von Gehlen; University of Muenster, Germany
Maximilian Holtgrave; University of Muenster, Germany
Ann-Marie Nienaber; Coventry University, United Kingdom
Gerhard Schewe; University of Muenster, Germany

For new ventures, acquiring venture capital (VC) investments is crucial in order to grow successfully. Using a two-study mixed-methods design, we detail and empirically test a conceptual framework about the development of cognition- and affect-based trust between ventures and VC-investors, and the influence of trust on resource transfer and new venture growth. Grounded in exchange-theory and based on interviews with 18 VC-investors and venture-founders in Germany (Study 1), our framework posits that informational and interpersonal signals, sent out by the entrepreneur during first negotiations, help overcome initial information asymmetries and build trust. Trust then lays the foundation for the transfer of the financial and non-financial resources required for venture growth. We test this framework using structural equation modeling with empirical data on 119 out of 500 (23.8%) German technology-based ventures (Study 2). Our data indicates that entrepreneur interpersonal signaling is decisive in building initial affect-based trust. This leap of faith, however, then needs to be substantiated by the ventures performance, underscoring the development of cognition-based trust. In sum, both dimensions of trust are important preconditions for resource transfer, whereby we find that new venture growth is most significantly driven by financial support. Implications of our findings for theory and practice are discussed.

TE-02.3 [R] Richard Branson and Virgin Galactic: A Case Study of Entrepreneuring as Emancipation

Steven M Muegge; Carleton University, Canada
Ewan Reid; Carleton University, Canada

The space industry has experienced a profound paradigm shift: once the exclusive domain of government, military contractors, and incumbent aerospace companies, space is increasingly accessible to new entrants founded by ambitious, well-resourced, and well-connected entrepreneurs from outside the traditional industry. We present early results from an ongoing study of technology entrepreneurship in the space industry, focusing here on the entrepreneuring actions of Sir Richard Branson, founder of Virgin Galactic. We employ the emancipatory perspective on entrepreneuring - a theoretical lens that challenges the traditional notion of entrepreneurs as profit-driven wealth-maximizers by focusing instead on impetus and actions for change. We begin by reviewing the core ideas of the emancipatory perspective - that entrepreneurs are motivated by a driving need to bring about change that disrupts the status quo, and enact change by authoring new relationships, arrangements, rules of engagement, and positions of power, and by making declarations of intent to create change. Using publicly-available sources, we identify and report examples of seeking autonomy, authoring, and making declarations by Branson. Finally, we discuss the explanatory power of the emancipatory perspective and the implications for the theory and practice of technology management.

TE-03 PANEL: Meet the Editors
Tuesday, 8/21/2018, 16:00 - 17:30
Room: Kona Moku Salon C
Chair: Timothy Anderson, Portland State University
Panelists Barry Bozeman; Arizona State University
Scott W Cunningham; Delft University of Technology
Tugrul Daim; Portland State University
Kathy Eisenhardt; Stanford University
Nathasit Gerdsri; Mahidol University
Elicia M Maine; Simon Fraser University
Harm-Jan Steenhuis; Hawaii Pacific University
Steven T Walsh; University of New Mexico

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

TE-04 Technological Forecasting
Tuesday, 8/21/2018, 16:00 - 17:30
Room: Waikiki Salon 1

Chair(s) Ichiro Sakata; The University of Tokyo

TE-04.1 [R] A Link Prediction-Based Method for Identifying Potential Cooperation Partners: A Case Study on Four Journals of Informetrics

Lu Huang; Beijing Institute of Technology, China
Yihe Zhu; Beijing Institute of Technology, China
Yi Zhang; University of Technology Sydney, Australia
Xiao Zhou; Xidian University, China
Xiang Jia; Beijing Institute of Technology, China

Global academic exchange and cooperation have become increasing trends in both academia and industry, but how to quickly and effectively identify potential partners is becoming an urgent problem. This paper proposes a link prediction-based model to help researchers identify partners from a large collection of academic articles in a given technological area. We initially construct a co-authorship network and take a series of indices based on network and similarity of researchers into consideration. A fitting model of link prediction is then established, in which logistic regression analysis is involved. An empirical study on four journals of informetrics is conducted to demonstrate the reliability of the proposed method.

TE-04.2 [R] Forecasting the Diffusion of Product and Technology Innovations: Using Google Trends as an Example

Daniel Duwe; Fraunhofer IAO, Germany
Florian Herrmann; University of Stuttgart, Germany
Dieter Spath; University of Stuttgart, Germany

Product innovations represent the backbone of sustainable entrepreneurial success. In times of increasingly short development and life cycles of products on the one hand and an increasing degree of product complexity and individuality on the other hand, the right timing of the development and market introduction of physical and digital product innovations has become the key success factor for companies. The forecast of the diffusion of innovative product technologies and in particular the tipping point after which they significantly penetrate the market is therefore of paramount importance both for new and established companies. Research has found answers on how to identify technological change, yet the prediction of the timing of technological change remains unsolved. Traditional life-cycle models usually measure the development of products and technologies based on one criterion such as sales or performance and lack in the definition of variables and their measurement. However, to predict the diffusion of innovative product technologies, multiple factors and their operationalization have to be taken into account in technology-push-market-pull systems. On the technology side, patents and publications have been acknowledged as valuable indicators for progress. On the market side, appropriate indicators still need to be identified. Therefore, in this paper a quantitative scientometric analysis of past innovations has been performed using Google Trends, a service which has recently taken on greater significance. The analysis yields a significant correlation.

TE-04.3 [R] Detecting Hotspots in Interdisciplinary Research Based on Overlapping Community Detection

Lu Huang; Beijing Institute of Technology, China
Xiang Jia; Beijing Institute of Technology, China
Yi Zhang; University of Technology Sydney, China
Xiao Zhou; Xidian University, China
Yihe Zhu; Beijing Institute of Technology, China

Disciplinary fusion has been observed in a range of previous studies, which creates great benefit in science, technology, and innovation. However, how to detect and distinguish the hotspots in interdisciplinary is a challenge for not only researchers but also stakeholders in government and industry sectors. A keywords' co-occurrence network is constructed by using academic articles published between 2012 and 2017 in the field of information science and artificial intelligence. Then, statistical methods are applied for finding the regularities of distributions of term frequency and keywords' k-cliques. Furthermore, the software CFinder, which is based on clique percolation method (CPM) algorithm and is used for detecting overlapping communities, is utilized to visualize the network. At last, we find that "social media", "conceptual model, "big data" and "crowdsourcing" are the hotspots of interdisciplinary research in this case.

TE-04.4 [R] Co-word Analysis to Detect Possible Combinations for Composite Materials

Chika Fujisue; The University of Tokyo, Japan
Hajime Sasaki; The University of Tokyo, Japan
Hiroko Yamano; The University of Tokyo, Japan
Ichiro Sakata; The University of Tokyo, Japan

As the development of new composite materials can take over 20 years, a less time-consuming approach to considering the vast number of possible combinations of materials and predicting their physical characteristics is required. Material informatics, a field of study combining information technology and material science, is one such promising approach whereby researchers use information technology to predict the physical characteristics of new composites. In the present study, we adopted a link prediction approach of co-occurrence words to detect possible combinations of previously uncombined materials in order to assist the development of new composite materials. We observed research areas of composite materials and estimated their growth in the immediate future. Using the bibliographic data of academic papers, we extracted co-words from the titles and abstracts and created co-occurrence networks of material words. From these networks, we extracted the optimal materials for detecting new combinations. This research contributes to the acceleration of the design of new composite materials by reducing the time and cost to research and develop new materials.

TE-05 Technology Adoption-2

Tuesday, 8/21/2018, 16:00 - 17:30
Room: Waikiki Salon 2
Chair(s) Samuel Fosso Wamba; Toulouse Business School

TE-05.1 [R] Critical Factors for Adoption of Wearable Technology for the Elderly: Case Study of Thailand

Shayarath Srizongkhram; Japan Advanced Institute of Science and Technology, Japan
Kunio Shirahada; Japan Advanced Institute of Science and Technology, Japan
Navee Chiadamrong; Thammasat University, Thailand

The populations of developing countries are moving to the ageing society. Although health-related technologies have been accelerating economic performance for more than two decades, in many cases, they are not enhanced to be useful for the users, especially the elderly. One such technology is the wearable device that can save humans by detecting episodic. The use of wearable technology has been forecasted to grow continuously. In the case of Thailand, it is expecting the aged society by 2025. The studies on wearable technology adoption for the elderly and creating new business are very limited. The research aims to determine the critical factors that affect the expectation of the customers, including the elderly and caregiver, to adopt wearable device technology. The study was conducted through the quantitative survey given to the elderly and caregiver. The expected results of this research can be used to develop product and service offerings by the technology entrepreneurship so that it matches the customer expectation, leading to a better customer well-being in the ageing society.

TE-05.2 [R] Public Broadcaster's Big-data Technology Trajectories: The Case of NHK and BBC

Ruiz Navas Santiago; Tokyo Institute of Technology, Japan
Kumiko Miyazaki; Tokyo Institute of Technology, Japan

The competitive environment of the broadcasting sector is changing; under this change, public broadcasters have to adapt to keep being relevant to their users. Big-data technologies play an essential part in the technological side of these changes. Our objective is to identify the public broadcasters' big-data technology trajectories in this changing environment. We propose two research questions to narrow down the objective: What are the big-data technol-

ogy trajectories of public broadcasters? Also, which are the directions of big-data technologies proposed by the public broadcasters? We propose as the method, to analyze scientific paper's keywords and combine it with network analysis. We compare two datasets, big-data and public broadcasters. The big-data set is borrowed from a previous work done by the authors which detected big-data keywords proxy of knowledge convergence. The public broadcasters' dataset is created from the scientific publications reported by BBC and NHK. We match the big-data converging keywords to the keywords of the BBC and NHK publications and visualize their behavior over the time (2008-2016). We analyze the documents linked to the shared keywords on both datasets to identify the big-data technology trajectories and propose future directions. We identified as big-data technological trajectories for BBC, linked open data, recommender system, semantic web, and image processing; and for NHK, speech recognition, generate metadata to index NHK's programs and augmented reality (AR). Concerning their future, the detected trajectories are expected to be useful for broadcasters and organizations related to their value chain.

TE-05.3 [R] Chatbot Technology Adaptation to Reduce the Information Gap in R&D Center

Apivadee Piyatumrong; NECTEC, Thailand
Chatchawal Sangkeettrakarn; NSTDA/NECTEC/SPT, Thailand
Sopawan Witdumrong; NSTDA/NECTEC/OED, Thailand
Jitpapas Cherdgone; NSTDA/NECTEC/HROD, Thailand

Information gap is an important obstacle occurring within multi-disciplinary publicly-funded R&D organizations. It prohibits employees from knowing information about internal procedure as well as the research center's products. From the stability and continuity point of view, the wider the information gap among employees, the lower the efficiency to reach the mission-vision of R&D centers. This work studied particularly the internal process dimension of competing values framework as it assesses directly the stability and continuity of an organization. This study used semi-structured interview and proposed to adapt Chatbot technology to help reduce such information gaps. The quantitative and qualitative analyses have been discussed. The results show that the methodology used in this work can illustrate the current organizational climate, particularly in the internal process facet, and confirm the usefulness of the proposed Chatbot technology adaptation for the case study R&D center. This study suggests that a research center should manage its own research products in a way that it can be reached by its employees. This makes it more efficient to disseminate knowledge and products of the research center to the private sector and to society.

TE-06 Decision Making-3
Tuesday, 8/21/2018, 16:00 - 17:30
Room: Waikiki Salon 3
Chair(s) Elma Van der Lingen; University of Pretoria

TE-06.1 [R] Developing a Decision Model Framework to Assess Arms Supplier Policies

Sungjin Kim; SUNY Korea, Korea, South
Nasir J Sheikh; University of Bridgeport, United States

Comparative assessment of arms supplier policies by recipient nations is rationally important for arms purchase. However, such assessment is typically context-dependent or sometimes skewed by one or two perspectives. The use of a rational decision model in assessing and ranking policy options has been widely studied and is considered here. This novel research develops a hierarchical decision model (HDM) framework consisting of the relevant perspectives, their related criteria, and appropriate policy alternatives. Through a literature review a taxonomy was developed consisting of technological, economic, political, industrial, and military (TEPIM) perspectives, 13 criteria, and 65 sub-criteria. Then, based on elicitation of expert judgments, arms supplier policy alternatives were found to be represented by 3 archetypal policy profiles: hegemonic power, commercial trade, and selective export. This framework will be applied to future research involving an arms recipient's import decision making.

TE-06.2 [R] Development and Verification of an Industry Application to Improve the Project Manager-to-Project (PM2P) Practice

Lone Seboni; University of Botswana, Botswana

This research is a follow-up from a previous study regarding the development of a mathematical model for allocating project managers-to-projects (PM2P). The aim of the current study is to develop an industry application for the PM2P practice, in the form of a decision support system (DSS), as part of operationalizing the mathematical model. Both the depth and breadth of literature surrounding the PM2P practice were appraised and integrated in a creative manner, using concepts from different disciplines, to produce an application customized to the working environment of a specific case organization. Based on real-life input data from the case organization to verify the functionality of the application, the results reveal the robustness and usefulness of the DSS. This study is the first major attempt to propose a novel and integrated industry application that is superior to existing PM2P approaches. This attempt is a contribution to existing knowledge because it addresses the issue of user-friendliness to practitioners for the first time.

TE-06.3 [A] Computer Assisted Technology Intelligence: An Introduction

Franck Komi Adjogble; University of Hagen, United States
Oliver Ullmann; University of Hagen, Germany
Andreas Patzold; University of Hagen, Germany
Joachim Warschat; University of Hagen, Germany
Thomas Fischer; University of Hagen, Germany
Antonino Ardilio; University of Hagen, Germany

Technology depends on innovation - but innovative developments are hard to predict. In addition to existing approaches for technology forecasting, the use of data envelopment analysis (DEA) provides valuable insights and prediction data. DEA offers a method to evaluate the relative efficiency of analyzed entities. Using the efficiency analysis features of DEA in technology forecasting enables predictions for future developments based on historic data. This paper introduces the Computer Assisted Technology Intelligence (CaTI) system. CaTI implements the technology forecasting using the DEA method by Oliver Inman, while modifying and expanding the method with the dynamization of the technological rate of change calculation using regression analysis, neural network and system dynamics. CaTI is an interactive system that processes data from a variety of sources and provides a comprehensive set of calculation methods. The results of the calculations are graphically provided to the forecaster. CaTI implements new approaches to the use of network data envelopment analysis in technology forecasting to examine the efficient interdependency of subcomponents of a technology. The system supports new functionalities such as collaboration of several forecasters in different locations. The paper describes the individual calculation modules that make up CaTI, their interaction and implementation as software system.

TE-09 Strategic Management of Technology-1
Tuesday, 8/21/2018, 16:00 - 17:30
Room: Milo III
Chair(s) Sergio M Borja; Seoul National University

TE-09.1 [R] Improving Network Positions through M&As: The Case of the Japanese Pharmaceutical Industry's International Expansion

Balazs Fazekas; Kyoto University / Kyoto Tachibana University, Japan
Yuanyuan Gong; Hyogo Prefectural University, Japan

In this paper, we propose a novel strategic motivation for M&As. We argue that beside traditional strategies, such as geographic extension, vertical integration, extension of the product line, and developing R&D capabilities, M&As can also be undertaken and analyzed with a field or network perspective. M&A strategy can be thought of as a particular tool to improve an organization's position within an organizational field and to build specific network positions. Thus, a number of strategic M&As undertaken by a company can help it move towards a more beneficial position and gain access to vital resources embedded

in the network through social capital. These positions can also provide new collaborative opportunities. For our investigations, we looked at top firms in the Japanese life science industry and attempted to understand how these firms were able to become more central in the international network, where they had only occupied quite peripheral positions. We also looked at one particular case through a qualitative lens, the case of Takeda Pharmaceutical, to see how the process takes place in more detail and found that M&As lead to new collaborations and acquisitions that the company would probably not have taken without the help of their previously acquired companies.

TE-09.2 [R] Incumbent Firm Capacity Building in Analytics: Strategy, Structure, and Innovation Management Perspectives

Mel Horwitch; Central European University, Hungary
Milos Milicsevics; Central European University, Hungary

This paper focuses on discerning patterns of analytics adoption in incumbent firms using insights from strategy, structure, and innovation management disciplines. Patterns of analytics activity are studied for Honeywell, Emerson, Pfizer, and Merck as they strive to build capacities to achieve competitive success in analytics. First, keyword queries using a single database were run. Second, based on a wider set of public domain sources, analytics activity at these firms was further examined. Perspectives of strategy professionalism, incrementalism and adaptive strategy, and general management strategy were employed. In terms of structure, to leverage analytics' potential, incumbents try especially to navigate an explicit-implicit dichotomy, to acquire relevant knowledge and talent, to leverage external ecosystems, and to build complex, sophisticated structures. Incumbents increasingly utilize diverse innovation management approaches, including managed development of new technology (R&D), commercialization and scaling, renewal and disruption, and entrepreneurialism. Even in such a heavily quantitative arena, developing relevant general management competencies is identified as an especially prominent aim for incumbents. More generally, incumbent firms entering analytics not only aim at obtaining superior analytics-specific skills (e.g., coding and software development). Such firms also strive more broadly to upgrade relevant strategy, structure, and innovation management competencies. Questions for subsequent research are also offered.

TE-09.3 [R] IEC Standard Revision Dynamics: Symbiosis between Standard and Technology

Seungyeon Moon; Sungkyunkwan University, Korea, South
Kyounghwan Chin; Sungkyunkwan University, Korea, South
Heesang Lee; Sungkyunkwan University, Korea, South

The International Electrotechnical Commission System of Conformity Assessment Scheme for Electrotechnical Equipment and Components (IECEE) enables each country to test products based on the same International Electrotechnical Commission (IEC) standard and to issue a test report that is accepted by other countries, instead of requiring that individual countries test products based on different national standards. In this way, it is possible to reduce costs, simplify the certification process, and reduce trade barriers. Relevant extant studies on standardization have focused on the network effect of the standard, the standard-setting process, and its political aspect. The standard essential patent (SEP) is a patent that cannot be avoided when complying with the standard. The extant studies on the SEP have concentrated on optimal patent application timing or filing patterns. In this study, we have examined standard dynamics concentrating on international standards and the SEP's characteristics, as well as its implications for firms with regard to a cycle of technology acceptance - standard development - intellectual property protection. We conducted survival analysis to analyze the standardization flow using data including IEC standards, IECEE-adopted standards and standards including SEPs. The results showed a difference between IEC-adopted standards and standards including SEPs regarding the occurrence of a standard revision. Such results highlighted the importance of standardization for firms' technology procurement and standardization strategies through IEC standard dynamics concerning the technology acceptance and SEPs.

TE-10 Information Management-3
Tuesday, 8/21/2018, 16:00 - 17:30
Room: Milo IV
Chair(s) Rainer P Hasenauer; WU-Wien

TE-10.1 [A] The Influence of Social Percolation in Improving Fundraising Strategies of Charity Organizations

Emi Trepci; WU Wien, Albania
Rainer P Hasenauer; WU-Wien, Austria

This paper aims to take a deeper look into the influence that social network factors, specifically word of mouth, have on donations decisions. It assumes that people tend to take donation decisions more often when there is some "social pressure" towards them, rather that when they are faced with the same case that requires donation, but privately. The whole study is going to be conducted in the focus of the social percolation theory. A survey is conducted to test the hypothesis. The group participating in the study is presented with a specific case which requires donation. In addition to the statistical analysis, two computer simulated models describing the percolation also took place. This study is expected to be of help, based on an innovative technology, to all the donations initiators including private and public charity institutions. The percolation perspective will give them indications in improving the procedure, convincing people donate. Furthermore, the simulation tool offers early (weak) signals if the donation theme will percolate through the special interest community by exceeding the probability threshold.

