Organized by
Portland State University
Department of Engineering and Technology Management

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- **INFORMS Technology Management Section**
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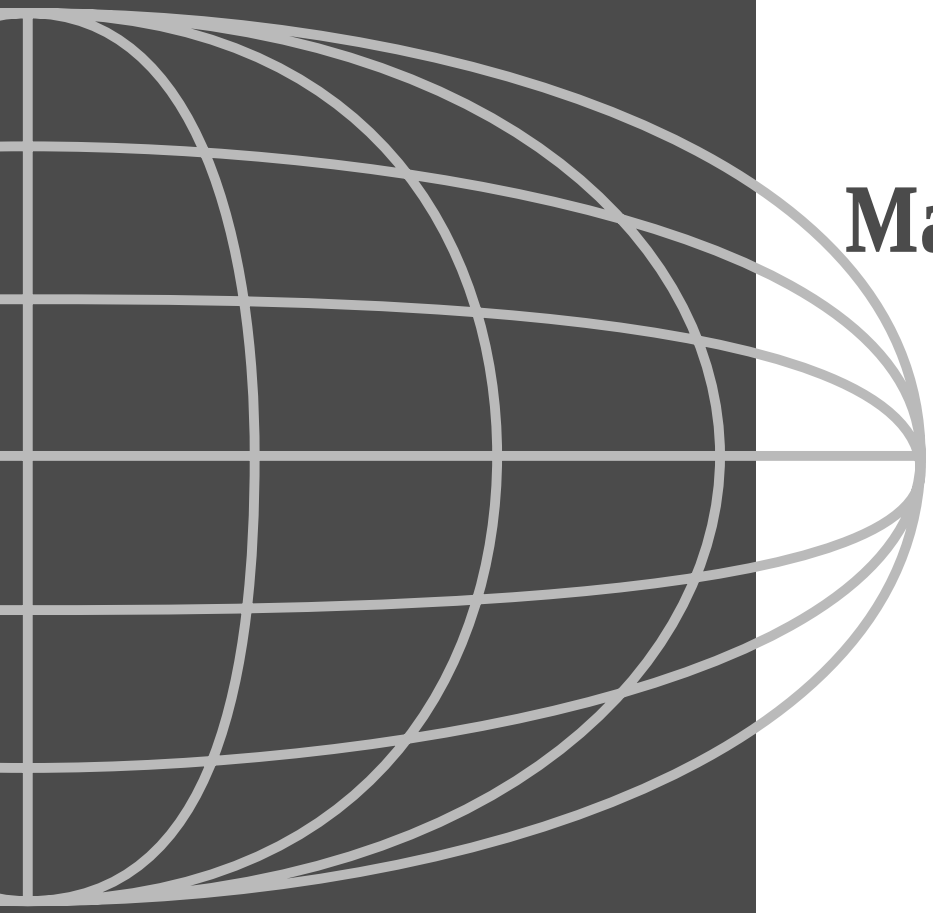

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PICMET '01

Portland International Conference on Management of Engineering and Technology

July 29 - August 2, 2001
Portland, Oregon USA

Technology Management in the Knowledge Era: Life in the e-World

1991–2001
PICMET
10 Years of Excellence

CONFERENCE BULLETIN

PICMET '01

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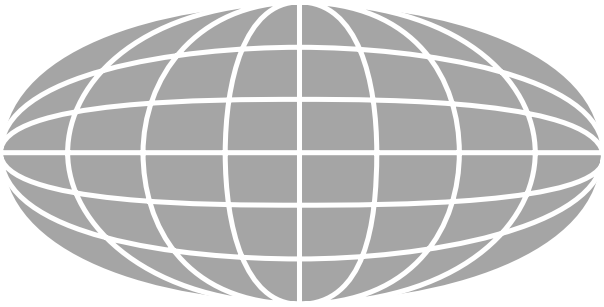

PICMET

Dear PICMET Guests:

We take great pride and pleasure in welcoming you to the 2001 Portland International Conference on Management of Engineering and Technology (PICMET) on this tenth anniversary.

The first PICMET was organized as a one-time event in 1991. We did not know that it would be the first of many PICMETs to come. It is because of the numerous requests from around the world that we decided to repeat it as a biennial conference. The second PICMET was in 1997, the next one in 1999, and this PICMET in 2001. It is now the largest conference on technology management in the world. There are 170 sessions with about 500 presentations in this year’s conference. The papers have been selected from about 750 submissions received from authors representing more than 200 universities and 100 industrial corporations, research institutes and government agencies.

It takes two years to plan and organize each PICMET. It was no different for PICMET ’01. The Executive Committee started to work on it immediately after PICMET ’99. The key parameters and strategies were developed, the structure of the conference was designed, the Plenaries and Executive Forums were planned, and the calls for papers were sent out to the researchers and implementers of technology management in the first year. The conference was divided into about forty projects with roughly 500 work packages. Literally hundreds of people took part in the execution of the work packages and worked very hard for two years to make PICMET ’01 a successful event. The Organizing Committee spent countless days to work on every aspect of the Conference. The “Core Team,” made up of our students in the Department of Engineering and Technology Management at Portland State University, took on major responsibilities as the project managers and project team members. They worked with tremendous enthusiasm to solve every problem that occurred. Their ever-increasing enthusiasm made the planning and organizing of PICMET ’01 a truly rewarding effort for all people involved. The Regional Coordinators represented PICMET around the world, contacted authors and reviewers, and provided a strong conduit between PICMET and the worldwide Technology Management community. The Program Committee provided invaluable assistance by organizing sessions, reviewing papers, and making accept/reject recommendations about the submissions. The Advisory Council provided guidance for the strategic direction of the conference. The Board of Directors monitored the progress and made the critical decisions. Finally, several public and private organizations saw the value of PICMET ’01 and provided financial support for it.

We acknowledge all of the people and organizations which supported PICMET, and extend our deep gratitude and thanks to every one of them.

Nine workshops are scheduled on Sunday, July 29, followed by the technical program. There are 171 sessions in PICMET ’01, including 4 plenaries, 2 Executive Forums, 15 tutorials, 12 panel discussions and special sessions, and 138 paper sessions. Approximately 80% of the presentations are research papers, indicated with an [R] preceding their title in this bulletin, and 20% are industry applications indicated with an [A].

The Executive Forums will be held from 11:30 to 13:30 on Monday and Tuesday. Top executives from leading companies will discuss the strategic trends in information technology in Monday’s Executive Forum, and the microprocessor industry in Tuesday’s Executive Forum.

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Dundar F. Kocaoglu, President and CEO

In addition, site visits have been arranged to several technology-based companies in Oregon for the guests to tour the facilities and to exchange ideas with the developers and managers of technology in those companies.

The papers scheduled for presentation at PICMET ’01 are clustered into twenty nine major tracks alphabetically listed below.

Collaboration for Technology Management
Competitiveness in Technology Management
Decision Making in Technol. Management
E-Business
Entrepreneurship
Environmental Issues in Technol. Mgmt.
Information/Knowledge Management
International Issues in Technol. Management
Management of Technical Workforce
Manufacturing Management
New Product Development
New Venture Management
Program/Project Management
R&D Management
Resource Management
Science & Technology Policy
Software Process Management
Strategic Management of Technology
Supply Chain Management
Technological Innovations
Technology Assessment & Acquisition
Technology Diffusion
Technology Management Education
Technology Management Framework
Technology Marketing
Technology Planning and Forecasting
Technology Transfer
Technology-Based Organizations
Telecomunications

We are pleased to hear from the participants that every PICMET is better than the previous one in terms of its contents, quality and the impact it is making on the technology management field.

We believe PICMET ’01 will have a major impact on the growth of the field and will contribute significantly to research, education and implementation of Technology Management. We hope you will find it beneficial and enjoyable.

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

Sincerely,

Dundar F. Kocaoglu
President and CEO

PICMET '01

PORTLAND INTERNATIONAL CONFERENCE ON MANAGEMENT OF ENGINEERING AND TECHNOLOGY

Portland, Oregon - USA July 29 - August 2, 2001

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PICMET ’01

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PICMET '01

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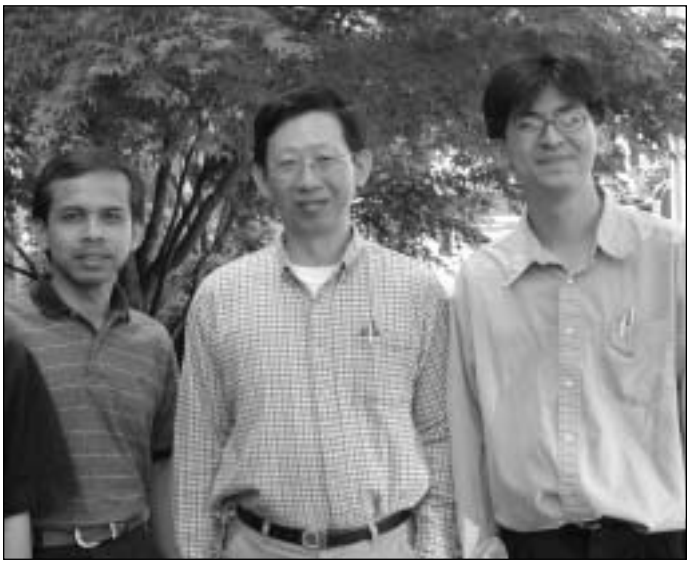

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LTM AWARDS

LEADERSHIP IN TECHNOLOGY MANAGEMENT AWARDS

PICMET 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. Andrew S. Grove, then CEO of Intel, was the first recipient of this award at PICMET '91; Norman Augustine, then Chairman of Lockheed-Martin, was the PICMET '97 recipient. At PICMET '99 Mr. Jack Welch, CEO of General Electric, received the award in the industry category, and Dr. Richard M. Cyert, President of Carnegie Mellon University, received it posthumously in the academic category.

Three awards will be given at PICMET '01: Dr. Modesto A. Maidique will receive it for the academic category, Donna Shirley for the government category, and Carleton S. Fiorina for the industry category. Brief background information on the 2001 recipients is given below.

Modesto A. Maidique
President, Florida International University

Modesto A. Maidique is the 4th president of Florida International University (FIU), a member of the State University System of Florida and the fastest growing research university in the United States. The university, known for its strong engineering and business programs, offers more than 200 degree programs from the baccalaureate to the doctoral level and has been cited seven times in U.S. News & World Report's annual ranking of "America's Best Colleges."

During his tenure at FIU, Dr. Maidique has presided over the establishment of the Schools of Architecture and Law, initiated the football program, and doubled enrollment to over 32,000 students today. In addition, sponsored research has increased more than seven-fold to $58.8 million, while endowment quintupled. In the year 2000, the university achieved the highest research rank given by the Carnegie Foundation for the Advancement of Teaching, and was granted the third Phi Beta Kappa chapter for a public university in Florida.

A graduate of the Department of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology (Ph.D.) and the Harvard Business School (PMD) program, Dr. Maidique has taught at both of his alma maters and at Stanford University. He is a world renowned authority on the management of high technology enterprises. For more than two decades — for institutions including the White House, Harvard and IBM — Dr. Maidique has provided counsel on critical management and educational issues impacting our nation.

Throughout his career in both the corporate and academic worlds, Dr. Maidique has been involved with high technology firms in a variety of capacities: as an executive in established and entrepreneurial high technology firms; as a consultant, lecturer, and director for multinational high technology giants; and as professor and lecturer at leading universities in the U.S. and abroad.

In 1970, Dr. Maidique co-founded a semiconductor company that now accounts for most of the sales of Analog Devices, Inc. (ADI), a $1.2 billion manufacturer of integrated circuits. He also served as president and CEO of Genome Therapeutics, a genetic engineering company, and as a general partner of Hambrecht & Quist, a venture capital firm. He has consulted and lectured for major American firms including IBM, Rockwell International, Honeywell, and Texas Instruments.

Dr. Maidique is the author of numerous articles in academic journals, a contributing author to ten books, and a co-author of *Strategic Management of Technology and Innovation,* a textbook now in its third edition, which is used at more than 100 colleges and universities. An article he co-authored, "The Art of HighTechnology Management," is one of the best selling articles published in the *Sloan Management Review.* He is also the co-author of *Energy Future,* a New York Times best seller on energy policy.

In 1989, former President George H. W. Bush appointed Dr. Maidique to the President's Educational Policy Advisory Committee. He also serves on the boards of National Semiconductor and Carnival Corporation, is Vice Chairman of the Miami Business Forum, and is past chairman of The Beacon Council, Miami's economic development authority. In 2000, President-elect George W. Bush appointed Dr. Maidique to the President's Education Advisory Committee.

Donna Shirley
Assistant Dean of Engineering for Advanced Program Development, University of Oklahoma. Former Manager, Mars Exploration Program

Donna Shirley is currently Assistant Dean of Engineering for Advanced Program Development at the University of

LTM AWARDS

Oklahoma, where she is participating in strategic planning and the development of new educational initiatives. She is also the official spokesperson for the Mars Millennium Project, an international, K through 12 educational initiative sponsored by the White House MillenNium Council, the Department of Education, the National Endowment for the Arts, the National Aeronautics and Space Administration, and the J. Paul Getty Trust.

In addition to three honorary doctorates, Ms. Shirley has a BS (University of Oklahoma) and MS (University of Southern California) in Aerospace Engineering, and a BA in Journalism (University of Oklahoma). She has over 35 years of experience in the aerospace industry, including more than 25 years in management. Her honors include the NASA Exceptional Leadership Medal; The American Society Of Mechanical Engineers Holley Award; and membership in the American Academy of Achievement, the Women In Technology International Hall Of Fame, and the Oklahoma Aviation and Space Hall Of Fame. She retired in 1998 from NASA's Jet Propulsion Laboratory where she was manager of the Mars Exploration Program.

The Mars Exploration Program - which was begun in 1994 with the highly successful Mars Global Surveyor and Mars Pathfinder missions - is sending orbiters, landers and/or rovers to Mars at every opportunity (every 26 months) through at least 2005, despite the loss of two missions in 1999. Prior to becoming manager of the program, Ms. Shirley managed the team which designed and built "Sojourner Truth," the Microrover which was landed by the Mars Pathfinder project on the surface of Mars on July 4, 1997. Sojourner investigated the Martian surface for nearly three months - more than ten times its expected lifetime. In her 32-year career at JPL Ms. Shirley's positions included: Project Engineer for the Cassini mission to Saturn, Manager of Exploration Initiative Studies, Manager of Automation and Robotics, Manager of JPL's Space Station Program, Manager of the Mission Design Section, and Project Engineer for the Mariner 10 mission to Venus and Mercury in 1974. Between 1990 and 93, as a part-time assignment, she established and led a NASA-wide Systems Engineering Working Group which developed and documented a standard systems engineering process for NASA Projects. As an outgrowth of this, in the summer of 1991 she led another NASA-wide team on Program/Project Management, which developed recommendations subsequently incorporated into the NASA Management Instruction for project management.

In addition to over 50 technical publications, she has written a book on *Managing Creativity* and has developed a class on that subject which is now offered at the University of Oklahoma in a variety of formats. She continues to be a widely sought-after speaker on subjects including Mars Exploration and Management, and has appeared in many national television news programs and documentaries. Broadway Books published her autobiography, titled *Managing Martians,* in 1998 and 1999.

Raised in Wynnewood, Oklahoma, Ms. Shirley now lives in Norman, Oklahoma. She has one daughter, Laura, who is a graduate student in psychology.

Carleton S. (Carly) Fiorina
Chairman and Chief Executive Officer, Hewlett-Packard Co.

Carleton S. (Carly) Fiorina is chairman and chief executive officer of Hewlett-Packard Company. HP is a leading global provider of computing and imaging solutions and services and is focused on making technology and its benefits accessible to all.

Since joining HP in July 1999, Fiorina has led HP's reinvention as a company that makes the Internet work for businesses and consumers. Under her leadership, HP has returned to its roots of innovation and inventiveness and is focused on delivering the best total customer experience.

Prior to joining HP, Fiorina spent nearly 20 years at AT&T and Lucent Technologies, where she held a number of senior leadership positions in sales and marketing. As president of Lucent's Global Service Provider Business, she expanded the company's international business and spearheaded the planning and execution of its initial public offering and subsequent spin-off from AT&T.

Fiorina holds a bachelor's degree in medieval history and philosophy from Stanford University; a master's degree in business administration from the Robert H. Smith School of Business at the University of Maryland at College Park, Md.; and a master's of science degree from MIT's Sloan School.

STUDENT PAPER AWARDS

STUDENT PAPER AWARD WINNERS

The number of students doing significant research in the area of Engineering and Technology Management was demonstrated by the 27 nominations received. This made the selection process difficult, but the following three winners stood out for their contributions.

Ajay Agrawal
Queen's University, Boston, Massachusetts

Public Sector Science and 'The Strategy of the Commons'

Advisor: Iain Cockburn

Abstract: This paper provides a game-theoretic explanation for the puzzling behavior of large firms (incumbents) who, while sponsoring university research labs, require all inventions generated by the sponsored labs be licensed openly on a purely non-exclusive basis. Under certain conditions, this results in an intellectual property "commons" with the consequence that no firm has the incentive to innovate, despite the potential profitability of the new technology. The strategy of spoiling incentives to innovate by eliminating exclusive intellectual property rights - the strategy of the commons - is motivated by a fear of cannibalization and supported by a credible threat. The author shows that the degree of cannibalization to which the new technology exposes the old market is responsible for this market failure and the author characterizes the sub-game perfect equilibrium in which "the strategy of the commons" is played. Within this framework welfare implications as well as strategy and policy issues are also investigated.

O.Ugur Yildirim
Yeditepe University, Istanbul, Turkey

Technology Processes Management Capability Profiles of Machine Manufacturers in Turkey

Advisor: M. Atilla Oner

Co-Authors: A. Nuri Basoglu, Bogazici University

Abstract: Technology Processes Management Capability Profiles Model (TPMCPM) integrates normative, strategic, and operational technology management levels with technology management subprocesses (identification, selection, acquisition, exploitation, protection, and abandonment of technology). This research aims to assess technology management capabilities and draw capability profiles of the machine manufacturing industry in Turkey.

Wilma W. Suen
Tufts University, Medford, Massachusetts

Managing International Technology Alliances: Ballard Power and Fuel Cell Vehicle Development

Advisor: Lee McKnight

Abstract: Multiparty international strategic alliances are becoming popular vehicles through which firms access resources, share risk, and learn. They are particularly useful in technology-based industries where products are becoming more complex and risk of failure is high. However, firms are profit maximizing actors who may behave opportunistically or defect in order to gain a larger share of the returns. This paper argues that power and interdependence between members, and between the firm and the alliance are key to determining a member's capability to act against its partners' or alliance's interests. The more powerful and less dependent the firm, the greater its freedom to act. The case of Ballard's alliance with DaimlerChrysler and Ford finds that alliances "construct" interdependence to balance the asymmetries in their relationships and tie the firms more closely together.

General Information

CONFERENCE FOCUS

The way we live is changing, the way we do business is changing, the way we organize ourselves is changing. The phenomenon described by the frequently used, mostly over-used term "paradigm shift" is already upon us.

As we enter the third millennium, the Internet is rapidly becoming the dominant force in changing the world around us. The Internet has already triggered the conversion from the old economy to the new, digital economy. This conversion is a vivid reminder that the future will belong to those who can harness this dominant force and manage it, rather than being managed by it. The new economy is not a collection of "dot.com" companies. It is the backbone that serves the entire economic system with every industry, every company, every individual affected by it and contributing to it. Regardless of what business we are in, regardless of what type of services or products we develop, we are all in the "new economy." We all have to abide by its rules to survive and to succeed. The new economy is the economic system of a new world, the digital world, or better yet, the "e-World."

How we create and manage the e-World will determine our direction. PICMET '01 pro-actively defines "Life in the e-World" as the engine that will establish the direction of the new economy and set the pace for it. It will set the pace for a world driven not by the brick and mortar of the previous eras, but by the ingenuity, innovation and creativity of the knowledge worker of the "Knowledge Era."

We will know that we are living in the e-World when the number of microchips reaches a level more than twice the world population. We will recognize that world when a college student in Shanghai will sell his bicycle to a young woman, electronically, and will see her only for the physical exchange of money for the bicycle. It will be the world when a surgeon in Johns Hopkins University will conduct a team of doctors through a rare operation in Italy without ever leaving Baltimore. We will be in the e-World when a teenager in Istanbul will pay for her bus ride by touching a screen with a ring she is wearing. We will know that we are living in the e-World when more than 10 million technology applications will be used to track the containers going through the Port of Singapore in one day. Imagine that the same day, millions of fresh cut flowers from around the Netherlands will be purchased in an auction and shipped to florists throughout the world within a few hours without the buyers and sellers ever seeing each other. Well...we are in that world today. All of these and many more events are taking place in an ordinary day right at this moment. In fact, these examples are from the book, *The Digital Day,* developed by Intel Corporation, and the videotape, *e-Planet: A Cyberday*, produced by CNBC during the year 2000.

Whether we recognize it or not, we are the citizens of the e-World. We are living a life that we never imagined even a decade ago. We are in a world where the survival of the fittest is determined by the ability to manage technology; and the demise is defined by the surrender to be managed by technology.
We believe that PICMET '01 will be the forum to equip the participants with the tools and concepts not only to cope with the challenges of the e-World, but to lead this new world through effective management of the technology that shapes it.

WHO SHOULD ATTEND

This high-impact conference will set the stage and define the directions of technology management for decades to come. The world's leading experts from academic institutions, industrial corporations and government agencies will participate in the discussions. The conference is essential for:

- Presidents and CEOs of technology-based corporations
- Vice presidents of engineering, R&D and technology in industrial organizations
- University presidents and administrators
- 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
- Students in Engineering Management, Management of Technology and related programs
- Government officials responsible for technology policy
- Government officials responsible for science and technology programs
- R&D managers in government laboratories
- R&D managers in corporations and industrial laboratories
- Engineering, manufacturing, operations, quality and marketing managers in technology-based organizations
- Project and product managers
- Information systems managers in industrial and service organizations
- Engineers and scientists moving from a technical specialty to a technical management position

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.

General Information

E-MAIL

Computers with Internet connections will be provided on Lower Level-2 (LL-2) below the Ballroom Level to give you the opportunity to check your e-mail and to send messages. You will need your host name/address, login name and password to use the system.

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: 08:00-09:30 B: 10:00-11:30 C: 13:30-15:00 D: 15:30-17:00 E: 17:15-18:45
Third and fourth digits show the room	01: Salon A 02: Salon B 03: Salon C 04: Salon D 05: Salon E 06: Salon G 07: Salon H 08: Salon I 09: Eugene 10: Portland 11: Columbia 12: Willamette 13: Douglas Fir 14: Meadowlark 15: Mt. Hood 16: Salmon

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 15:30 - 17:00 in Salon E.

AUDIO/VISUAL EQUIPMENT

Each session is equipped with an overhead projector, a flipchart and screen, and an LCD projector. A space in the area next to the e-mail stations on Lower Level-2 (LL-2) is designated as the Authors Room. If you need information about anything else concerning the conference, the Information Desk in the registration area will try to help you.

PICMET VOLUNTEERS

PICMET Volunteers wearing white golf shirts with the PICMET logo will assist the participants throughout the conference. If you need help in locating the room where your session will be held, finding a replacement bulb for the projector, or making a last-minute change in your transparencies, you can contact the PICMET Volunteers. They will do their best to help you. If you need information about anything else concerning the conference, the Information Desk in the registration area will try to help you.

PRESENTATION GUIDELINES

The Sessions: 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.

Guidelines for Session Chairs: 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.)

Guidelines for Speakers: 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.

MARRIOTT BUSINESS CENTER

A fully equipped business office is available on the Lobby Level of the hotel. A wide range of services is available from 6:30 a.m. to 9:00 p.m. Monday through Thursday, and from 6:30 a.m. - 5:00 p.m. on Friday.

The City of Roses

The following information about Portland is provided compliments of Portland Guide: Discovering Oregon, Published Quarterly by Skies America Publishing Company.

GETTING AROUND PORTLAND

Portland's public transportation is made up of the MAX (Metropolitan Area Express) train and Tri-Met buses. Buses and Max are free within a downtown area known as Fareless Square. Outside Fareless Square, fares range from $1.05 to $1.35, less for seniors, the disabled and youths. Tickets are interchangeable and can be purchased aboard buses or from ticket machines along the MAX line.

CLIMATE

The temperature in Portland varies between 56˚F (13˚ C) in the evening to 80˚F (27˚C) during the day, in July in Portland. The low humidity makes summer months very pleasant and comfortable. You may need a sweater or light jacket in the evening.

ATTRACTIONS

Bricks and ambiance are the two main ingredients that make up Pioneer Courthouse Square. Bordered by 6th and Broadway and Yamhill and Morrison, this people-watching common place is host to not only year-round events, but also to everyday brown-baggers and those wanting simply to rest and take in their surroundings. Starbuck's and Powell's Travel Bookstore also can be found on this popular property recognized locally as Portland's living room.

THE BREWERS FESTIVAL

Along with several nicknames such as the City of Roses, God's Country, and Stumptown, Portland is also known as the Microbrewery Capital of the World. Celebrating its 14th year, the Oregon Brewers Festival will be held at Tom McCall Waterfront Park on July 27-29. The Park is located on the west bank of the Willamette River, which is across street from the Portland Marriott Downtown. Seven local restaurants, 72 independent brewers, and live music will be featured throughout the weekend. Beer lovers have been coming to Portland from all over the world since 1988 for this annual event; 80,000 people are expected this year. If you like ales, bocks, porters, stouts, pilsners or barley wines, you won't want to miss this event. The main entrance is at Oak Street and Naito Parkway. Admission: Free, but a 2001 souvenir mug for $3.00 is required for tasting, and tokens are required for beer. Tokens cost $1 each: 3 tokens buys a 14-ounce mug of beer; 1 token buys a 4-ounce taster. Hours: Noon – 9 pm Friday and Saturday; noon – 7 pm Sunday.

A view of Portland from the International Rose Test Garden.

OMSI

Situated on the east bank of the Willamette River, the Oregon Museum of Science and Industry (OMSI) is the fifth-largest science museum in the country. Among OMSI's many attractions are six exhibit halls, the multi-storied OMNIMAX Theater and the Murdock Sky Theater. Visitors can play computer games, explore new technologies and even beam a message into space. Call for hours and admission prices. 1945 SE Water Ave., (503) 797-4000.

TOM McCALL WATERFRONT PARK

It's hard to believe this three-mile stretch along the Willamette River was once a busy expressway. Rather than impatient motorists, the park is now occupied with new types of movers—joggers, bikers and rollerbladers, as well as pedestrians in the mood for nothing more energetic than a stroll. Bordered by Front Ave., (Bill Naito Pkwy.), Tom McCall Waterfront Park is taken up during the warmer months with cultural and musical events, as well as overheated folks hoping to cool off in the Salmon Street Springs Fountain at the end of SW Salmon St. A Cruise along the Willamette on the Portland Spirit (conveniently docked by Salmon Street Springs Fountain) is another way to cool down while seeing Portland from a different vantage point.

PORTLAND ART MUSEUM

The Portland Art Museum lays claim to an impressive painting collection which includes the works of such masters as Renoir and Monet. The museum also houses permanent collections of Native-American, Asian, Pre-Columbian and West African art, as well as English silver and modern sculpture. Call for hours and admission prices. 1219 SW Park Ave., (503) 226-2811.

The City of Roses

OREGON HISTORY CENTER

Located in the heart of Portland's Park Blocks, the Oregon History Center's permanent and changing exhibits deal with Oregon and the Pacific Northwest, yesterday, today and tomorrow. The exhibits offer a combination of history and interactive technology for the enjoyment of visitors and residents alike. Call for hours and admission prices. 1200 SW Park Ave., (503) 222-1741.

THE GROTTO

Spread out over 62 beautifully wooded acres, the Grotto serves as both religious shrine and breathtaking garden. Carved into the base of a 110-foot cliff, Our Lady's Grotto enshrines a marble replica of Michelangelo's Pietá. An elevator connects the upper and lower levels of the sanctuary, with the upper level offering sweeping views of the Columbia River and Mt. St. Helens. Call for hours. NE 85th Ave. and Sandy Blvd., (503) 254-7371.

PITTOCK MANSION

One thousand feet above the city of Portland towers the stately Pittock Mansion. This historic 1914 property is an elegant, 22-room estate that sits on 46 acres of manicured grounds. The numerous hiking trails that surround the property are open to the public daily until nightfall. The Fate Lodge Restaurant, once a gardener's cottage, now serves lunch and afternoon tea during the week. Call for hours and admission prices to the mansion. 3229 NW Pittock Dr., (503) 823-3624.

POWELL'S CITY OF BOOKS

More than just a bookstore, Powell's is a Portland institution. The largest independently owned bookstore in the country, Powell's has more than one million volumes and covers a city block. For the easily confused (as well as many of the regulars), Powell's map helps guide browsers from one room to the next. Call for hours. 1005 W. Burnside, (503) 228-4651.

SATURDAY MARKET

In the great tradition of open-air markets, Portland's Saturday Market first assembled some 17 years ago beneath the Burnside Bridge, and has since become one of Portland's most frequented attractions. This weekend exhibition is filled with handmade items, food and sporadic entertainment. It runs every weekend from March through Christmas. It is open weekends, admission is free. Call (503) 222-6072 for hours.

WASHINGTON PARK

Washington Park is not only one of Portland's most beautiful sights, it also contains many of the city's favorite haunts. Lying within the park's expansive boundaries are not only the requisite children's play area, tennis courts and picnic areas, but such wonderful surprises as The Oregon Zoo, Japanese Garden, World Forestry Center, Hoyt Arboretum and the International Rose Test Gardens. Read on for more information on these attractions.

THE OREGON ZOO

This award-winning, 64-acre zoo is home to more than 875 animals representing more than 200 species. Among the zoo's many highlights is its African savannah exhibit which spotlights black rhinoceroses, giraffes, impalas, birds and zebras. The zoo's Asian elephant breeding program is world renowned. Its much-loved Packy, born in 1962, was, at the time, the first Asian elephant born in the Western Hemisphere in 44 years. Call for hours and admission prices. 4001 SW Canyon Rd., (503) 226-1561 or (503) 226-ROAR.