TE-10.2 [R] Analysis on Text of WeChat Official Account Based on Topic Model

Haodong Zhang; China Association Science and Technology, China
Hong Wu; China Association Science and Technology, China
Shuo Xu; Beijing University of Technology, China
Zheng Wang; China's Ministry of Science and Technology, China
Shengmei Du; ISTIC, China
Hui Luo; China Association Science and Technology, China
Rui Chen; China Association Science and Technology, China
Ning Zhang; China Association Science and Technology, China

Like Facebook, Twitter and Whatsapp, WeChat is also a famous mobile instant messaging product with over 980 million active accounts, which supports voice, video, pictures, text messages and payment. China's Ministry of Science and Technology has applied social media to science and technology management. Rui Ke Ji and Rui Dong Ruan are two of the official accounts in the WeChat matrix of China's Ministry of Science and Technology. Rui Ke Ji is run by the General Office and Rui Dong Ruan is mainly for Department of Resource Allocation and Management. In this research, an approach is established to processing texts of Rui Ke Ji and Rui Dong Ruan with an author-topic model. The experimental result indicates where the ministry's publicity lies, and there is a certain relationship between the content of the articles and the page views on WeChat. By comparing the view counts of Rui Ke Ji and Rui Dong Ruan at the same time, we can find what Chinese scientists and technicians are most concerned about, which can help to improve the science and technology publicity.

TE-11 Technology Diffusion
Tuesday, 8/21/2018, 16:00 - 17:30
Room: Milo V
Chair(s) Yasunobu Ito; JAIST

TE-11.1 [R] Understanding the Diffusion of the Blockchain Technology: A Patent-based Analysis Using the tf-lag-idf for Term Novelty Evaluation

Bennet Bruens; University of Bremen, Germany
Martin G Moehrle; University of Bremen, Germany

Blockchain technology seems to be an important driver in several application fields. It is already being used in the financial industry (where it has led to "Bitcoins" and other

electronic currencies), but it may also influence the logistics industry (e.g., enabling unique identifier for components), the service industry (as a replacement for personal identifiers), and others. It is based on the replication of information at several distributed locations. To obtain a better understanding of how blockchain technology has diffused and will continue to diffuse, we carry out a patent analysis. In particular, after compiling a patent set concerning this technology, we classify the respective patents by means of a keyword list. This method helps us identify claims, which deal with business processes (in contrast to manufacturing processes). We extract novel concepts from these claims over the course of time on the basis of informetric measures (tf-lag-idf). The analysis reveals a sequence of broad application fields of blockchain technology, however, only few industry-specific ones. This indicates that managers should evaluate the hype, which presently surrounds block chain technology with great caution. So far, the expectations and potentials discussed in the current literature and media are hardly reflected by patent data. However, the strong increase over recent years should inspire managers from application fields that are not yet at the center of patenting activity to develop related inventions and apply for patents quickly.

TE-11.2 [R] How Ethnography Infiltrated the Japanese Business Scene: A Case Study

Yasunobu ITO; JAIST, Japan

This paper explores how ethnography, the chief methodology of social/cultural anthropology, was introduced to, and spread through, the Japanese business scene in the decade following 2000. The way ethnography was introduced to the business community is rather convoluted and far from straightforward. (1) The explanations of ex-managers of companies that were first to adopt ethnography, described as "early adopters", were really only focused on business issues. (2) Researchers value academic networks, and they assert that ethnography entered Japan though endogenous developments in academia. (3) Recognizing this trend, the mass media sought other examples from various companies that they then reported on. These were companies that were doing consumer research and work in the field. These companies, described as "followers", did not know the English term "ethnography", but recognized the trend through being reported on and proceeded to employ this in the PR. One could see this as a "feedback loop" between mass media and firms' business affairs. The implication of the discussion here could also be seen as an example of how business trends are formed and take hold.

TE-11.3 [R] The Time Delay of Patent License in China

Deming Lin; Dalian University of Technology, China
Lulu Chen; Dalian University of Technology, China

Patent licensing contracts registered in SIPO are used as the sample to study the distribution of years, licensing modes, region, and discuss the characteristics of assignor and assignee. Furthermore, the time delay of patent licensing is also analyzed. The results show that most of the licensed patents are individual, international licensing is less, the patent licensing has delay, and more than 90% of patents are licensed six years after application.

WA-00 PLENARY - 3

DATE: WEDNESDAY, 8/22/2018
TIME: 08:30 - 10:00
ROOM: KONA MOKU BALLROOM
CHAIR: KIYOSHI NIWA; THE UNIVERSITY OF TOKYO

WA-00.1 [K]Invention to Innovation: The Role of Scientist Entrepreneurs

Elicia Maine; Simon Fraser University, Canada

The importance of university spin-offs in the commercialization of highly uncertain, early stage scientific inventions is increasing. While there is a growing body of literature on academic entrepreneurship, not much is known about the role of star scientists in university spin-off emergence. We argue that replicable entrepreneurial capabilities developed by scientist entrepreneurs can translate inventions from the scientists' lab into well-resourced university spin-offs. We inductively develop a model of the key role played by a star scientist entrepreneur in four interdependent entrepreneurial capabilities: technology-market matching, claiming and protecting the invention, assembling the founding team, and the strategic timing of firm formation. We compare and contrast 30 science-based university spinoffs - controlling for star scientist entrepreneur - to provide evidence suggesting that these entrepreneurial capabilities contribute to success. From this analysis, we draw recommendations for scientist-entrepreneurs, university leadership, and innovation policymakers.

WA-00.2 [K]Sustainable Environments and Technological Entrepreneurship in Small Island Development States (SIDS)

Pliny Fisk III; CMPBS and Texas A&M University, United States

ARK (adaptation, resilience, knowledge) is a 'think and do' collaboration of academic, business, and non-profit entities formed to foster sustainable economic development while protecting marine and terrestrial environmental diversity of SIDS worldwide given challenges of escalating climate change (CC). The current focus is on Belize and the Caribbean to develop transformative activities and models for CC mitigation and adaptation through two main projects for capacity-building and sustainable regional development. Project #1 is to build an Interactive Working Atlas (IWA) that provides comprehensive baseline environmental assessment data to monitor and evaluate CC along mountain to reef river corridors. Project #2 is to construct a state-of-the-art Ecology (Eco) Research Park that includes an Eco Research and Testing (ERT) Lab and Eco Business Incubator (EBI) to foster regional entrepreneurship and economic development. Both projects involve regional government, business, and academic participants to establish best practices for Caribbean-wide dissemination through the Open Campus of the University of West Indies. Given the recent and looming hurricane threat, The Center for Maximum Potential Building Systems (CMPBS) in now most concerned with related LandARK and SeaArk initiatives. The focus is on "resilient off-grid construction" using regional resources and material, entrepreneurial talent, and innovative building technologies and methods. LandARK construction includes economically conceived mitigation modules or "PODs" that are implemented as publicly accessible hurricane resistant safe housing. SeaARK is a related sea-based reef research/ ecotourism facility that incorporates repurposed submersible (floating) oil rig platforms. A resulting pyramid shaped POD-City creates an ecotourism as a reef habitat. This temporarily submersible and self-propelled movable structure constantly adjusts for water temperature and light and water quality to become a satellite directed sustainable floating reef city. The LandARK and SEAark projects and innovative practices are meant to inspire regionally-based ecosystems for sustainable value-added technology-based entrepreneurship and development.

WB-01 Innovation Management-6

Wednesday, 8/22/2018, 10:30 - 12:00
Room: Kona Moku Salon A
Chair(s) Masaharu Tsujimoto; Tokyo Institute of Technology

WB-01.1 [R] Applying the Technical Results and Experience from Unsuccessful Projects in New Projects: Kuraray and the Innovation of Nylon 9T

Mitsuteru Mutsuda; Hitotsubashi University, Japan

One of the big challenge of innovation management is how to manage the contingencies and uncertainties. Actually, it is impossible to obviate any contingencies and uncertainties from an innovation process. One of the solutions could be applying technical results and experiences from unsuccessful projects to new projects. Genestar is a kind of "aromatic nylon = high heat resistance nylon" and the start of the business was 1999. Although the demand for "high heat resistance nylon" was increasing at that time, Dupont (= Nylon 6T,

1994), Solvay (= Nylon 6T, 1991), Mitsui Chemical (= Nylon 6T, 1989) and Mitsubishi Gas Chemical (= Nylon MXD6, 1983) had already started the business five to ten years earlier. In addition, Kuraray had not had any engineering plastics business at that time, i.e., Kuraray was a newcomer in both the technical area and business area. Under the difficult situation, Genestar has been very successful; the business reached to 14,000 tons in 2017. This paper picks up Kuraray's Genestar (Nylon 9T) as the example and it discusses about how Kuraray made Genestar succeed by applying technical results and experiences from two withdrawn, terminated projects, (a) Polybutylene terephthalate (PBT) project and (b) nonan diamine project, which are based on different technical areas.

WB-01.2 [R] From Technology Transfer to Disruptive Innovation: The Case of EMBRAER

Marcelo A Machado; Kwantlen Polytechnic University, Canada
Kazuo Hatakeyama; Entrepreneur/Consultant, Brazil

The aircraft industry is a high-tech market with very high barriers to entry. Particularly considering the commercial aircraft market, only a handful of competitors account for most of the market share. Amongst this select group, Embraer is the only one from the developing world. This paper proposes Embraer's approach to innovation as a major factor for the company's global success. As part of a country-wide strategy, Embraer has for decades systematically employed technology transfer to build R&D capabilities. More recently, Embraer identified a gap in the market for larger regional jets and in collaborating with risk partners has launched a very competitive product line, considered an example of disruptive innovation. The regional jet market has recently received a lot of attention with the launch of Bombardier's C-Series. In this context, this paper attempts to validate its claims about Embraer by triangulating, primary and secondary sources of information, describing Embraer's trajectory and current position in the market. From Embraer's case, practical and conceptual implications are proposed. Additionally, limitations and opportunities for future research are also discussed.

WB-01.3 [R] Success Factors to Improve the Life Cycle of Information and Communication Technology Start-ups in Brazil

Joao Henrique S Pereira; University of Sao Paulo & University of Uberlandia, Brazil
Jose Eduardo F Lopes; University of Uberlandia, Brazil
Geciane S Porto; University of Sao Paulo, Brazil

This research aims to identify the success factors of Brazilian ICT start-ups and to contribute to improve the life cycle of these companies. For this, a survey was done with 174 Brazilian tech companies. The results identified the association of the success variables "company size in revenues" and "dimension of the customers base" with the firms' characteristics and present the ones with more impact for each of these two success parameters. The characteristics analyzed were: establishment of partnerships with actors of the innovation ecosystem, fonts to finance the research and development by subsidies, reimbursable fundraising, availability of risk capital, use of methods to develop projects or interact with the market, management of functional areas, human resources model for employee selection, company's vision of success, level of innovation in products and services and the aspects of the founders as experience, school level, copartners number and founder's dedication. The analysis used the SPSS statistical software. The tests applied were: Test t and Pearson's Chi-square. It is hoped that the findings of this research can contribute to better understand and develop this sector in Brazil with positive impacts for the future of the economy of this country.

WB-02 Entrepreneurship/ Intrapreneurship-5
Wednesday, 8/22/2018, 10:30 - 12:00
Room: Kona Moku Salon B
Chair(s) Takashi Iwamoto; Keio University

WB-02.1 [R] Revitalizing the Yamuna River: Social Entrepreneurship Approaches

Bala Mulloth; University of Virginia, United States
Bharat Rao; New York University Tandon School of Engineering, United States

New Delhi, India's capital city, with a population of almost 22 million faces a daunting challenge: Its sacred river, the Yamuna, is one of the most polluted in the world. In fact, within the city limits, the Yamuna is primarily constituted by treated and untreated sewage and other toxic effluents. The water is rendered "dead" with zero oxygen, thus posing serious health hazards to the citizens of New Delhi. Might there be a way to cleanup and revitalize the river plain using social entrepreneurial approaches? In this paper, we propose to study the key ingredients required for creating and nurturing a social entreprenurship and innovation based ecosystem in the region. The methodology employed is qualitative in nature and draws on evidence based on interpretative interviews as well as direct and indirect observations. Using case examples of five socially driven ventures in the region, we examine how they impact the local community in a manner that opens up new frontiers for positive social change. In doing so, these social entrepreneurs create value by introducing technology innovations that solve problems, while creating new opportunities for organizations and communities involved with the Yamuna river cleanup efforts.

WB-02.2 [R] Evaluation of Factors That Hinder Technology and Engineering Entrepreneurs in the Mining Sector

Bobby Mahlori; University of Pretoria, South Africa
Elma Van der Lingen; University of Pretoria, South Africa

Most South African entrepreneurs face obstacles that hinder them from successfully providing technological and engineering solutions to the mining industry. This research was done to establish what factors encourage the development of technology and engineering small, medium, and micro-enterprises (SMMEs) in the South African mining industry, and to identify obstacles faced by South African entrepreneurs in the mining industry. The research also evaluates programs that are run by the South African government and the private sector to support SMMEs, and to make recommendations about overcoming the obstacles faced by SMMEs in the South African mining industry. The study supported some of the personality characteristics, such as risk-taking, leadership, and motivation that are found to have a major influence on the success of technology and engineering entrepreneurs (TEEs). The obstacles identified as hindering the success of SMMEs created by TEEs are, among others, lack of finance, crime, and cultural differences. Government and the private sector could play a bigger role in supporting TEEs through policies and regulations, and by providing training and development initiatives. This research aims to help prospective entrepreneurs and organizations (for instance, mining houses) that intend to assist small businesses or entrepreneurs who want to succeed in starting technology and engineering businesses. The research could also be useful to public and private-sector entities that are involved in SMMEs.

WB-02.3 [R] Saudi Female Entrepreneurs, Situation and Challenges

Hemaid Alsulami; King Abdulaziz University, Saudi Arabia
Rimal Abu Taha; King Abdulaziz University, Saudi Arabia

The entrepreneurship concept has spread between Saudi youths instead of employment in the public or private sectors. In the last decade, small and medium enterprises (SMEs) in the Saudi market were occupied by non-Saudis, especially in the major cities. Therefore, the government, with the cooperation of the private sector, has established programs and initiatives to support young Saudis to open their own businesses and become entrepreneurs. The vision of Saudi Arabia 2030 has set a goal to increase the contribution of the SMEs to the economy. One key performance indicator of the vision is to increase the contribution of entrepreneurs from 20% to 35% by 2030 with a focus on supporting female employment and empowerment. This paper employed survey research to assess the current situation of female entrepreneurs in Saudi Arabia. The study revealed that most female Saudi entrepreneurs own small home-operated businesses. Financial funding and unawareness of supportive programs were found to be the main obstacles that are currently facing the development of female entrepreneurs in the Saudi market. The research concluded with recommendations which are believed can help to overcome the obstacles females are facing in establishing and running a business.

SESSIONS

WB-04 Internet of Things (IoT)
Wednesday, 8/22/2018, 10:30 - 12:00
Room: Waikiki Salon 1
Chair(s) Steven T Walsh; University of New Mexico

WB-04.1 [R] Transforming Value Chains into Internet-based Ecosystems: A Testbed Approach

Patrick Weber; Ferdinand-Steinbeis-Institute, Germany
Dominik Morar; University of Stuttgart, Germany
Heiner Lasi; Ferdinand-Steinbeis-Institute, Germany

The Internet of Things (IoT) enables the integration of distributed systems and actors, which furthermore initiates the transformation of traditional value adding chains into Internet-based ecosystems. Therefore, cooperation between actors from different domains is crucial. The essential characteristics of these ecosystems are cooperative value proposition as well as fragmentation of individual service components. The cooperative value proposition describes the common business goal, which the cooperation is based on. Today's enterprises need to cope with this transformation and therefore need an answer to the following question: How can traditional value adding chains be transformed successfully into Internet-based ecosystems? The testbed approach, which is presented in this paper, evolved from the experiences of six testbed workshops as well as a group discussion. Based on established concepts from the literature and the experiences of the six testbeds, a framework for generating a value proposition in Internet-based ecosystems was developed. In conclusion, the testbed approach supports a successful transformation into Internet-based ecosystems.

WB-04.2 [R] An International Comparative Study of Internet of Things Technologies Using Keywords Extracted from Newspapers

Masatake Saito; Chuo University, Japan

Currently, a large amount of news and articles related to the Internet of Things (IoT) is circulating worldwide along with information about Industry 4.0-related technical developments. In 2011, the German government even adopted "Industrie 4.0" as its national strategy to improve its global competitiveness. This study compares data from four countries: United States, Germany, China, and Japan. The author performs clustering by the weight of group after extracting IoT-related keywords that have appeared in newspapers. It was seen that the United States focuses on the Internet/data processing technologies, and Germany focuses on the production/M2M (machine to machine) technologies. However, Japan and China lacked such focus.

WB-04.3 [A] Development of a Use Phase Data Strategy for Connected Products: A Case Study in Industry

Julian Wilberg; Technical University of Munich, Germany
Tobias Kalla; Technical University of Munich, Germany
Manuel Fetscher; Technical University of Munich, Germany
Franz Rimbock; Wacker Neuson Vertrieb Europa GmbH, Germany
Christoph Hollauer; Technical University of Munich, Germany
Mayada Omer; Technical University of Munich, Germany

More and more products contain components for connectivity and this trend is often called the "Internet of Things" (IoT). Connected products affect competition and lead to novel opportunities to provide data-centered business models, gain insights into products' usage, or offer data-driven services. In general, a broad range of possible IoT use cases exists. However, having connected products is not a guarantee for success because companies struggle to derive a data strategy that defines which data is needed for selected use cases. Therefore, the researchers conducted a year-long case study together with an industry partner in order to better understand the opportunities that connected products provide and the obstacles that arise. The case study followed a process model that guides companies through the development of a use phase data strategy. Based on the insights gained during the case study, three additional methods supporting the strategy development were derived. Overall, the research findings show how important a systematic approach is in turning use phase data into value. Workshops with the company allowed the researchers to evaluate the process model and the methods which were developed. Future research should support companies in developing a monetization concept.

WB-04.4 [R] Emerging Markets and the IoT

Yorgos Marinakis; University of New Mexico, Netherlands
Inder Thukral; Boston Analytics, United States
Makarand Pandey; Boston Analytics, United States
Jorge Hernandez; Sandia National Laboratories, United States
Aard Groen; Groningen University, Netherlands
Steven T Walsh; University of New Mexico, United States

Emerging market economies rarely lead the commercialization of emerging technologies. This was understandable when emerging technologies were based on costly physical product technologies that produced products like airplanes, automobiles and more recently semiconductors and MEMS devices. Yet we are now in the information- or knowledge economy-based Schumpeterian cycle where exceptional infrastructure cost no longer applies. Emerging markets today have in many cases both the technological expertise and the infrastructure capital to embrace at least the IoT emerging service product technology base. If this is so, then what are the business models that are appropriate for emerging markets? Our research focuses on adding to the literature by investigating the differences between physical product-based and service product-based emerging technology adoption in emerging markets. We construct and demonstrate a comprehensive policy-based tool for the review of IoT-based (i.e., Software as a Service-based) opportunities.

WB-05 Intellectual Property-3
Wednesday, 8/22/2018, 10:30 - 12:00
Room: Waikiki Salon 2
Chair(s) Hung-Chun Huang, National Chi Nan University

WB-05.1 [R] Analyzing Patent Transactions with Patent-based Measures

Hung-Chun Huang; National Chi Nan University, Taiwan
Hsin-Ning Su; National Chung Hsing University, Taiwan
Hsin-Yu Shih; National Chi Nan University, Taiwan

Patent analysis has long been involved in economic studies of innovation and technology, demonstrating the value of patents as highly valuable assets. Thus, the systematic examination of patent transactions should be a priority concern in research. The aim of this study is to explore how patent-based indicators inform patent transaction probability, as well as patent transaction speed. A total of 58,768 TFT-LCD patents between 1976 and 2012 were analyzed. The results show patent-base indicators demonstrate four value segments, which affect transaction likelihood and duration. Adequately weighting these segments can strategize transactional advantage. This study provides insights into patent transaction factors, and addresses management implications for firms or authorities who are interested in acquiring market advantages.

WB-05.2 [R] Research and Development Situation Analysis of Anti-breast Cancer Drugs from Patent Intelligence Perspective

Wei He; Huazhong University of Science and Technology, China
Xiang Yu; Huazhong University of Science and Technology, China
Minghan Sun; Huazhong University of Science and Technology, China

The current incidence of breast cancer has increased dramatically, becoming the highest rate of cancer in women. The mortality of it ranked second. However, the process of researching and developing new drugs against breast cancer is extremely long and risky. In this paper, the mining of information from the patents provides important technical support for the relevant research institutions and pharmaceutical enterprises. Based on the "Derwent Innovations Index" (DII) database, this article studies the current situation and development trend of the

research on anti-breast cancer drugs from the aspects of patent applications, patent lifecycle, patent technology field, network density, degree centrality, structural holes, research theme and research frontier using the methods of patent bibliometrics analysis, social network analysis and term co-occurrence analysis. The results show that there are 22,102 patent applications of anti-breast cancer drugs in the global scope, which is in a stable technology development period in recent years. The number of patent applications in the United States and China is in the absolute leading position. The field of patent technology focuses on the study of anti-tumor activity and its pharmaceutical dosage forms. Research themes mainly involved in the gene expression of breast cancer, pharmaceutical preparations, drug combinations, malignancies, angiogenesis inhibitors, immune responses, small-molecule targeted anti-tumor drugs design, drug-protein binding, and mechanism of drug action. Meanwhile, delaying progression, drug combinations, antagonists, vaccine research and tyrosine kinase inhibitor are the development trend of anti-breast cancer drugs research. However, the patent technology of anti-breast cancer drugs in our country is mainly in the hands of universities and institutes, and it is suggested to strengthen the combination of research and development to realize the industrialization of anti-breast cancer drugs.

WB-06 R&D Management-2
Wednesday, 8/22/2018, 10:30 - 12:00
Room: Waikiki Salon 3
Chair(s) Naoshi Uchihira; Japan Advanced Institute of Science and Technology

WB-06.1 [R] A Management Model for Making Full Use of Personal Ability in Offshore R&D

Yang Wang; Japan Advanced Institute of Science and Technology, Japan
Naoshi Uchihira; Japan Advanced Institute of Science and Technology, Japan
Yasushi Ogawa; Ricoh.co.Ltd, Japan

Offshore R&D in developing countries such as China and India has increased in recent years. Meanwhile, because of the high uncertainty in offshore R&D, it's necessary to change research strategy and research contents dynamically depending on the situation of technology development and the status of the external environment. For this reason, the more research elements that are in the offshore R&D project, the personal ability of overseas developers will be more important. In other words, to improve the efficiency of offshore R&D, the management method which can overcome the problems of cross-cultural communication is required, and the management method that can fully use the personal ability of overseas developers is also required. Then, according to the progress toward integration of the home country team and overseas team in offshore R&D, we proposed a management model to manage home country developers and overseas developers as one same global team without the boundary for drawing out the personal ability of overseas developers. In order to make sure that the proposed management model can function well, a bridge manager is required to carry out three important roles to make sure that the home country and overseas can function as one team.

WB-06.2 [R] How Do Influences of Funding and Funded Organizations Affect Performance of Publicly-Supported Private R&D Projects?

Yaichi Aoshima; Hitotsubashi University, Japan
Kazunari Matsushima; The Universty of Tokushima, Japan
Naoki Takada; Hitotsubashi University, Japan

This paper explores the factors leading to the success of publicly-funded private R&D projects by analyzing survey data obtained from 506 projects supported by NEDO (New Energy and Industrial Technology Development Organization), Japan's public funding organization under Ministry of Economy, Trade and Industry (METI). We examined how involvement of both the funded firm and the funding organization in the project affects the project's commercialization performance. Our analyses showed that the project with higher strategic importance and stronger executive involvement was beneficial since it enabled the project to effectively leverage the company's internal resources. On the other hand, the funding organization's involvement had positive effects on performance only when the company showed low commitment to and weak involvement in the project; it had no or negative effect on performance with higher commitment and involvement from the company side. Our findings suggest that the success or failure of the publicly-funded private R&D is greatly related to the strategic position of the project within the company. This implies that assessing the company's in-house factors in addition to the potential of a technology is important in selecting funding projects, and that the funding organization should find an appropriate way of managing the project depending on project's strategic position.

WB-06.3 [R] Study on Cooperation Dynamic of Multi-enterprise Generic Technology R&D

Yuelong Zheng; Chongqing Technology and Business University, China
Lin Wang; Chongqing Technology and Business University, China
Zhongyi Huang; Chongqing Technology and Business University, China
Zhengzheng Leng; Chongqing College of Finance and Economic, China
Lixin Zhou; Chongqing Technology and Business University, China

Based on N-person evolutionary snowdrift games and public goods games model, this paper builds a game model of generic technology cooperative R&D with multi-enterprise under well-mixed population, and analyzes the affecting factors and evolution dynamic of multi-enterprise cooperation R&D. The results show that the cooperation and non-cooperation enterprise coexistence is the evolution equilibrium state of a generic technology cooperation R&D system. The equilibrium state increases with the increase of industrial scale and the decrease of benefit-cost ratio. Induced cost, which become the main decision-making variables whether or not the enterprise chooses cooperation R&D, can offset the inhibition effect of industry scale on generic technology cooperation R&D. Lower waiting cost motivates enterprises to choose generic technology cooperation R&D strategy. The increase of external support, the difficulty of generic technology imitated, the increase of enterprises decision-makings' correctness, and the decrease of transaction costs exert positive influence on the emergence of generic technology cooperation R&D behavior. The evolution of a generic technology R&D system is more sensitive to external support and the difficulty of generic technology imitated.

WB-08 Science & Technology Policy-2
Wednesday, 8/22/2018, 10:30 - 12:00
Room: Milo II
Chair(s) Yuanxi Huang; China Association for Science and Technology

WB-08.1 [R] The Influence of Research Infrastructure for Technological Entrepreneurship

Lili Qiao; National Academy of Innovation Strategy, CAST, China
Zheng Li; National Academy of Innovation Strategy, CAST, China
Yuanying Gao; National Academy of Innovation Strategy, CAST, China
Hui Luo; National Academy of Innovation Strategy, CAST, China
Yunyan Shi; National Academy of Innovation Strategy, CAST, China

Research infrastructures (RIs) are expected to play an important role in the development of scientific activities in China and the construction of China's national scientific systems. However, few studies have been devoted to the systematic evaluation of the technological entrepreneurship (TE) effects of China's RIs. This paper attempts to fill this gap by designing a comprehensive analytical framework composed of the two stages and different function type of RIs. The analysis is implemented based on a novel sample composed of four of China's typical RIs. More specifically, this paper classified these four Chinese RIs into the following two types according to their functions: dedicated research infrastructure, public experimental platform. Furthermore, this paper analyzes the features of the TE promotion effects of these RIs in construction and operation stages. There are three influence mechanisms, as technology source, the center of innovation resource attraction and technology service. This paper not only contributes to developing an analytical framework for evaluating the functions and TE promotive effects of large RIs but also presents evidence regarding the development

of RIs in emerging countries.

WB-08.2 [R] Policy of Government Procurement Promoting Scientific and Technological Innovation in China: Institutional Structure and International Comparison

Xiaoli Wang; Beijing Institute of Technology, China
Yun Liu; Beijing Institute of Technology, China
Bingxiu Gui; Beijing Institute of Technology, China
Meijian Yang; Beijing Institue of Technology, China
Yajie Xu; Beijing Institue of Technology, China
Jia-xin Chen; Beijing Institute of Technology, China

In many countries of the world, government procurement is a powerful tool for reflecting national strategic intentions and promoting scientific and technological innovation. Based on the perspective of the institutional structure and the method of policy for bibliometrics, we analyzed Chinese policies of government procurement to promote scientific and technological innovation, revealed the policymaking characteristics, and concluded that the Ministry of Finance should appropriately decentralize the policymaking work to other relevant departments of the State Council. This paper compares the main policy tools from five dimensions among China and other typical countries, such as the United States, the United Kingdom, Japan, Germany, France, and so on. There are five aspects, which include establishing the database for vendors of micro, small, and medium enterprises; developing the grade system and the post evaluation system; formulating detailed implementation methods of innovative products and services; carrying out classification management for imported products; and setting mandatory insurances. In general, for the policies of government procurement to promote scientific and technological innovation, this paper provides an effective reference for organizing the agencies and formulating the detailed measures. The research framework of this paper could be applied to analyze other policies.

WB-08.3 [R] What Influenced the S&TI Talents' Development in China: A Perspective View of the Candidates' in a Young S&TI Talents Rewarding Program

Lei Shi; National Academy of Innovation Strategy, CAST, China
Hui Luo; National Academy of Innovation Strategy, CAST, China
Guang Yang; National Academy of Innovation Strategy, CAST, China
Jing Bai; Harbin Engineering University, China

In the worldwide trend of "innovation first" and "innovation-driven," the question of how to cultivate innovative talents attracts even more attention. The science technology and innovation (STI) talents are regarded as the potential competitiveness of a nation, thus fostering an advantageous environment for the STI talents is not only a family expectation but also a national concern. Decades ago China began to launch numerous STI talent supporting programs, contests or rewards. Awarding Program for Future Scientists as one of them was embarked on in 2001, co-sponsored by China Ministry of Education, China Association for Science and Technology, and HS Chau Foundation, etc., for the purpose of cultivating children's innovative mindset, inspiring their interest in science, and encouraging their devotion to a S&T career. Through the assessment project of the 16th Awarding Program for Future Scientists (APFS) in 2016, the paper observes the application materials of the finalists for the APFS, and forms an analytical framework concerning the STI talents development on the basis of existing literature. With the methodology of text analysis, the major factors impacting the development of the talents are ranked, which are wide interest/hobbies and challenging experience, parental educational and career background, school teachers, the regional innovative environment, instructors and family atmosphere. This research study further verifies the research framework on the influential ingredients exerting some influence on the development of STI practices, opens a window to observe the potential STI talents development, and provides suggestions for STI talents cultivation.

WB-09 Science and Technology Communication-1
Wednesday, 8/22/2018, 10:30 - 12:00

Room: Milo III
Chair(s) Li He; China Research Inst. for Science Popularization

WB-09.1 [A] Research on the Shooting Techniques for Online Interactive Video Production and Audience Understandings of Popular Science News Feature

Mavis Tsai; Shih Hsin University, Taiwan
YiSong Chen; Shih Hsin University, Taiwan

Science is an important part of human life. To communicate environmental information adequately and effectively, the mass media need to provide suitable information and channels so the community can acquire new information, and thus generate innovations. In addition, new media have become quite important and convenient to a new generation. The purpose of this study is to investigate ways to shoot and produce an interactive short film for new media regarding popular environmentally-important issues that will increase audience learning and involvement. The researchers chose to use as a sample topic an environmental news feature issue: ways microplastics spell big problems for future generations. This application paper indicates methods of producing an interactive popular science video step-by-step, and especially focus on shooting methods, one of the most important parts for producing short films. Having produced an interactive short film, the researchers launched two focus group interviews of 12 audience members to discuss their perceptions and understanding of this short film. This study aims to compare their interests, perception and understanding regarding this popular science short film against the skills involved in video shooting and production to gain insight into the factors which affected audience understanding of the film.

WB-09.2 [A] Science and Technology Innovation Team Engagement with Popular Science: Model and Implementation

Xuan Liu; National Academy of Innovation Strategy, CAST, China
Yan Li; National Academy of Innovation Strategy, China
Hongwei Wang; National Academy of Innovation Strategy, China
Weiyu Yang; National Academy of Innovation Strategy, China

A complete science communication work is a communication chain that involves different subjects of communication. There are differences in the mode and path of different science communication guidance. In this study, case study is used to sort out and analyze the science popularization work carried out by the State Key Laboratories, and to explore their synergistic relationship and transformation paths. The research shows that the current model of scientific research teams participating in science popularization is shifting from task-based passive communication to responsibility-based active communication. Meanwhile, due to the significant differences in the core values, cost structure, collaborative subject and IT application of the scientific research teams, it is possible to adopt the reconstructed science popularization transformation path and the progressive popular science transformation path in the process of transformation. The research results provide a clear model and reference for the government to guide scientific research teams in conducting science popularization works in an orderly manner.

WB-09.3 [R] The Application Prospect Analysis of Technology Based on WeChat Official Accounts

Feifei Wu; Beijing University of Technology, China
Yiming Tong; Beijing University of Technology, China
Lucheng Huang; Beijing University of Technology, China
Hong Miao; Beijing University of Technology, China
Xin Li; Beijing University of Technology, China

Through determining the choice of the social media(WeChat) adhere to the criteria of the WCI, the WeChat Official Accounts which contain professional technical background and knowledge transmission target can be filtered as the research objects in the paper. The purpose of this paper is to finish the topic analysis of the information in the WeChat Official Accounts via the method of text mining, along with the support of regarding the push notifications in the WeChat Official Accounts as the data set.Combined with the judgement of

social cognition based on diverse topics, the conclusion of application prospect analysis of technology will be verified with the trial of the topic model and sentiment analysis. Finally, a case study of application prospect analysis of graphene Technology serves as the role of the empirical research in this paper.

WB-10 Competitiveness
Wednesday, 8/22/2018, 10:30 - 12:00
Room: Milo IV
Chair(s) Charles Weber, Portland State University

WB-10.1 [A] 4th Industrial Revolution and Open Access Network for Smart City

Se-Jin Park; ETRI-UST, Korea, South
Byung Woon Kim; UST / ETRI, Korea, South

The 4th Industrial Revolution is the result of the massive convergence of physical system and telecommunication infrastructure. The open access network for telecommunications policy has become more important than ever due to the appearance of cyber-physical system in the 4th Industrial Revolution. This paper, firstly, will narrow down the meaning of 4th Industrial Revolution into smart city, one of the most representative fields of convergence of physical system and telecommunications in the cities. The second part will analyze the structural reasons for amplifying the importance of an open access network in the telecommunications market due to the rise of the 4th Industrial Revolution. The third part will bring Japanese, UK and Australian cases to prove the relation of open access network policy and smart city, which was discussed in first and second parts, as they adopted open access network as their telecommunication policy to encourage the appearance of new smart city services. This part will reveal how the separation of NTT West and East, BT and Telstra through functional, legal and structural separation has brought the emergence of convergence of non-telecommunication areas with telecommunication system. In conclusion, it will emphasize the role of open access networks in telecommunication for the telecommunication policy maker who is deeply concerned about the accomplishment of the 4th Industrial Revolution.

WB-10.2 [A] Using Game Theory in Libyan Cellular Market

Nader N Beltaif; Portland State University, Libya
Charles Weber; Portland State University, United States

The Libyan cellular market still new, and it is primarily a competition between two major players. Also, there are serious steps inside the Libyan Ministry of Telecommunication to make a real competition inside the market. All those things have motivated the author to write this paper. The author is trying to help the leading players inside the market to know more about the best response that gave them best results. We have applied Game Theory because it is the strategic tool that gives you the best analysis and response when you have a competition between two players. The model that we have used here is Bertrand's model. This model is used when two companies are competing over price. We have noticed from our model analysis and our paper analysis that a price war might happen in this market. Therefore, we came up with recommendations to the regulators to organize the competition. Also, the author lists several recommendations to the operators that help them in case that price war happened in the market.

WB-10.3 [R] Systemic Competitiveness Factors in the Pharma Industry's Productivity and Innovation in Mexico

Enrique Martinez; INEFAM, Mexico
Jose C Ferreyra; INEFAM, Mexico
Jesus Zurita; Autonomous Metropolitan University (UAM), Mexico

The combination of Total Factor Productivity (TFP) and Systemic Competitiveness (SC) and Focus Groups (FG) approaches has demonstrated the existence of a structural change in the pharmaceutical industry (Phl) in Mexico, that explains the fall in the labor productivity, because of several conditions changes along of its activities. Over the last 20 years, there are multiple factors that have impacted in every link of the Phl´s value chain that need to be identified, like the inadequate implementation and practice of regulatory reforms from the public health macro-policies, as well as the lack of industrial meso-policies to promote manufacturing, have induced a significant drop in its generation of gross added value and consequently, an important loss of the Gross Domestic Product (GDP), as the TFP methodology demonstrated. By the use of SC approach, the main factors that determine each of the competitiveness levels were described and how they have impacted the main links of the Phl value chain, such as R&D and production links, with severe consequences in the molecules innovation, manufacturing and employment generation. Based on the FG among several Phl´s executives, it was possible to define the main factors that affected Phl´s value chain, as well as confirm the TFP and SC findings, that must be used for industrial and sanitary policies that promote its economic growth and its contribution to health national system.

WD-01 Innovation Management-7
Wednesday, 8/22/2018, 14:00 - 15:30
Room: Kona Moku Salon A
Chair(s) Ashfaq Ahmed; Purdue University Northwest

WD-01.1 [A] Advanced Innovation Management: Best Practice of German and American Corporations in the Mobility Sector

Rebecca Hirte; Daimler AG , Germany
Philip Roth; RWTH Aachen University, Germany

Many established corporations are currently seeking to adapt their business models and required innovation frameworks in order to compete with digital businesses based on radical innovations and disruptive technologies. This study examines advanced approaches of innovation management that are applicable for a successful transformation of firms' innovation activities. Semi-structured qualitative expert interviews (n=19) have been conducted in Germany and the USA between March and September 2017. Results include the need to build up technology-driven competencies within the corporation instead of mainly relying on external resources. In order to avoid the loss of digital talents, corporations should consider advancing their incentive schemes by including a flexible performance measurement. Further detected findings refer to approaches regarding the funding of innovation projects, cooperation with partners, as well as culture and internal structures required for innovation. Presented recommendations will help corporations to fine-tune their innovation activities by learning from insights into various multinational firms from the mobility sector. Furthermore, this research serves as a basis for further studies that intend to broaden the understanding of modern innovation management in the era of digital transformation.

WD-01.2 [R] How Innovation Strategies Affect the Role of Openness under Knowledge Spillovers?

Zhenyu Jiang; Huazhong University of Science and Technology, China
Zongjun Wang; Huazhong University of Science and Technology, China

The current study testifies to the impact of enterprises' innovation openness on their innovative capacity. Drawing on a dual-process model, it is suggested that enterprises with higher openness hold a stronger innovative capacity, and knowledge spillovers play a mediating role between openness and innovative capacity. We further propose that firms might suffer a decline of innovativeness provided attaching excessive importance to exploitation rather than exploration. In order to examine our predictions, we used investigation data answered by middle or senior managers from 205 emerging enterprises in China, and then performed analyses by means of hierarchical regression. Consistent with the supposed framework, we found that the effects of knowledge spillovers mediated the positive relationship between openness and innovative capacity. In addition, exploitative strategy negatively moderated the direct relationship between knowledge spillover effects and innovative capacity and the indirect relationship between openness and innovative capacity. Finally, the academic and practical implications of these findings as well as future research orientations are discussed.

WD-01.3 [R] A Comparative Study of Regional Quantitative Analysis of

China's Science & Technology Plan Management Reform Policies

Xuanting Ye; Beijing Institute of Technology, China
Junhuan Huo; Beijing Institute of Technology, China
Defang Yang; Beijing Institute of Technology, China
Zhenwei Zhang; Beijing Institute of Technology, China
Jian Zhang; Central University of Finance and Economics, China

With the global scientific and technological revolution increasingly emerging, all major countries in the world are constantly adjusting or improving their strategies and policies for technological innovation. The reform of China's science and technology plan, especially about the reform priorities, has drawn more and more attention from all countries. This paper uses the basic methods of literature research and content analysis combined with expert interviews to identify the policy tools and analyze related policies in the key areas (Central, Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta), and find that on the one hand, the policy at present emphasizes the overall environmental management of science and technology plans; on the other hand, these polices tend to focus on the transformation of government functions in the overall environmental construction.

WD-02 Entrepreneurship/ Intrapreneurship-6
Wednesday, 8/22/2018, 14:00 - 15:30
Room: Kona Moku Salon B
Chair(s) Prescott C Ensign; Wilfrid Laurier University

WD-02.1 [R] Influence of External Funding and Intellectual Property Protection on the Success of Technological Ventures: Case study

Thabiso T Kganyago; University of Pretoria, South Africa
Elma Van der Lingen; University of Pretoria, South Africa

This research builds on recent academic research on external funding and intellectual property protection. The objective of this research is to evaluate the influence of external funding and intellectual property protection on the success of three South African technological ventures. A case study method was used to collect and analyze the data. Aspiring technology entrepreneurs and growing technological companies may use the case study results to their advantage with regard to managing intellectual property protection and obtaining external funding. The pecking order theory for external funding was tested and confirmed. The research cases use patents, trade secrets and trademarks to protect their inventions; intellectual property protection gives them competitive advantage over their rivals. Intellectual property protection, specifically patents, had a positive influence in helping the research cases to secure capital from government programs. It was found that external funding and intellectual property protection positively influence the success of a technological venture.