JAPANESE GARDEN

Portland's Japanese Garden is considered one of the most beautiful and authentic Japanese gardens outside of Japan. Five gardens make up these gorgeous grounds—the traditional Flat Garden (Hira-niwa), the serene Strolling Pond Garden (Chisen Kaiyui-Shiki), the Tea Garden (Rojiniwa) which includes a ceremonial tea house, the Sand and Stone Garden (Seki-Tei), and a miniature Natural Garden (Shukeiyen). Call for hours and admission prices. 611 SW Kingston Ave., (503) 223-1321.

WORLD FORESTRY CENTER

Providing a dramatic introduction to the World Forestry Center is the 70-foot tall "talking tree," which illustrates the basic principles of tree growth. Also at the Center is a dramatic permanent exhibit entitles "Smithsonian Tropical Rainforests: A Disappearing Treasure." This Smithsonian exhibit features displays of tropical plants and animals, and tells the story of three families through life-size dioramas. A 15-minute multi-media show explores the heart of the rainforest in Borneo. Also at the World Forestry Center is a walk-through exhibit of Old Growth Forests which offers a Northwest perspective on forest ecology and conservation issues. Call for hours and admission prices. 4033 SW Canyon Rd., (503) 228-1367.

The City of Roses

HOYT ARBORETUM

Ten miles of trails filled with an astounding 700 species of trees and shrubs as well as breathtaking views make up Washington Park's Hoyt Arboretum. The nation's largest assortment of conifer species can be found on the arboretum's 175 acres. Spiraling up the southwest corner of the arboretum is the Vietnam Veterans' Living Memorial, which honors Oregonians who died or are still missing from that conflict. 4000 SW Fairview Blvd., (503) 823-3654.

INTERNATIONAL ROSE TEST GARDEN

Whether you want to take in spectacular scenery or the luscious smell of fragrant roses, the International Rose Test Garden offers both. Approximately 10,000 plants, among which are more than 400 varieties of roses, flourish high above a breathtaking city view. Established in 1917, the International Rose Test Garden is the oldest operating test garden in the country. Admission is free year-round. 400 SW Kingston Ave.

PORTLAND CLASSICAL CHINESE GARDEN

The garden is one of Portland's newest attractions. Located in Portland's Old Town/Chinatown, the "Garden of Awakening Orchids" is a collaboration with Portland's Chinese sister city, Suzhou. Inside the walled city block is a mix of pavilions, rocks, plants and walkways surrounding an 8,000-square-foot pond. Admission: Adults $6.00, Seniors (62+) $5.00, Students $5.00, Children 5 and under free. Northwest Third and Everett St. (503) 228-8131.

SHOPPING PORTLAND'S DOWNTOWN

Portland's downtown area is just plain fun to shop. While all roads lead to Damascus, at times it seems all shops open to Pioneer Courthouse Square—or some other equally delightful Portland landmark. A shopping trip in Portland is not just a nearly always successful mission, but a sightseeing excursion as well. Here are just a few of Portland's downtown shopping staples.

At Meier & Frank, shoppers can update their wardrobe, buy a mattress and matching bedroom set, check out the gourmet kitchen gadgets, and pick out that stereo system for the kid's birthday or fine china for that friend's wedding. 621 SW 5th Ave. (and branches at most of the major malls), (503) 223-0512.

Nordstrom is famed for its emphasis on service and its upscale yet not stuffy fashion. Clothing offerings for men, women and children run the gamut from tres chic to tres trendy. 701 SW Broadway (and most major malls), (503) 224-6666.

If you're looking for elegance—understated or otherwise—Saks Fifth Avenue is the place to shop. American and European designer wear for both men and women is spread over two levels, as is Saks' own line of clothing. SW Fourth and Fifth Aves., (503) 226-3200.

PORTLAND'S MALL SCENE

A mall is not a mall is not a mall—something Portland recognized early on. Shoppers will find a measure of eclecticism within the following area malls:

Pioneer Place is four airy levels of glass, greenery and fountains. Saks Fifth Avenue anchors Pioneer Place's 80 specialty shops. 700 SW Fifth Ave., (503) 228-5800.

Nestled in the John's Landing area along the Willamette River, the Water Tower offers a collection of specialty shops and restaurants in quaint surroundings. 5331 SW Macadam Ave., (503) 228-9431.

Just this side of the Columbia River is Jantzen Beach Center. Recently renovated, it offers wonderful surprises including a 1921 C.S. Parker carousel. 1405 Jantzen Beach Center, (503) 289-5555.

The nation's first major mall, Lloyd Center offers some 200 specialty shops in addition to familiar anchors. An ice rink offers entertainment. Bordered by Multnomah and Broadway, 9th and 15th Streets, (503) 282-2511.

Washington Square pulls shoppers into its many specialty shops with the help of several popular anchor stores. 9585 SW Washington Square Rd., off Hwy. 217, (503) 639-8860.

Clackamas Town Center's 185 specialty shops and popular anchors are offset by an ice rink. 12000 SE 82nd, (503) 653-6913.

Woodburn Company Stores, Oregon's newest and largest outlet center, features shops including Banana Republic Factory Store, Calvin Klein, Eddie Bauer, Great Outdoor Clothing Company, and Polo Ralph Lauren Factory Store to name a few. Take I-5 south to the Woodburn exit 271, (888) 664-SHOP.

GALLERIES

The Pearl District, loosely bordered by W. Burnside and NW Hoyt, NW 13th and NW Park, represents a good share of the gallery arena and comes to serious life on First Thursday each month with after-hours gallery scensters.

Galleries can also be found in fairly concentrated numbers in the Skidmore District (roughly between Front and Fourth Aves. from SW Oak to NW Glisan St.) and the city's downtown core. Not to be overlooked are galleries throughout the metro area as well.

SOCIAL EVENTS

There is a variety of social events to facilitate informal interactions of the PICMET '01 participants.

WELCOME RECEPTION—10TH ANNIVERSARY CELEBRATION

Sunday, July 29; 19:00 – 22:00
Ballroom-Portland Downtown Marriott Hotel
Dress: informal

Meet other conference attendees, renew old acquaintances and begin new friendships and collaborations and start PICMET '01 in a festive mood at this opening reception at the Marriott Hotel's Ballroom. **Included in the registration fee.***

DINNER AT THE WORLD TRADE CENTER

Monday, July 30; 19:30 – 22:00
Two World Trade Center, 121 SW Salmon St.
Dress: informal

PICMET attendees will enjoy a deliciously prepared dinner buffet at the World Trade Center's 10,000 sq.-ft. covered outdoor Plaza, located at 121 SW Salmon St., on the block between Front and First Avenues, and Salmon and Taylor Streets, a short walk from the Marriott Hotel. **Included in the registration fee.***

AWARDS BANQUET

Tuesday, July 31; cash bar at 19:00 – 20:00
Ballroom—Portland Marriott Downtown
Dinner at 20:00 – 22:30
Dress: business attire

This is the premier social event of the conference. Keynote speeches will be delivered, and the PICMET '01 "Leadership in Technology Management" and "Outstanding Student Paper" awards will be presented at the banquet. Guests will have a relaxed evening with a taste of delicious Northwest cuisine. Three dinner choices are: filet mignon, fresh salmon, and vegetarian. **Included in registration fee.***

DINNER CRUISE

Wednesday, August 1; 19:00 – 21:30
***Portland Spirit* Cruise Ship**
Boarding starts at 18:30
Dress: casual

Conference participants who sign up for the dinner cruise will board the Portland Spirit at downtown Portland's Riverplace Marina, a short walk from the hotel. The ship will head south on the Willamette River to the city of Lake Oswego. Dinner will be served buffet style, and there will be a cash bar. The boat will return to the Marina just as the sun is setting and the city lights are sparkling. **The price is $85; space is limited.**

Spirit of Portland

The one-day registration does not cover any of the social events. The student registration fee includes the Sunday evening reception, but does not cover Monday or Tuesday evening events. Tickets for these events may be purchased at the registration desk.

TRAVEL AND EXCURSIONS

SITE VISITS

Site visits to the following companies will be offered during PICMET '01.

INTEL CORP.

Monday, July 30, 09:00 – 12:30
Monday, July 30, 13:00 – 16:30
Wednesday, August 1, 13:00 – 16:30

Take a close look at the world's dominant microprocessor manufacturer. You will visit Intel's "high mix, low volume motherboard assembly operations with focus on new product introductions," located in the Portland metropolitan area. Intel's Oregon site employs over 14,000 people and is the largest Intel site in the world (maximum 10 per group).

Group 1 – Monday, July 30, 09:00 - 12:30

Group 2 – Monday, July 30, 13:00 - 16:30

Group 3 – Wednesday, August 1, 13:00 - 16:30

NIKE, INC.

Tuesday, July 31, 13:00 – 16:30

Portland is the home of Nike, the world's foremost sport products company. You will tour the world headquarters, a dazzling campus that includes a collection of buildings named for sports' best - Michael Jordan, Pete Sampras, Jerry Rice, etc. Note that this 45-minute tour does not include any manufacturing facilities.

FREIGHTLINER A DAIMLERCHRYSLER COMPANY

Wednesday, August 1, 09:00 – 12:30

Visit North America's No. 1 manufacturer of medium- and heavy-duty diesel trucks and specialized chassis. Freightliner's medium-duty line of trucks is the industry's fastest growing full product line and is regarded as the technological benchmark for truck manufacturing. You will see one of their assembly lines, which includes robotics technology and puts out 72-74 trucks a day.

GUEST PROGRAM

PICMET '01 participants who are bringing guests (a spouse or relative, for example) can register them for the Guest Program. The fee includes admission to all evening social events, with the exception of the Portland Spirit dinner cruise, as well as daily continental breakfasts, which will be served from 08:30 - 10:30 in the Salmon Room on the third floor of the Portland Marriott. The Salmon Room has a patio area surrounded by delightful gardens, so if the weather is nice, guests can enjoy their breakfast outside **(registration fee: $125 by May 1, 2001; $150 after May 1, 2001).**

PORTLAND, OREGON

Portland was listed as the *Money* magazine's No. 1 Choice of "The Best Places To Live" in an article in the December 2000 issue of the magazine. The following excerpts have been taken from that article.

Ask nearly anyone who lives in Portland what makes it great, and you'll be listening for a very long time. Portlanders are deeply passionate about their city—and rightly so. There's plenty to be proud of, especially the city's successful transformation from old timber town to high-tech hub. Portland is home to more than 1,200 technology companies, from Intel—the largest private sector employer—to Hewlett-Packard, Epson, NEC and scores of small software firms. That's made it one of the best job markets in the country. The region ranks in the top 20% of all metro areas in recent job growth and is expected to see a 26% increase in jobs in the next 10 years.

If all this tech talk makes it sound a bit like San Francisco, well, it is, but without the hassles and expense. That put Portland high on our list, yet there's so much more that makes it this year's best place to live. Let's start with the great character of the city itself. Three decades of keen planning have reined in urban sprawl and given rise to a mini-metropolis with short, easy-to-stroll blocks renowned for java joints, brewpubs and bookstores. A superb light rail network and a new streetcar system are helping to make it a cinch to get around. There's loads of culture, from the Portland Art Museum to local rock clubs...

Then there is the other major reason to recommend Portland: its stellar location in the heart of the beautiful Pacific Northwest. It's an area of unparalleled natural beauty, abundant with recreational opportunities, from skiing at majestic Mount Hood to windsurfing at the Columbia River Gorge and white-water rafting on the Clackamas River. Overall, there are 9,500 acres of parkland in the region, twice as many as in Denver. Not enough fun for you? Oregon's wine country is a hop away, as are rugged Pacific Ocean beaches. "Within an hour of the city you can be on a mountain, at the beach, in the desert or in the middle of a forest," says Portland native Matthew Subotnick, 28, creative services director for KXL radio. "You can't beat it." (*Money* magazine, December 2000, pp. 150-151)

TRAVEL AND EXCURSIONS

TOURS & TRAVEL

If you are coming to the Pacific Northwest for PICMET '01, why not take a vacation while you are here? PICMET has designated **Joan Sher at GK Ltd. Travel** of Portland, Oregon, as the official travel agent for the conference. She will help you plan any aspect of your trip, including airline reservations, car rentals, pre- and post-conference trips, and tours while in Portland.

The list of things to see and do in the Northwest is endless. Do you like to golf? Perhaps a trip to the resort city of **Bend** in the high desert of Central Oregon would be the place for you to relax and enjoy incredible views of the Cascade Mountains while golfing on one of 20 courses in the area. Or spend a few days at the **Oregon Coast** where you can whale watch, visit the end of the Oregon Trail, or just sit on the sand and enjoy breathtaking scenery. **Southern Oregon** offers the Tony award-winning Oregon Shakespeare Festival in the quaint town of Ashland. Between shows you can jet boat or raft down the scenic Rogue and Klamath Rivers. Wine connoisseurs would enjoy a visit to Oregon's wine country south of Portland in the **Willamette Valley.** If you would like to venture a little further, Las Vegas, Reno, San Francisco, Seattle, Vancouver, and Victoria, B.C., are all easily accessible from Portland. These are just a few examples of the many exciting adventures you could have while you are in the area. Joan will arrange special and personalized trips for you upon request.

Joan Sher can be contacted by phone (1-800-284-4180 or 1-503-635-7766), fax (503-635-7781), or e-mail (Joangktvl@aol.com).

EXCURSIONS

Several tours are offered to PICMET '01 participants to give guests an opportunity to see some of Oregon's spectacular scenery. We strongly recommend that you preregister for these tours because space is limited. PICMET reserves the right to cancel a tour if minimum requirements are not met.

WINE AND ART

Sunday, July 29, 2001; 09:30 – 16:00
$85.00; lunch is included

The first stop on this tour will be the Lawrence Gallery. Check out the art in the gallery, or visit Fireye Pottery or the antique shop that are in the same complex. Weather permitting, a catered lunch will be served outside in the gallery's garden. Next we will visit two of Oregon's award winning wineries in the beautiful rolling hills of Yamhill County, southwest of Portland: Rex Hill and Erath Vineyards. You will be given a step-by-step tour of the wine making process and will be able to sample some of the varieties from each winery.

PORTLAND CITY TOUR

Monday, July 30, 2001; 13:00 – 17:00
$45.00

This tour will take you through Portland's areas of special interest. We will travel through Old Town and China Town. We will show you the New Pearl District, and for the shopper, a drive along 23rd Street with its unique shops and restaurants will stay in your memory until you find a way to return and do some serious shopping. We will then visit Portland's West Hills to see the world-renowned International Rose Test Garden, Council Crest, and Pittock Mansion.

THE OREGON GARDEN AND SHOPPING AT WOODBURN OUTLET MALL

Tuesday, July 31, 2001; 09:00 – 16:00
$45.00; lunch is not included

Join us for a morning visit to one of Oregon's growing attractions, The Oregon Garden. Opened this year, the garden features 240 beautifully landscaped acres southeast of Portland near Silverton, Oregon. A brief tour will be arranged, and you will also have plenty of time to stroll at your leisure.

After the garden, we will visit the newest and largest outlet mall in Oregon. The Woodburn Company Stores feature top-name designers and manufacturers offering substantial savings over regular retail stores. Discount coupons will be provided, and remember-Oregon has no sales tax! We will give you several hours to shop. Lunch will be no host.

CANNON BEACH

Wednesday, August 1, 2001; 09:30 – 16:30
$45.00; lunch is not included

Spend the day strolling along Oregon's most photographed beach or visiting the many art galleries, cafes, restaurants, boutiques and shops that line the streets of Cannon Beach, overlooking the impressive "Haystack Rock." Lunch will be no host.

WORKSHOPS

SUNDAY, JULY 29

MORNING WORKSHOPS
08:30 – 12:30

WS-1: ***Technological Forecasting,*** **Dr. Joseph P. Martino, JPM Associates, University of Dayton, USA**
This workshop is a perennial winner in PICMET conferences, attracting a large number of attendees. Providing an introduction to classic and new technological forecasting methods and practices, the workshop equips you with a state-of-the-art snapshot of the field toolbox. Topics included will be growth curves, trends, scoring models, measures of technology, environmental monitoring, and applications to R&D planning.

Dr. Joseph P. Martino is an independent researcher and consultant in the field of technology management. He has written numerous articles and books on technological forecasting and R&D Project Selection. He is Associate Editor of the journal *Technological Forecasting and Social Change,* and is a member of the editorial advisory board of the journal *IEEE Transactions on Engineering Management.* He is a Fellow of the IEEE. He was a Senior Research Scientist at the University of Dayton Research Institute, and prior to that served in the U.S. Air Force, retiring in the grade of Colonel.

WS-2: ***Use of Patent Information for Strategic Business Planning,*** **Dr. Holger Ernst, Otto Beisheim Graduate School of Management, Germany**
Building on on-line databases and CD-ROM facilities, this workshop provides the participants with a roadmap for systematic and continuous evaluation of patent information in order to answer some of the most critical business questions: how to detect and evaluate technological changes in the competitive environment of the firm; how to evaluate the productivity of R&D in comparison to the competition; how to identify changes of technology strategies of the competition; how to find leading inventors in a specific technological field, etc. The workshop also shows you how to use answers to the questions for strategic business planning.

Holger Ernst was born in Siegen, Germany, in 1966. He studied Business Administration at the University of Kiel, Germany, and the University of Illinois at Urbana-Champaign, USA. He received a degree in Business Administration (1992) and his Ph.D. (1996) from the University of Kiel. In his Ph.D. he developed tools in order to use patent information for strategic R&D planning in companies. The dissertation has received rewards from academia as well as from practitioners. He has published many articles on patent issues since then and also consults major European corporations on this topic.

He now runs the chair for technology and innovation management and is co-director of the center for entrepreneurship at the Otto-Beisheim Graduate School of Management (WHU), Vallendar, Germany. WHU is one of the leading private business schools in Europe. At the WHU he teaches in the Master's program, the Executive MBA program with Northwestern University (Kellog), Evanston and the Merck University, a management education program for top executives.

His main research interests lie in the fields of technology management, new product development, entrepreneurship, and e-business. He has published articles in leading US journals in this field such as the Journal of Engineering and Technology Management and IEEE Transactions on Engineering Management and leading European journals such as Research Policy, R&D Management, Technovation, Zeitschrift für Betriebswirtschaft and Zeitschrift für Betriebswirtschaftliche Forschung.

He is also founder of a management consulting firm which focuses on improving technology management and new product development in firms.

WS-3: ***Managing New Corporate Ventures: People-Process-Politics,*** **Dr. David Wilemon, Syracuse University, USA**
An excellent approach for managing emerging opportunities is a venture team. This seminar gives fresh perspectives and insights about successfully managing new ventures. Specifically, focus is placed on how to manage the "fuzzy front-end" of a new technology; organize venture teams within mature organizations; create & maintain organizational support; keep the venture team focused and motivated; manage venture complexity; overcome bureaucratic inertia; use discovery and learning-based planning;

WORKSHOPS

and examine why venture teams succeed and fail. Participants learn the critical success factors necessary for companies to be highly agile, imaginative, and successful in managing innovative new ventures.

Dr. David Wilemon is Snyder Professor of Innovation Management and Entrepreneurship in the School of Management at Syracuse University. He also directs the Snyder Innovation Management Research Center and the Entrepreneurship and Emerging Enterprises Program. He is an active researcher in the areas of corporate ventures, product development, project management, and high-performing teamwork. He is a co-founder of the Product Development and Management Association (PDMA). His major professional interests focus on factors that create and support highly innovative organizations.

His research has appeared in the *Academy of Management Journal, Journal of Marketing, California Management Review, Sloan Management Review, Columbia Journal of World Business, Transactions on Engineering Management, Journal of Product innovation Management, Technology & Engineering Management,* and *R&D Management*. He has consulted with several companies including AT&T, Lucent Technologies (Bell Labs), Apple, IBM, GE, Schlumberger, Anaren Microwave, Welch-Allyn, 3M, NASA, Upjohn, the U.S. Air Force, the European Space Agency, Ohmeda, Management Centre Europe, Data General, Bank of Brazil, Universal Instruments, Royal Bank of Canada, and Bechtel. He also serves on the Board of Directors of Anaren Microwave.

WS-4: *Third Generation Methods for Recognizing, Evaluating and Building Competences and Resources,* Dr. John Mills and Dr. Mike Bourne, University of Cambridge, England
This workshop starts with its foundation stones:

- Technology strategy depends on a deep understanding of a firm's tangible and intangible resources.
- It is from this understanding that technology development choices are made.

Then, the tools that help managers identify and evaluate their strategically important resources and competences are described. Participants are involved in case studies. Finally, frameworks and performance measurement tools are described for building on a firm's resource and competence base.

John Mills spent 20 years with Shell International and Philips Electronics prior to joining the University of Cambridge in 1992. He holds degrees in control engineering, neurocommunications and business administration. His industrial experience ranges from operations research consultancy within the oil exploration, production and distribution industries and factory, development and business management in consumer electronics, white goods and mobile communications sectors. His research focuses on the development of practical processes for the formation and implementation of manufacturing and R&D strategies and the design of coherent performance measurement systems. He is lead author on the strategy workbooks 'Creating a Winning Business Formula' and 'Competing through Competences' (provisional titles) to be published by Cambridge University Press in Summer 2001.

AFTERNOON WORKSHOPS
13:30 – 17:30

WS-5: *Fast-Start Technology Roadmapping,* Dr. Rob Phaal and Dr. D.R. Probert, University of Cambridge, England
This workshop focuses on the practical application of technology roadmapping in the firm. Its purpose is to help business, technology, and product managers link technology investments to product and business strategies. Methodology is provided to allow a company to quickly explore the potential benefits of the roadmapping process. To enable fast learning, the participants use a group exercise to practice the methodology.

Robert Phaal joined the Centre for Technology Management at Cambridge University in 1997, and is currently engaged in a research programme to investigate strategic technology management issues in business. The particular focus of the research project is how to link technology resources to company objectives, in order to develop a set

of practical and well-founded tools to support technology strategy and planning initiatives in the firm. Outputs include a guide for supporting 'fast-start' technology roadmapping, supported by a tool catalogue. Robert has a background in mechanical engineering, consulting and contract research.

David Probert is currently the Head of the Centre for Technology Management. He had and industrial career with Marks and Spencer and Philips for 18 years before returning to Cambridge in 1991. His experience covers a wide range of industrial engineering and management disciplines in the UK and overseas. Following his research in the area of make-or-buy, he recently published 'Developing a make or buy strategy for manufacturing business' with the Institute of Electrical Engineers.

WS-6: ***Building A Business Case for A Radically Innovative Technology,*** **Dr. John A. Bers, Vanderbilt University, USA**
How do you build a "resilient" business strategy for a radically new technology? In this workshop, participants develop a business plan for a revolutionary technology. Using the techniques of multiple scenario analysis, demand modeling, and cash flow analysis, this workshop takes the participants through the process step-by-step.

Dr. John A. Bers is Associate Professor of the Practice of the Management of Technology at Vanderbilt University's School of Engineering. His interests focus on how technology and industrial companies identify actual and hidden assets and realize their business value in current and emerging markets.

John's career in strategic marketing and business development spans thirty years and several high-technology industries. Before joining the faculty at Vanderbilt, John managed strategic analysis and business development at Northern Telecom Inc., and strategic and technical planning for the Gas Research Institute, the research and development arm of the U.S. natural gas industry. He has also been in private practice as a technology marketing consultant.

John's formal education includes a B.Sc. from Yale University in physical chemistry, an MBA from the University of Chicago, an interdisciplinary doctorate from Harvard in planning and business strategy, and a Ph.D. in Management of Technology from Vanderbilt University. He has been an active member of several national and regional professional societies and has made numerous presentations on strategic business development and repositoning to national and regional audiences.

John also recently developed and taught one of the nation's first pure Internet graduate level courses in the marketing of advanced technology products and services. Other university teaching assignments have included courses in the dynamics of technological change, technology policy, business policy, principles of marketing, industrial marketing, electronic commerce, and management of technology. He currently serves on the faculty of National Technological University, the nation's leading provider of advanced technical education and training from a distance.

WS-7: ***Managing High-Technology Projects,*** **Dr. Hans J. Thamhain, Bentley College, USA**
This intensive workshop provides seasoned managers and project leaders with a forum for discussing technology-based project management concepts, tools, and techniques. The emphasis is on best-in-class practices applied to new product projects. Participants are exposed to the latest techniques for tracking and controlling projects, compressing the time-to-market cycle, managing innovations under cost and time pressures, and dealing with risk, conflict, and commitment.

Hans J. Thamhain specializes in technology-based project management. He has combined a career of RD&E and business management with university teaching and research. Currently a Professor of Management and Director of Project Management Programs at Bentley College, Boston, his industrial experience includes twenty years of high-technology management positions with GTE/Verizon, General Electric, Westinghouse and ITT. Dr. Thamhain has PhD, MBA, MSEE and BSEE degrees. He is well known for his research on technology-based project control and team leadership, and has written over seventy research papers and five professional reference books in project and technology management. Dr. Thamhain is the winner of the IEEE Engineering

WORKSHOPS

Manager of the Year 2000 Award and a Certified Project Management Professional, PMP.

WS-8: *Product Offerings in the Digital Economy,* Dr. Jean-Claude Balland, JCB Associates, USA
The Digital Economy is forcing all companies to reconsider their offerings. Historically a product and technology matter, products in the Digital Economy need to extend beyond the tangibles to include services, information, and other intangibles. An entire new value proposition needs to be created. This workshop provides the participants with a broad understanding of the key changes the Digital Economy is bringing and how they impact the traditional definition of products. The participants then learn to assess the vulnerability of a product and how to reinvent an existing offering into one that is Digital-Economy ready.

Dr. Balland is a high-technology business consultant, professor, and lecturer with extensive experience in sales and marketing management of high technology products in Europe, the United States, and Japan. His consulting practice, JCB Associates, helps companies address the strategic management issues that the digital economy is bringing upon them. Previously, Dr. Balland was director of internet marketing at Mentor Graphics Corporation. He also was a division marketing manager with Tektronix, Inc. for several years. Dr. Balland holds an EE from INSA in Lyons, France, and a Ph.D. in Physics from University of Lyons, France.

WS-9: *Decision Making in Complex Environments,* Dr. Thomas L. Saaty, University of Pittsburgh, USA
The Analytic Hierarchy Process (AHP) engages decision makers in breaking down a decision into smaller parts, proceeding from the goal to criteria to subcriteria down to the alternatives of action. To capture the complexity of the decision problem, wide participation is encouraged in constructing the hierarchy. The decision maker then makes only simple pairwise comparison judgments throughout the hierarchy to arrive at overall priorities for the alternatives of action. The decision problem may involve social, political, technical, and economic factors. Where there are several parties involved, negotiation may be required. The AHP helps people cope with the intuitive, the rational and the irrational, and with risk and uncertainty in this complex setting. This workshop includes a two-hour lecture and Expert Choice software exercises on the Analytic Hierarchy Process. The participants will receive a copy of the software. They are encouraged to bring their laptops to the workshop.

Thomas L. Saaty holds the Chair of University Professor at the University of Pittsburgh with appointments in the Operations Research Group of the Graduate School of Business, in Mathematics, Industrial Engineering, Philosophy of Science, sociology, International Security, and the Graduate School of Public and International Affairs. He came there in 1979 after ten years on the faculty of the Wharton School at the University of Pennsylvania. He was also Executive Director of the Conference Board of the Mathematical Sciences. He received his Ph.D. in mathematics from Yale University and did post doctoral work at the University of Paris. He then began his career with the MIT Operations Evaluation Group followed by several years at the office of Naval Research, one of which he spent as Scientific Liaison Officer at the U.S. Embassy in London. He is the author of 20 books in fields ranging from Operations Research and Management Science to Conflict Resolution, Urban Design and Behavioral Mathematics. Dr. Saaty is the originator of the Analytic Hierarchy Process (AHP) and partner with Professor Ernest H. Forman, of George Washington University, in producing the computer software package Expert Choice based on the AHP. He has lectured and consulted on the process and its uses in the United States and abroad to numerous business, government and academic communities. He has authored and co-authored twelve books on this subject, one of which, *Decision Making for Leaders,* has been recently translated to seven languages, and another, *Multicriteria Decisions: The Analytic Hierarchy Process*, translated to Chinese and Russian.

PLENARIES

Plenary Session—1
STRATEGIC DIRECTIONS OF THE e-WORLD

Date: Monday, July 30, 2001
Time: 08:00 - 09:30
Room: Salon E - Lower Level 1

Moderator: Al Herman

Al Herman is founder and President of Quantric Corporation, a management-consulting firm providing strategic management services to high-tech companies. Prior to founding Quantric, Dr. Herman was VP and General Manager of Planar Advance, Inc., a developer and manufacturer of flat panel displays and display systems in Beaverton, Oregon. For nine years prior to that he was President and General Manager of Tektronix Federal Systems group with businesses in electronic displays and electronic test equipment. During the preceeding nine years he held various senior management positions with Gould, Inc. including Corporate VP of Product and Technology Development, Group VP of Finance and Planning, VP of Advanced Programs and VP of Business Development. Dr. Herman has a BA in Mathematics, an MBA in Finance and Marketing and a PhD in Strategic Management. His doctoral research examined the technology strategies of 100 US electronics companies and their financial performance correlates. He currently teaches a graduate course in Competitive Strategy at Portland State University. Industry affiliations include the Institute of Electrical and Electronics Engineers (IEEE), the International Society for Optical Engineering (SPIE), the Society of Competitive Intelligence Professionals (SCIP) and Omega Rho, the Operations Research honor society.

Speaker: William R. King holds the title University Professor in the Katz Graduate School of Business at the University of Pittsburgh.

He was the Founding President and the first Executive Director of the Association for Information Systems (AIS)—a global organization of 1800 Information Systems academics. He has also served as President of The Institute of Management Sciences (TIMS)—an 8000 member international professional organization, as Editor-in-Chief of the *Management Information Systems Quarterly*—the core journal in the IS field—and as General Chairman of the International Conference on Information Systems (ICIS)—the premier research conference in the field.