WD-02.2 [A] Medical Technology Entrepreneurship: The Case Study to Produce Customized Prosthesis

Walter L Mikos; Federal University of Technology of Parana, Brazil
Silvana Weber; Federal University of Technology of Parana, Brazil
Kazuo Hatakeyama; Entrepreneur Consultant Office, Brazil

The objective of this paper is to present strategies and practices adopted by the Federal University of Technology to support technology-based emerging enterprises in the community. It seeks to depict the main differential, as the insertion of emerging enterprises to the infrastructure of research and extension, allowing to aggregate researchers according to regional singularity and field of excellence. The methodology applied was the case study, presenting a set of determined strategies and practices implemented to aid the development of emerging enterprises. The paper presents the results of the development of technology-based enterprises in the medical field, in the stage of pre-incubation, whereby the focus is customized molds to produce prosthesis for cranioplasty applied in the surgery of reconstruction of broken skull caps due to accidents or disease. The complexity faced by the emerging enterprise, considering what the product developed involves, apart from the use of medical technology of tomography, images of patients, to model 3D of prosthesis and construction of mold by additive manufacturing, must comply with legal and medical ethics. It is worth noting that the product has an important social impact, as it is destined for patients attended by public hospitals of the country.

WD-03 New Product Development-3
Wednesday, 8/22/2018, 14:00 - 15:30
Room: Kona Moku Salon C
Chair(s) Antonie Jetter; Portland State University

WD-03.1 [R] Firm's Product Innovation Strategy and Product Sales in Convergent Product Markets

Hyeokseong Lee; KAIST, Korea, South
Wonjoon Kim; KAIST, Korea, South

Although product convergence became the prevailing paradigm, our understanding is limited because of the small number of studies. We examine how a firm's resource base and recombinant capability affect market performance for convergent products using mobile phone market data for the United States. We find that a firm's resource base explains why a firm whose resource base is related to the base product (mobile phone) achieves better market performance for the convergent product (camera phone) than a firm whose resource base is for the additional product (camera). Moreover, recombinant capability - defined as the ability to combine resources and capabilities previously distinct - is a significant factor that enables firms whose performance previously lagged to catch up to that of the leaders in the convergent product market.

WD-03.2 [R] The Concerns of Innovating New Product Development Process in High Tech Companies: Evidence from Taiwan

An-Yu Chen; National Taiwan University, Taiwan
Hang Lee; National Taiwan University, Taiwan

The high-tech companies in Taiwan began to improve and innovate their new product development (NPD) process since the late 1980s. However, it is found that even if companies desire to strategically innovate their NPD process, for some companies, it is difficult to effectively implement it. This paper aims to explore why it is difficult in Taiwan for companies to innovate and implement their NPD processes. We use interview and questionnaire survey method to conduct our research. According to the result from our research, there is no significant difference in company size and R&D team member's educational background regarding how much the R&D team member supports the innovation and improvement of the NPD process. Aside from that, the result implies that the cost of NPD and concerns of multi-tasking in a cross-functional team are the major concerns for rejecting the innovation of NPD process. The study provides implications for R&D team managers to deal with the implementation of innovating the NPD process in terms of the cost in the process and the pressure within team members.

WD-03.3 [R] Innovation on Expired Patent Medicines in the Brazilian Pharmaceutical Industry

Ricardo T Yugue; FEA/USP, Brazil
Antonio Cesar A Maximiano; FEA/USP, Brazil
Roberto Sbragia; University of Sao Paulo, Brazil
Paulo T Nascimento; FEA/USP, Brazil

A representative percentage of the medicines manufactured in Brazil is based on expired patent drugs. As the generic drugs market is becoming more competitive and less profitable, incremental innovation is a strategic alternative to survive long term. Our purpose was to identify factors that influence the investment in innovation on patent-expired medicines (PEM) by pharmaceutical laboratories installed in Brazil. We also aimed to propose a theoretical model that would be helpful to understand the innovation process on PEM, main components, influencing factors and their relationships. Data from the market were collected by interviewing experts and executives from the pharmaceutical companies installed in Brazil. The empirical data were analyzed in respect to the proposed theoretical model. We found that in order to invest in incremental innovations on expired patent drugs, it is necessary to

develop an appropriate business model to market the new product, which is quite different from the former structure used to generic drugs. We also identified that one of the main difficulties is related to the required professional capabilities for producing the innovations. A case of success is presented as an example of investment in incremental innovation on PEM in Brazil.

WD-04 Science & Technology Policy-3
Wednesday, 8/22/2018, 14:00 - 15:30
Room: Waikiki Salon 1
Chair(s) Jili Hu; Jilin University

WD-04.1 [R] Dynamic Patterns of Knowledge Capabilities: A Comparative Analysis among OECD and G20

Keun Hwan Kim; Korea Institute of Science & Tech. Information, Korea, South
We Shim; Busan Institute of S&T Evaluation and Planning, Korea, South
Young-Ho Moon; Korea Institute of Science &Tech. Information, Korea, South
Yoseob Heo; Korea Institute of Science &Tech. Information, Korea, South
Jong Seok Kang; Korea Institute of Science &Tech. Information, Korea, South

This article made a fresh attempt to deduce a consensus on the definition of knowledge per se and valid measurements for it, thereby providing a better understanding of the advanced knowledge-based economy. By reviewing the literature, we identified that the conceptual approach to the phenomenon of technology convergence was identical to that of knowledge evolution. With two dimensions - persistence and diversity - the dynamic patterns of knowledge utilization of OECD and G20 nations are explained during 1991-2015. The results indicate the existence of four knowledge groups characterized by markedly different degrees of development from the technology perspective. The most highly industrialized nations such as the United States, Germany, and Korea have maintained their knowledge utilization capabilities at high levels. On the contrary, developing countries such as Indonesia, Mexico, and Czech Republic have struggled to develop the depth of knowledge. The value of suggested indicators for knowledge utilization capabilities for guiding public policy and cooperative strategy is finally discussed.

WD-04.2 [A] Influencing Factors on Social Acceptance of Autonomous Vehicles and Policy Implications

Jihye Lee; Ewha Womans University, Korea, South
Hyungsik Chang; Samsung Electronics Co., Ltd., Korea, South
Young Il Park; Ewha Womans University, Korea, South

Autonomous vehicles are of profound worldwide interest and automotive and IT industries related to autonomous vehicles have focused on them more intensely to commercialize. Experts predict that autonomous vehicles will bring about widespread changes in our lives, society, economy and culture. However, South Korea is insufficiently prepared for these changes. Another problem is that policies pertaining to autonomous vehicles in South Korea seem to be biased towards suppliers. Therefore, it is necessary to analyze Korean consumers' acceptance of autonomous vehicles. This study aims to examine what factors of autonomous vehicles affect consumers and whether they recognize the differences in levels of autonomous driving technology. The data were collected from 459 South Koreans over 20 years of age. According to the results of multiple regression analysis, general acceptance of autonomous vehicles was affected by usefulness, reliability and legality. PAV (partial autonomous vehicle) acceptance was influenced by safety, anxiety, ease of driving, driver convenience, driving education and driver's carelessness. In contrast, FAV (full autonomous vehicle) acceptance was influenced by safety, user convenience, and extra expenses. These results show that factors directly related to drivers influence PAV acceptance while external environmental factors affect FAV acceptance. This study has some implications for governments and the automobile industry pertaining to autonomous vehicles. Usefulness, reliability, and legality should be considered in order to increase acceptance of autonomous vehicles. Secondly, safety and driver/user convenience are important factors for acceptance of both of PAVs and FAVs. Finally, due to conflicting aspects, the strategies should be different between PAVs and FAVs.

WD-04.3 [R] Contribution to the Modeling of the Urban Space with a View to Its Development Oriented towards a Better Management and a Decongestion of Traffic in Antananarivo

Narizo Mahefa Rahaingoalison; FTM National Institute of Geography and Hydrograph, Madagascar
Pascal Ramanantsizehena; ESPA Ecole Superieure Polytechnique d'Antananarivo, Madagascar

Traffic jam is a main issue for Antananarivo citizens. Modeling this urban space helps both to understand the subject and find out adequate solutions. It is a part and parcel of a research including at least five models. One of them is the vocation-use model; this paper describes its main characteristics. Its confusion matrix is used to check if the actual uses of the various infrastructures match up to their vocations. Results obtained with a typical road section in this city assess the present K Cohen kappa coefficient value to be 0.62.

WD-05 Intellectual Property-4
Wednesday, 8/22/2018, 14:00 - 15:30
Room: Waikiki Salon 2
Chair(s) Jing Hu; China Jiliang University

WD-05.1 [R] Analysis of Technology Convergence in Robotics and Technological Portfolios among Robot-Related Organizations

Toshihiro Kose; The University of Tokyo, Japan
Ichiro Sakata; The University of Tokyo, Japan

Robot technology has played a significant role in the automation of manufacturing industries and the substantial improvement of productivity over the past half century. Robots are composed of various sophisticated technologies related to different fields such as mechanical engineering, control systems, electronics, and computer science. Under these circumstances, technology convergence among these fields could be one of the key factors to drive innovation. The understanding of this innovation is crucial for industries to make decisions whether to focus on technologies as their core competence, or to introduce them by collaborating with others. In addition, it is also critical for researchers, practitioners, and policy makers to assess which policies and measures should be taken. This study aims to analyze the technology convergence in the field of robotics, and to propose an objective methodology to evaluate the differences and characteristics of technological portfolios among major robot-related organizations. This analysis, based on a citation network to patents was made for cases where the scope of the technologies, such as the robot technologies described in this paper, is relatively similar and it is difficult to identify the differences among organizations using only the International Patent Classification (IPC).

WD-05.2 [A] A Study on the Integration Innovation Mode of China Railway High-Speed (CRH) Technology

Ling Feng; Hubei Normal University, China
Xiang Yu; Huazhong University of Science and Technology, China

This paper provides an overview of the development process and innovation mode of CRH. Integration and the use of external technology and knowledge are important factors in the rapid development of CRH. Comparative analysis found that the innovation mode of CRH is considered as integrated innovation. This paper uses SECI model to explain the integration innovation process of CRH. Knowledge flow and management are important in the integration of CRH, and the SECI model can explain the knowledge transformation during the integration innovation well. Based on this model, this paper analyzes integration innovation from four aspects: knowledge socialization, externalization, combination and internalization. In addition, the study found that through the overall coordination and guidance of China's high-speed rail development, the support for high-speed rail infrastructure research and corporate R&D, the government highlighted its important role in the process of China's high-speed rail innovation.

WD-05.3 [R] The Development of New Energy Vehicles Industry in China: Opportunity and Competition

Ziyang Huang; Huazhong University of Science and Technology, China
Xiang Yu; Huazhong University of Science and Technology, China

Developing a new energy vehicles industry, an effective way to deal with environmental pollution and the energy crisis and to achieve the sustainable development of technology and economy, has been highly valued by all governments. As an important combination of new energy industry and vehicles industry, its development not only represents the direction and inevitable trend of the global vehicles industry, but also an important means for China to realize energy savings and emissions reduction, industrial upgrading and supply-side reform. This paper firstly analyzes the development environment of China's vehicles industry based on the PEST theory. Then, it uses patent search information to analyze the global competitive landscape and China's position in the new energy vehicles industry. Finally, this paper concludes that China needs to increase investment in tackling problems in key technologies and encourage cooperation, restructurings and mergers between enterprises to strengthen the competitiveness of the new energy vehicles industry.

WD-06 R&D Management-3
Wednesday, 8/22/2018, 14:00 - 15:30
Room: Waikiki Salon 3
Chair(s) Brent Dixon; Idaho National Laboratory

WD-06.1 [A] Code Release Model for Technology Transfer on R&D Projects of SW Development

Jeong-Hyun Park; ETRI, Korea, South

This paper describes development technology verification and code release model that verifies and manages development technology and code in SW development R&D project. The proposed technology validation and code release model includes preparation and review of documented test cases according to the requirements at the requirement definition stage, utilization of the prepared test cases at the design and implementation stages by the developer, update of the test cases, static analysis of code, open source licensing verification methods and procedures, as well as demo and static analysis and verification of open source licensing additions to confirm development technology by quality agents prior to transferring the development technology to the enterprise after technology development. After validating the development technology and applying the code release model, the developers responded that the improvement in the development technique and the completion of the source code is more than 10% ~ 30%.

WD-06.2 [R] Creating an Evaluation Model of Services Innovation Factors of the Knowledge Hub: Using Hsinchu Science Park and Silicon Valley Case Studies

James K Chen; Asia University, Taiwan
Algane Jong; Jinan University, China

The result shows that innovation performance is the most important domain factor for service innovation of a knowledge hub (KH) by AHP and FAHP methods. Consequently, KH becomes a cost-effective and intermediary platform for academicians and entrepreneurs in implementation of a service innovation system. The new science park on adopting and implementing service innovation is focused on absorptive capacity and the learning environment to maintain regional development in the long-term. The main contribution of this research is an empirical investigation of key factors of service innovation of KH and comparing the differences between Silicon Valley of the United states and Hsinchu Science Park of Taiwan.

WD-06.3 [R] Study of Allocative Efficiency of Scientific and Technological Resources in Mega Cities of China

Ru Ma; National Academy of Innovation Strategy, China
Hongwei Wang; National Academy of Innovation Strategy, China

This paper employs data envelopment analysis (DEA) to study the development of allocative efficiency of scientific and technological resources in Chinese mega cities from 2011 to 2015. The result shows Shenzhen and Chongqing achieved the DEA-efficiency of using scientific and technological resource over the research time; Beijing and Guangzhou continuously improved their allocative efficiency and reached the production frontier at the later stage of research time. On the other side, Shanghai failed to realize the DEA-efficiency because of the excessive concentration of R&D expense and R&D labor; Tianjin suffered from relatively low allocative efficiency due to the redundancy of R&D personnel and the shortage of knowledge output. This paper mainly contributes to systematically investigating the allocative efficiency of scientific and technological resources in a specific city, instead of country, region, or province as before; and greatly increasing the practical significance of study by emphasizing the significance of each mega city in constructing China's national innovation system in empirical analysis.

WD-09 Science and Technology Communication-2
Wednesday, 8/22/2018, 14:00 - 15:30
Room: Milo III
Chair(s) Xuan Liu; China Research Inst. for Science Popularization

WD-09.1 [R] Research on the Improvement of Citizen's Scientific Literacy and Its Contribution to Economic Growth in Mainland China

Li He; China Research Inst. for Science Popularization, China

Based on the human capital theory and the related data from 1999 to 2015 in mainland China, this paper uses the TFP model to analyze the relationship between the improvement of citizen's scientific literacy and economic growth. The analysis shows that the contribution of capital investment to economic growth is the main factor. There is evidenced a significant positive effect of citizen's scientific literacy on the nation's economic growth along with the significant effect of the improvement of the people's physical health on economic growth. The article also analyzes the impact of economic growth from the four aspects of the composition of scientific literacy: scientific knowledge, scientific method, scientific attitude and the relationship between science and society. The four aspects of the formation of scientific quality have significant and different effects on economic growth.

WD-09.2 [R] Research on Assessment Index System for Science Communication Industry Development in China

Guangbin Liu; Beijing Institute of Petro-Chemical Technology, China
Fujun Ren; China Association for Science and Technology, China

Based on the industrial development theory and by reference to assessment index system frame of cultural industry, the assessment index system for science communication industry development is established concerning both statistical system and characteristics of science communication industry via a combination of qualitative and quantitative analysis. According to the latest statistical data of China science communication industry, correlation test is conducted for the assessment index. Then indicator screening is conducted by Delphi and statistical methods, and the indicators with strong correlation are deleted to improve the entire index system. The final index system includes four basic dimensions of indexes, i.e. industry scale, industrial resources, industrial growth capability and industrial development potential, and each dimension also includes several sub-indicators. The science communication industry scale dimension shows the current development status of this industry, the science communication industry resources represent the supports and motivation of the industry development, the industrial growth capability mainly comes from financial status of the industry, and the industrial development potential shows its development trend. By the end, more detailed explanation is given on the meaning and calculation method of all level indexes.

WD-09.3 [R] Investigation Report of Science Popularization Capability in

Enterprise in Mainland China

Li He; China Research Inst. for Science Popularization, China

In order to understand the current situation of science popularization's capability in enterprises and determine the impact of different factors on the science popularization's capability in enterprises, a research group in 2016 conducted interviews and questionnaires regarding the current state of science popularization capability. A total of 177 valid questionnaires were returned from different types of enterprises in Shanxi, Guangdong, Tianjin and Sichuan Provinces. The survey included the status of professionals and associations in enterprises, the status of enterprises, their science popularization facilities and their use status, corporate science popularization activities and the size of the audience. In addition, the survey included the relationship between the enterprises and science popularization along with the carrying out of science popularization activities. The investment expenditure for science popularization, its existing problems and causes, and through the data analysis, we can understand the capability building of science popularization in the enterprises. The problems and difficulties are found by investigation and the paper also put forward countermeasures and suggestions for enterprise science popularization capability.

WE-01 Innovation Management-8

Wednesday, 8/22/2018, 16:00 - 17:30
Room: Kona Moku Salon A
Chair(s) Mitsuteru Mutsuda; Hitotsubashi University

WE-01.1 [A] A Model Template Green Environment Initiative for Recycling Plastic Bottles with Progressive Entrepreneurship Partnership

Vu Duong; Duy Tan University, Vietnam
Ashfaq Ahmed; Purdue University Northwest, United States
Omer Farook; Purdue University Northwest, United States

Plastic has been widely adopted by the global industry as the most common and adaptable material for marketing their products. Current levels of plastic usage and disposal are one of the biggest environmental challenges that we have to deal with. Collecting and recycling plastic is one of the most important actions currently used to meet this challenge, but it represents one of the most demanding areas in the plastics industry today. A major percentage of recycled plastic produced each year is used to manufacture disposable packaging items or other short-lived items that are discarded within a year or so. This clearly means that our current use of plastics is not sustainable. In addition, because of the durability of the polymers involved, large amounts of discarded end-of-life plastics are accumulating as debris in landfills and in natural habitats worldwide. An energy efficient plastic recycling process involves a complex system of machines and new manufacturing practices. This paper discusses a promising environmental friendly solution for reducing pollution by recycling plastic bottles. The process of recovering waste plastic and reprocessing it into useful products would be implemented in three stages: a) Set up and organize a system for collecting plastics used for water and soda bottles. b) Design and manufacture production line for automatically processing plastic bottles to make plastic ribbon/wire of various sizes. c) Use the plastic ribbon/wire to manufacture prototypes of useful artifacts and products like tables, chairs, roofing material, decorations, etc. The project has both economic and social value. On the economical side, this will save money by minimizing all expenditure for waste processing related to destroying the plastic waste; the second important contribution of the project is the significant impact on employment creation, especially in rural areas; lastly, the recycled plastic is used to make new plastic products with reasonable prices for low-income families. On the social side, this will improve environmental conditions for life, reduce landfill waste, prevent disease-spreading due to recycling plastic, eliminate contamination from burning and melting plastic material, and increase public awareness of environmental protection for the benefit of humanity. A prototype of the project designed and manufactured in Duy Tan University, Vietnam, for cutting bottles into ribbon/wire and connecting them continuously is complete. We will present a pilot test result of our approach to use the plastic ribbon/wire to make new and useful products. A progressive sustainable economic model of Entrepreneurship Partnership is presented for the developing economies.

WE-01.2 [R] The Technological Innovation Efficiency of China's High-Speed Rail Enterprises Based on DEA Approach

Xi Yang; Huazhong University of Science and Technology, China
Xiang Yu; Huazhong University of Science and Technology, China

Enterprise is the main body of technological innovation. In recent years, China's enterprises attach great importance to scientific and technological innovation. By using the data envelopment analysis (DEA) and DEA-Malmquist index analysis approach, this paper conducts an empirical study to evaluate technological innovation efficiency of five of China's high-speed rail enterprises from 2012 to 2016 and confirm the main factors which influence the technological innovation of China's high-speed rail enterprises. The R&D expenditure and the R&D personnel were used as input variables, while patents, national scientific and technological awards and sales were used as output variables. Results imply that the overall trend of technological innovation efficiency for China's high-speed rail enterprises is good; technical change is the main factor that influences the technological innovation efficiency; due to the high technical change, CRRC Corporation Limited (CRRC) and China State Construction Engineering Corporation (CSCEC) recorded the higher average total factor productivity change than other enterprises. Finally, combining with the results of the empirical study, this paper puts forward the corresponding countermeasures of improving high-speed rail enterprises' technological innovation efficiency.