Dr. King has published more than a dozen books and has authored more than 300 papers in the leading journals of management science, strategic management, and information systems. His coauthored book, *System Analysis and Project Management,* won the McKinsey Foundation Award as a "significant contribution to the literature of management" and his co-edited book, *Project Management Handbook,* was named as "Book-of-the-Year" by the Institute of Industrial Engineers in 1984. He has received numerous other awards for his scholarly contributions including being named a Fellow of the American Association for the Advancement of Science, the Association for Information Systems and the Decision Sciences Institute.

As a consultant to a wide variety of international business firms such as Lockheed and Westinghouse (U.S.), Sulzer (Switzerland), and IBM (Australia), Dr. King has had significant impact on management practice and policy. As a staff member representing Senator Sam Nunn on the U.S. Senate Committee on the Budget, he performed studies that have had major impact on governmental policy.

In his leadership roles in TIMS, Dr. King motivated major change including conceiving and implementing a joint merger planning process between TIMS and the Operations Research Society of America that resulted, in 1994, in the creation of INFORMS—a 15,000 member global organization. Similarly, he put ICIS on a sound financial and administrative basis for the first

time and led activities involved in conceiving, developing, developing funding for, implementing and selecting the first editor for *Information Systems Research,* which has become the premier research journal in the IS field.

At the University of Pittsburgh, Dr. King redesigned, obtained faculty approval for, and implemented a new doctoral program that grew substantially in size and quality under his leadership. That program is now regarded as one of the finest in the nation. He was instrumental in the award of a multi-million dollar grant to the University of Pittsburgh by IBM Corp. for research and curriculum development in the management of information systems (MOIS). An innovative double degree, MBA-MS in MOIS, "techno MBA" program was established as a result. This program is ranked as one of the best such programs in the world. Dr. King has also been the recipient of research grants from the National Science Foundation and numerous other sources. He has led the development of three areas of research and instruction at Katz—management science, information systems and strategic management—founded and directed the Strategic Management Institute, redesigned, obtained faculty approval for, and directed the Katz School's Ph.D. program, which is widely regarded as one of the best in the world. He has also been active in University-wide planning and was co-founder of a multi-school graduate program in Telecommunications.

Dr. King received his Ph.D. from Case Institute of Technology (now Case Western Reserve University) in 1964 after completing a BS with honors in Industrial Engineering at the Pennsylvania State University and a MS from Case. He has previously served on the faculty of the Case Institute of Technology and the Air Force Institute of Technology (active military duty).

Speaker: Dr. Jay Lee is Wisconsin Distinguished and Rockwell Automation Professor at the Univ. of Wisconsin-Milwaukee as well as Director of Industry/University Cooperative Research Center on Intelligent Maintenance Systems (IMS). Previously, he served as Director for Product Development and Manufacturing at United Technologies Research Center (E. Hartford, CT), and was responsible for the strategic direction and R&D activities for next-generation products and services and to support United Technologies Corp's diversified business units, including Pratt & Whitney's jet engines, Sikorsky helicopters, Carrier air conditioning systems, Otis elevators, Hamilton Sundstrand aerospace components, and International Fuel Cell.

Prior to joining UTRC, he served as Program Directors for the Engineering Research Centers (ERCs) Program, the Industry/University Cooperative Research Centers (I/UCRCs) Program, and the Design, Manufacture, and Industrial Innovation (DMII) Div. at the National Science Foundation (NSF) during 1991-1998. Prior to joining NSF, he held several engineering and research management positions at Robotics Vision Systems, Inc. (RVSI) , Anorad Corp (a Rockwell Automation company), and the Office of Advanced Technology of the U.S. Postal Services-HQ. Previously, he had served as an adjunct professor for a number of academic institutions, including Johns Hopkins University, where he had served a part-time faculty member for the Hopkins Technical Management Program as well as for the School of Engineering and Applied Science during 1992-1998. He conducted research work at the Mechanical Engineering Lab. of the Ministry of International Trades and Industry (MITI) as a Japan Science and Technology Agency Fellow in 1995 as well as at the Univ. of Tokyo under a Japan Society for Promotion of Science (JSPS) Fellowship in 1997.

Working in the broad field of engineering, Dr. Lee has been involved in research, engineering development, and innovation management activities in the areas of automation, smart products, and smart service systems. His current research work involves in the areas of innovative design methods for self-maintenance products, machine degradation assessment, internet-based telemaintenance of equipment, and e-factory & e-manufacturing. His recent book (as a co-editor), entitled *Computer-aided Maintenance: methodologies and practices,* was published by Kluwer Publishing in March 1999. He is also a frequent invited speaker and has delivered over 30 invited keynote speeches at major international conferences.

Currently, he is member of Board on Manufacturing and Engineering Design of National Research Council (NRC), and a member of Board of Directors for the National Center for Manufacturing Science (NCMS), and as well as advisory committee member for a number of agencies. Previously, he had served as a committee member for the Manufacturing Process Control Study Board and the New York Science and Technology Center Review Board for the National Research Council (NRC). In addition, he serves as editorial board for a number of journals, including the ASME Journal on Manufacturing Science & Engineering, IEEE Transac-

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tion on Systems, Man, and Cybernetics, International Journal on Quality, Reliability, and Safety, and International Journal on Business Performance Management.

Dr. Lee received his B.S degree from Taiwan, a M.S. in Mechanical Engineering from the Univ. of Wisconsin-Madison, a M.S. in Industrial Management from the State Univ. of New York at Stony Brook, and D.Sc. in Mechanical Engineering from the George Washington University. He is a recipient of SME Outstanding Young Manufacturing Engineering Award in 1992. He is also a Fellow of SME.

Plenary Session—2
CRITICAL ISSUES IN THE DIGITAL ECONOMY

Date: Tuesday, July 31, 2001
Time: 08:00 - 09:30
Room: Salon E - Lower Level 1

Moderator: Gary Withers

Gary Withers is the Vice President for University Relations at Portland State University in Portland, Oregon.

Speaker: Mr. Larry Lesley is vice president and general manager of Personal Printing category within Hewlett-Packard's Imaging and Printing Systems business. This category includes personal inkjet and low-end laser printing solutions as well as personal all-in-one devices. Mr. Lesley joined Hewlett-Packard in January of 1980 in the finance department at the Santa Rosa Division. He progressed through various management jobs in Santa Rosa, Palo Alto, and Colorado Springs, where in 1985 he was named controller of the Colorado Telecommunications Division. He moved to San Jose in 1989 to become the controller for the Optoelectronics Division. In 1996, he was named controller of the Vancouver Division, the design center for personal inkjet printers. Mr. Lesley was promoted to controller of the Home Business Unit with the Inkjet Imaging Solutions business in 1997. Two years later, he returned to Vancouver Division as general manager; and subsequently, he was named a Hewlett-Packard vice president in August 2000.

Mr. Leslie was born in 1956 in Detroit, Michigan. He has a BBA from the University of Michigan at Ann Arbor and an MBA from the University of Arizona at Tucson. Larry resides in Vancouver, Washington.

Speaker: Richard H. (Rick) Wills, 45, joined Tektronix in 1979 and has held a variety of positions during his 21-year tenure. In January 2000, he was named President and Chief Executive Officer of the company, and was elected to the board of directors. Extensive experience in marketing, product and product line management, coupled with a global customer perspective, have been the foundation for Wills' many assignments at Tektronix. In 1999, he was taped as the President of the company's Measurement Business. In 1997, he was named President, European Operations where he was responsible for all European activities, including sales, marketing, manufacturing and logistics. While there, he was charged with building Tektronix' sales and marketing presence in Europe, the company's largest market outside the United States.

Wills moved to the European post from his role as the company's President of the Americas Operations, one of the three operational units established by Tektronix to accelerate growth in key international markets. Prior to that appointment, he served as Vice President and General Manager of the Measurement Division's Design Service and Test business unit. As a business unit manager since March 1995, Wills was responsible for Measurement's core products, which have grown to over $500M in annual sales.

In 1993 and 1994, Wills held the position of Worldwide Director of Marketing for the Measurement Business Division. During these years, his team started building a foundation for more extensive global marketing. Marketing centers were established in Europe, the Pacific, and the U.S. and linkages with Japan and the rest of the world were improved. And, from 1991 through 1993, Wills was responsible for running the core TDS line of oscilloscopes.

Wills has a master's degree in business administration from the University of Oregon and a bachelor's degree in computer systems from Linfield College. From 1979 until 1990, Wills held numerous sales and marketing positions in Michigan, Oregon, Washington, and California. Before joining Tektronix, Wills spent six years in the U.S. Air Force with assignments in the U.S. and Europe supporting military communication systems and advanced electronic avionics.

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Plenary Session—3
SCIENCE AND TECHNOLOGY POLICIES IN THE KNOWLEDGE ERA

Date: Wednesday, August 1, 2001
Time: 08:00 - 09:30
Room: Salon E - Lower Level 1

Moderator: Joseph W. Cox

Joseph W. Cox is Chancellor of the Oregon State System of Higher Education. He received his B.A. and Ph.D. in history form the University of Maryland. Prior to his current position, Dr. Cox served as the Professor, Dean, Vice President for Academic Affairs, and acting President at Towson State University; Vice President for Academic Affairs at Northern Arizona University; and as President of Southern Oregon State College. His research is on philanthropy in 19th Century America. Dr. Cox has authored several books, articles, reports and presentations on that topic.

Speaker: Graham Mitchell is the Bladstrom Visiting Professor at the Wharton School of the University of Pennsylvania, and Director of the Wharton Program in Technological Innovation. Between 1993 and 1997 he was United States Assistant Secretary of Commerce for Technology Policy. Appointed by the President and confirmed by the Senate his responsibilities included the development and implementation of policies to increase the role of technology in enhancing the well being and competitiveness of the United States. He was also charged with promoting the interests of the United States in developing international science and technology policies, programs and partnerships with our major trading partners. In this position, Dr. Mitchell has directed and authored major studies on the competitiveness of both mature and emerging U.S. industries, and on the S&T policies of advanced and growing economies throughout the world.

Before joining the Administration he served as Director of Planning and Forecasting for GTE where he developed and operated corporate technology planning systems covering GTE's main businesses in telecommunications, lighting, and materials. Prior to that he was for 12 years with the General Electric Company as manager of research, engineering, and business development in operations, and with the Corporate Research and Development Center. He began his career in fundamental research in plasma physics in England.

Dr. Mitchell has also served as a director of the Industrial Research Institute, and a consultant and advisor to industry, government, and academe. He is author of numerous papers on technology, management, and policy. He holds 7 U.S. patents, and is a recipient of several major honors including the IRI's "Maurice Holland Award" for the management of industrial R&D. He holds a B.Sc. and Ph.D. in Electrical Engineering from the University of Westminster, London.

Speaker: Donna Shirley is currently Assistant Dean of Engineering for Advanced Program Development at the University of Oklahoma, where she is participating in strategic planning and the development of new educational initiatives. She is also the official Spokesperson for the Mars Millennium Project, an international, K through 12 educational initiative sponsored by the White House MillenNium Council, the Department of Education, the National Endowment for the Arts, the National Aeronautics and Space Administration, and the J. Paul Getty Trust.

In addition to three honorary doctorates, Ms. Shirley has a BS (University of Oklahoma) and MS (University of Southern California) in Aerospace Engineering, and a BA in Journalism (University of Oklahoma). She has over thirty five years of experience in the aerospace industry, including more than twenty five years in management. Her honors include the NASA Exceptional Leadership Medal; The American Society Of Mechanical Engineers Holley Award; and membership in the American Academy Of Achievement, the Women In Technology International Hall Of Fame, and the Oklahoma Aviation and Space Hall Of Fame. She retired in 1998 from NASA's Jet Propulsion Laboratory where she was manager of the Mars Exploration Program.

The Mars Exploration Program—which was begun in 1994 with the highly successful Mars Global Surveyor and Mars Pathfinder missions—is sending orbiters, landers and/or rovers to Mars in every opportunity (every

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26 months) through at least 2005, despite the loss of two missions in 1999. Prior to becoming manager of the program, Ms. Shirley managed the team which designed and built "Sojourner Truth", the Microrover which was landed by the Mars Pathfinder project on the surface of Mars on July 4, 1997. Sojourner investigated the Martian surface for nearly three months—more than ten times its expected lifetime. In her 32-year career at JPL Ms. Shirley's positions included: Project Engineer for the Cassini mission to Saturn, Manager of Exploration Initiative Studies, Manager of Automation and Robotics, Manager of JPL's Space Station Program, Manager of the Mission Design Section, and Project Engineer for the Mariner 10 mission to Venus and Mercury in 1974.

Between 1990 and 93, as a part-time assignment, she established and led a NASA-wide Systems Engineering Working Group which developed and documented a standard systems engineering process for NASA Projects. As an outgrowth of this, in the summer of 1991 she led another NASA-wide team on Program/Project Management which developed recommendations subsequently incorporated into the NASA Management Instruction for project management.

In addition to over fifty technical publications she has written a book titled *Managing Creativity* and has developed a class on that subject which is now offered at and through the University of Oklahoma in a variety of formats. She continues to be a widely sought-after speaker on subjects including Mars Exploration and Management, and has appeared in many national television news programs and documentaries. Broadway Books published her autobiography, titled *Managing Martians* in 1998 and 1999.

Raised in Wynnewood, Oklahoma, Ms. Shirley now lives in Norman, Oklahoma. She has one daughter, Laura, who is a graduate student in Psychology.

Speaker: Young-Hwan Choi is vice president in charge of planning and R&D as well as dean of the Graduate School of Informatics of Sejong University, Seoul, Korea. He served as president of the Science and Technology Policy Institute (STEPI) and prior to that as vice minister of the Ministry of Science and Technology (MOST) in the Government of the Republic of Korea. While working in the Government, he held a variety of positions such as assistant minister for technological policy, director general of Science and Technology Promotion Bureau, director general of Information Industry Bureau, and the others.

Dr. Choi was a visiting scholar of the John F. Kennedy School of Government at Harvard University, where he collaborated with Prof. Lewis M. Branscomb, former science advisor to Presidents Johnson and Carter. He, as co-author with Lewis M. Branscomb, published a book, entitled *Korea at the Turning Point, Innovation-Based Strategies for Development,* PRAEGER publishers in 1996. He also has written a number of articles concerning science, technology, and innovation policies. He previously had served as the president of Korea National Railroad College and prior to that as an advisor to the Korea Advanced Institution of Science and Technology, and as a professor at Yeong Nam University, Korea.

He has been a frequent speaker and participated in over 30 international conferences on science, technology, and innovation policies and programs as head delegate, delegate, speaker, or participant. Choi received from his LL.B from Kyung Buk National University, MPA from Seoul National University, and Ph.D (Hon.) from Yeong Nam University, Korea. Currently, he is member of Korea Future Society (KFS) as well as World Future Society (WFS), member of Korea Public Administration Society (vice chairman,1990-1992), and founding member of Korea Society of Technology Management and Economy (KSTME).

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Plenary Session—4
GLOBAL PERSPECTIVES ON THE INFORMATION AGE

Date: Thursday, August 2, 2001
Time: 08:00 - 09:30
Room: Salon E - Lower Level 1

Moderator: Dr. Gunnar Hambraeus

Gunnar Hambraeus is the former president and chairman of the Royal Swedish Academy of Engineering Sciences. He is also the chairman of the Scandinavia-Japan Sasakawa Foundation. He holds a B.S. from Uppsala University, a master's in electrical engineering from the Royal Institute of Technology in Stockholm, and a Ph.D. from Chalmers University.

He has served as secretary for the State Council of Technical Research, technical advisor to the Swedish Embassy in Washington, D.C., editor in chief of Teknisk Tidskrift, and chief of staff to the International Atomic Energy Agency in Vienna. From 1969-70 Dr. Hambraeus was president and publisher of the Swedish Technical Press. He then became president (1971-82) and chairman (1983-85) of the Royal Swedish Academy of Engineering Sciences. He has also served as chairman of the Swedish Science Attache Service and as a member of the governing boards of numerous Swedish companies.

Dr. Hambraeus is currently of the boards of Swedish Telecom, Forshcda and Bruker Spectrospin. He is a member of Jakob Wallenberg and Wallenberg International Foundations, the IBM European Science Prize Jury, the Sweden America Foundation, and the Karlshamn Research Foundation. He has published numerous articles and papers on science and R&D policies, energy policy, and information technology.

Speaker: John McDougall, BSc., P.ENG., F.C.A.E., has served as Managing Director and CEO of the Alberta Research Council since the fall of 1997. He is also President and General Manager of McDougall & Secord, Limited; Chairman of D.B. Robinson & Associates; and a Director of PFB Corporation.

Born and raised in Edmonton, Mr. McDougall received his Bachelor of Science Degree in Civil Engineering from the University of Alberta in 1967. He also completed a number of postgraduate courses in environmental engineering.

An active participant in professional and community affairs, Mr. McDougall is a member of the Management Board of the Alberta Science and Research Authority; a member of the Conference Board of Canada Leaders' Forum on Innovation; a Director of Calgary Technologies Inc. and a Director of the Alberta Agriculture Research Institute. He is also the Past-President of the Canadian Council of Professional Engineers, APEGGA and the Edmonton Chamber of Commerce.

John is a fellow of the Canadian Academy of Engineers, Honorary Lieutenant Colonel of the 8 Field Engineer Regiment and an honorary member of APEGGA and the Mexican College of Civil Engineers. He is listed in Who's Who in Canada, Who's Who in Canadian Engineering and Who's Who in America.

He is married to Irene and has three grown sons—John, Jordan and Michael and one stepson, Kyle.

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

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

Mr. Lipscomb is one of the few executives with high-level experience in both print publishing and the world

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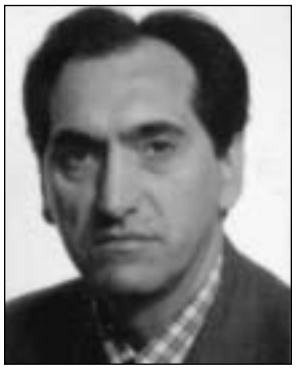
of electronic media. He has been both a magazine publisher of consumer magazines such as *The Ladies Home Journal* and a CEO in book publishing, where he was responsible for top bestsellers by authors as diverse as Agatha Christie, Susan Isaacs, Craig Claiborne, Jack Anderson and William Safire. Books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

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

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

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



Speaker: Jesús Villasante is Head of Unit "Applications related to businesses" in the Directorate General Information Society of the European Commission. The scope of this unit covers Smart Organisations, Knowledge Management and Technology Take up for SMEs. He joined the European Commission in December 1986. He has worked in Analysis and Preparation of Programmes and the Telematics Applications Programme, Networks and Services Applied to Health. At present he is Head of the Businesses Applications Unit of the Information Society Technologies Programme.

In 1993 he won a competition for the Information Technologies and Systems Body of the National Administration (Spain). He was nominated Head of the Informatic Service in the Directorate General of Planning of the Ministry of Economy.

In 1983 he joined Digital Equipment Corporation where he held positions as systems engineer in the Software Department, project manager for manufacturing industries and software advisor for the sales and business operations.

In 1981 he worked for Telefónica, the Spanish telecom operator, as a postgraduate trainee. From 1981 to 1983 he worked in the Computers in Medicine Section of the Air Force Hospital in Madrid in analysis and design of medical applications for the cardiology and other hospital departments.

Jesús Villasante was born in Madrid, Spain in 1957. He received a degree of Telecommunications Engineer by the Madrid Polytechnical University and a Master in Public Management by the Université Libre de Bruxelles, Ecole de Commerce Solvay.

EXECUTIVE FORUMS

Two Executive Forums will be held at special luncheons during PICMET '01. High-level executives from industry will discuss critical issues and emerging challenges in their industry at the Executive Forums. Registration fee for these optional events is $50 for each Forum including lunch.

Executive Forum-1
STRATEGIC DIRECTIONS OF INFORMATION TECHNOLOGY

Date: Monday, July 30, 2001
Time: 11:30 - 13:30
Room: Mt. Hood Room, Restaurant Level
Registration: $50 including lunch

The focus of this Executive Forum is on information technology, including IT investments, applications, key issues, strategies and challenges in the Internet-driven economy. Discussions will include global cooperation among companies in this era of rapid technological changes when the reduction in product development cycle is a key competitive requirement. The speakers, in alphabetical order, are:

Moderator: Les Fahey, CEO, Fahey Ventures

Panelists: Scott Gibson is the CEO of Gibson Enterprises. Prior to that he was the co-founder and president of Sequent Systems, which is now a division of IBM. Mr. Gibson currently serves as a Board member of TriQuint Semiconductor, Radisys, Egghead.com, Integrated Measurement Systems, Webridge, Emerald Solutions, etrieve, CenQuest, Livebridge, and the OHSU Foundation. He is the Chairman of the Board for Oregon Graduate Institute (OGI). Scott Gibson has a degree in Electrical Engineering and an MBA.

Panelists: Patrick Holmes is the Director of e-Business Architecture at Intel Corporation. He is responsible for developing Intel's enterprise applications architecture to make Intel a 100% e-Corporation. Mr. Holmes joined Intel in 1983 and has held technical and management positions in applications development, IT technology development and systems engineering. He led the design engineering for Intel's ERP implementation and the technology development of Intel's first e-Business application. Holmes left Intel for three years to be founder and CTO of an e-Commerce Application Service Provider. Holmes received a B.S. in Computer Information Systems from Arizona State University.

Panelists: Dr. Kwan Rim is the Chairman of Samsung Advanced Institute of Technology (SAIT), the central research laboratory of the Samsung Group. He received his M.S. in Mechanical Engineering in 1958 and Ph.D. in Theoretical and Applied Mechanics in 1960, both from Northwestern University in the USA. In 1960 he joined the Department of Mechanics and Hydraulics of the University of Iowa and was an engineering faculty member there until 1995. At the University of Iowa he was Chairman of the Department of Mechanics and Hydraulics (1971-74), Associate Dean of Engineering (1974-79), Chairman of the Division of Materials Engineering (1978-84), and Chairman of the Department of Biomedical Engineering (1984-90). He is the founder of the Biomedical Engineering Program at Iowa as well as the Iowa Institute of Biomedical Engineering.

Dr. Kwan Rim held the U.S. National Science Foundation's SEED (Scientists and Engineers for Economic Development) Professorship in 1976-77, served as the President of the Korea Advanced Institute of Science and Technology (KAIST) from 1982 to 1984, and as a visiting professor in Japan in 1992. He has also served on the boards of directors of numerous educational and research institutes. He was the 1992 recipient of the Outstanding Biomedical Engineering Educator Award from the American Society for Engineering Education. He also served on the President's Council on Science and Technology of the Republic of Korea.

Panelists: Dr. Seiichi Watanabe is the President of Frontier Science Laboratories and Corporate Executive Vice President of Sony Corporation. He has B.S., M.S. and doctoral degrees in Electrical Engineering, all from the University of Tokyo. Dr. Watanabe has held numerous positions at Sony Corporation since he joined it in 1967.

Executive Forum-2:
STRATEGIC DIRECTIONS OF THE SEMICONDUCTOR INDUSTRY

Date: Tuesday, July 31, 2001
Time: 11:30 - 13:30
Room: Mt. Hood Room, Restaurant Level
Registration: $50 including lunch

The focus of this Executive Forum is on the semiconductor industry. Key issues, emerging challenges and opportunities faced by the semiconductor industry will be addressed. The changes taking place in the industry and

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the strategies being developed to address those issues will be included in the discussions. The speakers are the top executives in leading companies in their respective segments of the semiconductor industry, listed in alphabetical order below:

Moderator: Tom Long, CEO, Motile, Inc., and Adjunct Professor, Portland State University, Dept. of Engineering and Technology Management

Panelists: Dr. Jon K. Clemens is President and CEO of Sharp Laboratories of America (SLA). SLA performs applied research in multimedia technologies and process technology development in the integrated circuits and liquid crystal display areas. SLA employs approximately 200 persons and is located in Camas, Washington. In addition, SLA has a subsidiary in India where approximately 70 persons are working on software development. Prior to joining SLA and after appointments as president at two small companies, Dr. Clemens served for five years as Senior Vice President of Science and Technology at Stanford Research Institute (SRI) International. Dr. Clemens is an electrical engineer with a doctorate from Massachusetts Institute of Technology. He spent 21 years at RCA research laboratories, where he was in charge of consumer electronics research. During this time his major contributions were in the field of multimedia. Dr. Clemens holds 19 patents related to consumer products and multimedia technology.

Panelists: Richard S. Hill has been Novellus' CEO and a member of the Board of Directors since December 1993. He was appointed Chairman of the Board of Directors in May 1996. Mr. Hill holds a bachelor's degree in engineering from the University of Illinois and a Master's in business administration from Syracuse University. He is a member of the board of trustees of the University of Illinois and is also on the boards of the Semiconductor Equipment and Materials International Association (SEMI), SpeedFam-IPEC, Inc., Semiconductor Research Corp. (SRC), and Luminent, Inc. From 1981 to 1993, Mr. Hill was employed by Tektronix, Inc., an electronics company, where he held positions as President of the Tektronix Development Company, Vice President of the Test and Measurement Group, and President of Tektronix Components Corporation, Prior to joining Tektronix, Mr. Hill held engineering management positions at General Electric, Motorola and Hughes Aircraft Company.

Panelists: Steven J. Sharp joined TriQuint in September 1991 as President, CEO and Director. In May 1992 he became Chairman of the Board. During the previous eight years, he had served in various roles associated with venture capital-financed semiconductor companies. In 1988-9 he was founder and CEO of Power Integrations, Inc. Previously, he was employed for 14 years by Signetics Corp. and for nine years by Texas Instruments. He holds a BS in Mechanical Engineering from Southern Methodist University, an MS in Engineering Science from California Institute of Technology, and an MBA from Stanford University.

Panelists: Donald R. VanLuvanee is President, Chief Executive Officer and a member of the Board of Directors of Electro Scientific Industries, Inc. (ESI) of Portland, Oregon. ESI designs and manufactures sophisticated electronic manufacturing products used around the world. ESI has nearly 1,000 employees worldwide and approximately 60% of its revenues are from export sales. Prior to Mr. VanLuvanee's move to ESI, he was President, Chief Executive Officer, and a member of the Board of Directors of Mechanical Technology Incorporated (MTI) of Latham, New York. MTI supplied contract research and development services in the areas of advanced high-speed rotating equipment and instrumentation systems and developed and manufactured technologically advanced equipment used in the test/measurement and defense/aerospace markets.

Prior to MTI, Mr. VanLuvanee was President and Chief Executive Officer of BCT Spectrum, Inc. BCT Spectrum supplied vacuum deposition systems to the electronic and semiconductor industries, specializing in advanced thin films for submicron electronic devices. Mr. VanLuvanee's earlier positions include President, Chief Operating Officer, and Director of Kulicke and Soffa Industries, Inc.; Vice President of Research and Development and Vice President of Product Design and Development at Syntex Dental Products; and engineering branch manager at Texas Instruments, Inc. in Dallas, Texas.

Mr. VanLuvanee was born in 1944. He attended Rensselaer Polytechnic Institute in Troy, New York, where he earned a B.S. in Electrical Engineering and a Master's degree in Electrophysics. He currently holds the Chair position on the Oregon State Board of Higher Education, and he serves on the boards of several technology-based companies.

TUTORIALS

Leading Projects as Strategic, Competitive Weapon

Aaron J. Shenhar, Institute Professor of Management
Stevens Institute of Technology
Wesley J. Howe School of Technology Management

This tutorial presents six principles on how to integrate project management with business strategy. It will show how to lead projects in a strategic way and how to turn them into successful competitive weapons. The tutorial will discuss the new role of project leaders, who, instead of just "getting the job done," must look at the global business aspects of their project, develop a specific project strategy, and provide vision and inspiration to project teams. In addition, it will show why, "one size does not fit all" and how to adapt project management to specific project types. The tutorial will show how to create an integrated strategic project plan and how to build the project's strategic focus during day-to-day project execution.

Closing the Strategic Vision / Implementation Gap for Competitive Advantage

Donald (Don) E. White, Professor, Cal Poly University
John R. Patton, President, CADENCE Management Corp.

This tutorial focuses on how a firm can close the gap between its strategic vision and its operational implementation, and thereby create a sustainable competitive advantage. It presents Strategic Management By Projects (SMBP) as an approach to link and tightly integrate the strategic plan with its implementation. The approach focuses on the strategic portfolio of strategy fulfilling projects, identifies critical integrative links, processes, and metrics, and highlights case study results.

Dr. Don White is Professor of Industrial and Manufacturing Engineering at Cal Poly University, San Luis Obispo, CA. His education includes both engineering (B.S.M.E. U.C. Berkeley, Ph.D. Case Western Reserve University) and business (M.B.A. Pepperdine University). Dr. White's has had 19 years industry experience (engineering and managerial) with: Pacific Telesis, ARCO, Exxon, Bell Labs, and Lawrence National Labs in diverse functional and cross-functional areas (e.g., strategic planning and implementation, project/product development and management, marketing/manufacturing/financial operations).

At Cal Poly, his research interests have included: new product development, integrated change management, economic decision making, strategic management, and project management. Also, he was instrumental in establishing the interdisciplinary M.B.A./M.S. Engineering Management Program (EMP) and its Industry/University Partnership.

John Patton is President of CADENCE Management Corporation. John's leadership in the development and dissemination of state-of-the-art project management techniques has established him as one of the industry's leading "change masters". John's consulting experience includes assignments on numerous multi-million dollar new product development projects around the world. His career has encompassed every aspect of project management, from strategic planning to construction and product introductions. John's recent assignments include course delivery and consulting in Spanish to Latin American companies, new product launches in Europe and training in Japan.

TUTORIALS

Integrating Scientific and Technical Information (STI) and Knowledge Management (KM) Systems in R&D-Performing Organizations

Al Rubenstein , Professor Emeritus, Northwestern University and President, International Applied Science and Technology Associates (IASTA, Inc.).
Elie Geisler, Illinois Institute of Technology

This will be an interactive session on the practical issues of providing information sources and channels to actual and potential users of the outputs of R&D. It will address design variables for systems that will improve accessibility for non-technical people in production, marketing, customer service, general management and other non-R&D groups in the organization. Many such groups have traditionally encountered difficulties in trying to get at and effectively use the outputs of R&D to help them in doing their own jobs. The focus is on cost-effective integration or strong interfacing of R&D-oriented STI systems and company-wide and application-oriented KM systems. Participants are encouraged to present "mini-cases" (5 minutes each) of their organizations' attempts (successful or not) to accomplish such integration. The moderators will introduce the session with brief presentations on key issues, based on their several decades of research and consulting on STI and KM systems and on R&D/Technology Management. A new paper, "Knowledge Management Systems: Effective Rollout and Operation to Meet User Needs" will be included in the PICMET Proceedings as background reading.

Al Rubenstein is Professor Emeritus of Industrial Engineering and Management Science at Northwestern University and President of International Applied Science and Technology Associates (IASTA, Inc.). At MIT and Northwestern he established the program on Management of Research, Development, and Innovation (POMRAD) and at Northwestern the Master of Engineering Management program and the Center for Information and Telecommunication Technology. He is author of almost 200 articles and books on R&D/Technology Management. He has been director of two companies and consultant to more than 100 industrial and governmnet organizations in the U.S., Europe and Japan. Several book publishers are reprinting his book *Managing Technology in the Decentralized Firm.* Among his awards are Pioneer in Innovation, Engineering Manager of the Year and an Honorary Doctorate in Engineering. He is former editor of the *IEEE Transactions on Engineering Management.*

Eliezer Geisler is Professor of Organizational Behavior at the Stuart Graduate School of Business, Illinois Institute of Technology, and Director of the Center for Management of Medical Technology (CMMT). He holds a doctorate from the Kellogg School at Northwestern University. Dr. Geisler is the author of over 80 scientific publications and five books, the most recent: *The Metrics of Science and Technology* (Greenwood Publishing group, 2000) and Creating Value with Science and Technology (Greenwood Publishing Group 2001). He was Chair of the College of Innovation Management and Entrepreneurship division of INFORMS, department editor for information technology for the *IEEE Transactions on Engineering Management,* and associate editor for the *International Journal of Healthcare Technology and Management.* His research and consulting interests are evaluation and metrics of science and technology, the management of medical technology, and the strategic management of technology.

Designing Fast, Flat, Flexible Organizations

Janet D Fiero and **E. Craig McGee**

The software development industry is one of the most dynamic, fast-paced industries in the world. New versions of software can be released every six to twelve months. New technology renders existing software systems obsolete overnight. Strategic alliances form and disband rapidly. Technology components are licensed to apparent competitors. A competitor one month is a collaborator the next. Consider the technology startups...Netscape, America OnLine, Iomega, etceteras. All have experienced rapid growth and success. This tutorial teaches basic principles for designing organizations that results in a fast and flexible organization staffed with motivated and responsible employees at all levels. The authors will use a real-life case to describe how one software development company utilized teams to reduce its time-to-market for new products. It is the story of an entrepreneurial startup that transformed itself into part of a multi-billion dollar international corporation. It is the story of survival...creating robust, efficient processes to support the company's growth. It was critical to be able to get new products and enhancements to customers. This tutorial will assist engineering managers transitioning from a functional organization to a product aligned team-based organization.

TUTORIALS

Janet D. Fiero, Ph.D., MBA worked in semiconductor companies for 17 years as an engineer, manager and internal consultant before starting her own consulting business in 1985. Her consulting expertise began with quality management and has transitioned into change management and organizational development. She has been selected four times to serve as an examiner for Malcolm Baldrige National Quality Award. She earned her Ph.D. in Human and Organizational Systems from The Fielding Institute in 2000.

Craig McGee, Ph.D. has over twenty years experience in change management with extensive background in organization assessment and development, organization design, team development, process improvement, management development, labor relations, and compensation. He has served in external consulting, corporate staff and line management roles, and has the ability to blend a strong technical background with pragmatic, sound business judgment. Craig received a Ph.D. in Industrial/Organizational Psychology from the University of Tennessee.

Accelerating Innovation with TRIZ

Ellen Domb, The PQR Group, Upland, California, USA

The participants will be able to use the TRIZ tools to solve real technical problems in their own organizations. They will be familiar with the basic precepts of TRIZ, and will be able to recognize situations where TRIZ can be of use. They will be able to recognize the need for TRIZ in conjunction with the tools that they are already using. and to use them together.

"TIPS" is the acronym for "Theory of Inventive Problem Solving," and "TRIZ" is the acronym for the same phrase in Russian. TRIZ was developed by Genrich Altshuller and his colleagues in the former USSR starting in 1946, and is now being developed and practiced throughout the world.

TRIZ research began with the hypothesis that there are universal principles of invention that are the basis for creative innovations that advance technology, and that if these principles could be identified and codified, they could be taught to people to make the process of invention more predictable. The research has proceeded in several stages over the last 50 years. Over 2 million patents have been examined, classified by level of inventiveness, and analyzed to look for principles of innovation. The three primary findings of this research are as follows:

1. Problems and solutions were repeated across industries and sciences
2. Patterns of technical evolution were repeated across industries and sciences
3. Innovations used scientific effects outside the field where they were developed

In the application of TRIZ all three of these findings are applied to create and to improve products, services, and systems.

The TRIZ workshop is an interactive session. The instructor introduces each topic, and demonstrates the use of each technique and tool. The participants work as individuals applying the Ideal Final Result to practice problems and to problems in their own organizations.

The participants are formed into teams to learn the 40 Principles of Inventive Problem Solving. The teams apply the 40 Principles to the collective experience of their teams, then to the practice problem, to equip them to use the technique after the class. Examples from e-business and the e-World will be used to demonstrate the applicability of TRIZ to the main theme of the conference.

Dr. Ellen Domb speaks frequently to business and professional groups on the impact of TQM on organizations and on accelerating new product development using TRIZ and quality function deployment. She is an instructor for San Diego State University, The Claremont Graduate School, George Washington University, GOAL/QPC, and The American Supplier Institute. She is the co-author of *Beyond Strategic Vision, Strategic Planning that Makes Things Happen, Management Readings in TQM, Developing Your Concurrent Engineering Plan, The Voice of the Customer: Find it! Use it!* and of courses and papers on the applications of quality function deployment and TRIZ.

TUTORIALS

Design for the New Millennium: Internet-Centric, Information-Driven Design Processes

Scott Borduin, Vice President and Chief Technology Officer, Autodesk, Inc.

Design in the new millennium will barely resemble the splintered cumbersome design process designers are familiar with now. Today, designers create their designs in isolation, using fax, phone, and overnight delivery to glue together the total design process. The effort is slow, laborious, and error-prone. The best design solutions often are abandoned in favor of expediency. But this is poised to change.

In the design process for the new millennium, the design will emerge as the centerpiece of a vast Internet-centric information network encompassing everything from the earliest preliminary specifications and partially developed ideas to finished designs, detailed engineering documents, and data about materials, production capacity, and costs. In this presentation, Mr. Borduin will introduce the designer's new central role as the design information integrator. He will explain how designers and others involved in the project will draw upon and contribute to the extensive web of design information. He will show how the designer will use the Internet to solve a variety of design challenges, from selecting materials to pricing suppliers. Finally, he will examine how the new design process reduces costs and speeds the design cycle through reuse of design information.

Case studies may include:

- Welch's, the worldwide leader in marketing grape-based products: cross-functional teams including R&D, quality, marketing, sales, engineering, finance, and operations share data via the web to streamline manufacturing processes and create new packaging.
- Buzzsaw.com: a portal designed specifically to help the construction industry streamline it processes and drive information through the design chain. Manufacturers like Owens Corning and Erco lighting of Germany are already realizing the value of spreading their product specs into the design chain.

Attendees will learn:

- How designers create, leverage, and manage a growing body of design information
- How the Internet facilitates collaborative design
- How designers can maximize their use of suppliers and other outside parties in the design process
- How other members of the design team can leverage design information
- How designers can use information to speed the design process and to create better designs
- How existing tools and technologies can be used to create an information-driven design process now
- How new technologies, such as virtual reality, will enhance the design process

Scott Borduin, Vice President and Chief Technology Officer (CTO) is responsible for providing Autodesk's technical vision and strategy for the future. As CTO, Borduin will synthesizes many of the technical aspects of development, provides technical due diligence on potential acquisitions, and facilitates the application and reuse of key technologies across the Autodesk business divisions. Prior to becoming CTO Borduin held the position of Chief Architect of the Autodesk Inventor(tm) software program.

Borduin came to Autodesk in 1993, when a company he co-founded, Woodbourne, was acquired by Autodesk. That technology became the foundation for the solid modeling functionality in Autodesk's Mechanical Desktop(r) software. Prior to Woodbourne, Borduin worked at ComputerVision as an Application Engineering Manager, and also at GE Calma as an Application Engineer.

Borduin holds a Bachelor of Science and a Masters of Science in Mechanical Engineering from the University of Michigan.

Project Management Office Implementation Issues

Parviz F. Rad, Department of Management Science, George Washington University, Washington, D.C., USA

PMO is the organizational entity with full-time personnel to provide a focal point for administrative, training, and consulting in the area of project management. Because of the beneficial effects of implementing a project management office, increasingly more organizations opt to establish project management office (PMO) to support and manage the project management efforts.

A project management office deals with the two major categories of issues that are encountered in managing projects: those dealing with things and those dealing with people. The people-oriented functions include providing experts to those who need or desire such services, assist current project managers, and train future project managers. In the quantitative/administrative area, or in the

area of things, a PMO will maintain an archive for current and previous problems encountered by project manages. A PMO will also maintain a list of potential contractors and vendors with a detailed performance history to be used as a reference in the contract awards. The PMO can additionally provide an inventory of software tools for project management and its allied areas, and an inventory of administrative tools such as checklists and forms for managing and documenting projects.

Parviz F. Rad is Associate Professor and Director of Project Management Program at The George Washington University. He holds an M.Sc. Degree from Ohio State University and a Ph.D. from Massachusetts Institute of Technology. He has 30 years of professional experience during which he has served in governmental, industrial, and academic capacities. He has participated in project management activities and in development and enhancement of quantitative tools in project management in a multitude of disciplines including software development, construction, and pharmaceutical research. Dr. Rad has been recognized as a Professional Civil Engineer, Certified Cost Engineer, and as a Project Management Professional.

Speakers Clinic

Alan Francis

The PICMET Speakers Clinic provides on-site support services to our speakers enabling them to give their best and most compelling presentation. Beginning with a concentrated 45-minute tutorial, each presenter will be given the opportunity to meet individually with the instructor. In this private session you can strengthen and polish your public speaking skills insuring your ideas are communicated in a clear, focused and informative style. There will be tips and techniques on relaxation, positive imaging and chi kung to transform anxiety and nervousness into assets.

Alan Francis, Clinic Director, holds post-secondary certifications to teach and administrate in California and served as an academic dean. He assisted in research that led to the implementation of the UCLA Pain Control Clinic and was founder and director of Turnaround, a comprehensive psycho-social services center in Los Angeles, California. He consults as strategic planner, technical writer/researcher, conference clinic director and facilitator for corporations and associations.

Creating an Environment That Fosters Innovation

Gerard H. Gaynor, Innovation Management Institute, Minneapolis, Minnesota

This tutorial explores the challenges facing organizations that depend on innovation for sustained business performance. Innovation can only survive in an environment that understands the management of risks and uncertainties, an environment that stimulates and energizes the organization, and an environment that balances freedom with discipline. The session focuses on what it takes to build an environment that supports innovation-no mysteries, just applying the fundamentals.

What Does It Take to Be An Innovator?

Gerard H. Gaynor, Innovation Management Institute, Minneapolis, Minnesota

This tutorial explores the challenges facing innovators and prepares them to accept those challenges. Innovation involves more than coming up with the next idea-it involves taking the idea and pursuing it relentlessly to successful implementation. The session focuses on the personal characteristics of an innovator; the innovation process; overcoming resistance to innovation; the role of resources and organizational infrastructure; and how to put it all together.

Gerard H. (Gus) Gaynor is a retired international technology executive who held positions in research, manufacturing engineering, product development, and general business management at 3M, one of the world's most innovative organizations. Upon retirement from 3M, he organized G. H. Gaynor and Associates, Inc., a consulting firm focusing on technology management and innovation. He was designated a Senior Fulbright Scholar on two occasions, 1990-91 and 1993-1994. He has three books related to managing technology published by McGraw-Hill. He has taught at the University of Minnesota Graduate Program in Managing Technology and is currently an adjunct professor at St. Thomas University in St. Paul, Minnesota. He is a Fellow and active volunteer in the Institute of Electrical and Electronics Engineers.

TUTORIALS

Analytic Network Process

Thomas L. Saaty, University of Pittsburgh

This tutorial is about practical decision-making that usually involves dependence and feedback among all the factors using the Analytic Network Process (ANP) - a generalization of the linear Analytic Hierarchy Process (AHP) developed by Saaty for multi-criteria decision-making. Decisions are necessarily tied to our value systems and we need a logic that can include human values along with technical and engineering factors. The participants of this tutorial will receive the ANP software.

Thomas L. Saaty holds the Chair of University Professor at the University of Pittsburgh with appointments in the Operations Research Group of the Graduate School of Business, in Mathematics, Industrial Engineering, Philosophy of Science, sociology, International Security, and the Graduate School of Public and International Affairs. He came there in 1979 after ten years on the faculty of the Wharton School at the University of Pennsylvania. He was also Executive Director of the Conference Board of the Mathematical Sciences. He received his Ph.D. in mathematics from Yale University and did post doctoral work at the University of Paris. He then began his career with the MIT Operations Evaluation Group followed by several years at the office of Naval Research one of which he spent as Scientific Liaison Officer at the U.S. Embassy in London. He is the author of 20 books in fields ranging from Operations Research and Management Science to Conflict Resolution, Urban Design and Behavioral Mathematics. Dr. Saaty is the originator of the Analytic Hierarchy Process (AHP) and partner with Professor Ernest H. Forman, of George Washington University, in producing the computer software package Expert Choice based on the AHP. He has lectured and consulted on the process and its uses in the United States and abroad to numerous business, government and academic communities. He has authored and co-authored twelve books on this subject, one of which Decision Making for Leaders, has been recently translated to seven languages, and another Multicriteria Decisions: The Analytic Hierarchy Process translated to Chinese and Russian.

Intel's Path to Becoming 100% e-Corporation

Bud Stratton, Bill Giard, John Cartwright

During this session we will address three related topics: First, we will provide an overview of Intel Corporation's efforts to evolve toward a 100% e-Corporation. Second, we will look at technological advancements in both the Internet medium and thin-client technology that have enabled Intel to provide its suppliers with real-time data in a quick and cost effective manner. We will highlight two solutions that are helping to shape the way Intel is doing business. Lastly, we will address industry efforts to drive the development and adoption of data exchange standards referred to as RosettaNet standards. Specific attention will be given to the progress being made in two of the seven RosettaNet business clusters-Product Data and Manufacturing.

Bud Stratton, BSEE Oregon State University; MEIE Texas A&M University; Masters business mgmt, Stanford University (Sloan Fellow); PhD candidate Portland State University; Co-manager for Intel Source Applications.

Bud is responsible for development, implementation and sustainment of Intel's supply chain source applications. These applications span all of Intel and include Intel's ERP and PDM systems as well as other associated applications including supplier facing web applications.

William Giard, BSCS Portland State University; Sr. Programmer/Analyst, Intel Corp. Bill joined Intel as a recent college graduate from Portland State University in 1996. He began with Intel working on the design engineering application helping to push new database technologies. He has worked closed with Microsoft to increase the functionality and robustness of MS SQLServer's replication engine. Bill's current focus is on improving Intel's e-business architecture, bringing rich client functionality to a thin-client browser, and has written internal and external facing applications using these technologies. Bill is a Microsoft Certified Systems Engineer (MCSE) and an Intel Certified Web Developer.

TUTORIALS

John Cartwright, BS Computer Applications, California State University, Fresno; MS Information Systems Management, University of Southern California; Program Manager, Supply Chain Applications, Mergers, Acquisitions and Outsourcing, Intel Corp.

John is responsible for the planning and integration of Supply Chain Applications into Intel mergers and acquisitions. He is also on-loan to RosettaNet as the Product Manager of two of their six clusters, Product Information and Manufacturing. John is responsible for the segment and PIP architecture within these two clusters and is the Program Manager for Discrete Manufacturing. John also Chairs the NEMI Factory Information System (FIS) Technical Implementation Group that successfully completed the factory Plug and Play project and initiated the Virtual Factory Implementation Project (VFIIP). VFIIP has created three specific areas for supply chain standards; manufacturing product genealogy information, manufacturing product quality information and product design configuration data.

Competitive Strategies in High-Tech Industries

Al Herman, Quantric Corporation

Strategic management in the intensely competitive environments characteristic of many high-tech industries requires the use of methods and tools keyed to the dynamics of that environment. This tutorial is intended to familiarize participants with current concepts, tools and methods used to analyze, formulate and implement competitive strategies in high-tech industries. Covered topics include: strategy development models, strategy archetypes (including e-business models), industry and competitor analysis, business intelligence tools, sources and sustainability of competitive advantage, quantitative dynamics of competition and strategy implementation tools.

Al Herman is founder and President of Quantric Corporation, a management-consulting firm providing strategic management services to high-tech companies. Prior to founding Quantric, Dr. Herman was VP and General Manager of Planar Advance, Inc., a developer and manufacturer of flat panel displays and display systems in Beaverton, Oregon. For nine years prior to that he was President and General Manager of Tektronix Federal Systems group with businesses in electronic displays and electronic test equipment. During the preceding nine years he held various senior management positions with Gould, Inc. including Corporate VP of Product and Technology Development, Group VP of Finance and Planning, VP of Advanced Programs and VP of Business Development. Dr. Herman has a BA in Mathematics, an MBA in Finance and Marketing and a PhD in Strategic Management. His doctoral research examined the technology strategies of 100 US electronics companies and their financial performance correlates. He currently teaches a graduate course in Competitive Strategy at Portland State University. Industry affiliations include the Institute of Electrical and Electronics Engineers (IEEE), the International Society for Optical Engineering (SPIE), the Society of Competitive Intelligence Professionals (SCIP) and Omega Rho, the Operations Research honor society.

The Joy of Bibliographies: An Introduction to Bibliography Management Tools

Timothy Anderson, Portland State University

The literature review is frequently the least enjoyed part of doing a research project and perhaps even described as painful. We will show how to organize and conduct your literature review from the initial literature search to formatting the bibliography using EndNote. Freeing time from the busy work of formatting requirements can enable you to focus on the most interesting and valuable part of the literature review - reading the literature and structuring your write-up.

Dr. Tim Anderson is an Associate Professor of Engineering and Technology Management at Portland State University. Dr. Anderson received an electrical engineering degree from the University of Minnesota, and M.S. and Ph.D. degrees in Industrial and Systems Engineering from the Georgia Institute of Technology. He was PICMET 1997 Program Co-Chair, Program Chair for PICMET '99 and PICMET '01 as well as being Director of Technical Activities. Dr. Anderson's research focuses on productivity analysis, technology forecasting, quantitative benchmarking, and new product development. He has been giving workshops on bibliography management since 1996 to over 100 graduate students and faculty members.

TUTORIALS

Creative R, D, & E Teams

Mike Beyerlein and **Jill Nemiro**

Technical professionals work increasingly in a variety of team forms to be able to contribute most effectively to the work of an organization. This workshop examines team designs, the factors that make them succeed or fail, and the conditions that promote creativity and innovation in teams and team-based organizations.

Michael Beyerlein is Director of the Center for the Study of Work Teams and Professor of Industrial/Organizational Psychology at the University of North Texas. His research interests include all aspects of work teams, organization transformation, work stress, creativity/innovation, knowledge management and the learning organization, and complex adaptive systems. He has published in a number of research journals and has been a member of the editorial boards for TEAM Magazine, Team Performance Management Journal, and Quality Management Journal. Currently, he is senior editor of the JAI Press/Elsevier annual series of books Advances in Interdisciplinary Study of Work Teams with seven volumes in print and two in preparation, including Team Leadership, Knowledge Work in Teams, and Product Development Teams. He is also organizing the launch of a new series of books for Jossey-Bass Pfeiffer on collaborative work systems. In addition, he has been co-editor with Steve Jones on two ASTD case books about teams and edited a book on the global history of teams, Work teams: Past, Present and Future. He is co-editing a book, a fieldbook, and a workbook with virtual teams of experts from across the U.S. on collaborative work systems.

Jill Nemiro is an Assistant Professor in the Behavioral Sciences Department at California State Polytechnic University, Pomona; and an adjunct professor in the Human Resources Development Masters Program at Claremont Graduate University. She has also served on the faculty at California State University, Long Beach; California State University, Los Angeles; CSPP-LA, and Chaffey Community College. In addition, Jill has worked for twenty years in the entertainment industry, as a film and videotape editor, specializing in management training and corporate videos, children's television programs, and documentaries.

Her research interests are in the area of organizational and group creativity, and the virtual workplace. She has published articles recently in Creativity Research Journal and the Journal of Creative Behavior. Her recent book chapters can be found in Advances in the Interdisciplinary Study of Work Teams, The Encyclopedia of Creativity, and Knowledge Management and Virtual Organizations. She has presented papers at the Academy of Management Conference, American Educational Research Association Conference, International Conference for Advances in Management, Institute for Behavioral and Applied Management, Western Psychological Association Conference, and the University of North Texas' Symposiums on Individual, Team, and Organizational Effectiveness and Collaborative Work Systems. She has worked as a research associate for the Museum of Creativity Project at the Milken Foundation, for the Institute for the Academic Advancement of Youth with Johns Hopkins University, and for WestED.

Dr. Nemiro received her Ph.D. in Organizational Psychology from Claremont Graduate University in 1998. She has a Master of Arts degree in Industrial and Organizational Psychology from California State University, Los Angeles; as well as a Bachelor of Arts degree in Motion Picture/Television from the University of California, Los Angeles.

TECHNICAL PROGRAM

PROGRAM OVERVIEW

The PICMET '01 technical program consists of 180 sessions including: four Plenaries, two Executive Panels, 15 Tutorials, 12 panel discussions and special sessions, 138 paper sessions, and 9 workshops.

The Plenaries are scheduled from 08:00 to 09:30 every morning, Monday, July 30 through Thursday, August 2 in Salon E. They are described in the "Plenaries" section of this Bulletin.

The Executive Forums are scheduled at noon, from 11:30 to 13:30 on Monday, July 30 and Tuesday, July 31. They will be held in the Mt. Hood Room on the Restaurant Floor (R-level by the elevator). The Executive Forums are described in the "Executive Forums" section of this Bulletin.

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

Panel Discussions and special sessions are also scheduled during the regular program.

Workshops are presented on Sunday, July 29, and require separate registration.

SPEAKERS CLINIC

A unique feature of PICMET '01 is the "Speakers Clinic." Dr. Allen Francis, an expert in physical and emotional aspects of making presentations, will be available to assist the authors who would like to discuss methods to feel at ease and to improve their presentations in front of groups.

The Speakers Clinic will provide on-site support services to our speakers enabling them to give their best and most compelling presentation. Beginning with a concentrated 45-minute tutorial, each presenter will be given the opportunity to meet individually with Dr. Francis. In this private session the speakers will learn to strengthen and polish their public speaking skills, insuring that their ideas are communicated in a clear, focused and informative style. There will be tips and techniques on relaxation, positive imaging and chi kung to transform anxiety and nervousness into assets.

The tutorial is scheduled from 10:00 to 11:30 on Monday, July 30 in the Meadowlark Room on the 3rd. floor. The follow-up sessions will be held, by appointment with Dr. Francis, in the specially designated and separated area of the Exhibit Hall in Salon E throughout the conference. There is no fee for these services.

THE PAPERS

In response to requests from PICMET '99 participants for explicit identification of research papers and applications-oriented papers, we developed separate evaluation criteria for each category and selected referees appropriate for it. While we emphasized research methodology, the use of the research literature, the theory behind the paper, the sample size and impact on the research community of the "Research Papers", the important 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 '01 are listed with an [R] in front of their titles on the following pages; and the "Industry Applications" papers are shown with an [A] in front of their titles. Roughly 75-80% are in the [R] category, rest are in the [A] category.

You will find the Research Papers and Industry Applications mixed in the sessions. It was done intentionally to assure that the exchange of ideas between those presenting research papers and those presenting applications-oriented papers.

THE SCHEDULE

The plenary is the only session in the 08:00-09:30 a.m. time slot. After that, there are 14-16 break-up sessions throughout every day. 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. Session titles are abbreviated in these displays.

In the second set of schedules, the sessions are listed in chronological order to give you a breakdown of the sessions by time of day. The full session titles are given in this set.

The third set contains the same information as the second set but the sessions are ordered by the room numbers. This set is intended to give you a good picture of the 29 tracks in which the sessions are scheduled. The sessions on 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 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 to follow, the events to attend and the people to meet with.

We hope these will help you to take full advantage of the richness of the technical program at PICMET '01.

Program Schedule - Monday July 30, 2001

		MA	MB	MC	MD	ME
	Room	08:00 to 09:30	10:00 to 11:30	13:30 to 15:00	15:30 to 17:00	17:15 to 18:45
01	Salon A		Information/Knowledge Management (I/K M) (1)	(2)	(3)	(4)
02	Salon B		Supply Chain Management (1)	(2)	Panel (1)	Tutorial (1)
o3	Salon C		Strategic Management of Technology (SMT) (1)	(2)	(3)	(5)
04	Salon D		Panel (2)	Technology Planning and Forecasting (TP/TF) (1)	(2)	(4)
05	Salon E	Plenary—1	E-Business (1)	(2)	(3)	(4)
	Salon F		Exhibits, Speakers Clinic, Coffee Breaks, Software Demonstrations			
06	Salon G		Telecomunications (1)	(2)	TP/TF (3)	NPD (1)
07	Salon H		Decision Making (1)	(2)	(3)	(4)
08	Salon I		Entrepreneurship (1)	(2)	(3)	(4)
09	Eugene		Environmental Issues (1)	Project/Program Management (1)	(2)	(3)
10	Portland		Competitiveness (1)	(2)	Technology-Based Organizations (1)	(2)
11	Columbia		Tech. Mgmt. Framework (1)	Technology Diffusion (1)	(2)	Collaboration (1)
12	Willamette		New Venture Management (1)	International Issues (1)	(2)	Science & Tech. Policy (1)
13	Douglas Fir		Tutorial: Speakers Clinic (2)	Tutorial (3)	SMT (4)	Manufacturing Management (1)
14	Meadowlark		Tutorial (6)	Tutorial: Analytic Network Process (7)	Tutorial (8)	Tutorial (9)
15	Mt. Hood				Tutorial (15)	
16	Salmon				Panel (10)	

Plenary-1: Strategic Directions of the e-World
Panel (1): Aligning the Supply Chain Operations Reference (SCOR) Model with Enterprise Applications
Panel (2): The Future of Technology Forcasting and Assessment
Panel (10): Technology Management Education in the e-World: (How) Are We Elevating the Practice?
Tutotial (1): Leading Projects as Strategic, Competitive Weapons
Tutotial (2): Competitive Strategies in High-Tech Industries
Tutotial (3): Designing Fast, Flat, Flexible Organizations
Tutorial (8): Integrating Scientific and Technical Information (STI) and Knowledge Management (KM) Systems
Tutorial (9): Closing the Strategic Vision/Implementation Gap for Competitive Advantage
Tutorial (15): Business Simulations for Promoting Entrepeneurship and Innovation-1

PROGRAM SCHEDULE - TUESDAY JULY 31, 2001

		TA	TB	TC	TD
	Room	08:00 to 09:30	10:00 to 11:30	13:30 to 15:00	15:30 to 17:00
01	Salon A		Information/Knowledge Management (I/K M) (5)	(6)	(7)
02	Salon B			Information/Knowledge Mgmt/ (I/K M) (13)	(14)
03	Salon C		Strategic Management of Technology (SMT) (6)	(7)	(8)
04	Salon D		Tech. Planning and Forecasting (5)	Disruptive Tech. Issues & Analysis	Tech. Planning and Forecasting (6)
05	Salon E	Plenary—2	E-Business (5)	(6)	(7)
	Salon F		Exhibits, Speakers Clinic, Coffee Breaks, Software Demonstrations		
06	Salon G		New Product Development (NPD) (2)	(3)	(4)
07	Salon H		Resource Management (1)	(2)	Technology Transfer (1)
08	Salon I		R&D Management (1)	(2)	(3)
09	Eugene		Project/Program Management (4)	(5)	I/K M (19)
10	Portland		Technology-Based Organizations (3)	Technological Innovations (1)	(2)
11	Columbia		Collaboration (2)	(3)	Tech. Mgmt Education (1)
12	Willamette		Science and Technology Policy (2)	(3)	(4)
13	Douglas Fir			Manufacturing Management (3)	(4)
14	Meadowlark		Tutorial (10)	(11)	
15	Mt. Hood				Panel (9)
16	Salmon			Management of Technical Workforce (1)	(2)

Plenary-2: Critical Issues in the Digital Economy
Panel (9): IEEE Transactions on Engineering Management: Strategic Directions and Critical Issues
Tutorial (10): The Joy of Bibliographies: An Introduction to Bibliography Management Tools
Tutorial (11): Design for the New Millennium: Internet-Centric, Information-Driven Design Processes