WE-01.3 [R] Strategic Foresight and Policy Interpretation of Mass Entrepreneurship and Innovation(MEI) in China

Li Zhang; National Academy of Innovation Strategy, CAST, China
Yu Zhao; National Academy of Innovation Strategy, CAST, China
Zhou Daya; National Academy of Innovation Strategy, CAST, China

China's development has entered a new normal, which is a critical transformable age from old developing energy to a new one. We should take mass entrepreneurship and innovation (MEI) as a structural reform to stimulate the creativity of the whole society and build a new engine of development. Up to date, the State Council of China has published nearly 30 policy papers to promote China MEI since 2014. To understand policy effectiveness, the State Council entrusted China Association for Science and Technology (CAST) to do the third-party evaluation on the MEI implementation in July 2015. This evaluation was mainly focused on policy tools. We chose several perspectives to evaluate the implementation situation and outcomes of MEI, including the entrepreneurial platforms, financing channels and entrepreneurial groups (university students, scientific and technical workers, returning migrant workers, returnees, etc.). The method we use is includes 20,000 questionnaires sent to the university students and S&T workers, big data mining with companies such as Baidu and Ali research, field interview and investigation in 20 provinces, second-hand information collected from Ministries. This paper will show the evaluation results of 2015 MEI and 2016 MEI and will give suggestions for further development of MEI.

WE-02 Entrepreneurship/ Intrapreneurship-7

Wednesday, 8/22/2018, 16:00 - 17:30
Room: Kona Moku Salon B
Chair(s) Bala Mulloth; University of Virginia

WE-02.1 [R] Grassroots Opportunities for Innovation, Technology, and Entrepreneurship: Makerspaces in Non-Urban Communities

Prescott C Ensign; Wilfrid Laurier University, Canada
Philipp Leupold; Technische Hochschule Nurnberg, Germany

A revolution has been underway in creating, innovating, and making things. The development of makerspaces is a 21st century development that is taking place - particularly in large urban locations - throughout the world. More recently, smaller/non-urban communities have witnessed the development of makerspaces as grassroots opportunities for innovation,

technology and entrepreneurship. Makerspaces are viewed as setting the stage for economic growth and creative capital development for decades to come. To date, most research has focused on makerspaces in urban settings. This exploratory study extends our knowledge of makerspaces located in small-medium sized/non-urban communities. We found the seeds of true "grassroots" innovation, technology and entrepreneurship are being initiated in the context of small to medium sized and rural communities in the Province of Ontario Canada. The study addresses four questions. (1) Where are non-urban makerspaces located geographically? (2) What types of maker platforms are used? (3) What are the organizational and structural characteristics of these makerspaces? (4) Are these grassroots makerspaces a reflection of a local community's entrepreneurial ecosystem? It provides data to stimulate further discussion on research and policy issues relative to development of non-urban makerspaces.

WE-02.2 [A] Management of Deep Technology Startups in Japan

Takashi Iwamoto; Keio University, Japan

Industrial structure reform is necessary in Japan since most mass production-based businesses were moved to the other Asian countries such as Korea, Taiwan, China and Southeast Asia, and growth of deep technology startups is very important for the industrial structure reform. The number of deep technology startups growing successfully is still small in Japan, but some success cases started to appear. In this research, most successful cases were studied and the key points of management of deep technology startups in Japan were extracted. It was extracted in this research that not only good deep technologies but also the existence of business management for deep technologies was important for success. Also, branding is important especially in Japan because Japanese people place value on trust much more than people in the other countries and it is important that deep technology startups get big companies, which most people in Japan trust, as customers.

WE-02.3 [R] Information & Communication Technology (ICT) Can Change the Way of Women Entrepreneurs Run Their Businesses: A Case Study in Bangladesh

Muhammad H Bhuyan; Tongji University Shanghai China, China
Demian Chen; Tongji University Shanghai China, China

The objective of this study is to point out the ICT factors and constraints in women entrepreneurs'-owned small and medium enterprises (SMEs) in Bangladesh. The main focus of this study is to find out the importance of involving ICT (information and communication technology) management for a successful SME operation. The main object of this paper is to investigate and analyze how ICT's can benefit women entrepreneurs to keep a running improvement in women empowerment in Bangladesh. The article also focuses on existing collaboration between the women entrepreneurs and ICT's in Bangladesh. Bangladesh is a developing country, and for a developing country the role of entrepreneurship is very imperative. Almost half of the population in Bangladesh is women. There is a concept in our country that women are good at housework. But in this era, they are proving it wrong, and they are contributing to local GDP more and more. But as a developing country, the rate of literate women is very low. However, nowadays women are conscious about their rights. Entrepreneurship creates a unique opportunity to make women self-independent. Now women in Bangladesh create their own ventures. For example, they are operating boutique shops, food shops, restaurants, etc. Entrepreneurship is changing their lives and boosting the empowerment of women. But this is the age of globalization, and one of the most essential tools of globalization is ICT. ICT gives a tremendous opportunity for women to build and contribute to a strong economic fundamental.

WE-03 New Product Development-4
Wednesday, 8/22/2018, 16:00 - 17:30
Room: Kona Moku Salon C
Chair(s) Matti A Sommarberg; Tampere University of Technology

WE-03.1 [R] Conceptual Design of an Adsorption Refrigeration System: Conceptual Design as Core of the Innovation Cell

Jose C Alvarez Merino; Universidad Peruana de Ciencias Aplicadas, Peru
Kazuo Hatakeyama; UNISOCIESC, Brazil

Research university groups that interact with other similar groups require support with prototypes and laboratory hardware to apply acquired knowledge, as well as to generate new knowledge since the research was performed. Particularly, this happens in the theme of refrigeration by absorption/adsorption that had interrupted its technological trajectory in Peru. So, with the conceptual design and the prototype of refrigeration by adsorption to perform tests and research, the researchers will become more available to develop joint works and to participate in international networks of research. For this, we will perform the conceptual design of adsorption refrigeration system - that utilizes the solar energy and the recovery of heat as a source energy - based in our model that considers the conceptual design as the core of the innovation cell, and it integrates the proposals of Porter & Newman, Tay & Gu, and Altshuller. Results of this work open the possibility, to the research group, to perform joint projects and to grow in the theme.

WE-03.2 [R] The Effects of Product Line Length on Firm Performance

Johanna Kirjavainen; Tampere University of Technology, Finland
Saku J Makinen; Tampere University of Technology, Finland
Matti Sommarberg; Tampere University of Technology, Finland

What products to offer represents one of the most important strategic choices a firm has to make in order to survive in competitive environments. Decisions about the length and breadth of a firm's product line are difficult but vital to its success. Despite this, the performance effects of product line length are a topic of continuing discussion in academia. There are also multiple ways to define both product line length and breadth, further hindering the analysis and comparison of the results. This study defines both product line length and breadth and distinguishes them as separate dimensions of a firm's product portfolio. Additionally, the relationship between product line length and firm performance is analyzed through customer evaluations. The study is set in the digital camera industry, focusing on the new product introductions into the compact product category during 2000 - 2014. Our results offer indication that there exists an inverted U-shaped relationship between product line length and firm performance.

WE-03.3 [R] Convolution or Transformation?: The Integration of GNSS Signals and WSNs

Oludare Olorunniwo; Obafemi Awolowo University, Nigeria

Signal tracking in a challenged environment such as deep indoor or urban canyon, where standard positioning signals fail, has inspired a variety of augmentation systems. WSN technology has improved position accuracy, especially where GNSS signals have become noisy or unreliable. However, the compatibility and interoperability of GNSS signals with standard sensor fusion is an evolution that is ongoing. This paper presents the social, technical, engineering, environmental, and political (STEEP) perspective on integrated GNSS signals in conjunction with the spectral requirements and performance metrics necessary. The observed model suggests that optimal descriptors are pivotal to the integration of WSNs and navigational signals.

WE-03.4 [R] Factors Influencing Interaction of Creative Teams in Generation of Ideas of New Products: An Approach from Collaborative Scripts

Jose J Aguilar; National University of Colombia, Colombia
Manuel J Trujillo; National University of Colombia, Colombia

The effective generation of new ideas with collaborative teams in the early stages of new product development is one of the most difficult challenges facing the management of product innovation. The systematic nature of the interaction processes in collaborative teams based on specific productive context has not been sufficiently addressed. This study

proposes a systematic process of product development that allows, through a script of early stage of product development, improving the effectiveness of collaborative teams. The proposal is based on ill-structured problem-solving models, the perspective of resources and capabilities based on literature of management, and the approaches from the design of co-creation and collaborative learning. The proposed script was evaluated through an experiment design with four product development teams. The proposal goal has three contributions: first, in relation to the improvement of the novelty of the product; second, in relation to the decrease of uncertainty in the introduction of the product to the market; and third, encouraging standardized work practices that adhere to a consistent set of procedures that can be successful. The study showed that this work with collaborative teams based on collaboration scripts leads to improved results in relation to the novelty of the ideas generated in the design process and in its feasibility in productive contexts.

WE-04 Emerging Technologies-2
Wednesday, 8/22/2018, 16:00 - 17:30
Room: Waikiki Salon 1
Chair(s) Gary Langford; Portland State University

WE-04.1 [R] Novel Approach To Managing Technological Entrepreneurship Using A Model-Based Systems Approach To Develop Low Cost Earth Orbiting Satellites

Gary Langford; Portland State University, United States
Jeff Carpenter; Portland State University, United States
Ian Watkins; Portland State University, United States
Brock Marsh; Portland State University, United States
Luke Beaulieu; Portland State University, United States

The ability to send low-cost satellites into space has changed the satellite industry and vastly opened up the use of satellites to transform data into information for individuals, organizations, commercial companies, and governments. This information can be corroborated with other sources of data to evaluate the availability of precious resources, e.g., potable water, agriculture; to forecast upcoming famines or diseases; and to perform mapping, communications, and competitive analyses. The cost of owning a satellite is less than $100,000 (using commercial parts) to $1,000 (built by school kids). Launch costs are tens of thousands of dollars, which can be eliminated through subsidies. Compare these costs to $200 million to $1 billion costs for similar functionality, higher performance and greater durability - an interesting trade space that favors multiple low-cost flights versus significantly higher costs for permanent satellites for an increasing number of applications. The challenge is to form and manage a development team of unskilled professionals, high school students, or university students to meet deadlines and flight standards. These team members are likely highly motivated and unskilled. This paper describes the technical management strategy and techniques used to develop the 10 cm, 6-sided CubeSats.

WE-04.2 [R] The Development of Carbon Capture and Storage in China: Progress, Challenge and Collaboration

Conghui Yin; Shanghai Maritime University, China
Ziyang Huang; Huazhong University of Science and Technology, China

With huge technical potential, carbon capture and storage (CCS) technology has received high attention by countries around world as an important means to tackle climate change. China is facing severe pressure of carbon dioxide mitigation and has been devoted to developing CCS technologies. This study explores the global CCS competitive landscape and China's position by patent analysis, and it also investigates the development environment in China for developing CCS from political, economic, social and technological perspectives by using a method of PEST analysis. The result shows China has made some progress in recent years but also faces difficult challenges. The study examines the collaboration network in Chinese CCS industry and analyzes the features, actors and groups in the network by adopting the method of social network analysis. It is found that there are few and weak cooperative relations within China. The study also analyzes the potential R&D collaboration opportunities between China's major CCS organizations and international technology-leading CCS enterprises through the construction of technical relevance networks. The analysis results of collaboration network and technical relevance network can provide references for the development of CCS technology innovation and the promotion of international CCS knowledge exchange. At last, three suggestions are proposed for promoting the development of CCS technology in China.

WE-04.3 [R] The Evolution of China's LED Industry from the View of Disruptive Technology Innovation

Xuanting Ye; Beijing Institute of Technology, China
Defang Yang; Beijing Institute of Technology, China
Jian Zhang; Central University of Finance and Economics, China
Yun Liu; University of Chinese Academy of Sciences, China
Jingru Yin; Beijing Institute of Technology, China

The unique technical principals and superior technical performance make LED lighting achieve the disruption of traditional lighting. This paper conducts an analytical framework of "technology-market-policy" to reveal the internal mechanism and key driving factors of LED as a disruptive technology, from the sprout of science and technology to become a new generation of lighting technology replacing the traditional lighting. Studying the growth path of China's LED industry and excavating the influencing factors and important impetus in its growth process enable us to recognize the characteristics and incentives of emerging industries based on disruptive technology innovation.

WE-05 Intellectual Property-5
Wednesday, 8/22/2018, 16:00 - 17:30
Room: Waikiki Salon 2
Chair(s) Li Gu, Dalian University of Technology, China

WE-05.1 [R] The Patent Portfolios Value Evaluation Based on the TOPSIS-Entropy Method

Weiling Song; Huazhong University of Science and Technology, China
Xiaodong Yuan; Huazhong University of Science and Technology, China

How to evaluate the value of patent portfolios in a competitive market has attracted increasing attention. At present, most existing methods have to determine the weightings of multiple indicators based on expert judgements in the process of patent value evaluation. In this paper, we propose a new approach to value firms' patent portfolios by combining Entropy and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), which can be called the TOPSIS-Entropy method. The weights of multiple indicators can be determined by using Entropy, while the ranking of patent portfolios value is calculated by TOPSIS. A case of applying the TOPSIS-Entropy method is given in the paper. The TOPSIS-Entropy method is proved reasonable and suitable for patent portfolios value evaluation.

WE-05.2 [R] A Study on Establishment of the Patent Application Quality Evaluation Index System

Li Gu; Dalian University of Technology, China
Xue Han; Dalian University of Technology, China
Weichun Yan; Dalian Medical University, China
Chen Hong; Dalian University of Technology, China

With the implementation of the national intellectual property strategy, the State Intellectual Property Office of the P.R.C., in "Several Opinions on Further Enhancing the Patent Application Quality", has clearly indicated that the amount of intellectual property creation and the quality of intellectual property should be coordinated and developed. Leading creators of intellectual property should shift their attention from the quantity of the intellectual property they produce to the quality of that intellectual property. The quality of patent applications plays an important role in patent quality evaluation and innovation. Therefore, it is important to further improve the quality of patent applications to ensure the efficient operation of the patent system. This research will start from the connotation of patent application quality, with insight from domestic and foreign scholars on the quality index of patent applications. Then

this research will develop a system of patent application quality evaluation index that aims to provide policy bases and decision-making references for the appropriate evaluation of patent application quality.

WE-05.3 [R] Analysis of the Influencing Mechanism of Patent Alliance Upon the Innovation: From Network Effects Perspective

Jing Hu; China Jiliang University, China
Lijun Zhou; China Jiliang University, China
Yueyi Zhang; China Jiliang University, China

In the context of technical standards highly introducing the technical patents, by obtaining the ownership of patents of technical standards, enterprises influence the expectations of consumers, dominate the leading advantages at the market, improve the entry threshold of technical market and thus get enormous business interests. However, the close connection between technical standards and patents forces the increasing emergence of the "patent thicket" problem, which not only prohibits the promotion of standards and the commercialization of new technologies, but also slows down the innovation motivations of enterprises. As an important tool to promote the technical standards for the enterprises, the patent alliance can reduce the transaction costs and lawsuit disputes as well as accelerate the promotion and application of proprietary technologies. Meanwhile, taking advantage of the network effects of technical standards, the patent alliance can enlarge the installed base, influence consumers' expectations and reinforce the positive feedback mechanism of technical standards, thus making itself one of the effective paths to resolve the problem of patent thicket and promote the innovation. On the basis of theories regarding the network effects of technical standards, this paper proposes the meanings of network effects for the technical standards and constructs the concept model through which the patent alliance influences the innovation. The questionnaire investigation was conducted, and the analysis was done by the structural equation so as to clarify the factors affecting the innovation of patent tool as well as its acting paths.

WE-06 R&D Management-4
Wednesday, 8/22/2018, 16:00 - 17:30
Room: Waikiki Salon 3
Chair(s) James K Chen; Asia University

WE-06.1 [A] Net Present Value-Based Analyses of Products in Development by Pharmaceutical and Biotech Firms

Shino Kondoh; Kyoto University, Japan
Reiko Onodera; Tokyo Institute of Technology, Japan
Mitsuya Sakurai; Kyoto University, Japan
Atsushi Seki; UBS AG, Japan
Shintaro Sengoku; Tokyo Institute of Technology, Japan

The productivity of pharmaceutical research and development (R&D) has steadily declined over the past 10 years. The value-based evaluation approach is expected to lead to a better understanding of the value structure of pharmaceutical products compared to the current volume-based one by identifying key drivers for improving R&D productivity. In the present study, we conducted a comparative analysis based on a conventional valuation methodology across the nationality and business model of pharmaceutical firms using a value-based database. We selected five major pharmaceutical firms in terms of corporate value from Japan, the U.S., and Europe, as well as three biotech firms. We chose five representative pipeline products from each of these firms. Comparative analyses using net present value or NPV, peak sales, and lifespan that is represented as the ratio of total sales to peak sales revealed significant differences based on firm types and the origin of products (in-house or external), which have not been observed in the conventional volume-based approach. Thus, the findings provide additional implications for pharmaceutical value-formation processes and mechanisms. The present study advocates a segmented analysis of the activities of individual firms and emphasises the utility of value-based management for improving R&D productivity.

WE-06.2 [A] Technology and System Readiness Assessment for a Nuclear Energy R&D Program

Brent Dixon; Idaho National Laboratory, United States
Michael Todosow; Brookhaven National Laboratory, United States
Gretchen Matthern; Idaho National Laboratory, United States
Roald Wigeland; Idaho National Laboratory, United States

This paper discusses modification of the U.S. Department of Energy's (DOE) Technology Readiness Assessment Guide (DOE G 413.3-4A) for use in the Office of Nuclear Energy's Nuclear Technology Research and Development (NTRD) program. DOE 413.3-4A describes an approach for identifying and managing technology risks in large construction projects to ensure technology development is part of the project baseline and technology maturity is sufficiently advanced before including a technology in the facility design. The process includes the identification of critical technology elements (CTEs), followed by in-depth evaluation of technology readiness levels (TRLs) and development of technology maturation plans (TMPs) for those CTEs. This approach was augmented for the NTRD program to include system readiness levels (SRLs) as a complement to TRLs, and developing perspective tracks to better organize the TRL/SRL evaluations that determine the level of knowledge/maturation of the CTEs (e.g., experiments & modeling, safety & hazards, manufacturing, etc.). The augmented approach was tested on two areas of research in 2017 (metallic nuclear fuels and fuel dissolution for recycling) and is now being applied to a complete advanced nuclear fuel cycle (from uranium mining to waste disposal).

WE-06.3 [R] Knowledge Spillover among Semiconductor Foundries

Chun-Chieh Wang; National Taiwan University, Taiwan
Mu-Hsuan Huang; National Taiwan University, Taiwan

Constant innovation has become an important survival rule for companies in the knowledge economy. How to capture the external knowledge (the knowledge spillover) and how to internalize external knowledge from the knowledge flow (the technology convergence) have become important issues. A case analysis of knowledge spillover and technology convergence was conducted, and it focuses on the top IC foundries including AMD, Chartered Semiconductor, Samsung Electronics, TSMC, and UMC. In this study, the analysis is distinguished by wafer size into three periods: the six-inch (1976-1991), eight-inch (1989-1999), and twelve-inch wafer (1997-2011). Patentometrics and social network analysis (SNA) methods are adopted, and the R&D cooperation and patent citations among foundries are used to represent the strong ties and weak ties of knowledge spillover. The strength and range of technology convergence can be measured based on the co-occurrence of patent classes between foundries. The results of this study revealed that there are similar knowledge spillover patterns among the major IC foundries; however, there were considerable differences in terms of technology convergence. The comparison between the knowledge spillover and technology convergence of these foundries can help technology managers predict the emergence of new technology and assist in the planning of R&D strategies.

WE-08 Strategic Management of Technology-2
Wednesday, 8/22/2018, 16:00 - 17:30
Room: Milo II
Chair(s) Charles Weber, Portland State University

WE-08.1 [R] IT Governance Effectiveness and Its Influence on Innovation Product and Process

Sergio M Borja; Seoul National University, Korea, South
Keungoui Kim; Seoul National University, Korea, South
Hyenyoung Yoon; Seoul National University, Korea, South
Junseok Hwang; Seoul National University, Korea, South

Information technology (IT) and innovation are topics that receive the attention among academics. However, the increasing and pervasive dependence on IT from organizations has raised a lot of concerns on the topic of IT governance (ITG). ITG and innovation have not had the attention among academics. This study aims to examine the relationship among effective

ITG, ITG relevant knowledge and how they influence an innovation product and process. This study uses structural equation modeling (SEM) to evaluate 215 valid surveys that were collected from members of the respective local chapters located in Bogota, Colombia, of the following institutions: Information Systems Audit and Control Association (ISACA) and Project Management Institute (PMI). In addition, members of the Colombian Computer Science Engineers Association (ACIS) also participate in answering our survey instrument. Our study found that ITG has positive and significant influence on innovation product and process. ITG relevant knowledge influences positively ITG, especially when ITG experience is high; however, when the ITG experience is low, its effect is perceived as negative on innovation product and process.

WE-08.2 [R] Nokia Phones: From a Total Success to a Total Fiasco

Ahmed A Alibage; Portland State University, United States
Charles Weber; Portland State University , United States

This research intensively reviews and analyzes the strategic management of technology at Nokia Corporation. Using traditional narrative literature review and secondary sources, we reviewed and analyzed the historical transformation of Nokia's core business, leadership strategies, business architecture, R&D policy, innovation strategy, product lunch, and smartphones recognition and demonstration. We identified various strategic gaps that the previous analytical studies seemingly have failed to identify and generalize. Therefore, we add to the literature a bundle of the lessons learned that chronologically explain how Nokia failed to create and sustain competitive advantages, particularly in the smartphone market. We concluded that the problem at Nokia was not the lack of innovation, but rather, it was the lack of a precise technology forecasting, and misunderstanding that the needs in the smartphone market were not just about demonstrating a mobile phone that makes calls, texts and connects to the web, but also the platform that operates all these functions together. Since Nokia's brand name is recently back in the market through a newly licensed firm (HMD Global), we further discuss how likely Nokia's new smartphones will possibly compete and plausibly succeed in a very well-established market.

WE-08.3 [R] Business Intelligence and Data Analytics as a Driver of Dynamic Capability Strategic Approach

Maoloud Y Dabab; Portland State University, United States
Charles Weber; Portland State University, United States

Papers addressing the dynamic capability (DC) approach either support it as the best strategy or express its defects and impediments to implementation. However, this paper aims to promote the DC through the means of digital transformation from the angle of business intelligence and data analytics (BIDA). This article employs the logic of matching the essential components of the DC and BIDA to verify the extent of their conformity. A literature review methodology has been adopted since there are a considerable number of publications that focus on DC and BIDA. This paper posits that the main components of DC are sensing and exploring changes, seizing opportunities, and managing reconfiguration and transformation. Whereas, the features of knowledge discovery, decision support, predicting changes and risks are related to the BIDA. Additionally, this study found that the BIDA has a significant positive effect on the DC and helps to achieve a competitive advantage. By drawing the connection and demonstrating the impact of the essential elements of DC and BIDA, this article shows the vital framework of how the BIDA supports the DC. Finally, some limitations and gaps that provide suggestions for future research in this area are discussed.

WE-09 Enterprise Management-2

Wednesday, 8/22/2018, 16:00 - 17:30
Room: Milo III
Chair(s) Oliver Yu; San Jose State University

WE-09.1 [A] Feasibility Study on Establishing Human Resource Development Infrastructure for Developing Countries: The Case for Ghana's Power Company

Johng-Ihl Lee; SUNY Korea, Korea, South
Mun-Su Park; SUNY Korea, Korea, South
Sang Hwa Kwun; SUNY Korea, Korea, South
Soonwoo Chang; SUNY Korea, Korea, South

This paper summarizes a feasibility study on the Human Resource Development (HRD) infrastructure plan establishment in a transmission system sector for Ghana (the project hereinafter), which was designed to promote technical engineering capacity building in the electricity sector. Based on the analysis of the general status of the economic, political, and energy factors, the paper aims to explore a suitable HRD system of transmission in Ghana. The conclusive remark of the paper is that developing a training center is suggested, as a result of the operational and managerial examinations on the status of the public electricity supply company.

WE-09.2 [R] Mapping Critical Factors Affecting the Dynamics of Biotechnology Companies' Aggregate Value

Cristiano G Pereira; University of Sao Paulo, Brazil
Joao R Lavoie; Portland State University , United States
Amir Shaygan; Portland State University, United States
Maria Angelica O Luqueze; University of Sao Paulo, Brazil
Geciane S Porto; University of Sao Paulo, Brazil

Recently, biotech companies are increasingly attracting the attention from investors. Since last year, from the top-ten performers in the NASDAQ-100 (index consisting of the 100 largest non-financial companies listed on Nasdaq) six were biotech. However, the reasons behind these companies' success or the actions that lead them to be successful are still ambiguous. This paper intends to give insights on what are the critical success factors in the biotech industry by analyzing financial and market data from the 10 companies in Nasdaq-100 that are biotech. We analyzed the enterprise value (EV) of companies from 2002 to 2016 to identify fluctuations, which can be associated with key indicators such as R&D expenditure, corporate deals, patent portfolio, pipeline, and several additional indicators. Our results show an overall analysis of the main critical success factors and strategic actions, in a temporal manner, which the top valued biotech firms fall into. The factors of highest importance included constant and high investment on R&D, intense transaction related to mergers and acquisitions for big biotech companies, and a favorable regulatory environment for drug approvals. Some other relevant factors involve the company's focus and a proper management of its innovations. The study gives an overview of the consolidated critical factors among US biotech companies indicating what the biopharmaceutical is dependent on to steer them to failure or success.

WE-09.3 [A] Developing an Innovative Organizational Culture: A People-Centered and Value-Focused Approach with Case Studies

Oliver Yu; San Jose State University, United States

As culture encompasses the values and behaviors of an organization, developing an innovative culture is essential for promoting and sustaining creativity and innovation in an organization. Combining a new model on human values with the case study results of two leading innovative organizations, 3M and SRI International, this paper presents a people-centered and value-focused approach for developing an innovative organizational culture. The approach consists of three key elements: organization values and alignment, team motivation and development, and innovation selection and commitment. The paper discusses these key elements in detail and demonstrates their practical implementations at the two case-study organizations.

WE-09.4 [R] Management of Modular Enterprises

Karoly Nagy; Budapest University of Technology and Economics, Hungary
Edmond Hajrizi; University for Business and Technology, Other
Edrina Gashi; Corvinus University, Hungary

This study summarizes some important results of the theoretical methodological foundation

provided by the author of an ongoing virtual economic zone (VEZ) development project. Modular (modularized) enterprises are a new generation "subspecies" of digital enterprises. The framework for modularization and its operations is provided by VEZ, which implies a kind of "service system" running mainly on the base of an Internet of Things "infrastructure". The topic of a VEZ project is concerned with the intersection of cloud computing, big data and the Future of Internet, focusing on the use of IPv6. Modularization and development of VEZ will facilitate the creation of more effective and new qualitative types of enterprises and organizational culture all over the world. In addition, enterprise modularization will increase opportunities for development of the human-technology partnership. In a modular enterprise, the management team has a permanent opportunity to examine the conditions of every module directly if it is necessary. The leaders avoid the danger resulting from the distortions of aggregated reports. At the same time, they face the fact that management of modular enterprises demands a completely different approach from the habitual point of view and requires big data thinking. The future of work at the enterprise modularization will shape the future of technology management and will increase the opportunities for development of the human-technology partnership.

HA-00 PLENARY - 4

DATE: THURSDAY, 8/23/2018
TIME: 08:30 - 10:00
ROOM: KONA MOKU BALLROOM
CHAIR: HARM-JAN STEENHUIS; HAWAII PACIFIC UNIVERSITY

HA-00.1 [K]Innovation for Impact: Value-creation as the Necessary Competitive Advantage

Curtis R Carlson; Practice of Innovation LLC, United States

We are in the global innovation economy. There are abundant unmet opportunities in large markets, but technology often improves at exponential rates and global competition is increasingly fierce. Unfortunately, today innovative success is often poor. S&P 500 companies last for less than 15 years before going away. Experience shows that most R&D has little or no value. Most university "technology transfer" programs lose money. The application of value-creation best practices significantly improves innovative output. Remarkably, few professionals have the value-creation perspectives and skills required to systematically identify and develop major new opportunities. This talk reviews the innovative practices used at SRI International when I was CEO. These practices took SRI from 20 years of failing to tripling in size and creating tens of billions of dollars of new market value, including HDTV, Intuitive Surgical, and Siri, now on the iPhone. Similar practices are described in a 2017 National Academy of Engineering report on value-creation best practices. Based on these concepts, we have created an "Innovation for Impact" value-creation guidebook for use by the NSF. The ability to use these practices and systematically create important new R&D programs and high-impact innovations are among the most important skills a professional can have.

HA-00.2 [K]Enabling Projects Oriented Teams to Drive Innovation

Sadik Esener; Oregon Health and Sciences University, United States

The study of "wicked" problems suggests that multidisciplinary teams can accelerate innovation to solve complex and intractable challenges such as the early detection of cancer. Detecting cancer early radically increases the chances of survival after a cancer diagnosis, making the concept of team-based innovation potentially essential to decreasing suffering from cancer. The Knight Cancer Institute Cancer Early Detection Advanced Research (CEDAR) Center seeks to actively implement and enable team-based science to accelerate breakthroughs. Our center brings together researchers and entrepreneurs with a range of expertise, experience and perspective to create novel solutions that can be translated to the marketplace. We have created a project driven, flat hierarchy where the best ideas rise to the top and are funded. Putting a true team-based model into place requires intention around incentives, staffing, team development, and output measurement. We will discuss the implementation of this operational model using case studies from active and terminated projects.

HB-01 Innovation Management-9

Thursday, 8/23/2018, 10:30 - 12:00
Room: Kona Moku Salon A
Chair(s) Rebecca Hirte; Daimler AG

HB-01.1 [R] Does My Organization Need an Innovation Management Function?: Towards a Model for Evaluation

Marthinus J Du Plessis; University of Pretoria, South Africa
Marthinus W Pretorius; University of Pretoria, South Africa

Many innovation management experts, especially those from academic institutions and management consulting firms, believe that innovation is a discipline in its own right (or developing towards one). From this point of view, it can be concluded that the management of innovation activities in organizations will be performed by a separate function within the structure of the organization. There are many examples of companies that manage innovation as a corporate function, headed by a VP innovation, chief technology and innovation officer or the like. To the contrary, other companies that also underpin the key role of innovation do not believe in functional structuring of the management of innovation. Their approach relies heavily on the innovative culture and open, unstructured interaction and idea sharing through all levels of the organization. Google is a good example that supports this approach. This paper aims to share insight into this contradictory issue. A literature-based research approach is followed to identify possible factors that can help firms to characterize themselves. The common view is that innovation management consists of dimensions like innovative leadership, innovation culture, the innovation process, knowledge management and others. This point of view supports the need to drive innovation with an integrative approach mainly by active management of innovation through a formal structure within the organization. Nevertheless, various points of view for or against a formal structure are argued in terms of the contexts related to these dimensions. Conclusions are drawn, and a taxonomy is suggested for the development of a model for firms to guide themselves when determining their need for an innovation management function and what the management priorities should be.

HB-01.2 [R] Discontinuous Innovation and the Defense Innovation Cycle

Adam Jay Harrison; New York University, United States
Bharat Rao; New York University, United States

This paper extends the concept of transilience mapping developed by Abernathy and Clark (1984) to model the cycle of innovation in the United States Department of Defense (DOD). Here, transilience is defined as the capacity of an innovation to influence the established technological paradigm in the DOD, which includes both the accepted methods of value creation and the resulting dominant designs. Examples of reinforcing and disruptive innovation in the DOD are mapped to the four modes of innovation (i.e., niche, architectural, regular, and revolutionary), and the concept of a defense innovation cycle based on the emergence of new dominant designs is introduced. The analysis shows that the relationship between technological innovations and dominant designs over time is associated with the extent to which new innovations are either consistent or inconsistent with the technological paradigm.

HB-01.3 [R] Outbound Open Innovation: Re-imagining Diversification Strategies in Technology Companies

Dimitrios Salampasis; Swinburne University of Technology , Australia
Anne-Laure Mention; RMIT University, Australia

SESSIONS

The global business environment is immersed with increasingly complex and volatile forces of competition, positioned within a relentless endeavor to maintain a transient advantage. In this frame of reference, groundbreaking technology-driven changes gradually lead many industrial cohorts in the verge of disruption. In light of these developments, the emergence of open innovation, as a connection-driven innovation paradigm, aims at providing a set of practices to organizations, fostering collaborative and intrapreneurial initiatives, along, across and beyond functional and organizational boundaries, facilitating the rethinking of antiquated business models and value propositions. In this context, this research contributes to the extant open innovation and technology management literature by shedding light to the role outbound open innovation plays as a vehicle of diversification in technology-driven companies. In-depth semi-structured interviews conducted within Vielltco, a leading producer of sensing solutions, illuminate the peculiarities of outbound open innovation practices as a means of leveraging un/under-utilized ideas, projects and technologies towards developing diversified commercialized offerings within existing and new (related and unrelated) markets. This research shares novel academic and managerial insight related to intra- and cross-industry innovation, the stimulation of intrapreneurial actions, along with the outbound open innovation integrated capabilities required in order to accelerate diversification strategies in technology-driven companies.

HB-02 Entrepreneurship/ Intrapreneurship-8
Thursday, 8/23/2018, 10:30 - 12:00
Room: Kona Moku Salon B
Chair(s) Kazuo Hatakeyama; Entrepreneur Consultant Office

HB-02.1 [A] Building a Sustainable Business Model through Technology Entrepreneurship: An Analysis of Business Models from a System and a System of Systems Perspective

Gary Langford; Portland State University, United States
Teresa Langford; Portland Community College, United States

Case study methods are used to identify key elements of business models in highly competitive environments. Small businesses, in particular, must rely on entrepreneurial prowess and innovation, adapt to their environment, have sufficient resources, and skillfully manage project outcomes in entrepreneurial start-up situations. This research hypothesized that a problem faced by entrepreneurial organizations is due to the fundamental flaws and poor adaptability of their business models to satisfy needs of customers and prospective customers. The problem is that the flow of value from business to customer was different from the flow of value from business to user. Two kinds of business models were examined - for-profit and non-profit. Each business model is expressed and compared in terms of their inherent systemic nature as both a system and as a system of systems. A systems approach is used to identify the essential requirements for building a sustainable business model through a mix of technology innovations for products and services. This paper reveals why sustainable entrepreneurial businesses can be built regardless of given their status as for-profit or non-profit. The advantages and disadvantages of for-profit and non-profit businesses are discussed.

HB-02.2 [R] Assessing Photovoltaic Solar Technologies as a Solution for the Problem of Power Shortage in Iraq

Ahmed A Alibage; Portland State University, United States

In a developing country like Iraq, the infrastructure of the electricity public sector (production, transportation, and distribution) has suffered for a long time from the direct effects of successive wars, lack of technocracy, bureaucracy, neglect, massive corruption, and much more that have all contributed to the failure of this sector. Indeed, the electricity sector in Iraq has not been developed for more than 40 years and has not even properly rehabilitated and/or maintained its facilities, which has led to a huge gap between the demand and supply (demand is double the supply). It is obvious that the alternative solutions that have been proposed and implemented since 2003 have not become a solution that could fill even a small portion of the gap. In this paper, a proposed solution that seemingly has never been given a chance to be put on the table by both private and public sectors will be discussed. An assessment for photovoltaic solar panels technologies as an effective, viable, and quick solution for the infrastructure and demand problem was conducted using the hierarchical decision model (HDM) as a methodology to assess the most efficient and affordable candidate technologies relevant to all the valid perspectives and criteria.

HB-02.3 [A] Analysis of the Main Factors Affecting the Entrepreneurial Willingness of Science and Technology Workers in China

Kang Li; National Academy of Innovation Strategy, CAST, China
Hui Shi; Ministry of Science and Technology, China
Dasheng Deng; National Academy of Innovation Strategy, CAST, China

Science and technology workers, who should play the role of being the main force to boosting mass entrepreneurship and innovation, have not been fully mobilized. Based on the literature review, this paper employed the survey data and structural equation models to analyze the main factors which affect the entrepreneurial willingness of science and technology workers in China. The results indicate that the entrepreneurial environment significantly affects the entrepreneurial will, but the effect of mass entrepreneurship and innovation policy is not significant.

HB-03 Social Innovation
Thursday, 8/23/2018, 10:30 - 12:00
Room: Kona Moku Salon C
Chair(s) Jili Hu, Portland State University

HB-03.1 [R] Scholar Groups of Open Source Software Research in the Field of Social Sciences Based on Author Co-Citation Analysis

Ling Wang; China University of Political Science and Law, China
Zhenwei Dong; China University of Political Science and Law, China

In the current era, when many proprietary software vendors consider the source code as their important intellectual property, the introduction and development of open source software is undoubtedly a subversive change. The development of open source software is related to all walks of life, and academic research has become a hot spot. In this paper, the authors use Author Co-Citation Analysis to analyze the relevant literatures in the field of social sciences in the Web of Science database from 1986 to 2017. It is found that the current scholar groups of open source software in the field of social sciences can be divided into four scholar groups: collaboration model scholar group, participation motivation scholar group, open innovation scholar group and economics analysis scholar group. There is a close relationship among these scholar groups, and the degree of contact between nodes in the network is relatively large. Authors' co-citations are common in this field, and authors are coexisting and interacting with each other, which means that interdisciplinary characteristics of this field are significant and there is a direct or indirect interaction between the scholars with multiple citations.

HB-03.2 [R] An Analysis on Characteristics and Impacts of Chinese Highly Cited Researchers' Transnational Mobility

Fangjuan Yang; Tsinghua University, China
Zheng Liang; Tsinghua University, China
Lan Xue; Tsinghua University, China

In the trend of globalization of science and technology (S&T), there has been a sweeping flow of high-level scientific and technological talent (HSTT). Training and recruiting HSTT is a strategic choice of all countries and regions of the world to gain international competitive advantages. In order to make full play to the role of HSTT in the development of economy and society, China has implemented an open policy and mechanism to press ahead transnational construction of HSTT in an all-round way. This paper focuses on HSTT which is represented by Chinese highly cited researchers (CHCR). Firstly, this paper summarized the characteristics of CHCS's transnational mobility from the views of form, stage, direction, scale, frequency and time on curriculum vitae analysis. Secondly, this paper built econometric models to

measure the influence of CHCR's transnational mobility on international co-publication and scientific research productivity.

HB-04 Science & Technology Policy-4
Thursday, 8/23/2018, 10:30 - 12:00
Room: Waikiki Salon 1
Chair(s) Young Il Park; Ewha Womans University

HB-04.1 [R] National Policy and Academic Research Trends on Nuclear Safety in Japan Since the Fukushima Disaster

Ichiro Okabe; Tokyo Institute of Technology, Japan
Yuya Kajikawa; Tokyo Institute of Technology, Japan

Due to the Fukushima Daiichi Nuclear Power Plant accident, the government and industries that should be responsible for nuclear safety have totally lost their trust from the public. To regain the credibility after the disaster, the Government of Japan cooperated with the Atomic Energy Society of Japan to create a "Roadmap for Technology and Human Resources for Light Water Reactor Safety" to share the priority of technology and human resource development with electric utilities, plant manufacturers, academia, central/ local governments, and residents. We first applied citation network analysis exploring interrelationships between the 18,145 papers on nuclear plant safety and key technology categories defined in the government safety roadmap. We then evaluated which technology domains are strongly affected by the Fukushima disaster using a time series analysis of annual numbers of publications. We further quantified the impact of Japan's recent academic contributions on each technical domain of nuclear safety research compared to the worldwide trend. The results quantitatively identified areas where Japanese researchers' contributions are relatively low despite the importance described in the road map. We believe our results contribute to evaluating the government's policy according to quantitative evidence derived from bibliometric data.