PROGRAM SCHEDULE - WEDNESDAY AUGUST 1, 2001

		WA	WB	WC	WD
	Room	08:00 to 09:30	10:00 to 11:30	13:30 to 15:00	15:30 to 17:00
01	Salon A		Information/Knowledge Management (I/K M) (8)	(9)	(10)
02	Salon B		Information/Knowledge Management (I/K M) (15)	(16)	(17)
03	Salon C		Strategic Management of Technology (SMT) (9)	(10)	(11)
04	Salon D		Technology Planning and Forecasting (TP/TF) (7)	(8)	(9)
05	Salon E	Plenary—3	E-Business (8)	(9)	(10)
	Salon F		Exhibits, Speakers Clinic, Coffee Breaks, Software Demonstrations		
06	Salon G		New Product Development (NPD) (5)	(6)	(7)
07	Salon H		Technology Transfer (2)	(3)	(4)
08	Salon I		R&D Management (4)	(5)	SMT (12)
09	Eugene		Software Process Management (1)	(2)	(3)
10	Portland		Technological Innovations (3)	Technology Assessment & Acquisition (1)	(2)
11	Columbia		Technology Management Education (2)	(3)	(4)
12	Willamette		Science & Tech. Policy (5)	(6)	Panel (7)
13	Douglas Fir		Panel (8)	Tutorial (4)	Tutorial (5)
14	Meadowlark		Tutorial (12)	Tutorial (13)	Tutorial (14)
15	Mt. Hood				Tutorial (17)
16	Salmon			Technology Marketing (1)	(2)

Plenary-3: Science and Technolgy Policies in the Knowledge Era
Panel (7): Special Session: Engineering Management Program Heads
Panel (8): Technology Commercialization
Tutorial (4): Accelerating Innovation with TRIZ
Tutorial (5): Intel's Path to Becoming 100% e-Corporation
Tutorial (12): Project Management Office (PMO): Implementation Issues
Tutorial (13): Creating an Environment that Fosters Innovation
Tutorial (14): What Does It Take to be an Innovator?
Tutorial (17): Creating R, D, & E Teams

PROGRAM SCHEDULE - THURSDAY AUGUST 2, 2001

		HA	HB	HC
	Room	08:00 to 09:30	10:00 to 11:30	13:30 to 15:00
01	Salon A		Information/Knowledge Mgmt. (I/K M) (11)	
02	Salon B		Information/Knowledge Mgmt. (I/K M) (18)	
03	Salon C		Strategic Management of Technology (SMT) (13)	
04	Salon D		Panel (3)	
05	Salon E	Plenary—4	E-Business (11)	Panel (4)
	Salon F		Exhibits, Speakers Clinic, Coffee Breaks, Software Demonstrations	
06	Salon G		Telecomunications (3)	
07	Salon H		Technology Transfer (5)	
08	Salon I		Panel (5)	
09	Eugene		Panel (6)	
10	Portland		Technology Assessment & Acquisition (3)	
11	Columbia		Product Development at Hewlett-Packard (1)	
12	Willamette		Human Resource Development in the Network Economy (1)	
13	Douglas Fir		Supply Chain Management (3)	
14	Meadowlark		Technology Marketing (3)	
15	Mt. Hood			
16	Salmon			

Plenary-4: Global Perspectives on the Information Age
Panel (3): Engineering and Technology Management Journals
Panel (4): Special Session: PICMET '03 Strategies
Panel (5): Special Session: Engineering and Technology Management Student Colloquium
Panel (6): Organizational Mechanics of the Open Source Movement

Schedule of Sessions

Schedule of Sessions by Room

Number	Room	Session	Time	Session title
01	Salon A	MB	10:00-11:30	Information/Knowledge Management-1
01	Salon A	MC	13:30-15:00	Information/Knowledge Management-2
01	Salon A	MD	15:30-17:00	Information/Knowledge Management-3
01	Salon A	ME	17:15-18:45	Information/Knowledge Management-4
01	Salon A	TB	10:00-11:30	Information/Knowledge Management-5
01	Salon A	TC	13:30-15:00	Information/Knowledge Management-6
01	Salon A	TD	15:30-17:00	Information/Knowledge Management-7
01	Salon A	WB	10:00-11:30	Information/Knowledge Management-8
01	Salon A	WC	13:30-15:00	Information/Knowledge Management-9
01	Salon A	WD	15:30-17:00	Information/Knowledge Management-10
01	Salon A	HB	10:00-11:30	Information/Knowledge Management -11: E-Commerce
02	Salon B	MB	10:00-11:30	Supply Chain Management-1
02	Salon B	MC	13:30-15:00	Supply Chain Management-2
02	Salon B	MD	15:30-17:00	PANEL: Aligning the Supply Chain Operations Reference (SCOR) Model with Enterprise Applications
02	Salon B	ME	17:15-18:45	TUTORIAL: Leading Projects as Strategic, Competitive Weapon
02	Salon B	TC	13:30-15:00	Information/Knowledge Management-13
02	Salon B	TD	15:30-17:00	Information/Knowledge Management-14: Manufacturing Industry
02	Salon B	WB	10:00-11:30	Information/Knowledge Management-15: Financial Sector
02	Salon B	WC	13:30-15:00	Information/Knowledge Mgmt.-16: Patents & Intellectual Property
02	Salon B	WD	15:30-17:00	Information/Knowledge Management-17: Knowledge Generation
02	Salon B	HB	10:00-11:30	Information/Knowledge Management-18: Modeling
03	Salon C	MB	10:00-11:30	Strategic Mgmt. of Technology-1: Patents
03	Salon C	MC	13:30-15:00	Strategic Mgmt. of Technology-2
03	Salon C	MD	15:30-17:00	Strategic Mgmt. of Technology-3
03	Salon C	ME	17:15-18:45	Strategic Mgmt. of Technology-5
03	Salon C	TB	10:00-11:30	Strategic Mgmt. of Technology-6
03	Salon C	TC	13:30-15:00	Strategic Mgmt. of Technology-7
03	Salon C	TD	15:30-17:00	Strategic Mgmt. of Technology-8
03	Salon C	WB	10:00-11:30	Strategic Mgmt. of Technology-9
03	Salon C	WC	13:30-15:00	Strategic Mgmt. of Technology-10: Information Technology
03	Salon C	WD	15:30-17:00	Strategic Mgmt. of Technology-11: Manufacturing
03	Salon C	HB	10:00-11:30	Strategic Mgmt. of Technology-13
04	Salon D	MB	10:00-11:30	The Future of Technology Forecasting and Assessment
04	Salon D	MC	13:30-15:00	Technology Planning & Forecasting-1: Strategic Perspectives
04	Salon D	MD	15:30-17:00	Technology Planning & Forecasting-2
04	Salon D	ME	17:15-18:45	Technology Planning & Forecasting-4: Student Projects
04	Salon D	TB	10:00-11:30	Technology Planning & Forecasting-5
04	Salon D	TC	13:30-15:00	Disruptive Technology: Issues and Analysis
04	Salon D	TD	15:30-17:00	Technology Planning & Forecasting-6
04	Salon D	WB	10:00-11:30	Technology Planning & Forecasting-7
04	Salon D	WC	13:30-15:00	Technology Planning & Forecasting-8
04	Salon D	WD	15:30-17:00	Technology Planning & Forecasting-9

Schedule of Sessions

Number	Room	Session	Time	Session title
04	Salon D	HB	10:00-11:30	PANEL: Engineering & Technology Management Journals
05	Salon E	MA	08:00-09:30	PLENARY: Strategic Directions of the e-World
05	Salon E	MB	10:00-11:30	E-Business-1
05	Salon E	MC	13:30-15:00	E-Business-2
05	Salon E	MD	15:30-17:00	E-Business-3
05	Salon E	ME	17:15-18:45	E-Business-4
05	Salon E	TA	08:00-09:30	PLENARY: Critical Issues in The Digital Economy
05	Salon E	TB	10:00-11:30	E-Business-5
05	Salon E	TC	13:30-15:00	E-Business-6
05	Salon E	TD	15:30-17:00	E-Business-7
05	Salon E	WA	08:00-09:30	PLENARY: Science and Technology Policies in the Knowledge Era
05	Salon E	WB	10:00-11:30	E-Business-8
05	Salon E	WC	13:30-15:00	E-Business-9
05	Salon E	WD	15:30-17:00	E-Business-10
05	Salon E	HA	08:00-09:30	PLENARY: Global Perspectives on the Information Age
05	Salon E	HB	10:00-11:30	PANEL: E-Business-11: Implementation
05	Salon E	HC	13:30-15:00	SPECIAL SESSION: PICMET ’03 Strategies
06	Salon G	MB	10:00-11:30	Telecommunications-1
06	Salon G	MC	13:30-15:00	Telecommunications-2
06	Salon G	MD	15:30-17:00	Technology Planning & Forecasting-3
06	Salon G	ME	17:15-18:45	New Product Development-1
06	Salon G	TB	10:00-11:30	New Product Development-2
06	Salon G	TC	13:30-15:00	New Product Development-3
06	Salon G	TD	15:30-17:00	New Product Development-4
06	Salon G	WB	10:00-11:30	New Product Development-5
06	Salon G	WC	13:30-15:00	New Product Development-6
06	Salon G	WD	15:30-17:00	New Product Development-7
06	Salon G	HB	10:00-11:30	Telecommunications-3
07	Salon H	MB	10:00-11:30	Decision Making in Technology Management-1
07	Salon H	MC	13:30-15:00	Decision Making in Technology Management-2
07	Salon H	MD	15:30-17:00	Decision Making in Technology Management-3
07	Salon H	ME	17:15-18:45	Decision Making in Technology Management-4
07	Salon H	TB	10:00-11:30	Resource Management-1
07	Salon H	TC	13:30-15:00	Resource Management-2
07	Salon H	TD	15:30-17:00	Technology Transfer-1
07	Salon H	WB	10:00-11:30	Technology Transfer-2
07	Salon H	WC	13:30-15:00	Technology Transfer-3
07	Salon H	WD	15:30-17:00	Technology Transfer-4
07	Salon H	HB	10:00-11:30	Technology Transfer-5
08	Salon I	MB	10:00-11:30	Entrepreneurship-1
08	Salon I	MC	13:30-15:00	Entrepreneurship-2
08	Salon I	MD	15:30-17:00	Entrepreneurship-3
08	Salon I	ME	17:15-18:45	Entrepreneurship-4
08	Salon I	TB	10:00-11:30	R&D Management-1

Schedule of Sessions

Number	Room	Session	Time	Session title
08	Salon I	TC	13:30-15:00	R&D Management-2
08	Salon I	TD	15:30-17:00	R&D Management-3: Strategy
08	Salon I	WB	10:00-11:30	R&D Management-4: Evaluation
08	Salon I	WC	13:30-15:00	R&D Management-5: Process
08	Salon I	WD	15:30-17:00	Strategic Management of Technology-12
08	Salon I	HB	10:00-11:30	SPECIAL SESSION: Engineering and Technology Management Students Colloquium
09	Eugene	MB	10:00-11:30	Environmental Issues
09	Eugene	MC	13:30-15:00	Project/Program Management-1
09	Eugene	MD	15:30-17:00	Project/Program Management-2
09	Eugene	ME	17:15-18:45	Project/Program Management-3
09	Eugene	TB	10:00-11:30	Project/Program Management-4
09	Eugene	TC	13:30-15:00	Project/Program Management-5
09	Eugene	TD	15:30-17:00	Information/Knowledge Management-19
09	Eugene	WB	10:00-11:30	Software Process Management -1
09	Eugene	WC	13:30-15:00	Software Process Management-2
09	Eugene	WD	15:30-17:00	Software Process Management-3
09	Eugene	HB	10:00-11:30	PANEL: Organizational Mechanics of the Open Source Movement
10	Portland	MB	10:00-11:30	Competitiveness in Technology Management-1
10	Portland	MC	13:30-15:00	Competitiveness in Technology Management-2
10	Portland	MD	15:30-17:00	Technology Based Organizations-1
10	Portland	ME	17:15-18:45	Technology Based Organizations-2
10	Portland	TB	10:00-11:30	Technology Based Organizations-3
10	Portland	TC	13:30-15:00	Technological Innovations-1
10	Portland	TD	15:30-17:00	Technological Innovations-2
10	Portland	WB	10:00-11:30	Technological Innovations-3
10	Portland	WC	13:30-15:00	Technology Assessment and Acquisition-1
10	Portland	WD	15:30-17:00	Technology Assessment and Acquisition-2
10	Portland	HB	10:00-11:30	Technology Assessment and Acquisition-3
11	Columbia	MB	10:00-11:30	Technology Management Framework
11	Columbia	MC	13:30-15:00	Technology Diffusion-1
11	Columbia	MD	15:30-17:00	Technology Diffusion-2
11	Columbia	ME	17:15-18:45	Collaboration for Technol. Mgmt.-1
11	Columbia	TB	10:00-11:30	Collaboration for Technol. Mgmt.-2
11	Columbia	TC	13:30-15:00	Collaboration for Technol. Mgmt.-3
11	Columbia	TD	15:30-17:00	Technology Management Education-1
11	Columbia	WB	10:00-11:30	Technology Management Education-2
11	Columbia	WC	13:30-15:00	Technology Management Education-3
11	Columbia	WD	15:30-17:00	Technology Management Education-4
11	Columbia	HB	10:00-11:30	Product Development at Hewlett-Packard
12	Willamette	MB	10:00-11:30	New Venture Management
12	Willamette	MC	13:30-15:00	International Issues-1
12	Willamette	MD	15:30-17:00	International Issues-2
12	Willamette	ME	17:15-18:45	Science and Technology Policy-1

Schedule of Sessions

Number	Room	Session	Time	Session title
12	Willamette	TB	10:00-11:30	Science and Technology Policy-2
12	Willamette	TC	13:30-15:00	Science and Technology Policy-3
12	Willamette	TD	15:30-17:00	Science and Technology Policy-4
12	Willamette	WB	10:00-11:30	Science and Technology Policy-5
12	Willamette	WC	13:30-15:00	Science and Technology Policy-6
12	Willamette	WD	15:30-17:00	SPECIAL SESSION: Engineering Management Program Heads
12	Willamette	HB	10:00-11:30	Human Resource Development in the Network Economy
13	Douglas Fir	MB	10:00-11:30	Competitive Strategies in High-Tech Industries
13	Douglas Fir	MC	13:30-15:00	Designing Fast, Flat, Flexible Organizations
13	Douglas Fir	MD	15:30-17:00	Strategic Mgmt. of Technology-4
13	Douglas Fir	ME	17:15-18:45	Manufacturing Management-1
13	Douglas Fir	TC	13:30-15:00	Manufacturing Management-3
13	Douglas Fir	TD	15:30-17:00	Manufacturing Management-4: Strategic Issues
13	Douglas Fir	WB	10:00-11:30	PANEL: Technology Commercialization
13	Douglas Fir	WC	13:30-15:00	TUTORIAL: Accelerating Innovation with TRIZ
13	Douglas Fir	WD	15:30-17:00	TUTORIAL: Intel's Path to Becoming 100% e-Corporation
13	Douglas Fir	HB	10:00-11:30	Supply Chain Management-3
14	Meadowlark	MB	10:00-11:30	TUTORIAL: Speakers Clinic
14	Meadowlark	MC	13:30-15:00	TUTORIAL: Analytic Network Process
14	Meadowlark	MD	15:30-17:00	TUTORIAL: Integrating Scientific and Technical Information (STI) and Knowledge Management (KM) Systems
14	Meadowlark	ME	17:15-18:45	TUTORIAL: Closing the Strategic Vision / Implementation Gap for Competitive Advantage
14	Meadowlark	TB	10:00-11:30	TUTORIAL: The Joy of Bibliographies: An Introduction to Bibliography Management Tools
14	Meadowlark	TC	13:30-15:00	TUTORIAL: Design for the New Millennium: Internet-Centric, Information-Driven Design Processes
14	Meadowlark	WB	10:00-11:30	TUTORIAL: Project Management Office (PMO): Implementation Issues
14	Meadowlark	WC	13:30-15:00	TUTORIAL: Creating an Environment That Fosters Innovation
14	Meadowlark	WD	15:30-17:00	TUTORIAL: What Does It Take to Be An Innovator?
14	Meadowlark	HB	10:00-11:30	Technology Marketing-3
15	Mt. Hood	MD	15:30-17:00	TUTORIAL: Business Simulations for Promoting Entrepreneurship and Innovation-1
15	Mt. Hood	TD	15:30-17:00	PANEL: IEEE Transactions on Engineering Management: Strategic Directions and Critical Issues
15	Mt. Hood	WD	15:30-17:00	TUTORIAL: Creative R, D, & E Teams
16	Salmon	MD	15:30-17:00	PANEL: Technology Management Education in the e-World: (How) Are We Elevating the Practice?
16	Salmon	TC	13:30-15:00	Management of Technical Workforce-1
16	Salmon	TD	15:30-17:00	Management of Technical Workforce-2
16	Salmon	WC	13:30-15:00	Technology Marketing-1

SCHEDULE OF SESSIONS

Schedule of Sessions by Date
Monday, July 30, 2001

Time	Session	Number	Room	Session title
08:00-09:30	MA	05	Salon E	PLENARY: Strategic Directions of the e-World
10:00-11:30	MB	01	Salon A	Information/Knowledge Management-1
10:00-11:30	MB	02	Salon B	Supply Chain Management-1
10:00-11:30	MB	03	Salon C	Strategic Mgmt. of Technology-1: Patents
10:00-11:30	MB	04	Salon D	The Future of Technology Forecasting and Assessment
10:00-11:30	MB	05	Salon E	E-Business-1
10:00-11:30	MB	06	Salon G	Telecommunications-1
10:00-11:30	MB	07	Salon H	Decision Making in Technology Management-1
10:00-11:30	MB	08	Salon I	Entrepreneurship-1
10:00-11:30	MB	09	Eugene	Environmental Issues
10:00-11:30	MB	10	Portland	Competitiveness in Technology Management-1
10:00-11:30	MB	11	Columbia	Technology Management Framework
10:00-11:30	MB	12	Willamette	New Venture Management
10:00-11:30	MB	13	Douglas Fir	Competitive Strategies in High-Tech Industries
10:00-11:30	MB	14	Meadowlark	TUTORIAL: Speakers Clinic
13:30-15:00	MC	01	Salon A	Information/Knowledge Management-2
13:30-15:00	MC	02	Salon B	Supply Chain Management-2
13:30-15:00	MC	03	Salon C	Strategic Mgmt. of Technology-2
13:30-15:00	MC	04	Salon D	Technology Planning & Forecasting-1: Strategic Perspectives
13:30-15:00	MC	05	Salon E	E-Business-2
13:30-15:00	MC	06	Salon G	Telecommunications-2
13:30-15:00	MC	07	Salon H	Decision Making in Technology Management-2
13:30-15:00	MC	08	Salon I	Entrepreneurship-2
13:30-15:00	MC	09	Eugene	Project/Program Management-1
13:30-15:00	MC	10	Portland	Competitiveness in Technology Management-2
13:30-15:00	MC	11	Columbia	Technology Diffusion-1
13:30-15:00	MC	12	Willamette	International Issues-1
13:30-15:00	MC	13	Douglas Fir	"Designing Fast, Flat, Flexible Organizations"
13:30-15:00	MC	14	Meadowlark	TUTORIAL: Analytic Network Process
15:30-17:00	MD	01	Salon A	Information/Knowledge Management-3
15:30-17:00	MD	02	Salon B	PANEL: Aligning the Supply Chain Operations Reference (SCOR) Model with Enterprise Applications
15:30-17:00	MD	03	Salon C	Strategic Mgmt. of Technology-3
15:30-17:00	MD	04	Salon D	Technology Planning & Forecasting-2
15:30-17:00	MD	05	Salon E	E-Business-3
15:30-17:00	MD	06	Salon G	Technology Planning & Forecasting-3
15:30-17:00	MD	07	Salon H	Decision Making in Technology Management-3
15:30-17:00	MD	08	Salon I	Entrepreneurship-3
15:30-17:00	MD	09	Eugene	Project/Program Management-2
15:30-17:00	MD	10	Portland	Technology Based Organizations-1
15:30-17:00	MD	11	Columbia	Technology Diffusion-2
15:30-17:00	MD	12	Willamette	International Issues-2
15:30-17:00	MD	13	Douglas Fir	Strategic Mgmt. of Technology-4

SCHEDULE OF SESSIONS

Time	Session	Number	Room	Session title
15:30-17:00	MD	14	Meadowlark	TUTORIAL: Integrating Scientific and Technical Information (STI) and Knowledge Management (KM) Systems
15:30-17:00	MD	15	Mt. Hood	TUTORIAL:Business Simulations for Promoting Entrepreneurship and Innovation-1
15:30-17:00	MD	16	Salmon	PANEL: Technology Management Education in the e-World: (How) Are We Elevating the Practice?
17:15-18:45	ME	01	Salon A	Information/Knowledge Management-4
17:15-18:45	ME	02	Salon B	TUTORIAL: Leading Projects as Strategic, Competitive Weapon
17:15-18:45	ME	03	Salon C	Strategic Mgmt. of Technology-5
17:15-18:45	ME	04	Salon D	Technology Planning & Forecasting-4: Student Projects
17:15-18:45	ME	05	Salon E	E-Business-4
17:15-18:45	ME	06	Salon G	New Product Development-1
17:15-18:45	ME	07	Salon H	Decision Making in Technology Management-4
17:15-18:45	ME	08	Salon I	Entrepreneurship-4
17:15-18:45	ME	09	Eugene	Project/Program Management-3
17:15-18:45	ME	10	Portland	Technology Based Organizations-2
17:15-18:45	ME	11	Columbia	Collaboration for Technol. Mgmt.-1
17:15-18:45	ME	12	Willamette	Science and Technology Policy-1
17:15-18:45	ME	13	Douglas Fir	Manufacturing Management-1
17:15-18:45	ME	14	Meadowlark	TUTORIAL:Closing the Strategic Vision / Implementation Gap for Competitive Advantage

Tuesday, July 31, 2001

08:00-09:30	TA	05	Salon E	PLENARY: Critical Issues in The Digital Economy
10:00-11:30	TB	01	Salon A	Information/Knowledge Management-5
10:00-11:30	TB	03	Salon C	Strategic Mgmt. of Technology-6
10:00-11:30	TB	04	Salon D	Technology Planning & Forecasting-5
10:00-11:30	TB	05	Salon E	E-Business-5
10:00-11:30	TB	06	Salon G	New Product Development-2
10:00-11:30	TB	07	Salon H	Resource Management-1
10:00-11:30	TB	08	Salon I	R&D Management-1
10:00-11:30	TB	09	Eugene	Project/Program Management-4
10:00-11:30	TB	10	Portland	Technology Based Organizations-3
10:00-11:30	TB	11	Columbia	Collaboration for Technol. Mgmt.-2
10:00-11:30	TB	12	Willamette	Science and Technology Policy-2
10:00-11:30	TB	14	Meadowlark	TURORIAL: The Joy of Bibliographies: An Introduction to Bibliography Management Tools
13:30-15:00	TC	01	Salon A	Information/Knowledge Management-6
13:30-15:00	TC	02	Salon B	Information/Knowledge Management-13
13:30-15:00	TC	03	Salon C	Strategic Mgmt. of Technology-7
13:30-15:00	TC	04	Salon D	Disruptive Technology: Issues and Analysis
13:30-15:00	TC	05	Salon E	E-Business-6
13:30-15:00	TC	06	Salon G	New Product Development-3
13:30-15:00	TC	07	Salon H	Resource Management-2
13:30-15:00	TC	08	Salon I	R&D Management-2
13:30-15:00	TC	09	Eugene	Project/Program Management-5

Schedule of Sessions

Time	Session	Number	Room	Session title
13:30-15:00	TC	10	Portland	Technological Innovations-1
13:30-15:00	TC	11	Columbia	Collaboration for Technol. Mgmt.-3
13:30-15:00	TC	12	Willamette	Science and Technology Policy-3
13:30-15:00	TC	13	Douglas Fir	Manufacturing Management-3
13:30-15:00	TC	14	Meadowlark	TUTORIAL: Design for the New Millennium: Internet-Centric, Information-Driven Design Processes
13:30-15:00	TC	16	Salmon	Management of Technical Workforce-1
15:30-17:00	TD	01	Salon A	Information/Knowledge Management-7
15:30-17:00	TD	02	Salon B	Information/Knowledge Management-14: Manufacturing Industry
15:30-17:00	TD	03	Salon C	Strategic Mgmt. of Technology-8
15:30-17:00	TD	04	Salon D	Technology Planning & Forecasting-6
15:30-17:00	TD	05	Salon E	E-Business-7
15:30-17:00	TD	06	Salon G	New Product Development-4
15:30-17:00	TD	07	Salon H	Technology Transfer-1
15:30-17:00	TD	08	Salon I	R&D Management-3: Strategy
15:30-17:00	TD	09	Eugene	Information/Knowledge Management-19
15:30-17:00	TD	10	Portland	Technological Innovations-2
15:30-17:00	TD	11	Columbia	Technology Management Education-1
15:30-17:00	TD	12	Willamette	Science and Technology Policy-4
15:30-17:00	TD	13	Douglas Fir	Manufacturing Management-4: Strategic Issues
15:30-17:00	TD	15	Mt. Hood	PANEL: IEEE Transactions on Engineering Management: Strategic Directions and Critical Issues
15:30-17:00	TD	16	Salmon	Management of Technical Workforce-2

Wednesday, August 1, 2001

08:00-09:30	WA	05	Salon E	PLENARY: Science and Technology Policies in the Knowledge Era
10:00-11:30	WB	01	Salon A	Information/Knowledge Management-8
10:00-11:30	WB	02	Salon B	Information/Knowledge Management-15: Financial Sector
10:00-11:30	WB	03	Salon C	Strategic Mgmt. of Technology-9
10:00-11:30	WB	04	Salon D	Technology Planning & Forecasting-7
10:00-11:30	WB	05	Salon E	E-Business-8
10:00-11:30	WB	06	Salon G	New Product Development-5
10:00-11:30	WB	07	Salon H	Technology Transfer-2
10:00-11:30	WB	08	Salon I	R&D Management-4: Evaluation
10:00-11:30	WB	09	Eugene	Software Process Management -1
10:00-11:30	WB	10	Portland	Technological Innovations-3
10:00-11:30	WB	11	Columbia	Technology Management Education-2
10:00-11:30	WB	12	Willamette	Science and Technology Policy-5
10:00-11:30	WB	13	Douglas Fir	PANEL: Technology Commercialization
10:00-11:30	WB	14	Meadowlark	TUTORIAL: Project Management Office (PMO): Implementation Issues
13:30-15:00	WC	01	Salon A	Information/Knowledge Management-9
13:30-15:00	WC	02	Salon B	Information/Knowledge Management-16: Patents & Intellectual Property
13:30-15:00	WC	03	Salon C	Strategic Mgmt. of Technology-10: Information Technology
13:30-15:00	WC	04	Salon D	Technology Planning & Forecasting-8
13:30-15:00	WC	05	Salon E	E-Business-9
13:30-15:00	WC	06	Salon G	New Product Development-6
13:30-15:00	WC	07	Salon H	Technology Transfer-3

SCHEDULE OF SESSIONS

Time	Session	Number	Room	Session title
13:30-15:00	WC	08	Salon I	R&D Management-5: Process
13:30-15:00	WC	09	Eugene	Software Process Management-2
13:30-15:00	WC	10	Portland	Technology Assessment and Acquisition-1
13:30-15:00	WC	11	Columbia	Technology Management Education-3
13:30-15:00	WC	12	Willamette	Science and Technology Policy-6
13:30-15:00	WC	13	Douglas Fir	TUTORIAL: Accelerating Innovation with TRIZ
13:30-15:00	WC	14	Meadowlark	TUTORIAL: Creating an Environment That Fosters Innovation
13:30-15:00	WC	16	Salmon	Technology Marketing-1
15:30-17:00	WD	01	Salon A	Information/Knowledge Management-10
15:30-17:00	WD	02	Salon B	Information/Knowledge Management-17: Knowledge Generation
15:30-17:00	WD	03	Salon C	Strategic Mgmt. of Technology-11: Manufacturing
15:30-17:00	WD	04	Salon D	Technology Planning & Forecasting-9
15:30-17:00	WD	05	Salon E	E-Business-10
15:30-17:00	WD	06	Salon G	New Product Development-7
15:30-17:00	WD	07	Salon H	Technology Transfer-4
15:30-17:00	WD	08	Salon I	Strategic Management of Technology-12
15:30-17:00	WD	09	Eugene	Software Process Management-3
15:30-17:00	WD	10	Portland	Technology Assessment and Acquisition-2
15:30-17:00	WD	11	Columbia	Technology Management Education-4
15:30-17:00	WD	12	Willamette	SPECIAL SESSION: Engineering Management Program Heads
15:30-17:00	WD	13	Douglas Fir	TUTORIAL: Intel's Path to Becoming 100% e-Corporation
15:30-17:00	WD	14	Meadowlark	TUTORIAL: What Does It Take to Be An Innovator?
15:30-17:00	WD	15	Mt. Hood	TUTORIAL: Creative R, D, & E Teams
15:30-17:00	WD	16	Salmon	Technology Marketing-2

Thursday, August 2, 2001

08:00-09:30	HA	05	Salon E	PLENARY: Global Perspectives on the Information Age
10:00-11:30	HB	01	Salon A	Information/Knowledge Management -11: E-Commerce
10:00-11:30	HB	02	Salon B	Information/Knowledge Management-18: Modeling
10:00-11:30	HB	03	Salon C	Strategic Mgmt. of Technology-13
10:00-11:30	HB	04	Salon D	PANEL: Engineering & Technology Management Journals
10:00-11:30	HB	05	Salon E	PANEL: E-Business-11: Implementation
10:00-11:30	HB	06	Salon G	Telecommunications-3
10:00-11:30	HB	07	Salon H	Technology Transfer-5
10:00-11:30	HB	08	Salon I	SPECIAL SESSION: Engineering and Technology Management Students Colloquium
10:00-11:30	HB	09	Eugene	PANEL: Organizational Mechanics of the Open Source Movement
10:00-11:30	HB	10	Portland	Technology Assessment and Acquisition-3
10:00-11:30	HB	11	Columbia	Product Development at Hewlett-Packard
10:00-11:30	HB	12	Willamette	Human Resource Development in the Network Economy
10:00-11:30	HB	13	Douglas Fir	Supply Chain Management-3
10:00-11:30	HB	14	Meadowlark	Technology Marketing-3
13:30-15:00	HC	05	Salon E	SPECIAL SESSION: PICMET '03 Strategies

Personal Schedule

	Sunday	Monday	Tuesday	Wednesday	Thursday
08:00-09:30 (A)		Plenary (Salon E)	Plenary (Salon E)	Plenary (Salon E)	Plenary (Salon E)
09:30-10:00 Coffee Break					
10:00-11:30 (B)					
11:30-13:30 Lunch Break		Optional Executive Forum (Mt. Hood)	Optional Executive Forum (Mt. Hood)		
13:30-15:00 (C)					PICMET '03 Planning (Mt. Hood)
15:00-15:30 Coffee Break					
15:30-17:00 (D)					
17:00-17:15 Coffee Break					
17:15-18:45 (D)					
	19:00-22:00 Ice Breaker Reception (Salon E)	19:30-22:30 Reception (World Trade Center)	19:00-22:00 Awards Banquet (Salon E)	19:00-21:30 Dinner Cruise Optional	

Notes:

SESSIONS

MB-01 Information/Knowledge Management-1
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Salon A**
Chair: Robert J Parden; Santa Clara University

MB-01.1 [R] Focusing the Knowledge Management Process

Robert J Parden; Santa Clara University, United States

The term "Knowledge Management" is causing some confusion. If you adhere to the definitions of data, information and knowledge, knowledge is not managed, it is the people who have knowledge that are managed. We clearly recognize data and data processing. Then data given context becomes information. But then information and knowledge become intertwined and confused. Perhaps the "Knowledge-Creating Company" by Nonaka and Takeuchi helped to clarify the air. They emphasized explicit knowledge as that which can be digitalized. That means that some information has been wrongly classified as knowledge. Tacit knowledge, on the other hand, is in the minds of the knower and can be clearly identified because it is much more difficult to transfer to others. The ambiguity continues when we extend to The Management of Information Technology, and the use of the term "knowledge repositories" when speaking of digital processing. This is clarified somewhat when firms speak of "best practices" as a historical record of problem solving success. They then propose that tacit knowledge must be transferred one-on-one, and index "the knowers" by their area of expertise and e-mail addresses. This distinction becomes essential when speaking of managing, or preferably, leadership. It is not clear that creative innovators are effectively managed. It is clear that they require new kinds of self, team, and network leadership for the New Economy.