HB-04.2 [R] Influencing Factors on Components and Materials R&D Projects : An Ex-Post Performance Analysis

Yong-gon Cho; Korea Evaluation Inst. of Industrial Technology, Korea, South
Sungjun Hong; Korea Institute of Energy Research, Korea, South
Junhee Bae; Korea Institute of Geoscience and Mineral Resource, Korea, South
Dongphil Chun; Pukyong National University, Korea, South

To enhance Korean industrial competitiveness, the government made a huge R&D investment in various components and materials R&D projects. The ministry of trade, industry and energy has invested consistently, and 288,068 mil Korean won was invested in 2016. This research used R&D inputs and outputs data that was collected by a management agency, Korea Evaluation Institute of Industrial Technology (KEIT). This research analyzes the ex-post performance of complete materials and parts R&D projects using data envelopment analysis (DEA). We focus on evaluation of ex-post performance and reveal the influencing factors of the results. There are our main results through empirical analysis. Firstly, a chemical-oriented organization's performance is superior to other technology areas such as machinery, electronics, and IT. Secondly, the performance is differentiated by R&D supervision institution. Research institutes and universities have higher performance than big firms and SMEs. Furthermore, the research stage is also an important factor. Basic research projects' performance is better than applied, and development research projects'. Lastly, cooperation type is a valuable factor that is related with open innovation. The university-research institute combination is the best type for enhancing R&D performance. This study can suggest meaningful information to decision makers within policy and R&D organizations.

HB-04.3 [R] The Nature of Growth of SMEs in Developing Economy: A Case of Medium-Sized Enterprise in Thailand

Songphon Munkongsujarit; National Science and Technology Development Agency, Thailand

Small- and medium-sized enterprises (SMEs) are the backbone of the economy, especially in developing countries, contributing to a major part of employment and gross domestic product (GDP) of the countries. Generally, policy makers try to come up with a variety of measures to support and boost the growth as well as competitive advantages of SMEs in order to stimulate the economic sustainability of the countries. Thus, the understanding of the nature of growth of SMEs would play an important role in supporting the appropriate policies for the development of the countries. This paper examines the nature of growth of SMEs in a developing country, by using the medium-sized enterprises in Thailand as a case study. Need assessment of the enterprises as well as gap analysis between the expected state and the current state of the enterprises were performed in order to identify the development roadmap for the enterprises. This study also presents the policy recommendation for the development of SMEs according to need assessment and gap analysis activities.

HB-04.4 [R] Cost Benefit/Effectiveness Analysis of Climate Change Adaptation in Potohar Region by Building Rainwater Harvesting Dams

Bareerah Fatima; Pakistan Council of Research in Water Resources, Pakistan
Faizan Hasan; Pakistan Council of Research in Water Resources, Pakistan
Muhammad Choudhary; NAMAL, Pakistan

Northern Punjab region of Pakistan, known as Potohar region comprises 2.26 (Million Hectre) of rich land with mean annual rainfall varying from 400 mm to 1400 mm that has high runoff potential. Climate of this region is affected by variation in rainfall frequency, flash floods and long dry periods. The increasing gap in water supply and demand put huge stress on already scarce water resources. Considering the potential of rainwater harvesting in Potohar, the Government has been subsidizing rainwater harvesting projects since 1980's. Given the historical uncertainties of climate, importance of rainwater harvesting is increased for it being a most feasible climate change adaptation option. Rainwater harvesting is evaluated as climate change adaptation option by performing cost benefit analysis and cost effectiveness analysis. A total 400 farming families were reviewed in this research that were reported to have benefitted from subsidized rainwater harvesting projects. For this research, 21 farmers and farms were surveyed and their cases were collected across the Potohar region. Findings of this research have revealed that, 60% of the surveyed farmers have higher understanding of climate change and they are willing to add value into their farming practice to increase their income, while 67% of farmers recognized that Potohar region has high potential for rainwater harvesting. Older dams had higher income and showed higher benefit cost ratio, on the other hand dams constructed during last two years have shown marginal to lower benefits. Overall economic benefits and effectiveness had established rainwater harvesting as suitable climate change adaptation option.

HD-01 PANEL: PICMET '18 Debrief and Future PICMET Planning
Thursday, 8/23/2018, 14:00 - 15:30
Room: Kona Moku Salon A
Panelist(s)

Timothy R Anderson; Portland State University
Dilek Cetindamar; University of Technology Sydney
Antonie Jetter; Portland State University
Dundar F Kocaoglu; Portland State University
Hakan Kutgun; Portland State University
Robert H Martin; Software Management Consulting
Caroline Mudavadi; Portland State University
Kiyoshi Niwa; The University of Tokyo
Liono Setiowijoso; Portland State University
Harm-Jan Steenhuis; Hawaii Pacific University
Charles M Weber; Portland State University
Byung Sung Yoon; Portland State University

This session will provide an opportunity to give feedback on PICMET '18 and to get involved in the planning for the PICMET '19 Conference.

Author Index

A

Abu Taha, Rimal ; WB-02.3
Acai, Joseph ; MD-08.1
Adami, Marcos ; TB-07.4
Adebayo, Olumide ; TD-05.1
Adjogble, Franck Komi ; TE-06.3
Agwa-Ejon, John Francis; MB-07.3; MD-07.2
Ahmed, Ashfaq; WD-01; WE-01.1
Ahn, Mark J. ; TB-04.2
Alibage, Ahmed A.; WE-08.2; HB-02.2
Alin, Pauli ; TB-10.4
Allegretti, Sebastian ; ME-02; TB-02.3
Alnasri, Yaser ; ME-08.1
Alsulami, Hemaid ; WB-02.3
Alvarez Merino, Jose C. ; WE-03.1
Alzahrani, Ahmed ; ME-04.1
Alzahrani, Saeed ; ME-04; ME-04.1
Amadi-Echendu, Joe ; MD-08.1
Anderson, Timothy R.; MA-00; HD-01
Anzai, Tomohiro ; TB-09.2
Aoshima, Yaichi ; WB-06.2
Arakawa, Riku ; ME-10.3
Ardilio, Antonino ; TE-06.3
Atalay, Bulent ; TA-00.2

B

Bae, Junhee; TB-08; HB-04.2
Bae, Zong-Tae ; TD-02.3
Bagno, Raoni B. ; MD-02.3
Bai, Jing ; WB-08.3
Banganayi, Clever ; MD-07.3
Banka, Kenichiro ; MB-07.2
Barham, Husam ; ME-07.1
Barros, Marcia ; TB-07.4
Beaulieu, Luke ; WE-04.1
Bechtold, Ulrike ; MD-11.1
Becker, Pamela ; TB-10.4
Beltaif, Nader N. ; WB-10.2
Bernardy, Anne ; MB-10.2
Bertling, Matthias ; MD-04.3
Bhuyan, Muhammad H. ; WE-02.3
Bichueti, Roberto S. ; MD-08.3; WE-01.2
Bilankulu, Charmaine ; TD-06.2
Borgstedt, Philipp ; TB-09.1
Borja, Sergio M.; TE-09; WE-08.1
Bosnjak, Mile ; MB-08.2
Bozeman, Barry ; TE-03
Bradley, Danielle ; TB-02.2
Broering, Stefanie ; MB-08.1
Bruens, Bennet ; TE-11.1
Buchanan, Walter W. ; TB-10.1
Burggraf, Peter ; MD-04.3
Burmaoglu, Serhat ; ME-01
Busch, Jeffrey ; ME-08.1; ME-08; TB-07

C

Caferoglu, Huseyin ; MD-06.2
Cao, Renzhi ; MB-11.1; MD-06.3; TB-02.2
Carlotta, Belviso ; MD-11.1
Carlson, Curtis R. ; HA-00.1
Carpenter, Jeff ; WE-04.1
Castro-Leon, Enrique G. ; TB-01.3
Cetindamar, Dilek ; TA-00; TE-02.1; HD-01
Chaiwongyen, Anuwat ; TD-09.1
Chan, Leong ; MB-11; MB-11.1; MD-06.3; TB-02.2
Chang, Hyungsik ; WD-04.2
Chang, Soonwoo ; WE-09.1
Chang, Tin-Chang ; MB-10.1
Chen, An-Yu ; WD-03.2
Chen, C. ; ME-02.2
Chen, Chung-Jen ; TB-08.2
Chen, Dar-Zen ; MD-05.1
Chen, Demian ; WE-02.3
Chen, James K. ; MD-10.2; WD-06.2; WE-06
Chen, Jia-xin ; WB-08.2
Chen, Lulu ; TE-11.3
Chen, Rui ; TE-10.2
Chen, YiSong ; WB-09.1
Chen, Yung-Lin ; MB-10.1; TD-10
Cheng, Lin C. ; MD-02.3
Cherdgone, Jitpapas ; TE-05.3
Chiadamrong, Navee ; TE-05.1
Chiavetta, Denise ; MD-04.1
Chin, Kyounghwan ; ME-09.2; TE-09.3
Chinda, Krisada ; TD-09.1
Cho, Yong-gon ; HB-04.2
Choudhary, Muhammad ; TB-07.3, HB-04.4
Choy, King-lun T.; MB-02.1; ME-11.2; TD-06.1
Chu, Yanqun ; ME-02.3
Chun, Dongphil ; HB-04.2
Chung, Do Bum ; MB-06.1
Conover, Matthew ; MD-06.3
Corsaro, Daniela ; MB-03.1
Cowan, Kelly R. ; TD-04.3
Craven, Rebecca ; ME-07.1
Cunningham, Scott ; MD-04.1; ME-01; TE-03

D

Da Costa, Carlos Rafael R. ; MD-08.3
Dabab, Maoloud ; MD-10.1; ME-07.1; TD-11.2; WE-08.3
Dabic, Marina ; MB-08.2; MB-08
Dai, Xuran ; ME-04.1
Daim, Tugrul ; TB-06.3; TD-04; TD-04.3; TE-03
Dannapfel, Matthias ; MD-04.3
Daya, Zhou ; WE-01.3
de Lange, Johan ; ME-03.3; ME-03
Deng, Dasheng ; HB-02.3
Diels, F. ; MD-03.1
Dixon, Brent ; WD-06; WE-06.2
Djassemi, Manocher ; MD-09.3; ME-09
Doelle, Christian ; MD-03.2; MD-03.1
Dong, Zhenwei ; HB-03.1
Du, Shengmei ; TE-10.2; TD-10.3
Du Plessis, Marthinus J. ; HB-01.1
Du Pont, Vivian ; TD-05.3
Dukhi, Shivaar ; ME-09.3
Duong, Vu ; WE-01.1
Duwe, Daniel ; TE-04.2
Dyba, Charlotte ; ME-03.1

E

Ebi, Manuel ; MD-03.2
Edmondson, Joseph C. ; MB-05.3; MD-05
Eisenhardt, Kathleen ; MA-00.1; TE-03
Ensign, Prescott C. ; MD-02.2; WD-02;

Author Index

WE-02.1
Esener, Sadik ; HA-00.2
Eto, Manabu ; MD-01; TB-01.2

F

Fang, Xin ; MB-11.2; MB-11.3
Farook, Omer ; WE-01.1
Fatima, Bareerah ; HB-04.4
Fazekas, Balazs ; TE-09.1
Feng, Ling ; WD-05.2
Ferreyra, Jose C. ; WB-10
Fetscher, Manuel ; WB-04.3
Fischer, Thomas ; TE-06.3
Fisk III, Pliny ; WA-00.2
Flores Marca, Nataly J. ; MB-10; TD-10.2
Fosso Wamba, Samuel ; TD-05.2; TE-05
Freiling, Mike ; MD-10.1
Frizzo, Kamila ; MD-08.3; TD-08.3; MD-08.4
Fujimoto, Jun ; TD-09.3
Fujisue, Chika ; TE-04.4

G

Gabel, Marie ; TB-09.1
Gaidedi, Abdulhakim ; TB-06.3
Gao, Yuanying ; WB-08.1
Gashi, Edrina ; WE-09.4
Geissler, Mario ; ME-02.1
Gerdsri, Nathasit ; MD-08.2; MD-08; TD-04.2; TE-03
Geum, Youngjung ; MB-06.2
Gibson , Elizabeth ; ME-07.1
Goji, Tomotaka ; MB-05.2; TD-10.1
Gomes, Alessandra ; TB-07.4
Gomes, Clandia M. ; MD-08.3; TD-08.3; MD-08.4
Gong, Yuanyuan ; TE-09.1
Groen, Aard ; WB-04.4
Gu, Li ; WE-05; WE-05.2
Gui, Bingxiu ; WB-08.2
Guo, R. ; ME-02.2
Guo, Ruey-Shan ; TB-08.2
Gupta, Ranjit ; MB-08.3

H

Hallam, Cory R. A.; MD-11.3; TD-02; Hacklin, Fredrik ; TD-01.2
Haddud, Abubaker ; ME-08.2; TB-10.2
Hajrizi, Edmond ; WE-09.4
Han, Xiao ; MB-03; MB-03.1; MB-03.2
Han, Xue ; WE-05.2
Hanewicz, Cheryl ; TB-10.4; TB-10
Harmon, Robert R. ; TB-01.3; TD-01
Harrison, Adam Jay ; HB-01.2
Hasan, Faizan ; HB-04.4
Hasenauer, Rainer P. ; MD-11.1; ME-11; TE-10.1; TE-10
Hashigami, Yasutaka ; TB-01.1
Hatakeyama, Kazuo ; MD-03; WB-01.2; WE-03.1; WD-02.2; HB-02
Hayashi, Yuki ; MB-05.2
He, Li ; WB-09; WD-09.1; WD-09.3
He, Wei ; WB-05.2
Heo, Dongcheol ; MB-01.2
Heo, Yoseob ; WD-04.1
Hernandez, Jorge ; WB-04.4
Herrmann, Florian ; TE-04.2
Hirano, Makoto ; MD-07; ME-09.1
Hirte, Rebecca ; WD-01.1; HB-01
Hollauer, Christoph ; WB-04.3
Holtgrave, Maximilian ; TE-02.2
Holtkemper, David ; TB-04.1
Hong, Chen ; WE-05.2
Hong, Sung Wha ; ME-10.2
Hong, Sungjun ; HB-04.2
Horwitch, Mel ; TE-09.2
Hosoya, Ryuichi ; MD-06.1
Hsiao, Yung-Chang ; TB-08.2
Hsieh, Chih-Hung ; TD-08.2
Hsu, Wei-Chen ; ME-04.1
Hu, Jili ; WD-04; HB-03
Hu, Jing ; WD-05; WE-05.3
Hu, Kae-Kuen ; TB-08.2
Hu, Yanni ; ME-11.3
Hu, Zhichen ; MB-03.2
Huang, Hung-Chun ; MB-09; MB-09.2; WB-05; WB-05.1
Huang, Lu ; TE-04.1; TE-04.3
Huang, Lucheng ; ME-06.3; TE-01.2; WB-09.3
Huang, Mu-Hsuan ; WE-06.3
Huang, Yuanxi ; MB-08.4; WB-08
Huang, Zhongyi ; WB-06.3; MB-01.3
Huang, Ziyang ; WD-05.3; WE-04.2
Huo, Junhuan ; WD-01.3
Hwang, Junseok ; WE-08.1
Hwangbo, Wonju ; TB-06.2

I

Ikawa, Yasuo ; MB-07.1
Ikome, John M. ; MD-09.2; ME-09
Insawat, Sinrintorn ; ME-04.2
Inui, Toshiyuki ; MB-05.4
Ishida, Shuichi ; MD-03.3
Ishihara, Sumie ; MD-03.3
Ishitani, Yasuto ; TB-02.1; TD-02
Ito, Yasunobu ; TB-08.1; TE-11; TE-11.2
Itoh, Sayaka ; MD-04.2
Iwamoto, Takashi ; WB-02; WE-02.2

J

JJang, Hye-Jeong ; MB-06.1
Jenzen, Henry ; TD-05.3
Jeong, Yujin ; TD-06.3
Jetter, Antonie ; TB-11.3; WD-03; HD-01
Jia, Xiang ; TE-04.1; TE-04.3
Jiang, Zhenyu ; WD-01.2
Jong, Algane ; WD-06.2
Jordan, Felix ; MB-10.2
Joy, Simy ; MD-02.1
Jun, Seung-Pyo ; TB-09.3

K

Kajikawa, Yuya ; MB-08.3; MD-05.2; HB-04.1
Kakimoto, Takashi ; TB-11.2
Kalla, Tobias ; WB-04.3
Kameoka, Yasuaki ; ME-10.3
Kanakana, Grace ; MD-09.2
Kang, Jong Seok ; WD-04.1
Kang, Rihyei ; TB-07.3
Kano, Shingo ; MD-04.2; TD-04.1
Kasseckert, Andreas ; TB-02.3

Author Index

Kataoka, Rieko ; MB-07.1
Katoh, Shogo ; TB-09.2
Ke, Tsung-Han ; MB-09.2
Kelzenberg, Christoph ; ME-03.3
Kganyago, Thabiso T. ; WD-02.1
Kim, Byung Woon ; WB-10.1
Kim, Byungil ; MB-06.1
Kim, Keun Hwan ; TB-09.3; WD-04.1
Kim, Keungoui ; WE-08.1
Kim, Sungjin ; TE-06.1
Kim, Sunhye ; TD-06.3
Kim, Wonjoon ; WD-03.1
Kirjavainen, Johanna ; WE-03.2
Kneipp, Jordana M. ; MD-08.3; TD-08.3; MD-08.4
Kocaoglu, Dundar F. ; HD-01
Kohda, Youji ; TB-07.3
Kondoh, Shino ; WE-06.1
Kongar, Elif ; TD-05.1
Kose, Toshihiro ; WD-05.1
Koshiyama, Takehiko ; TD-09.3
Kosylo, Nathan ; MD-06.3
Kovac, Ivana ; MB-08.2
Kovavisaruch, La-or ; MB-06.3; MB-06; TD-09.1
Kruglianskas, Isak ; MD-08.3; WE-01.2
Kuan, Chung-Huei ; MD-05.1; TD-08
Kuang, Di ; MB-03.1; MB-03.2
Kubo, Hiroshi ; TB-11.2
Kuhn, Maximilian ; MD-03.1
Kutgun, Hakan ; TD-05.3; HD-01
Kwun, Sang Hwa ; WE-09.1

L

Labas, Davor ; MB-08.2
Lai, Taisi ; ME-08.3
Lam, H.Y. ; MB-02; MB-02.1; ME-11.2; TD-06.1
Lammers, Thorsten; TB-04; TB-04.3; TE-02.1
Lamsam, Panita ; ME-04.2
Langford, Gary; WE-04.1; WE-04; HB-02.1
Langford, Teresa ; HB-02.1
Lanz, Minna ; TD-09.2
Lasi, Heiner ; WB-04.1
Lau, Felix S. ; ME-03.1; ME-03.2
Lauto, Giancarlo ; TB-09.2
Lavoie, Joao R. ; WE-09.2
Lee, Chung-Shing ; MB-11.1; TB-02.2
Lee, Hang ; WD-03.2
Lee, Heesang ; ME-09.2; TE-09.3
Lee, Ho-Joon ; MB-06.2
Lee, Hyeokseong ; WD-03.1
Lee, Hyuck Jai ; ME-10.2
Lee, Jihye ; WD-04.2
Lee, Johng-Ihl ; WE-09.1
Lee, Sungjoo ; TD-08.1
Lee, Xing Wang ; MB-02.2; ME-04.3
Leng, Zhengzheng ; WB-06.3
Leupold, Philipp ; WE-02.1
Li, Kang ; HB-02.3
Li, Munan ; ME-02.3
Li, Xin ; ME-06.3; TE-01.2; WB-09.3
Li, Yan ; WB-09.2
Li, YingJie ; MB-03.3
Li, Zheng ; WB-08.1
Li, Zhengfeng ; MB-09.3
Liang, Zheng ; HB-03.2
Lin, Chien Huei ; TD-08.2
Lin, Deming ; TE-11.3
Liu, Guangbin ; WD-09.2
Liu, John S. ; TD-08.2
Liu, Kaikai ; MB-04.3
Liu, Xuan ; MB-03.3; WD-09; WB-09.2
Liu, Xuefeng ; MB-02.3
Liu, Yun ; WB-08.2; WE-04.3
Long, Shixiang ; MB-04.3
Lopes, Jose Eduardo F. ; WB-01.3
Lu, Louis Y. ; TD-08.2
Luk, C.C. ; MB-02.1
Luo, Hui ; MB-09.3; TE-10.2; WB-08.3; WB-08.1
Luqueze, Maria Angelica O. ; WE-09.2