MB-01.2 [R] Cooperation with Universities as Part of Technological Knowledge Management of Companies

Maria Celeste Reis Lobo de Vasconcelos; Faculdade de Ciências Humanas de Pedro Leopoldo, Brazil
Marta Araújo Tavares Ferreira; Universidade Federal de Minas Gerais - UFMG, Brazil

Technological innovation has been one of the main agents of economic and social change in several countries. However, how does the innovation process occur? Experience has demonstrated that the most innovative companies are those, which show a greater competence in managing knowledge. This work intends to analyze knowledge management in companies participating in a cooperation program with universities in the state of Minas Gerais, Brazil.

MB-01.3 [R] University Class-Professor Scheduling Model for the Portland State University Computer Science Department

Karla S Fant; Portland State University, United States
Stephen Nahas; Intel,

This paper presents the University Class Scheduling Model, which uses genetic algorithms to generate a series of feasible class schedules. It compares and contrasts this to more traditional approaches using linear programming. With targets, ranges, and constraints, this model assigns faculty and times, restricting groups of classes from overlapping.

MB-02 Supply Chain Management-1
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Salon B**
Chair: Axel Busch; University of Paderborn

MB-02.1 [R] Multi-Agent Based Virtual Enterprise Supply Chain Network for Order Management

King Lun Choy; Hong Kong Polytechnic University, Hong Kong
Wing Bun Lee; Hong Kong Polytechnic University, Hong Kong

Information integration of the supply chain for the manufacturing industry is essential because a competent and promising company needs an efficient information system to communicate with its customers, suppliers, and partners within the entire supply chain. Virtual Enterprise (VE) is a network or loose coalition of a variety of value adding services in a supply chain that unite for a specific period of time for a specific business objective, and disband when the goal is achieved. Virtual enterprise supply chains cut across traditional corporate boundaries and introduce new technical and business opportunities and challenges. The emerging new business strategy in the corporate sector is geared towards maximizing the benefits of the relatively narrow windows of opportunities yielded by increasingly volatile global markets, and optimally sharing the risks and resources through collaborations. In this paper, a VE is modelled in which a multi-agent system consisting of four agents, namely, interface agent, task agent, information agent and security agent together with a case-based reasoning decision support tool will be discussed. To illustrate the usability of the proposed VE architecture, a total order management system (TOMS) developed for a small and medium size enterprise (SME) is explained.

MB-02.2 [R] Supply Chain Management - Conception of a Collaborative Planning Approach in Case of Short-term Requirements Alteration

Wilhelm Dangelmaier; University of Paderborn, Germany
Axel Busch; University of Paderborn, Germany

The optimisation of the entire Supply Chain becomes ever more important due to increasing competition and a stronger customer orientation. In this context new future solutions are expected by production planning and control systems that enable a fast and flexible planning and control on an intercompany collaborative basis. For this purpose a paradigm change regarding the cooperation with preceding and following Supply Chain Partners will be necessary. One-sided local optimisation at the expense of other Supply Chain Partners will be replaced by inter-company collaboration in the planning and execution sector. For the sector of short-term requirements alteration a conception of inter-company planning processes based on collaboration and Win-Win-Situations for all Partners will be presented in this paper. The basic of the model will be formed by an incompany optimisation tool. It enables companies to gain necessary flexibility and data transparency to react to short-term requirements alterations. The optimisation process results in an incompany profit-maximising action which enables the company to get in touch with customers and suppliers in the next phase of the inter-company coordination processes. Both, the incompany optimisation as well as the inter-company coordination model are designed in such a way that the alternatives of action converge to an optimum in the entire Supply Chain.

MB-02.3 [R] Industrial Engineering in Banana Packaging in Australia

Lal C Wadhwa; James Cook University, Australia

Relationship between technology, workforce, and output are established through a study of variations in banana packaging practices in Australia. Scientific determination of the time required to complete various elements of the banana packing activity has been undertaken to establish the standard production level for varying levels of technology and workforce and for designing a well-balanced and efficient packaging system

MB-03 Strategic Mgmt. of Technology-1: Patents
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Salon C**
Chair: Kathleen K Murphy; Portland State University

MB-03.1 [R] Classification of the Patent Strategy of the Japanese Firms by Market Environment and the Characteristics of Technology

Koichi Hasegawa; Japan Advanced Institute of Science and Technology, Japan
Akiya Nagata; Japan Advanced Institute of Science and Technology, Japan
Ryoko Toyama; Japan Advanced Institute of Science and Technology, Japan
Toru Hirata; Toyama college, Japan
Tatsuya Sasaki; Japan Advanced Institute of Science and Technology, Japan

This paper attempts to show the framework to explain several types of the patent strategy of the firms. The framework theoretically explains the differences in the nature of the four basic positions of the firms towards their intellectual property rights, which influence the direction of their patent strategies. The differences in the position are caused by the interaction of the market environment and the product characteristics. The framework is tested by interviews of six large Japanese firms that are famous for their patent strategies.

MB-03.2 [R] Changing Roles of Intellectual Property Division in Japanese Firms

Toru Hirata; Toyama College, Japan
Akiya Nagata; Japan Advanced Institute of Science and Technology, Japan
Ryoko Toyama; Japan Advanced Institute of Science and Technology, Japan
Tatsuya Sasaki; Japan Advanced Institute of Science and Technology, Japan
Hasegawa Koichi; Japan Advanced Institute of Science and Technology, Japan

The importance of "Intellectual Property Division" has risen in Japanese firms. Many Japanese firms reformed the structure of their intellectual property divisions the latter half of 1980's and 1990's, as the Pro-patent Policy"had been reinforced around the world. As a result, the intellectual property division has increased its importance as a strategic section to hold the dominant position in the market. We interviewed a Japanese company that is excellent in the R&D and the patent strategy, and pursued the change in its intellectual property division. The study found that the function of the intellectual property division is evolving from the patent control to the strategic management of intellectual properties in cooperation with the marketing strategy. The role of intellectual property division as an interface between R&D and the market is now more emphasized.

MB-03.3 [R] Coevolution of Patent Strategy and Product Strategy

Tatsuya Sasaki; Japan Advanced Institute of Science and Technology, Japan
Akiya Nagata; Japan Advanced Institute of Science and Technology, Japan
Ryoko Toyama; Japan Advanced Institute of Science and Technology, Japan
Toru Hirata; Toyama College, Japan
Koichi Hasegawa; Japan Advanced Institute of Science and Technology, Japan

In the Era of Knowledge, the fit between the environment such as market and national patent system and product and patent strategies determines the longevity of a product. Patent strategy and product strategies coevolve by influencing each other through technology choices. This study offers a model to explain the co-evolution of patent and product strategies.

MB-04 PANEL: The Future of Technology Forecasting and Assessment
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Salon D**
Moderator: Harold A Linstone; Portland State University

Panelists: Joseph P Martino; JPM Associates
Alan L Porter; Georgia Institute of Technology
Tugrul Daim; Intel Corporation

The driving force for the techniques developed in the 1950s and 1960s was the military-industrial-academic complex which focused on the aerospace sector. Now the overarching technology is based on the information sciences and the life sciences will galvanize the next era. Will this evolution require new ways to address technology forecasting and assessment?

MB-05 E-Business-1
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Salon E**
Chair: Eliezer Geisler; Illinois Institute of Technology

MB-05.1 [R] Re-architecting Business Infrastructures through Global Business-to-Business Electronic Commerce

Elias G Carayannis; The George Washington University, United States
Jeffrey Alexander; The George Washington University, United States

Business-to-business electronic commerce (B2BEC) activity worldwide is estimated to grow to several trillions of dollars within the next few years. Already, the increase in B2BEC has had an increasingly large and broad impact on industrial structures and the ways we measure and evaluate such fundamental concepts as risk, the valuation of and return on intangibles such as intellectual capital, brand-related goodwill, and service sector productivity. Major companies across the world are struggling to position themselves to take advantage of this new realm of business opportunity. The future of B2BEC, however, is clouded by challenges in determining global standards in technology, business processes, and government policy. In this paper, we review the evolution and current direction of global B2B EC in several industries and show how firms have used EC as a strategic differentiator in maximizing customer value added. We profile in detail the role of electronic commerce as a strategic enabling, infra-structural, path-breaking and multi-use technology that if properly leveraged, can lead to radical improvements in both quality and productivity in inter-firm trading relationships. We end by identifying best practices in industry and government for accelerating the deployment of electronic commerce, and for making this activity an agent of strategic change in the emerging digital economy.

MB-05.2 [R] Organizing for e-Business: The Implementation of Management Principles in Electronic Commerce

Eliezer Geisler; Illinois Institute of Technology, United States

This paper reviews some key structural and design dimensions of organizations and how they apply to electronic business and the virtual organization. The paper reviews the relevant literature on design of electronic commerce organizations. Although few studies have dealt with these issues, the paper highlights some research questions that emerge from the literature, and examines selected dimensions, such as formalization, departmentation, and inter-organizational relations. The paper concludes that electronic commerce organizations are faced primarily with design issues, so that conventional knowledge of structural dimensions is highly applicable to this new business phenomenon.

MB-05.3 [R] e-Commerce Incubators : The New Dot-Com Factories

Halime Inceler Sarihan; Portland State University, United States

E-Commerce Incubators have become a new hot way to foster growth for the dot.com companies. New e-commerce incubators functioned as new dot.com factories by offering office space, funding, hardware, software, hosting services call centers and physical infrastructure and some other services to dot.com start-ups. Some of the popular ones are Idealab, Hotbank, Garage.com CMGI, eCompanies, eHatchery, Camp6, Epoch and Latitute Blue. This paper will give a snap shot of the working incubator model, elaboration of the differences between venture capital (VC) firms and e-commerce incubators and future outlook of the e-commerce incubators after the dot.com shakeout.

MB-06 Telecommunications-1
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Salon G**
Chair: Sang-Baek Chris Kang; ETRI- IT Technology Management Research Institute

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MB-06.1 [A] Impacts of Outsourcing Manufacturing

Michael H Cole; University of Arkansas, United States
Scott J Mason; University of Arkansas, United States
Li Yan; Avaya Inc., United States
Tze-Chen Hau; University of Arkansas, United States

In a past project for a large telecommunications company, the investigators developed a system for production scheduling and buffer sizing. Recently the company decided to spin off its manufacturing operations. The current project examines this decision's impact on the management of the production and logistics processes of the new organizations.

MB-06.2 [R] WAP as Marketing Strategy in Malaysia: An Assessment

Ali Khatibi; Multimedia University, Malaysia
V. Thyagarajan; Multimedia University, Malaysia

As a fixed line technology the internet has proved highly successful in reaching the homes of millions worldwide. The WAP (Wireless Access Protocol) bridges the gap between the mobile world and the internet as well as corporate intranets. This tremendous surge of interest and development in the area of wireless data in recent times has caused worldwide in many ways and particularly in the field of commerce and trade also. In Malaysia the mobile telecommunication was introduced in 1986. The growth of cellular service was tremendous and it reached the level of 3.2 million customers within this 14 year period. By the introduction of WAP technology in Malaysia by Cel-

com, Maxis, and Time it has opened an another marketing channel to deliver product and services to the consumers. This has created a new interest to study the acceptance level among the users of WAP as a marketing strategy. The present paper analyses the consumer perception about the use of WAP technology as a marketing strategy. The present study was carried out with a sample of 120 consumers drawn from diversified groups of consumers of Malaysia.

MB-06.3 [R] An Analysis of Telecommunications Market Structure and Carriers' Strategies in Korea

Myung-Hwan Rim; ETRI, Korea, South
Hyun-Woo Lee; ETRI, Korea, South
Kum-Ju Kwon; ETRI, Korea, South

This paper analyzes the Korean mobile telecommunications market structure and carriers' 3G strategies in Europe and Asia telecommunications market. In the prospect of Korean mobile telecommunications market structure, it also includes the trend of the mobile telecommunications and service deployment from 2G/2.5G to 3G. And, we prospect it how the market structure and business direction of five existing operators are changing by comparing the strategies of the Korean 3G service carriers.

MB-06.4 [A] Perspectives on Korean High-Speed Internet Access Market: Market Structure and Deployment

Sang-Baek Chris Kang; ETRI- IT Technology Management Research Institute, Korea, South
Hyun-Jong Kim; ETRI- IT Technology Management Research Institute, Korea, South

In this paper, the current status of explosive Korean broadband high-speed Internet access market is analyzed with respect to a deployment of Asymmetric Digital Subscriber Line (ADSL)and Cable Modem. All factors that affected the spread of ADSL technology will be analyzed within the framework of Michael Porter's five competitive forces model. The market structure, carriers, rivalry of ADSL competition, penetration rate and ADSL market forecast compared with global carriers will be major topics in this analysis.

MB-07 Decision Making in Technology Management-1
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Salon H**
Chair: Fatma Tiryaki; Yildiz Technical University

MB-07.1 [R] Simulation of the PICMET Registration Process

Doug Jones; Portland State University, United States

This student paper will present the results of a simulation model for the PICMET '01 registration process with a live demonstration using Pro-Model. Did it work? Come and see for yourself!

MB-07.2 [R] For Solving Multiple Objective Linear Fractional Programming Problem via the Analytic Hierarchy Process

Mehmet Ahlatcioglu; Yildiz Technical University, Turkey
Fatma Tiryaki; Yildiz Technical University, Turkey

The methods for solving multiple objective linear fractional programming (MOLFP) problem has been encountered in the literature. By using Analytic Hierarchy Process (AHP) as a different from these, we have found weights for the objectives and by assigning them as coefficients to being linearized objective functions and at the same time interacting with decision maker (DM) we have obtained efficient solutions.

MB-07.3 [R] Car Purchase Decisions

Akira Yato; Kyocera, United States
Jose R Rodriguez; Intel Corp., United States
Olgay Cangur; Portland State University, United States
Ravee Boonbutra; Portland State University, United States
Rizwan Kumte; Portland State University, United States
Rolly Lahagu; Portland State University, United States

This paper demonstrates how using multicriteria decision models and pairwise comparison tools can assist car buyers select the car that meets their needs and emotions. A software demo will also be presented with an easy to use and deploy tool that automates the decision process. The paper is based on a project conducted in a graduate course in the Engineering & Technology Management department at Portland State University

MB-08 Entrepreneurship-1
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Salon I**
Chair: John Whittaker; University of Alberta

MB-08.1 [R] Turkish Entrepreneurs in Information and Communication Industry

Dilek Cetindamar; Sabanci University, Turkey

As entrepreneurship is an important tool for the development of future growth sectors, this paper attempts to analyze the dynamics of entrepreneurs in information and communication technology-based firms. By using the results of a survey, the paper shows how entrepreneurs in a developing country context set up firms and what problems they have and what they suggest for the improvement of entrepreneurship.

MB-08.2 [R] Study on the Competitiveness of the Brazilian Pharmaceutical Industry Based on Porter's Typology

Jorge Ferreira F da Silva; Pontifícia Universidade Católica do Rio de Janeiro, Brazil
Antonio Felipe de Almeida Pinho; Pontifícia Universidade Católica do Rio de Janeiro, Brazil

The main purpose of this study is to evaluate how the strategies chosen by the firms inserted in the Brazilian pharmaceutical industry within the period 1995-1998 have influenced their strategic positioning and consequently affected their performance. Based on Michael Porter's theory on competitive strategies, the study presents the pertinent strategies for firms operating in the Brazilian pharmaceutical industry and identifies the strategic groups formed by the firms components of the industrial segment under analysis. The research was implemented by means of gathering a data bank comprising 50 laboratories. The database contains information on the strategic behavior of those firms based on eleven variables concerning the strategies pursued as well as on four variables concerning performance. Data were then statistically analyzed through the use of the following tools: Factor Analysis, Cluster Analysis and Multivariate Analysis of Variance (MANOVA). The results obtained suggest that the differences in the average performance among the strategic groups identified may be explained by the different strategic decisions taken by each firm of the sample.

MB-08.3 [R] Engineers, Entrepreneurs and the Commercialization of Technology

John Whittaker; University of Alberta, Canada

Engineering and entrepreneurial skills are essential ingredients in the commercialization of technology. This paper examines the two skill sets. Engineering favors conservative, proactive, risk-averse, individuals committed to technological feasibility. Entrepreneurship demands visionary, optimistic, risk seeking, individuals who are good communicators. These skill sets rarely reside in a single individual and consequently in the development process, a certain tension is inevitable.

MB-09 Environmental Issues
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Eugene**
Chair: Amy G Saberiyan; Neek Engineering

MB-09.1 [R] Knowledge Management in Ecological Design Environment-Friendly Product Design Strategies and Design Enabling Both Easy Assembly and Disassembly

Yasuyuki Yamagiwa; Sony Corporation, Japan
Jun Numata; Musashi Institute Technology, Japan
Yuko Namiki; Musashi Institute of Technology, Japan

With environmental problems increasing in recent years, companies manufacturing household electrical appliances, computers and other products are

continuing to develop environment-friendly products to meet the rules and regulations in different countries regarding environmental protection. This research concerns design strategies to establish a methodology for product design that takes into consideration everything from maintenance and upgrading to reuse and recycling to achieve environment-friendly products. Furthermore, the research focuses on the assembly and disassembly operations that occur with environment-friendly products, and through mutual comparison of assembly ease and disassembly, establishes principles for design enabling both easy assembly and disassembly.

MB-09.2 [R] Knowledge Based Approach for Environmental Compliance Auditing of EIA Projects: A Case Study of Malaysia

Mizanur Rahman; Universiti Putra Malaysia, Malaysia
Mohamed Daud; Universiti Putra Malaysia, Malaysia
Mohd. Zohadie Bardaie; Universiti Putra Malaysia, Malaysia
Mohd Nasir Hassan; Universiti Putra Malaysia, Malaysia

This paper describes the knowledge-based approach for environmental compliance auditing of EIA related developmental projects in Malaysia. Environmental compliance auditing mainly checks the environmental compliance and suitability of mitigation measures taken during project activities. It involves the baseline data or guideline values for comparing the changes in environmental conditions, monitoring database for selected variables, identifying the causes and effects of environmental pollution, and recommending remedial measures. The proposed system is comprised of three components, namely compliance audit model, monitoring database, and a knowledge base.

MB-09.3 [R] Management of the Cross Media Impacts of Municipal Landfill Sites: The Delphi Technique

Theng Lee Chong; Universiti Putra Malaysia, Malaysia
Mohd Nasir Hassan; Universiti Putra Malaysia, Malaysia
Muhamad Awang; Universiti Putra Malaysia, Malaysia
Mohd Yazid Saman; Universiti Putra Malaysia, Malaysia
Md. Mizanur Rahman; Universiti Putra Malaysia, Malaysia

Most of the existing solid waste disposal sites in Malaysia are practising either open dumping or controlled tipping because the technology of proper sanitary landfill practice is not totally implemented. The environmental conditions from these sites are thus expected to be bad, especially in terms of the contamination of soil, air, surface and underground water, and also impacts on flora and fauna, including humans. The contamination associated with solid waste disposal sites involved three major environmental compartments or media, i.e. the atmosphere, water and soil. This 'Cross media' or 'Multimedia' impacts phenomenon has been recognised in various countries as being of potential importance and complicated. This study discusses the development of simple evaluation systems by using the Delphi Approach, which emphasises the development of weightage for different parameters selected in the evaluation procedures.

MB-09.4 [R] Technology Selection in Brownfields Redevelopment

Dundar Kocaoglu; Portland State University, United States
Kenneth J Williamson; Oregon State University, United States
Amy G Saberiyan; Neek Engineering, United States
Leonard Olive; City of Portland,

Sustainable redevelopment of contaminated "Brownfields" properties offers many economic and social benefits. However, due to the uncertainties of potential clean up cost, the practicality of available technologies, time constraints, community concerns, as well as additional costs associated with development of Brownfields sites, many developers forgo Brownfields development. These same uncertainties cause lending institutions to hesitate when making loans for development of projects proposed for contaminated sites. The goal of this paper is to provide a general decision making model that can be utilized in the technology selection for decision makers on proposed Brownfields site clean ups.

MB-10 Competitiveness in Technology Management-1
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Portland**
Chair: Deok Soon Yim; Science and Technology Policy Institute

MB-10.1 [R] The Competitiveness of SMEs in China

Guan JianCheng; Beijing University of Aeronautics and Astronautics, China
Ma Ning; Beijing University of Aeronautics and Astronautics, China
Gao Baiyang; Beijing science & technology committee, China

The paper analyzes the meaning of competitiveness of small and medium-sized enterprises (SMEs) from the viewpoint of technological innovation. Seven innovation factors are put forward which affect competitiveness of SMEs based on the interpreting of the actual competing status of SMEs in China. The methods of correlation and regression are used to analyze the relationship between seven innovation factors and competitiveness described by sales volume, profit return and export volume. We find that R&D devotion, manufacturing capability and technology acquiring influence significantly competitiveness of SMEs, and other four factors (including technology cooperation, marketing ability, personnel and policy) have not given obvious play to competitiveness yet. Therefore, both SMEs themselves and government should adopt necessary measures to strengthen these four aspects so as to improve the competitiveness of SMEs on the whole.

MB-10.2 [R] Improving the Competitiveness of the Management Technology of Japanese Firms

Kazuo Yanagishita; Nihon University, Japan
Makoto Tanaka; Japan Management Association Consulting, Japan
Akio Kameoka; Japan Advanced Institute of Science and Technology, Japan

In the report "Comparative Evaluation of Industrial/Technological Competitiveness"[1], Professor Kameoka identified that the competitiveness, of Japanese firms' management techniques and talents, is low. In response to this, a research group, aimed at investigating the competitiveness of the management technology of Japanese firms, was initiated. The group collected data through the use of questionnaire based research. A new management model, "V=L x R x P", was defined. It is proposed, to use this model, to improve weak areas identified by our investigation.

MB-10.3 [R] The Diversification Stage and Strategic Development Types of the Holding Companies in Turkey

Seckin Polat; Istanbul Technical University, Turkey
Tufan V Koc; Istanbul Technical University, Turkey
Verda C Yunusoglu; TUBITAK-Marmara Research Center, Turkey

The purpose of this study is to determine the forms of strategic development of the Turkish Holding Companies. The management shall thus be able to get some clues by drawing such a framework. This way it shall be possible to estimate as to where the holding companies shall be in the near future. If there are different types of patterns, the analysis of growth pattern performance can be carried out and the type of pattern, which fit the company most, can be selected. The strategic group types can be estimated. This way, the companies shall be able to define similar types of companies, which can have comparable values for their targets.

MB-11 Technology Management Framework
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Columbia**
Chair: Charles W. N Thompson; Northwestern University

MB-11.1 [R] Field Methods in Research on Technology Management

Charles W. N Thompson; Northwestern University, United States

Available concepts, terms, and frameworks provide an inadequate set of symbols for describing the choice of designs used in field research in technological organizations. Dimensional analysis of a sample of research reports demonstrates the usefulness of measuring selected characteristics and also provides some insight into the pattern of journal reports.

MB-11.2 [R] Defining and Measuring Organizational Success: Toward a Dynamic, Multi-Dimensional Model

Alan C Maltz; Stevens Institute of Technology, United States
Aaron J Shenhar; Stevens Institute of Technology, United States
Donald N Merino; Stevens Institute of Technology, United States

Traditional measures of corporate success have been shown ambiguous and

potentially poor indicators of future performance. Success in the short term is typically measured by last quarter's profitability and revenue growth, but these are not necessarily valid metrics for long term success in the present dynamic markets. Today's turbulent environments have caused fundamental shifts in organizational design and management practices, and measures of organization performance need to adapt to these conditions. Recognition of this issue has resulted in recent attempts to develop non-financial measures of performance. Serious questions exist, however, with current measures and the theoretical literature has been slow in responding to these issues. This paper will first discuss the limitations of existing measures, and the need for a more dynamic frame of reference reflecting multiple time-periods. It then suggests a multidimensional framework for further investigation of organizational success. This framework is examined in light of five relevant research streams: (1) corporate entrepreneurship, (2) strategy, (3) process and product development, (4) marketing and (5) economics/finance. Based on this framework, additional avenues for future research are envisioned and discussed.

MB-11.3 [R] Towards a Contingency Framework for Management of Technology Theory

Anders Drejer; Aalborg University, Denmark

The foundation of the paper is the discussion of different traditions and approaches to Management of Technology (MoT) and to Technology Studies (TS) at firm level. The current confusion and many different traditions regarding the content of MoT leads to the identification of a need for a contingency model for MoT theory. And contingency factors should be related to empirical challenges of firms, thereby enabling technology managers to apply MoT theory pragmatically. It is argued that existing mappings of MoT theory are, indeed, not sufficiently related to empirical contingency factors. Thus, the main purpose of the paper is to discuss such empirical contingency factors that could be applied to MoT theory and make it more useful for technology managers in practice. The well-known distinction between technology exploitation and disruptive technological change is discussed and dismissed as too simplistic. Instead, three situations for technology management are formulated and briefly related to MoT theory to round up the paper. The latter forms the main contribution of the paper.

MB-12 New Venture Management
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Willamette**
Chair: Alptekin Erkollar; Universität Klagenfurt

MB-12.1 [R] The External Exploitation of Capabilities - A Methodology for Reviewing the Organization's Capabilities

David W Birchall; Henley Management College, United Kingdom
George Tovstiga; ABB Business Services Ltd., Switzerland

In this paper the authors explain an approach which enables organisations to identify those capabilities needed in order to support the development of the firm's intellectual property and subsequent exploitation beyond its use within its current and planned product/service portfolio. The methodology is illustrated through an examination of its application to a large organization interested in creating an incubator unit to encourage and support 'spin-offs', 'spin-outs' or what has more recently been termed 'carve-outs'. The authors begin by looking at the reasons behind the current popularity of in-house incubators within large knowledge-rich organizations. They then discuss the concept of capability mapping and the nature of knowledge acquisition and exploitation within organizations which they believe to be a fundamental step towards an effective exploitation strategy. This is followed by an examination of the external exploitation of capabilities before demonstrating how capabilities for supporting such a venture might be identified.

MB-12.2 [R] A Study on the Satisfaction of Customers in Korean Business Incubators

Moon-Koo Kim; ETRI, Korea, South
Dong-Heon Jeong; ETRI, Korea, South
Myeong-Cheol Park; Information and Communications University, Korea, South

Nowadays in Korea, many Business Incubators(BIs) are founded to support the creation of ventures by government or universities. But many BIs don't meet the customer's needs. So this study were focused on the satisfaction of customers in Korean BIs. To attain this purpose, this study investigated the current status and characteristics of BI by the questionnaire survey. And then the Correlation of the BIs' Types and the satisfaction of customers were analyzed.

MB-12.3 [R] A Model for Virtual Incubator

Qingrui Xu; Zhejiang University, China
Caozhi Xu; Zhejiang University, China
Jin Chen; Zhejiang University, China

In a knowledge-based economy, for Information Technology industry, authors think that outsourcing and human capital are critical to maintain sustainable advantage for enterprises. The paper propose a 'virtual incubator' model to facilitate startup success and business network formation, authors also suggest to build the public-private partnership to stimulate venture invest.

MB-13 TUTORIAL: Competitive Strategies in High-Tech Industries
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Douglas Fir**

Speaker(s) Al Herman; Quantric Corporation

Strategic management in the intensely competitive environments characteristic of many high-tech industries requires the use of methods and tools keyed to the dynamics of that environment. This tutorial is intended to familiarize participants with current concepts, tools and methods used to analyze, formulate and implement competitive strategies in high-tech industries. Covered topics include: strategy development models, strategy archetypes (including e-business models), industry and competitor analysis, business intelligence tools, sources and sustainability of competitive advantage, quantitative dynamics of competition and strategy implementation tools.

MB-14 TUTORIAL: Speakers Clinic
Monday, 7/30, 10:00 AM - 11:30 AM **Room: Meadowlark**

Speaker(s) Alan Francis;

The PICMET Speakers Clinic will provide on-site support services to our speakers enabling them to give their best and most compelling presentation. Beginning with a concentrated 45-minute tutorial, each presenter will be given the opportunity to meet individually with the instructor. In this private session you can strengthen and polish your public speaking skills insuring your ideas are communicated in a clear, focused and informative style. There will be tips and techniques on relaxation, positive imaging and chi kung to transform anxiety and nervousness into assets.

MC-01 Information/Knowledge Management-2
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Salon A**
Chair: Markku Tuominen; Lappeenranta University of Technology

MC-01.1 [R] Measuring Intangibles: Managing Intangibles for Tangible Outcomes

Elias G Carayannis; The George Washington University, United States
Rudy Watson; The George Washington University, United States

Effective knowledge sharing has emerged as a key characteristic of the most competitive organizations. Existing processes and methodologies focus on the measurement of tangible outcomes. Organizations monitor tangible results such as increased profits and reduced costs using traditional methods. As organizations become more aware of the impacts of knowledge management, focus will be placed on developing metrics which measure the intangible benefits of knowledge sharing. This will enable management to make more effective decisions related to the deployment of the organization's knowledge management strategy thus leading to improved tangible outcomes. Existing program management measurements have been applied to this area with varying applicability. Tangible outcomes of knowledge sharing may be measured by tried and true means; however, intangible benefits may be slightly

more elusive. This paper will focus on the identification of intangible benefits, the cause-and-effect relationships, and the applicability of existing metrics to these intangibles. The premise is that existing measurements may not apply. The development of new metrics for managing intangibles to obtain tangible outcomes is a necessity.

MC-01.2 [A] Ways for Analysts and Managers to Boost Utilization of Empirical Technology Analyses

Alan L Porter; Georgia Institute of Technology, United States

"Managerial intuition" is largely bunk. Managers in today's information economy need empirical knowledge. Yet, anomalously, most technology analyses are unused. Why? Organizational experiences suggest several analyst actions to enhance utility, including: - tightly couple with users - customize knowledge representations - provide Just-In-Time results (through semi-automated software processes) I also offer suggestions for technology managers to enhance their effectiveness.

MC-01.3 [R] Knowledge Management: An Exploratory Study in the Satellite Launching Vehicle Project

Maria Zelia S Landini; Institute of Aeronautical Technology, Brazil
Jose Henrique S Damiani; Institute of Aeronautical Technology, Brazil

The search for the full use of the knowledge of individuals, who work in an organization, has deserved continuous references in the scientific literature. This is due to the fact that the organizations have become aware of the importance of how to manage the knowledge and, especially, how to develop strategies to transform it into collective knowledge. In order to enlarge its competitiveness, quality, and effectiveness, internally and externally, an organization must use the intelligence and the knowledge of each one of their collaborators, in other words, the organizations should use knowledge management. In these terms this research, through empiric and exploratory methods, intends to be, in the perception of the idividuals analyzed, the beginning of an investigation of Knowledge Management in a military research organization . Therefore, the Satellite Launch Vehicle Project (VLS Project) was taken as a reference. The VLS Project is developed by the Institute of Aeronautics and Space (IAE) in the Aerospace Technical Center (CTA), organ integrated to the Brazilian Aeronautical Command. However, in Brazil, there is still no registration of such a research, what creates the interest and the motivation to investigate the real applicability of knowledge management in a Military Institution, one of the three segments in Brazilian Satellite Launching Program.

MC-02 Supply Chain Management-2
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Salon B**
Chair: Thomas Gulledge; George Mason University

MC-02.1 [R] Technological Management in the Industrial Network: The Sugar Supply to the Industrially Processed Food Chain

Maria Rita Pontes Asumpção; Universidade Federal de São Carlos, Brazil

The present paper analyzes the integration process of the productive chain of brazilian sugar to the network of supplies of processed food, promoted by the deregulation of the sugar sector and globalization of the markets. That process, conditioned by technological and organizational changes, makes emerged an intermediate market for sale of the sugar to the industrial market, being constituted a new industrial network.

MC-02.2 [R] e-Supply Chain for International Technology Package Development

Nazmun Nahar; University of Jyväskylä, Finland
Timo Käkölä; University of Jyväskylä, Finland
Najmul Huda; Tallinn Technical University, Estonia

The research investigates how firms have integrated modern information and communications technologies (ICTs) to supply chains of technology suppliers. Empirical research indicates that the utilization of ICTs by firms has improved the development and delivery of technology packages abroad and distributed the technology package development process among technology suppliers, subcontractors, and technology recipients who are located in different countries. The main contribution of this paper is a framework for distributed technology development process called "e-supply chain for international technology transfer."

MC-02.3 [A] Aligning the Supply Chain Operations Reference (SCOR) Model with Enterprise Applications

Tamer Cavusoglu; George Mason University, United States
Thomas Gulledge; George Mason University, United States
Thomas Kessler; PROMATIS, Inc., United States

Success in Supply Chain Management (SCM) is dependent on how well the complex web of processes, technology and behaviors are engaged to meet strategic objectives. Successful results require that value chains integrate and jointly manage business processes. In this research, a state-of-the-art enterprise business process framework is derived from the standard software technologies, called Enterprise Applications (EA). EAs, such as ERP (Enterprise Resource Planning), SCM, and e-Commerce systems enable both internal and extended enterprise integration. An enterprise that runs on ORACLE Applications (e-Business Suite), for example, gathers, evaluates, processes and disseminates data based on the business process logic configured in the specific implementation.

MC-03 Strategic Mgmt. of Technology-2
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Salon C**
Chair: Linda L Brennan; Mercer University

MC-03.1 [R] Strategic Technology Control: A Conceptual Framework

Hans-Helmuth Jung; Swiss Federal Institute of Technology Zurich, Switzerland
Philip Bucher; Swiss Federal Institute of Technology Zurich, Switzerland

Strategic control is state of the art in the theory of strategic management today. However, the literature on technology management does not mention any elements, that could be used for strategic technology control. On the other hand, there is a widespread need in industry to have an effective and efficient control and navigation of the technology strategy implementation. The following paper illustrates the main tasks of strategic technology control.

MC-03.2 [A] Strategically Evolving the Future: Directed Growth of Intellectual Capital

Dana W Clarke, Sr.; Ideation International Inc., United States

The progression of goods, services and even entire markets has historically resulted through natural evolution spawned by human creativity. While this approach has served both industry and consumers well, it is inadequate for the competitive environment of today and tomorrow. An alternative to the random evolution of intellectual capital is to direct its evolution. The methodical creation of intellectual capital provides a means for moving from guesswork, prediction, and forecasting to a structured process used to create high-value intellectual capital.

MC-03.3 [R] A Brave New e-World: Technology Management for Corporate Social Responsibility

Linda L Brennan; Mercer University, United States
Victoria E Johnson; Mercer University, United States

Expectations of corporations are higher than ever before. Investors and other stakeholders consider companies in terms of the "double bottom line," reflecting financial performance and corporate social responsibility. Technology has been both a driver and an enabler in the increase in social performance. We examine this dual role in the growing e-World, using cross-case analysis of eight firms to develop a positive model of strategic responsibility.

MC-04 Technology Planning & Forecasting-1: Strategic Perspectives
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Salon D**
Chair: Al Herman; Quantric Corporation

MC-04.1 [R] Observations on the Application of Chaos Theory to the Study of Kondratyev Waves

James Lill; Portland State University, United States

In this talk we will briefly review some of the major attempts to explain Kondratyev Waves, and critically examine the application of chaos theory to their analysis by Berry. Sample calculations suggest that the application of chaos theory to time series data is beset with similar problems to those that plague windowing; that is, false signals can be imposed on random data due to artifacts of the numerical analysis itself. This paper is based on a project conducted in a graduate course in the Engineering & Technology Management department at Portland State University. The members of the project team were Jim Lill, Edgardo Berrios, Ravee Boonbutra, Rafael Borja, Ozgur Koc, Michael Magee and Sevket Numanoglu

MC-04.2 [R] Industrial Practice in Technology Planning—Implications for a Useful Tool Catalogue for Technology Management

Clare J.P. Farrukh; University of Cambridge, United Kingdom
Robert Phaal; University of Cambridge, United Kingdom
David R Probert; University of Cambridge, United Kingdom

The results of a recent survey to establish current UK industrial practice in technology planning are presented. The nature of the companies responding, their approach to technology planning and their perceived needs in terms of tools and techniques are outlined and discussed in relation to the ongoing development of a catalogue of technology management tools.

MC-04.3 [A] Characterisation of Technology Roadmaps: Purpose and Format

Robert Phaal; University of Cambridge, United Kingdom
Clare J.P. Farrukh; University of Cambridge, United Kingdom
David R Probert; University of Cambridge, United Kingdom

Technology roadmapping is an approach that supports the integration of technological considerations into product and business planning. The method has been widely adopted by industry, although its implementation can represent a challenge to managers in terms of initiating the process, and then keeping it 'alive'. This paper describes a 'fast-start' technology roadmapping process that has been developed to address these industrial needs. Development and testing of the method in a wide range of situations, combined with a review of other published technology roadmaps, has enabled a classification system for roadmaps to be constructed, based on both their purpose and format.

MC-05 E-Business-2
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Salon E**
Chair: Burton Dean; San Jose State University

MC-05.1 [R] ES3 - Electronic Supplier Selection System

Senthil Ramani; i2 Technologies, United States
Mark R Henderson; Arizona State University, United States
Dan Shunk; Arizona State University, United States
Matthew Carlyle; Arizona State University, United States
Philip Carter; Arizona State University, United States

ES3 (Electronic Supplier Selection System) will coordinate e-business between a customer and its supply chain based on secure Internet communication. ES3 will permit a customer to immediately evaluate, order and schedule product delivery and determine the best of several suppliers. ES3 is a state-of-the-art decision tool that will enable manufacturers to make intelligent and quick decisions on choosing the right suppliers for the right products. Using a rigorous multi-objective algorithm, to drive its engine, along with a Web-enabled JAVA solution as a front end, ES3 is a means to integrate the enterprise.

MC-05.2 [R] An Analysis and Comparison of Different Types of Electronic Payment Systems

Hsiao-Cheng Yu; National Chiao Tung University, Taiwan
Pei-Jen Kuo; IBM Taiwan, Taiwan
Kuo-Hua Hsi; National Chiao Tung University, Taiwan

Two Parties conducting business transaction through Internet do not see each other face to face; neither exchange any document or currency hand to hand. When electronic money is transferred from a buyer to a seller over telecommunications network, its accuracy and security is critical. This paper explored the advantages and limitations of four types of electronic payment systems, namely the online credit card payment system, the electronic cash payment system, the electronic check payment system and the smart card based electronic cash payment system. Each payment system was assessed from four perspectives: the technological aspect, the economic aspect, the social aspect, and the regulatory aspect. The findings of this research could be useful for companies who are planning to adopt or to devote R & D into an electronic payment system.

MC-05.3 [R] Research Issues in e-Business

K. Vinodrai Pandya; University of East London, United Kingdom
A. O. Arenyeka-Diamond; University of East London, United Kingdom
R. Bhogal; University of East London, United Kingdom

With the businesses increasingly trading on Internet, especially in B2C and B2B categories, there has been many successes as well as failures. The authors have discussed research issues such as strategy, legality and management, which are relevant to advancement of applications of e-business. These issues are becoming important in the face of recent spates of pure dot-com failures. The authors realize that e-business is multi-disciplinary and thus has far and wide research implications in its adoption. The authors are involved in various research activities. Two activities - investigations of business model for e-tailing and the customisation and value adding processes in user interface, are currently being undertaken and discussed in this paper. This paper is relevant to researchers, academics and practitioners in almost all professions.

MC-06 Telecommunications-2
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Salon G**
Chair: Douglas Harms; Intel Corporation

MC-06.1 [A] Globalization of Wireless Telephone

Mirza M Luqman; NEC Eluminant Technologies, United States
Sunshine Sanchez; Portland State University, United States
Ming Shi; Sharp Microelectronics of Americas, United States

Wireless telephone technology is changing at a phenomenal pace. Existing standards and protocols pose serious challenges for globalization of next-generation wireless telephones. This paper provides an overview of wireless technologies and future trends as Smartphone. Wireless globalization strategy is developed. SWOT, quality, market share, and manufacturability issues are analyzed. The paper is based on a project report completed in the Engineering and Technology Management Department of Portland State University. The project team members were Mubarak Alkahili, Akram El-Madhoun, Mirza M. Luqman, Sunshine Sanchez, Tony Sandiford, and Ming Shi.

MC-06.2 [A] DCX NET DaimlerChrysler

Matthias Pfeifer; Portland State University, United States
Olgay Cangur; Portland State University, United States
Ferry Cosmedy; Portland State University, United States
Rattiya Tukta Maneesri; Portland State University, United States
Sunnithi Poopair; Portland State University, United States
Jirasak Tungkawachara; Portland State University, United States

This paper illustrates on base of the new founded DCX NET holding by DaimlerChrysler the reason for launching a new strategy based on e-commerce in the automotive industry. Thus connected procedures, structures and treats are presented and the different business areas of DCX NET are analyzed. Furthermore expectations and prognoses regarding the furthermore e-commerce trend in the automotive industry are listed. The paper is based on a project conducted in a graduate course in the Engineering & Technology Management department at Portland State University.

MC-06.3 [A] Nokia: From Pulp Mill to Telecommunications Giant

Doug Harms; Portland State University, United States
Ala'a Abunijem; Portland State University, United States
Gregg Theiss; Portland State University, United States
Rami Khalaf; Portland State University, United States
Shahzada Iqbal; Portland State University, United States

Rakhman Gul; Portland State University, United States
Mohamed Moussa; Portland State University, United States

This paper examines the history of Nokia with respect to its strategic planning and policies, tracing its roots from a single pulp mill in 1865 to a telecommunications leader. Critical decisions and planning are discussed, along with a case study of the company's environmental policies. Nokia has postured itself well for the future with a strong research and development program, key acquisitions, and aggressive market expansion. The paper concludes with a SWOT analysis to summarize the writers' opinions of how well Nokia has postured itself to maintain and expand its market leadership.

MC-07 Decision Making in Technology Management-2
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Salon H**
Chair: Dundar F Kocaoglu; Portland State University

MC-07.1 [R] Evaluation and Selection Processes of Petroleum Exploration and Development Projects: An Empirical Study

Razif Abd. Razak; Universiti Teknologi Malaysia, Malaysia
Dundar F Kocaoglu; Portland State University, United States

The paper describes the decision-making process of U.S. petroleum companies in identification, evaluation and selection of petroleum exploration and development projects. The information was gathered through a combination of literature survey, input from expert panel and survey responses from decision-makers in petroleum companies. The paper discusses methodology, analyses and results of the study.

MC-07.2 [R] Model Development for Strategic Decision for Technology Selection in the Petrochemical Industry

Toryos Pandejpong; Portland State University, United States
Dundar F Kocaoglu; Portland State University,

An interactive decision-support model for technology selection in the petrochemical industry is presented. With the assistance of an expert panel, Analytical Hierarchy Process (AHP) is utilized to define the decision problem and to provide the justification for selecting the alternative that best matches organization's requirements. A specific case study has been developed for the purpose of demonstrating and validating the model.

MC-07.3 [R] Mutual Fund Selection Decisions

Karla Fant; Portland State University, United States

Financial planning can make the difference between an uncertain future, living from paycheck to paycheck, and a comfortable retirement. Mutual funds can meet both short and long term financial needs. By applying financial goals to individual utility functions, a mutual fund investment strategy may be obtained. This paper is based on a project conducted in a graduate course in the Engineering & Technology Management department at Portland State University. The members of the project team were Karla Fant , Steven Nahas, Elif Baktir , Jim Lill, Barbara.D. Miller and Gloria Trujillo.

MC-08 Entrepreneurship-2
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Salon I**
Chair: Maeda Noboru; Kochi University of Technology

MC-08.1 [R] The Strategic Decisions Impact over the Fast-food Franchisees Performance: The Franchisor - Franchisee Relationship

Marcos Cohen; Pontifícia Universidade Católica do Rio de Janeiro, Brazil
Jorge Ferreira F da Silva; Pontifícia Universidade Católica do Rio de Janeiro, Brazil

Motivated by the increasing interest and controversy raised by the practice of franchising in Brazil, this work describes the research carried out among the fast food franchisees networks all around the country, measuring the franchisees perception of the competitive strategies deployed by the respective franchisors and their satisfaction with the franchisor-franchisee relationship, aiming at the identification of the role of the relationship in the average performance of these same franchisees. The research main objective was to identify, in the light of Porter's theory about competitive strategies, whether the differences in the average performance (qualitatively measured by means of the franchisee satisfaction) among franchisees strategic groups in the fast food industry could be explained by the difference in the franchisor-franchisee relationship quality, as perceived by the franchisees. In this sense, it was tried to represent this relationship quality by means of observable variables - the franchising characteristics - measured by means of a qualitative scale applied to the franchisees satisfaction.

MC-08.2 [R] The Use of Small Units to Generate and Transfer Knowledge Within Large Firms

Mario Benassi; University of Trento, Italy

The paper focuses attention on the blurring of the time-honoured dichotomy between large and small firms, highlighting the way that large companies are now importing working patterns typical of smaller firms through internaldecomposition. Decomposition suggests ways of creating and transferring know-how that are both original and worthy of detailed examination.

MC-08.3 [A] The Business Landscape of the Wireless Internet: Evolution and Adaptation in the Emerging Nordic Wireless Internet Industry

Sören Sjölander; Chalmers University of Technology, Sweden
Magnus Johansson; Ariad, Sweden
Isabel Ericsson; Ariad, Sweden
Ola Jensen; Ariad, Sweden
Jonas Plogner; Ariad, Sweden

The Wireless Internet industry is only in the beginning of its innovative evolution. The structure and roles of the companies active in the industry are far from settled and the entrepreneurial activity in the area is very strong. For new ventures in emerging industries, rapid learning is key. Opportunistic adaptation and strategy formation is likely to be characterized by frequent changes in the business model. This paper presents an identification and analysis of 139 unlisted Nordic start-up companies related to Wireless Internet. There is a compact resistance against traffic revenue sharing among mobile network operators in Sweden. The revenue models of many start-ups include traffic sharing with cellular network operators, which is why we believe those start-ups will have to revise their business models. Among positioning technologies, GPS integrated in the mobile terminal is of certain interest due to the specific advantages it has over existing solutions integrated in the infrastructure. Many start-ups base their business models on system resident positioning technologies while we believe terminal resident technologies well dominate the future due to cost and performance advantages. Start-ups learning from experience and adapting their definition of target customer as well as their business model to the market evolution showed a significantly higher propensity to secure additional funding compared to non-adapting ventures.

MC-09 Project/Program Management-1
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Eugene**
Chair: Aaron J Shenhar; Stevens Institute of Technology

MC-09.1 [R] Project Spirit - A Strategic Concept

Zvi H Aronson; Stevens Institute of Technology, United States
Thomas G Lechler; Stevens Institute of Technology, United States
Richard R Reilly; Stevens Institute of Technology, United States
Aaron J Shenhar; Stevens Institute of Technology, United States

The classic approach to explain project success has reached its limits. By introducing a new framework, which is called "Strategic Project Leadership," Shenhar (2000), questions these limits and extends the borders to a modern approach of project management in the new economy. One major dimension of strategic project leadership is "project spirit". Project spirit deals with excitement, passion and enthusiasm, as a driving force, which energizes teams, unleashes talent, and enhances project performance Our objective is to define the concept of project spirit that includes project culture, commitment, citizenship behavior, and satisfaction and to provide project manager with guidelines for managing project spirit.

MC-09.2 [R] Drivers of Project Delivery Capability: An Empirical Study

Dragan Milosevic; Portland State University, United States
And Ozbay; Portland State University,

Cycle times, customer satisfaction, quality differentiation, and cost leadership in project delivery are competitive factors. They make the project delivery capability (PDC) at least as important as traditional sources of competitive advantage including economies of scale, knowledgeable human resources, knowhow, and financial capital. Given the utmost importance of PDC, what strategies could organizations deploy in order to enhance their PDC? Our quest to answer this question began with a literature search that identified a set of factors frequently deployed in the industry. We termed this set - project delivery factors. The expectation is that the factors should be able to enhance PDC. We, then, embarked on an exploratory research study to examine how project delivery factors could be used to increase PDC in companies. With this intent in mind, we proceeded to define PDC and project delivery factors, describe hypotheses, explain our methodology, and discuss results and implications for project managers.

MC-09.3 [R] Evaluating Japanese National R&D Projects Using A Lifecycle Model

Dai Toyama; the University of Tokyo, Japan
Kiyoshi Niwa; the University of Tokyo, Japan

A national R&D project lifecycle model is proposed as a tool to analyze project's success and failure factors. It was applied to 57 Japanese R&D projects evaluated within the last three years. Some key negative factors are identified such as ambiguity of objectives and a tendency for project member organizations to become self-serving.

MC-10 Competitiveness in Technology Management-2
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Portland**
Chair: John R Norsworthy; Rensselaer Polytechnic Institute, USA

MC-10.1 [R] A New Framework on Industrial Competitiveness

Meng Li; Japan Advanced Institute of Science and Technology, Japan
Gaku Ishii; Japan Advanced Institute of Science and Technology, Japan
Akio Kameoka; Japan Advanced Institute of Science and Technology, Japan

A framework on industrial competitiveness reflecting the competition plus cooperation among industries, academia, and government in Japanese context was proposed based on Kyosei philosophy. It offers an alternative perspective to examine the nature of competitiveness and recommend policy orientations toward virtuous competition. An indicator system was provided to monitor the changes with major determinants.

MC-10.2 [R] Comparative Evaluation of Industrial/Technological Competitiveness in Japan, the USA, Europe, and Asia

Akio Kameoka; Japan Advanced Institute of Science and Technology, Japan
Gaku Ishii; Japan Advanced Institute of Science and Technology, Japan
Mayumi Sakai; Japan Advanced Institute of Science and Technology, Japan
Teruyuki Kimura; Japan Techno-Economics Society, Japan
Nobuaki Kayanuma; Japan Techno-Economics Society, Japan

The concept of industrial competitiveness, which emerged in America in the 1980s, has now became critical for Japan. A recent survey on 290 industrial technologies has clarified Japan's strength and weakness. This paper proposes new concepts of 'symbiotic competitiveness' and a new type of technologist 'techno-producer' who promotes the next-generation innovations.

MC-10.3 [R] Mergers in the U.S. Telecommunications Industry and Market Valuation Effects

Wolfgang Bessler; Justus-Liebig-University, Germany,
Tatiana G Shusterman; Rensselaer Polytechnic Institute, USA, United States
John R Norsworthy; Rensselaer Polytechnic Institute, USA, United States

In this study we investigate whether the recent mergers and acquisitions within the U.S. telecommunications industry were value enhancing for shareholders. In particular we investigate which firms did benefit the most from this consolidation wave. In our analysis we employ a financial valuation framework that estimates the potential merger gains at the time around the merger announcement. The analysis of these valuation effects includes individual bidding firms as well as groups of firms such as local and long distance bidders. These classifications reveal some interesting insights into the question of which telecom firms gained from these mergers and which firms are well positioned for competition in the future. Overall, we find that mergers of long distance companies had much stronger negative valuation effects than those announced by local companies. We also find that the negative valuation effects of the bidding firms are in contrast to the synergies and positive wealth effects that telecom executives usually claim at the announcement of the merger.

MC-11 Technology Diffusion-1
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Columbia**
Chair: Stephen Ruth; George Mason University

MC-11.1 [R] Scheme's Adaptability & Infusion of Mobile Phones: Clarification and Extension of Former Findings

Jukka Mäkinen; Pori School of Technology and Economics, Finland
Hannu Jaakkola; Pori School of Technology and Economics, Finland

This paper deals with the hidden information in a diffusion curve. The existing model, The Infusion of Mobile Phones, is clarified by simplifying it. In addition to this, a deeper psychological dimension is added to the scheme. The insertion of this psychological dimension is based on the idea that the individual structure of motivation is dependent on an individual time orientation.

MC-11.2 [R] From e-Business to m-Business: Influence of Existing Customs

Jukka Mäkinen; Pori School of Technology and Economics, Finland
Hannu Jaakkola; Pori School of Technology and Economics, Finland

Is the understanding of existing customs a key to forecasting diffusion? The matter of interest is mobile phones. Usually the existing customs play an important role in a diffusion process. From this point of view an attempt is made to integrate the old and new potential services, mobile phones/ devices and different kinds of mobile environments. This work can be characterized as fundamental research and development of the diffusion and infusion process of mobile phones. The researcher has tried to define the addictive environments, technology and service orientated variables and the main B2B (Business to Business) and B2C (Business to Customer) services. In addition to B2C, B2B is taken under examination because it is assumed that some interesting variables will be lost if B2B is not dealt with, too.

MC-11.3 [R] Assessing the Yield of IT Projects in Developing Nations: Aggregated Models Are Not Sufficient

Stephen Ruth; George Mason University, United States
Bhaskar Choudhury; George Mason University, United States

Determination of the outcome of an IT project in a developing nation is often based on sectoral models and highly aggregated data. This paper offers an example of a replicable methodology to go to the grass roots-the user level-to obtain valuable insights from the individual and group data that are masked by the aggregate statistics.

MC-12 International Issues-1
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Willamette**
Chair: German Nunez; OHSU

MC-12.1 [R] Diversity Management and Japanese Companies in the U.S.

Sadanori Arimura; Yamaguchi University, Japan

Diversity management practices by Japanese companies in the U.S. are discussed in this presentation. The paper is based on a field study using a survey instrument. Particular emphasis is placed on workforce diversity, diversity related problems/issues, views on diversity, and diversity initiatives.

MC-12.2 [R] International R&D Projects of Korea: Current Status and Future Strategy in the Global Innovation System

Seongjae Yu; Chung-Ang University, Korea, South
Deok Soon Yim; Science and Technology Policy Institute, Korea, South
Sung Bum Hong; Science and Technology Policy Institute, Korea, South
Kichul Lim; Science and Technolgoy Policy Institute, Korea, South

This research analyzed international cooperative R&D projects, which are supported by the Korean government. First, the status of international R&D projects was evaluated descriptively. Second, the success and failure factors were identified through interviews and survey results. Finally, some policy directions were suggested for Korean Government.

MC-12.3 [R] Comparative Analysis of Research and Development Environment in the Universities of Japan and the U.S.A

Kenzo Fujisue; The University of Tokyo, Japan
Keiichi Ohi; Techno-Research Institute, Japan
Kazuhiko Nishi; Shobi University, Japan
Ichiro Sakata; Ministry of International Trade and Industry, Japan
Ichiya Nakamura; MIT, United States

This paper compares the number of doctoral candidates and research expenditures in Japanese and US universities. The inferiority of Japanese universities to the US universities has been pointed out as one of the reasons for the loss of Japan's competitiveness. In this study, we compared Japanese universities with US universities from the viewpoints of the number of doctoral candidates and the amount of government sponsored R&D budgets. These two criteria have been adopted from the Carnegie Classification. As a result of our study, we identified the following results under some conditions; 1) the number of US research universities (125) is much higher than that of the Japanese universities (16), 2) the percentage of graduate students at US universities is higher than that at Japanese universities, and 3) the gap among US universities is larger than that among the Japanese universities.

MC-13 TUTORIAL: Designing Fast, Flat, Flexible Organizations
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Douglas Fir**

Speaker(s) Janet D Fiero;
E. Craig McGee;

The software development industry is one of the most dynamic, fast-paced industries in the world. New versions of software can be released every six to twelve months. New technology renders existing software systems obsolete overnight. Strategic alliances form and disband rapidly. Technology components are licensed to apparent competitors. A competitor one month is a collaborator the next. Consider the technology startups...Netscape, America OnLine, Iomega, etceteras. All have experienced rapid growth and success. This tutorial teaches basic principles for designing organizations that results in a fast and flexible organization staffed with motivated and responsible employees at all levels. The authors will use a real-life case to describe how one software development company utilized teams to reduce its time-to-market for new products. It is the story of an entrepreneurial startup that transformed itself into part of a multi-billion dollar international corporation. It is the story of survival...creating robust, efficient processes to support the company's growth. It was critical to be able to get new products and enhancements to customers. This tutorial will assist engineering managers transitioning from a functional organization to a product aligned team-based organization.

MC-14 TUTORIAL: Analytic Network Process
Monday, 7/30, 1:30 PM - 3:00 PM **Room: Meadowlark**

Speaker(s) Thomas L Saaty; University of Pittsburgh

This tutorial is about practical decision-making that usually involves dependence and feedback among all the factors using the Analytic Network Process (ANP) - a generalization of the linear Analytic Hierarchy Process (AHP) developed by Saaty for multi-criteria decision-making. Decisions are necessarily tied to our value systems and we need a logic that can include human values along with technical and engineering factors. The participants of this tutorial will receive the ANP software.

MD-01 Information/Knowledge Management-3
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Salon A**
Chair: Dennis J Kulonda; University of Central Florida

MD-01.1 [R] Comparative Analysis of Systems Thinking and Goldratt's Thinking Processes: Task Analysis for Enhancing Organizational Knowledge Management

Philip F Musa; University of Alabama, United States
James R Burns; Texas Tech. University, United States
Mario G Beruvides; Texas Tech. University, United States

The focus in this research is on the effectiveness of two problem solving or task analysis methodologies in order to enhance of knowledge management in organizations. The two methodologies are systems thinking and Goldratt's thinking processes. One of the goals of the research is to investigate the effectiveness of the two theories in managing task domains when controlling for individual differences. The synergies between the two theories are also investigated. In this research, knowledge management centers more on humans rather than on computers. A background overview of knowledge and knowledge management is first presented. Within the context of knowledge management, the subject of task analysis or problem solving is then presented. Fundamentally, knowledge management has to do with the creation of explicit processes that enhance knowledge and learning throughout the organization. Maintaining this perspective, knowledge management is defined as "the systematic, explicit, and deliberate building, renewal, and application of knowledge to maximize the enterprise's knowledge-related effectiveness and returns from its knowledge asset" (Liebowitz and Beckman, 1998). Since organizations are often made of workgroups or teams, and the workgroups are, in turn, made up of individuals, when we speak of organizational learning or knowledge management, aggregation necessarily has to be preceded by analysis at the individual level. Using masters degree students as subjects, several hypotheses are generated and tested. The results of the study are presented and analyzed. It is believed that the results of this study will be helpful for managers to gain a better understanding of the dynamics of the two task analysis methods investigated.