M

Ma, Jianquan ; MB-03.3
Ma, Ru ; WD-06.3
Machado, Marcelo A. ; WB-01.2
Mageza, Kulani ; MD-07.3
Mahlori, Bobby ; WB-02.2
Maine, Elicia M. ; TE-03; WA-00.1
Majuri, Matti ; TB-09; TD-09.2
Makinen, Saku ; TD-02.1; WE-03.2
Mariano, Stefania ; TD-04.4
Marinakis, Yorgos ; WB-04.4
Marsh, Brock ; WE-04.1
Martin, Robert H. ; ME-07; HD-01
Martinez, Enrique ; WB-10
Matsuda, Takanari ; MB-05.2; TD-10.1
Matsuno, Yuji ; TD-01.3
Matsushima, Kazunari ; WB-06.2
Matthern, Gretchen ; WE-06.2
Maximiano, Antonio Cesar A. ; WD-03.3
Mayande, Nitin ; ME-06.1
McAllen, Dorothy K. ; ME-08.2; TB-10.2
McDougall, John ; MA-00.2
Mei, Hanfei ; MD-06.3
Melo Filho, Leonel D. ; MD-02.3
Mention, Anne-Laure ; HB-01.3
Metanantakul, Krip ; MB-01.2
Miao, Hong ; WB-09.3; TE-01.2
Mikos, Walter L. ; WD-02.2
Milicsevics, Milos ; TE-09.2
Mitsumori, Yaeko ; MB-05; MB-05.1; TB-08.3
Miyamoto, Kengo ; TB-07.3
Miyazaki, Kumiko ; MB-08.3; MD-06.4; TE-05.2
Moehrle, Martin G. ; MD-06; MD-06.2; TE-11.1
Mohammadi, Mehdi ; TE-01.3
Mokhtarzadeh, Nima G. ; TE-01.3
Mokwalo Monareng, Seun ; MD-07.2
Montshiwa, Abednico L. ; MB-09.1
Moon, Seungyeon ; TE-09.3
Moon, Young-Ho ; WD-04.1
Morar, Dominik ; WB-04.1
Motke, Francies D. ; TD-08.3; MD-08.4
Mudavadi, Caroline ; HD-01
Muegge, Steven M. ; ME-07.2; TE-02.3
Mugova, Chipo ; MD-11.2; ME-09.3; MD-11
Mulaba-Bafubiandi, Antoine F. ; MD-07.1; MD-07.2; MD-07.3
Mulloth, Bala ; WB-02.1; WE-02
Munkongsujarit, Songphon ; HB-04.3
Murshed, S. M. Monzur ; ME-07.2

Author Index

Mutsuda, Mitsuteru ; WB-01.1; WE-01

N

Nagahira, Akio ; MD-03.3
Nagy, Karoly ; WE-09.4
Nakashio, Yuko ; MD-05.2
Namba, Kazuhide ; MD-01.1
Nascimento, Paulo T. ; WD-03.3
Newman, Nils ; MD-04.1
Neyer, Bastian ; TB-09.1
Ngqulunga, Bonginkosi R. ; TE-01.1
Nguyen, Le ; MD-11.3
Nienaber, Ann-Marie ; TE-02.2
Niwa, Kiyoshi ; WA-00; HD-01
Nomakuchi, Takao ; TD-11.1; TD-11
Novak, Ivan ; MB-08.2

O

Ogawa, Yasushi ; WB-06.1
Okabe, Ichiro ; HB-04.1
Okara, Svetlana ; MB-08.1
Olorunniwo, Oludare ; TD-08.4; WE-03.3
Omer, Mayada ; WB-04.3
Onoda, Takashi ; TB-08.1
Onodera, Reiko ; WE-06.1

P

Pandey, Makarand ; WB-04.4
Park, Jeong-Hyun ; WD-06.1
Park, Mun-Su ; WE-09.1
Park, Se-Jin ; WB-10.1
Park, Young Il ; TB-06.2; TD-06; WD-04.2; HB-04
Pattanatornchai, Jintana ; ME-04.2
Patzold, Andreas ; TE-06.3
Pereira, Cristiano G. ; WE-09.2
Pereira, Joao Henrique S. ; WB-01.3
Perlin, Ana Paula ; TD-08.3
Piyatumrong, Apivadee ; TE-05.3
Pontelo de Souza, Matheus L. ; MD-02.3
Poonamallee, Latha ; MD-02.1
Pora, Ummaraporn ; TD-04.2
Porter, Alan L. ; MD-04; MD-04.1; ME-01
Porto, Geciane S. ; WB-01.3; WE-09.2
Pourasgari, Pedram ; TE-01.3
Pretorius, Jan-Harm C. ; MD-07.1
Pretorius, Marthinus W. ; HB-01.1
Prodhan, Anup ; MB-07.3
Pulsri, Nonthapat ; MB-01.1; TB-11.1
Pun, K.P. ; TD-06.1

Q

Qi, Xin ; MB-03.1
Qiao, Lili ; WB-08.1
Qiu, Yang ; ME-08.3

R

Rahaingoalison, Narizo Mahefa ; WD-04.3
Rahman, Nayem ; MD-10.1
Ramakrishna, Akash Bali ; TD-11.3
Ramanantsizehena, Pascal ; WD-04.3
Ramesh, Bhavana ; TD-11.3
Rao, Bharat ; WB-02.1; HB-01.2
Regatierri, Alberto ; TB-04.3
Reid, Ewan ; TE-02.3
Ren, Fujun ; WD-09.2
Rimbock, Franz ; WB-04.3
Roth, Philip ; WD-01.1
Ruth, Stephen ; TB-10.3

S

Saadatmand, Mohammadsaleh ; TD-11.2
Sagalowicz, Daniel ; MD-10.1
Saito, Masatake ; WB-04.2
Sakata, Ichiro ; MB-05.2; ME-10.3; TD-10.1; TE-04; TE-04.4; WD-05.1
Sakurai, Mitsuya ; WE-06.1
Salampasis, Dimitrios ; TB-01; HB-01.3
Salmen, Michael ; ME-03.3
Sangkeettrakarn, Chatchawal ; TE-05.3
Sanpechuda, Taweesak ; TD-09.1
Santiago, Ruiz Navas ; TE-05.2
Santos, Lucyana ; TB-07.4
Sarmmad, Tahire ; TB-07.3
Sasaki, Hajime ; TE-04.4
Sasaki, Yasuo ; ME-10.1; MD-10
Sato, Ryusuke ; MD-06.4
Say, Alicia ; ME-02.2; TB-02
Sbragia, Roberto ; WD-03.3
Schaller, Amaury ; TD-04.4
Schewe, Gerhard ; TB-09.1; TD-09; TE-02.2
Schilling, Melissa A. ; TA-00.1
Schmidt, Tim ; ME-03.2
Schuh, Gunther ; MB-10.2; MD-03.1; MD-03.2; ME-03.1; ME-03.2; ME-03.3
Scillitoe, Joanne ; MD-02.1; MD-02
Seboni, Lone ; TE-06.2
Seidenstricker, Sven ; TB-02.3
Sejake, Portia ; MD-11.2
Seki, Atsushi ; WE-06.1
Sengoku, Shintaro ; TB-09.2; WE-06.1
Setiowijoso, Liono ; HD-01
Shaygan, Amir ; TB-04.2; WE-09.2
Sheikh, Nasir J. ; TB-06; TB-06.1; TD-05.1; TE-06.1
Shi, Hui ; HB-02.3
Shi, Lei ; WB-08.3
Shi, Yuanyuan ; MB-11.1
Shi, Yunyan ; WB-08.1
Shih, Hsin-Yu ; MB-09.2; WB-05.1
Shim, Hong Souk ; TD-08.1
Shim, We ; TB-09.3; WD-04.1
Shirahada, Kunio ; TD-05; TE-05.1
Sick, Nathalie ; MB-08.1; TE-02.1
Silva, Marck ; TB-07.4
Singh, Nirdesh ; MD-07.1
Siu, Paul K.Y. ; ME-11.2
Smith, John ; MD-06.3
So, Dae Sup ; TB-09.3
Sommarberg, Matti A. ; TD-02.1; WE-03; WE-03.2
Son, Wonbae ; TB-06.1
Song, Weiling ; WE-05.1
Song, Yu ; ME-02.4
Souza Junior, Wesley C. ; MD-02.3
Spath, Dieter ; TE-04.2
Srizongkhram, Shayarath ; TE-05.1
Steenhuis, Harm-Jan ; MB-11.2; MB-11.3; TE-03; HA-00; HD-01
Stich, Volker ; MB-10.2

Author Index

Su, Hsin-Ning ; WB-05.1
Sun, Benson S. ; MD-10.2
Sun, Minghan ; WB-05.2
Suominen, Arho ; ME-01

T

Takada, Naoki ; WB-06.2
Takai, Keigo ; ME-11.1
Tan, Hongying ; ME-11.3
Tanaka, Hiroaki ; MD-05.2
Tanaka, Hiroko ; TB-11.2
Tanaka, Kazuya ; ME-10.3; ME-10
Tanaka, Yoshitoshi ; MB-05.4; MD-05.3
Taniguchi, Ryo ; TB-07.2
Tannirandon, Adiphol ; MD-08.2
Tao, Xiaobo ; ME-02.4
Teng, Eryue ; ME-08.3
Thawesaengskulthai, Natcha ; TD-04.2
Thukral, Inder ; WB-04.4
Tiwari, Rashi ; ME-04.1
Tobino, Daiki ; ME-09.1
Todosow, Michael ; WE-06.2
Tokita, Sayaka ; MD-09.1
Tomidei, Laura ; TB-04.3
Tomita, Aki ; TD-02.2; TE-02
Tong, Yiming ; WB-09.3
Towata, Yosuke ; MD-05.3
Trepci, Emi ; TE-10.1
Triukose, Sipat ; TD-04.2
Tsai, Mavis ; WB-09.1
Tsujimoto, Masaharu ; TB-01.1; TD-01.2; WB-01
Tsutsui, Mariko ; TD-01.1; TE-01
Tu, Yi-Hsien ; MB-02.2; ME-04.3

U

Uchihira, Naoshi ; MB-07.1; MB-07.2; MB-07; ME-10.1; WB-06; WB-06.1
Ullmann, Oliver ; TE-06.3
Ulusemre, Tolga ; MB-11.2; MB-11.3

V

an der Lingen, Elma ; TD-06.2; TE-06; WD-02.1; WB-02.2
Vatananan-Thesenvitz, Ronald ; MB-01; MB-01.1; MB-01.2; TB-11.1; TB-11; TD-04.4
Vegh, Jennifer ; TB-02.2
Vogt, Florian ; ME-03.1
von Gehlen, Kristina ; TE-02.2

W

Wakabayashi, Naoki ; ME-11.1
Walsh, Steven T.; TE-03; WB-04; WB-04.4
Walwyn, David ; TE-01.1
Wang, Chun-Chieh ; WE-06.3
Wang, Hailong ; MB-04.3
Wang, Hong ; MB-03.1; MB-03.2
Wang, Hongwei ; MB-03.3; WB-09.2; WD-06.3
Wang, Kangyou ; ME-06.2
Wang, Lin ; MB-01.3; WB-06.3
Wang, Ling ; HB-03.1
Wang, Wenshu ; ME-02.3
Wang, Xiaoli ; WB-08.2
Wang, Yan ; TE-01.2
Wang, Yang ; WB-06.1
Wang, Yangyang ; MD-01.2
Wang, Yinqiu ; MB-09.3
Wang, Zhao ; MB-02.3
Wang, Zheng ; TE-10.2
Wang, Zongjun ; WD-01.2
Warschat, Joachim ; TE-06.3
Washida, Yuichi ; MB-04.1; MB-04
Watanabe, Toshiya ; MB-04.2
Watanavisit, Sineenat T. ; MB-06.3
Watkins, Ian ; WE-04.1
Weber, Charles ; ME-06.1; ME-06; TB-04.2; TD-11.2; WB-08; WB-10.2; WE-08; WE-08.2; WE-08.3; HD-01
Weber, Patrick ; WB-04.1
Weber, Silvana ; WD-02.2
Wetterney, Tim ; ME-03.2
Wieninger, Simon ; TB-04.1
Wigeland, Roald ; WE-06.2
Wilberg, Julian ; WB-04.3
Wisadsud, Sodsai ; TD-09.1
Witdumrong, Sopawan ; TE-05.3
Wongsatho, Thitipong ; TD-09.1
Wu, Feifei ; WB-09.3; TE-01.2
Wu, Hong ; TE-10.2
Wu, Hung-An ; MB-02.2; ME-04.3
Wu, Yuchen ; MD-10.3

X

Xie, Qianqian ; ME-06.3
Xu, Guannan ; MD-10.3
Xu, Shuo ; TD-10.3; TE-10.2
Xu, Tingni ; MD-04.3
Xu, Yajie ; WB-08.2
Xue, Lan ; HB-03.2

Y

Yamaguchi, Yoshikazu ; TD-09.3
Yamano, Hiroko ; MB-05.2; TE-04.4
Yamasaki, Ko ; MD-03.3
Yamasaki, Kunitoshi ; MD-06.1
Yamazaki, Akira ; TD-09.3
Yan, Mengling ; ME-11.3
Yan, Weichun ; WE-05.2
Yang, Defang ; WD-01.3; WE-04.3
Yang, Fangjuan ; HB-03.2
Yang, Guang ; MB-08.4; WB-08.3
Yang, Heyoung ; ME-10.2
Yang, Meijian ; WB-08.2
Yang, Weiyu ; WB-09.2
Yang, Xi ; WE-01.2
Ye, Xuanting ; WD-01.3; WE-04.3
Yin, Conghui ; WE-04.2
Yin, Jingru ; WE-04.3
Yoon, Byung Sung ; HD-01
Yoon, Byungun ; TD-06.3
Yoon, Hyenyoung ; WE-08.1
Yoshida, Suzuka ; MB-05.4
Yoshioka-Kobayashi, Tohru ; MB-04.2
Yu, Oliver ; WE-09.3; WE-09
Yu, Xiang ; MB-04.1; WB-05.2; WD-05.2; WD-05.3; WE-01.2
Yuan, Xiaodong ; WE-05.1

Author Index

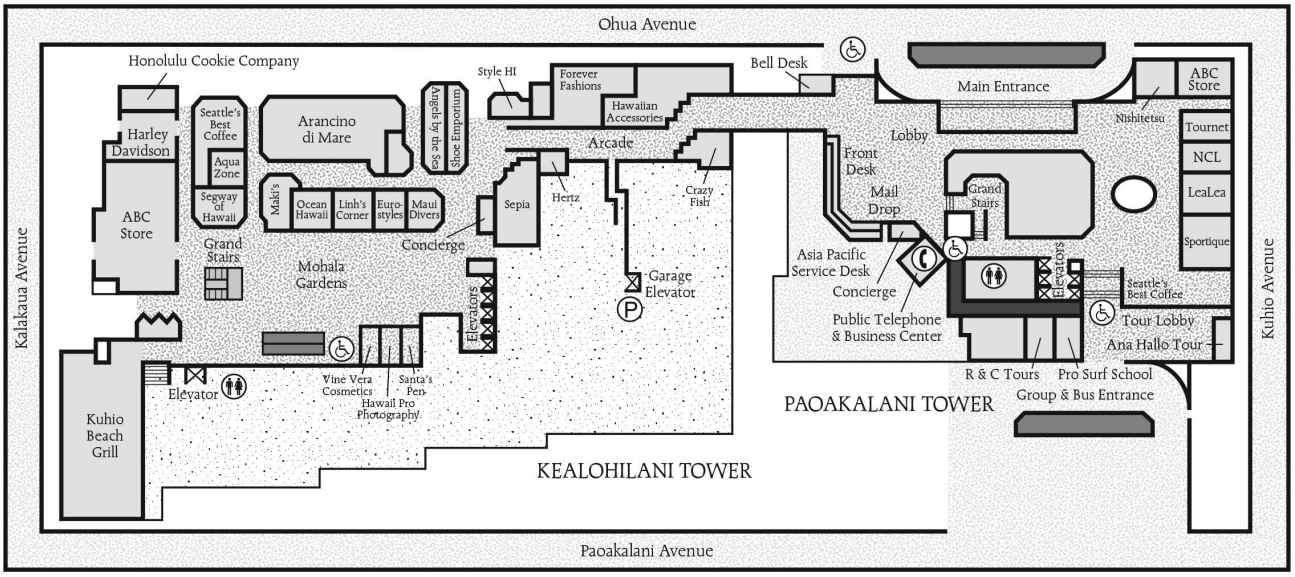
Yugue, Ricardo T. ; WD-03.3
Yurtseven, Murat K. ; TB-10.1

Z

Zanger, Cornelia ; ME-02.1
Zarefard, Mohammadreza ; TE-01.3
Zelaya, Jader ; ME-10.1
Zeller, Violett ; MB-10.2
Zhang, Haodong ; TD-10.3; TE-10.2
Zhang, Hongtao ; MD-06.3
Zhang, Jian ; WD-01.3; WE-04.3
Zhang, Li ; ME-08.3; WE-01.3
Zhang, Ning ; TE-10.2
Zhang, Pei ; TB-11.3
Zhang, Xiaolei ; ME-06.2
Zhang, Yi ; MD-04.1; TE-04.1; TE-04.3
Zhang, Yueyi ; WE-05.3
Zhang, Zhenwei ; WD-01.3
Zhao, Jixin ; ME-02.4
Zhao, YangYang ; TD-10.2
Zhao, Yu ; WE-01.3
Zheng, Yuelong ; MB-01.3; WB-06.3
Zhou, Lijun ; WE-05.3
Zhou, Lixin ; WB-06.3
Zhou, Xiao ; TE-04.1; TE-04.3
Zhou, Yuan ; MD-10.3
Zhu, Jinwei ; MD-01.2
Zhu, Lijun ; TD-10.3
Zhu, Yihe ; TE-04.1; TE-04.3
Zurita, Jesus ; WB-10

Marriott Floor Layout

FIRST FLOOR



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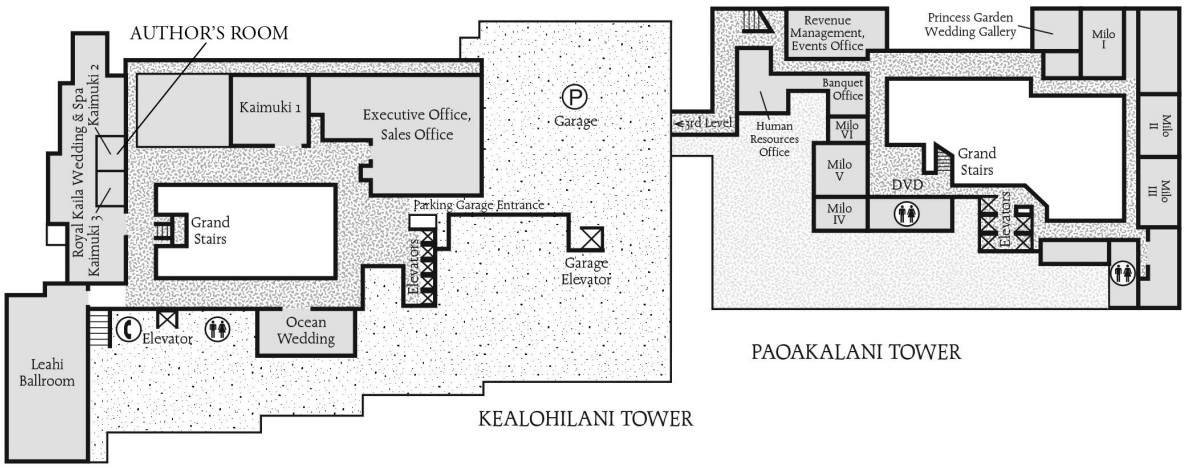

THIRD FLOOR