MD-01.2 [R] The Holonic System Paradigm

Carlos N Vetorazzi Jr.; State University of Santa Catarina, Brazil
Geraldo Telles; State University of Campinas, Brazil

The holonic manufacturing system paradigm is a derivation of a classical framework theory, and has implications at all levels of a manufacturing system. Here we present the main concepts of holonic systems and some issues related to the collaboration and coordination aspects in this context. Finally, some considerations of implementation are made.

MD-01.3 [R] The New Document Methodology: A Value Creation Tool for the Enterprise

Dennis J Kulonda; University of Central Florida, United States

This paper sketches the evolution of document management systems from simple imaging/retrieval systems to an enlarged framework that forms a model of the enterprise. It specifically examines a new methodology based upon five axioms and four supporting cycles that creates a platform for a dynamic document model of the firm.

MD-02 PANEL: Aligning the Supply Chain Operations Reference (SCOR) Model with Enterprise Applications
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Salon B**
Panelist(s) Tamer Cavusoglu; George Mason University
Thomas Gulledge; George Mason University
Chirag Asaravala; PROMATIS, Inc.

Success in Supply Chain Management (SCM) is dependent on how well the complex web of processes, technology and behaviors are engaged to meet strategic objectives. Successful results require that value chains integrate and jointly manage business processes. In this research, a state-of-the-art enterprise business process framework is derived from the standard software technologies, called Enterprise Applications (EA). EAs, such as ERP (Enterprise

Resource Planning), SCM, and e-Commerce systems enable both internal and extended enterprise integration. An enterprise that runs on ORACLE Applications (e-Business Suite), for example, gathers, evaluates, processes and disseminates data based on the business process logic configured in the specific implementation.

MD-03 Strategic Mgmt. of Technology-3
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Salon C**
Chair: John W Peterson; Lucent Technologies

MD-03.1 [A] Lessons Emerging from the 'MATI' Project: More on the Technology Value Chain

John W Peterson; Lucent Technologies, United States
Michael Radnor; Northwestern University, United States

Effective strategic management involves the process of formulating and executing the means to create relative perceived value. Such value creation depends on successful balancing of returns to the owners and investment in growth. As industry transitions to the knowledge age, the technology centered firm must realign both the business and technology value chains to assure congruity as the business models change, the organization flattens out and a supply chain metastructure emerges. Using lessons learned from the MATI project (Management of Accelerated Technology Insertion), the means to achieve this will be described.

MD-03.3 [R] Identifying an Optimal Start-Up Date for Information Technology Projects: A Real Options Approach

John A Campbell; Griffith University, Australia

Real options pricing modeling is a new way of thinking about investment decisions. It provides a useful framework for analyzing the value of investment flexibility. For many IT investments there is often an option for the investment to be made straight away, or delayed for some period of time. Options pricing approaches may be appropriate for evaluating IT investments that have this characteristic. However there are very few examples in the literature that demonstrate how these models can be used. This paper uses options pricing theory to develop a parsimonious decision criterion for deriving the optimal time to start IT projects.

MD-04 Technology Planning & Forecasting-2
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Salon D**
Chair: Hugo Tschirky; Swiss Federal Institute of Technology

MD-04.1 [R] Planning for Technology Implementation: An SD (DEA) Approach

Warren K Vaneman; Virginia Polytechnic Institute & State University, United States
Kostantinos Triantis; Virginia Polytechnic Institute & State University, United States

The introduction of new technologies often causes a temporary loss of productivity and leads to additional unforeseen costs over a system's life-cycle. One of the reasons for this productivity degradation is traditional systems engineering management fails to plan for the effects of technology implementation. However, planning for technology implementation is not an easy venture. When introducing new technology the engineer and/or manager must decide the optimum system composition, often from a large number of system configuration options, and an equally large number of operational process scenarios. This paper discusses the eight tasks involved with simulating and optimizing the dynamic behavior of a system. This approach combines System Dynamics (SD) theory with Data Envelopment Analysis (DEA) into a framework called System Dynamics with Data Envelopment Analysis incorporated SD(DEA). By employing this approach, we believe that the attributes of both the dynamic complexity (i.e. SD) and combinatorial complexity (i.e. linear programming, DEA) theories can be realized within the same framework.

MD-04.2 [A] Technology Intelligence System in a Medium-Sized MedTech Company

Pascal Savioz; ETH Zurich, Switzerland
Marcel Scacchi; Institut Straumann AG, Switzerland
Hugo P Tschirky; ETH Zurich, Switzerland

Due to the lack of resources small and medium-sized companies are unable to run a Technol-ogy Intelligence System like multinationals. However, technical information need is at least equally important for both types of enterprises, when not more. This industry application shows how a medium-sized Swiss Medtech company handles this gap. A model of Technol-ogy Intelligence for SME's will be presented.

MD-04.3 [R] Implementing a Technology Intelligence System: Key Issues

Pascal Savioz; ETH Zurich, Switzerland
Andreas Heer; ETH Zurich, Switzerland
Hugo P Tschirky; ETH Zurich, Switzerland

The implementation of a management system depends on multiple factors. Anticipating these factors could be crucial for success. This paper is about key issues considered in implement-ing a Technology Intelligence System. Theoretical viewpoints as well as practical experience are matched together in order to present optimal solutions in dealing with these key issues.

MD-05 E-Business-3
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Salon E**
Chair: David H Gobeli; Oregon State University

MD-05.1 [R] Enhancing the e-Business Value Sequence through R&D

David H Gobeli; Oregon State University, United States
Harold F Koenig; Oregon State University, United States

E-business models are increasingly being required to improve firm value, especially through greater profitability. R&D can improve firm value by contributing to the three strategic elements of the value sequence: product or service innovation, operational effectiveness, and brand equity, as well as supporting information technology.

MD-05.2 [R] Building Blocks of a Successful e-Business Strategy

Anice I Anderson; Arizona State University, United States
David Le Strat; Integrated Information Systems, United States
William Moor; Arizona State University, United States

The rapid pace at which Internet technologies and online markets are evolving and merging complicates the act of plotting an organization's e-business direction. In order to devise an e-business strategy that will provides companies with a competitive edge, decision makers need to understand the technologies that will allow them to leverage their core competencies. This paper will present the various building blocks to develop a successful e-business strategy.

MD-05.3 [R] e-Commerce and Innovation Business Process Reengineering

Jin Chen; Zhejiang University, China
Dan He; Zhejiang University, China
Wang Anquan; Zhejiang University, China

Nowadays being faced with more severe global competition than ever, enterprise must transform from efficiency-oriented strategy to innovation-oriented strategy. This paper first introduces the basic concepts of workflow, BPR and technology innovation, then put forward a model of information processing and flow in enterprises' management of product development- New Product Development Workflow (NPDWF).

MD-06 Technology Planning & Forecasting-3
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Salon G**
Chair: Robert R Schaller; George Mason University

MD-06.1 [A] Science and Technology Roadmapping to Support Project Planning

Jeremiah J McCarthy; Idaho National Engr. and Environmental Laboratory, United States

Daniel J Haley; Idaho National Engr. and Environmental Laboratory, United States
Brent W Dixon; Idaho National Engr. and Environmental Laboratory, United States

Disciplined science and technology roadmapping provides a framework to coordinate research and development activities with project objectives. This case-history paper describes initial project technology needs identification, assessment and R&D ranking activities supporting characterization of 781 waste tanks requiring a 'hazardous waste determination' or 'verification of empty' decision to meet an Idaho state Voluntary Consent Order.

MD-06.2 [R] A Methodology for Forecasting Future Completion Times of Independent R&D Events

Cheol S Kwon; SungKyunKwan University, Korea, South
Keun T Cho; SungKyunKwan University, Korea, South
Joon H Park; SungKyunKwan University, Korea, South

We are trying to extend a traditional Cross Impact Model to a model that can estimate the impact of time on the completion of interdependent R&D events in this paper. We have designed the model for estimating the time forecasts, which reflect the impact of time. They are based on the assumption that the distribution function of the completion time of one event varies with the completion time of the other event. We have also designed two types of parameters in technological seeds and social needs to represent the degree of time impact according to the relationship between interdependent events.

MD-06.3 [R] Technological Innovation in the Semiconductor Industry: A Case Study of the International Technology Roadmap for Semiconductors (ITRS)

Robert R Schaller; George Mason University, United States

This paper summarizes a dissertation that explores the Semiconductor Industry Association's (SIA) Technology Roadmap, now referred to as the International Technology Roadmap for Semiconductors (ITRS). It is a study of its origin, evolution, and future role in influencing industry strategies and public policies. The overall thesis is that the Roadmap is one important element of a broader industrial arrangement that has evolved from the convergence of technological, economic, institutional, and cultural factors, all hinged on the goal of sustaining historical industrial productivity - also referred to as "Moore's Law." The ITRS plays a vital role in research and industrial planning throughout the semiconductor community. It serves as a guide to organizations for short- and long-term research and development on pre-competitive technology areas, and increasingly in strategic decision-making involving the multi-billions in capital investments needed annually for plant and equipment. The scope has broadened substantially over time: the Roadmap process is now international, including representation from the five largest producing regions of the world: the U.S., Japan, Taiwan, Korea, and Europe.

MD-07 Decision Making in Technology Management-3
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Salon H**
Chair: Dundar F Kocaoglu; Portland State University

MD-07.1 [A] Job Selection Decisions

Cheryl Duarte; MacKay & Sposito, Inc., United States
Reuben Gilmore; LSI Logic, United States
Chuck Yang; Network Associates, Inc., United States

This paper describes a scenario involving the decision of a recent graduate to choose a new job from seven offers all in different cities. Not sure of making the decision, a multicriteria decision analysis is performed. The analysis utilizes pair-wise comparisons to differentiate and rank city criteria and job data. The paper is based on a project conducted in a graduate course in the Engineering & Technology Management department at Portland State University. The team members included the authors of this paper and Ala'a Abunijem, Mike Ferrigno and Pious Michael.

MD-07.2 [A] Power Back-up Systems Selection Decisions

Ferry Cosmedy; Portland State University, United States
Matthias Pfeifer; Portland State University, United States
Valentin Havugiyaremye; Portland State University, United States
Sundarnath Valluri; Portland State University, United States
Rajesh Gopalakrishnan; Portland State University, United States
Surendra Lingareddy; Portland State University, United States

This paper presents a model to assist in determining critical criteria and configuring those criteria for optimal power backup selection. The analytic hierarchical process (AHP) was used as the decision-making analysis techniques in this application. Because the study is based on one expert's views and subjective values at Portland State University, the results are applicable only to that case. The paper is based on a project conducted in a graduate course in the Engineering & Technology Management department at Portland State University.

MD-07.3 [A] Internet Service Provider Selection Decisions

James VanHuis; A-DEC, United States
Ozgur Koc; Portland State University, United States
Jarrath Presse; Portland State University, United States
Rafael Borja; Portland State University, United States

This paper presents a Hierarchical Decision Model for the selection of a home Internet Service Provider (ISP). The model uses cost, bandwidth, content features, and technical support criteria to rank ISP selections according to a users preference. The user preferences are analyzed through the Pairwise Comparison Method and scored on a utility curve for the criteria. This paper is based on a project conducted in a graduate course in the Engineering & Technology Management department at Portland State University. The project members were the authors plus Kiatiporn Lertsathitphong.

MD-07.4 [R] Cell Phone and Service Plan Purchasing Decisions

Anastasia Alvear; Portland State University, United States

This paper describes a scenario involving the decision of purchasing a cell phone and service plan. It shows how a basic hierarchical decision model (HDM) using the pair-wise comparison method (PCM) can be developed and used to improve the decision. The paper is based on a project conducted in a graduate course in the Engineering & Technology Management department at Portland State Univeristy. The team members were Anastasia Alvear, Matthew Freeland, Rattiya Maneesri, Khemanut Teangtrong, Wichan Wannalertsri, and Uraiporn Wattanakasemsakul.

MD-08 Entrepreneurship-3
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Salon I**
Chair: Hans J Thamhain; Bentley College

MD-08.1 [R] Entrepreneurial R&D: An Organizational Design for Enhanced Patent Productivity

Mary Mathew; Indian Institute of Science, India
Urmi Chattopadhyay; Indian Institute of Science, India

The use of the concept of entrepreneurship in the context of R&D is an exciting and radical change for a performing organization. "Entrepreneurial R&D" is a process where a dynamic relation is created between research, development, market needs and commercialization. R&D personnel in the organization constantly convert R&D effort into intellectual property that create value for its clients, shareholders, employees and the knowledge society. Market oriented organizational designs and collaboration with academic institutions will bring the R&D effort closer to "crown jewel patents". This paper elaborates an attitudinal and organizational design model for entrepreneurial R&D and considers a framework for its measurements.

MD-08.2 [R] Can Innovative R&D Performance Be Managed

Hans J Thamhain; Bentley College, United States

Companies around the world look toward their R&D function for innovative ideas that can be transferred to market for economic gain. Yet, managers often argue that innovative R&D performance is difficult to measure and nearly impossible to control. The findings of a field study into technology-oriented R&D environments show that effective management of innovative R&D teams

involves a complex set of variables related to the task, people, and organizational environment. Correlation of these variables to performance suggests that many of the performance variables have their locus outside the R&D organization, however managerial leadership style has significant cross-functional impact and drives R&D creativity. Suggestions for examining leadership effectiveness will be discussed.

MD-08.3 [R] High-Growth Start-ups - Demanding an Entrepreneurial Growth Theory

Christian Artmann; University of Karlsruhe, Germany
Thomas Lechler; Stevens Institute of Technology, Germany
Jianlin Wu; University of Science and Technology of China, Germany

A common complaint among researchers in the field of entrepreneurship is that traditional management theories are not applicable to start-up firms, especially not to high-growth ventures. In this paper we try to verify this hypothesis by analyzing the exiting growth models and theories. In the second part, the theoretically derived results are compared with the findings of five outperforming, high-growth firms out of a sample of 183 IT- and technology-based start-ups. The results clearly indicate the need of further research and the development of a new growth model which takes the observed growth patterns into account.

MD-09 Project/Program Management-2
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Eugene**
Chair: Matthew J Liberatore; Villanova University

MD-09.1 [R] Scheduling of Design Projects Using Artificial Intelligence

Ji-hong Yan; Tsinghua University, China
Cheng Wu; Tsinghua University, China

This paper studies the scheduling of design projects in concurrent development process with uncertain number of feedback revisions. At first, definitions describing the concurrent activities are proposed. Then an optimization based methodology that combines heuristic algorithm, artificial intelligence (fuzzy, genetic) and scheduling theory is developed. Some key factors such as time order, information and resource constraints, lead time and concurrent time of activities, which can make the concurrent activities be executed successfully, are taken into account adequately. Weights of the above factors are decided by genetic algorithm. In addition, fuzzy logic is used to decide the ability of different roles taken by designers. Moreover, the process of prerelease and feedback revision is realized by means of coping with the revision process as a rescheduling cycle from the revising point. Simulation example is a fraction of practical development project, and satisfied results are obtained.

MD-09.2 [R] Calculating the Theoretical Project Completion Time of Large Networks in Polynomial Processing Time

Luis F Copertari; McMaster University, Canada
Norman P Archer; McMaster University, Canada

Knowledge and technology-based organizations rely on large activity networks to manage R&D projects. Avoiding optimistic completion times due to the characteristic PERT assumptions is a problem that can grow exponentially in complexity with the number of activities. We have developed a recursive technique that solves the problem in a polynomial number of steps, assuming that all duration times follow beta distributions.

MD-09.3 [R] Another Approach to Formulation of Project Cost Analysis Based Upon Multi-Valued Mappings

Ladislav Lukas; University of West Bohemia, Czech Republic

The paper deals with some theoretical aspects of project cost analysis. Project is defined by network graph as usual, but the specific approach to direct cost scheduling is based upon an idea to use multi-valued mappings for defining activity durations within the project. It means that for any branch, which represents an project activity, a time period instead of a single value is given. Activity cost functions are defined as piecewise linear non-increasing functions given over corresponding activity durations. The steps and assumptions enabling formulation of project direct cost scheduling problem in form of a set of coupled CPM and LP problems is discussed in detail. The outlined procedure may serve to efficient project cost analysis in many technology management problems.

MD-09.4 [R] Applying Fuzzy Logic to Critical Path Analysis

Matthew J Liberatore; Villanova University, United States

Fuzzy logic has been proposed as an alternate approach to probability for quantifying uncertainty related to activity duration. There is no consensus concerning the best approach to use in practice. The purpose of this paper is to illustrate a new, straightforward method for applying fuzzy logic to assess uncertainty in critical path analysis.

MD-10 Technology Based Organizations-1
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Portland**
Chair: Peter Flynn; University of Alberta

MD-10.1 [A] Nurturing a High-Performance Work Force: Good Idea, But How Do We Measure Progress?

Garry D Coleman; University of Tennessee, United States
Joseph Costa; ACS/AEDC, United States
Ralph E Graham; U.S. Air Force, United States
Lyndon Haston; Sverdrup Technology/Jacobs, United States

The Air Force's Arnold Engineering Development Center has a strategic objective "to nurture a high-performance work force." A multi-criteria measurement system, the Center's Human Resource Index, was developed to measure progress on this objective. This case describes the index, and its evaluation and refinement after two years of use.

MD-10.2 [R] Performance Measurement System Design Processes for Engineering and Other Service Functions

Mike Bourne; Cranfield University, United Kingdom
Mark Wilcox; University of Durham, United Kingdom

Management processes are available for the design of business unit performance measurement systems and cascading these measures within the main functions. However, there are fewer published approaches for developing measures in service functions. This paper will compare and contrast case studies of three alternative approaches for developing performance measures in engineering support service functions, highlighting the shortcomings and benefits of each approach.

MD-10.3 [R] Redesigning Performance Appraisals for Improved Management

Peter Flynn; University of Alberta, Canada

Performance appraisals are typically applied across all performance levels, and have evolved to include goal setting and coaching. This conceptual approach is flawed. As noted by Deming, messages about team performance are contradicted. In addition, the process is inherently flawed for the large middle range of performers, for whom it destroys the important coaching and goal setting component. It likely shapes reduced performance through a handicapping phenomenon. A redesign that separates coaching from rating and treats performance groups differently based on corporate and individual needs is presented.

MD-11 Technology Diffusion-2
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Columbia**
Chair: K. Ramanathan; University of Western Sydney

MD-11.1 [R] An Evolving Pattern of Korean Industrial Technology Linkage Structure-based on IT Industry

Moonsoo Kim; ETRI, Korea, South

The notion of knowledge-based economy highlights the strategic importance of inter-industrial knowledge flow. Among others, the crucial role of IT industry is emphasized. The pattern whereby technological knowledge is created,

accumulated and disseminated through the interactive learning among industries can be portrayed as a network. Based on the network theory, this empirical study analyzes, from the dynamic perspective, inter-industrial technological knowledge structure of Korean manufacturing sector during the reference period of early '80 to mid '90. Overall, density of network tends to have been increasing over time, implying that knowledge network becomes expanded and intensified. The role of IT industry in the global network has been also increased but needs to be further strengthened in the future. The findings in turn render some important policy implications that should be addressed in developing technology policy.

MD-11.2 [R] Multi-Generation Diffusion Model for Economic Assessment of New Technology

So Young Sohn; Yonsei University, Korea, South
Byung Joo Ahn; Yonsei University, Korea, South

In the era of 21st century, development of emerging information technology is the essence of the advancement. This kind of new technology, however, often requires a great deal of amount of initial investment for both procedures of R&D and commercialization. As cost invested in developing the specified technology is increasing, investors are paying more attention to cost to benefit analysis (CBA). One of the basic elements of CBA for new technological development is the diffusion pattern of demand of such technology. Typically, it would be hard to presume the diffusion pattern of demand when the new product or the technology is under development. In this case, a simulation study is necessary. Many studies of technology evaluation have adopted a single generation model to simulate the diffusion pattern of demand. This approach, however, considers the diffusion of the new technology itself, not taking into account newer generation which can replace the one just invented. In the real market situation, one must consider the competition and substitution phenomena between old and new technologies. In this paper, we show how multi-generation technology diffusion model can be applied for more accurate CBA for information technology. Additionally, Monte Carlo simulation is performed to find influential factors on the CBA of a Cybernetic Building System.

MD-12 International Issues-2
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Willamette**
Chair: German Nunez; OHSU

MD-12.1 [A] Restructuring of Electricity Supply Industry in Developing Countries: Lessons from Thailand

Nopporn Leeprechanon; Royal Melbourne Institute of Technology, Australia
A. K David; Hong Kong Polytechnic University, Hong Kong
Selva S Moorthy; Royal Melbourne Institute of Technology, Australia
Robert D Brooks; Royal Melbourne Institute of Technology, Australia
Fubin Liu; Southeast University, China

The factors that drive restructuring of the electricity supply industry (ESI) in Thailand, as is the case in other developing countries in Asia, are different in many important ways from the factors that drive the reforms in the West. Chief among these differences are the need for the creation of a nation grid, which is at a relatively early stage of evolution, the directive role of government policy in a matter pertaining to this essential sector of the national economy, and the way in which a power market should be designed. The inherited pre-reform organizational structures are also very different and this impacts on feasible post-reform options. This paper discusses several of these issues and places emphasis on transmission system organization and management in ESI reform.

MD-12.2 [R] System Dynamic Modeling of Conflicts Within Turkey and Between Turkey and Her Neighbors

C.Murat Boz; Yeditepe University, Turkey
A. Nuri Basoglu; Bogazici University, Turkey
M. Atilla Oner; Yeditepe Univ, Depts of Bus Adm + Syst Engineering, Turkey

This study intends to investigate the variables effecting the probability of domestic and international conflict and the interactions between them using a system dynamics model. The simulation is run between Turkey and her neighbors separately. Conducting simulation experiments with this model lets the analysts explore the dynamic behavior and results of scenarios.

MD-12.3 [R] Global e-Business and Knowledge Management

Najmul Huda; Tallinn Technical University, Estonia
Nazmun Nahar; University of Jyväskylä, Finland
Jaak Tepandi; Tallinn Technical University, Estonia

Expansion into foreign markets is becoming increasingly important for most of the companies. It is, however, a very complex endeavor. By utilizing resource-based theory and a multiple focus group research method, this study introduces a knowledge management integrated global e-business framework which allows the sharing and utilizing of knowledge about globalization with the help of knowledge management tools and facilitates foreign market entry rapidly and effectively.

MD-13 Strategic Mgmt. of Technology-4
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Douglas Fir**
Chair:

MD-13.1 [R] Synchronizing Business & Systems with Business Objects

Pallab Saha; Indian Institute of Science, India
R. Srinivasan; Indian Institute of Science, India

Ever since BPR took the management world by storm, there have been numerous efforts to discover newer and more efficient methods of modeling business processes. This gave rise to an entirely new field, "Business Engineering." This paper proposes to use the latest business engineering techniques that can be used to discover and generate business patterns for five common business processes.

MD-13.2 [R] Growth Modelling for e-Commerce Firms

Junwen Feng; Nanjing University of Science and Technology, China
Willard Zangwill; University of Chicago, United States

Some basic issues of electronic commerce firms is discussed. A general procedure to model the growth of the EC firms is proposed. A mathematical optimization model to analyze the issues and determine the optimal growth rate is given. Finally, a case study is presented, and some possible extensions are discussed.

MD-13.3 [R] Acquiring Business Information from Web Communities

Sathi Mahesh; University of New Orleans, United States
Sandra Hartman; University of New Orleans, United States

The shift to a knowledge based economy has increased the need to effectively acquire knowledge for exploration, analysis, and reporting from a variety of sources. The rapid pace of change has forced organizations to find ways of adapting to environmental and technological changes. This paper looks at the technical and behavioral issues involved in generating, filtering, processing, and disseminating business information from web sources. We focus on fostering the creation of information from web communities. We examine a variety of models for using the Internet to gain an understanding of business needs and relates the technology choices to behavioral issues that need to be considered in order to effectively implement this technology in the organization. Effective implementation of these technologies will help position the organization strategically and help it to manage change effectively.

MD-14 TUTORIAL: Integrating Scientific and Technical Information (STI) and Knowledge Management (KM) Systems
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Meadowlark**
Speaker(s)
Al Rubenstein; International Applied Science and Tech. Associates
Eliezer Geisler; Illinois Institute of Technology

This will be an interactive session on the practical issues of providing information sources and channels to actual and potential users of the outputs of R&D. It will address design variables for systems that will improve accessibility for non-technical people in production, marketing, customer service, gener-

al management and other non-R&D groups in the organization. Many such groups have traditionally encountered difficulties in trying to get at and effectively use the outputs of R&D to help them in doing their own jobs. The focus is on cost-effective integration or strong interfacing of R&D-oriented STI systems and company-wide and application-oriented KM systems. Participants are encouraged to present "mini-cases" (5 minutes each) of their organizations' attempts (successful or not) to accomplish such integration. The moderators will introduce the session with brief presentations on key issues, based on their several decades of research and consulting on STI and KM systems and on R&D/Technology Management. A new paper, "Knowledge Management Systems: Effective Rollout and Operation to Meet User Needs" will be included in the PICMET Proceedings as background reading.

MD-15 TUTORIAL: Business Simulations for Promoting Entrepreneurship and Innovation-1
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Mt. Hood**
Speaker(s) Gary Summers; Oregon Graduate Institute
Terry Schumacher; Rose-Hulman Institute of Technology

Management simulations are ideal, risk-free learning environments where managers test ideas and learn from feedback. The Winning At Design simulation (hands-on demonstration) exposes the influence of vision, coaching, risk-taking, and partnerships in innovation. The Executive Innovation simulation teaches management of innovation and R&D and analyzes executives' judgements and decision-making.

MD-16 PANEL: Technology Management Education in the e-World: (How) Are We Elevating the Practice?
Monday, 7/30, 3:30 PM - 5:00 PM **Room: Salmon Room**
Panelist(s) Linda L Brennan; Mercer University

It is no longer sufficient to "teach your cat French;" for accreditation you must demonstrate that "votre chat peut parler Francais." The emphasis of educational accreditors on the assessment of learning outcomes has provided powerful motivation to reexamine our instructional designs at the program and course levels. How have the educational objectives of technology management programs changed in the e-World? Panelists will compare and contrast program objectives and assessment methods, noting changes that have been made in response to changes in e-business.

ME-01 Information/Knowledge Management-4
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Salon A**
Chair: Jim Sena; California Polytechnic State University

ME-01.1 [R] Dissecting the Professional Culture: Insights from Inside the I.T. 'Black Box'

Elias G Carayannis; The George Washington University, United States
John R Sagi; The George Washington University, United States

Global and multinational corporations are increasingly relying upon information systems that are developed and operated across a multicultural environment. Teams often consist of professionals who vary greatly in their cultural dimensions. These professionals follow the guidelines of the systems development life cycle (SDLC). The SDLC phases may differ in the traits necessary for their success. Thus, cultural differences may impact the success of a systems development project. This study develops a model for studying the dimensions most valuable to the SDLC. Empirical analysis then points to both the strong belief in a "professional culture" and yet to the identification of common cultural dimensions important to specific phases of the SDLC across government, university and industry sectors and communities of practice.

ME-01.2 [R] Managing Collaborative Knowledge-Based Teams: The Use and Misuse of Computer Supported Technologies

Jim Sena; California Polytechnic State University, United States
A.B. (Rami) Shani; California Polytechnic State University, United States

This paper describes three case studies that illustrate the usage of computer-supported technologies in knowledge-based teams. Special emphasis is placed on the use of Lotus Notes which is deployed in a varied extent in all three cases. The first case examines a software development project for a California-based division of a disk storage manufacturer. The other two cases are based in Sweden. One case involves a heavy engineering project for a large multinational conglomerate where Lotus Notes was used to manage projects. The last case involves a light engineering application to coordinate agencies that schedule and track ship movement and maintenance. Various methodologies and analysis techniques were used ranging from field studies, questionnaires, observation and interviews. Comparative results are presented in the form of critical success factors where the key factors are top management support and team readiness to accept computer-supported technologies.

ME-01.3 [R] Group Decision Support Systems in Industrial Customer Need Assessment

Hannu Karkkainen; Lappeenranta University of Technology, Finland
Kalle Elfvengren; Lappeenranta University of Technology, Finland
Marko Torkkeli; Lappeenranta University of Technology, Finland
Markku Tuominen; Lappeenranta University of Technology, Finland

We have studied the usefulness of Group Decision Support Systems (GDSS) in the assessment of industrial customers' needs. We reviewed the earlier related GDSS literature and described the results of three extensive real-world GDSS applications. Finally, we analyzed the benefits of GDSS and their implications for particularly industrial customer need assessment.

ME-02 TUTORIAL: Leading Projects as Strategic, Competitive Weapon
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Salon B**
Speaker(s) Aaron J Shenhar; Stevens Institute of Technology

This tutorial presents six principles on how to integrate project management with business strategy. It will show how to lead projects in a strategic way and how to turn them into successful competitive weapons. The tutorial will discuss the new role of project leaders, who, instead of just "getting the job done," must look at the global business aspects of their project, develop a specific project strategy, and provide vision and inspiration to project teams. In addition, it will show why, "one size does not fit all" and how to adapt project management to specific project types. The tutorial will show how to create an integrated strategic project plan and how to build the project's strategic focus during day-to-day project execution.

ME-03 Strategic Mgmt. of Technology-5
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Salon C**
Chair: Paul Forrester; Aston University

ME-03.1 [A] An Analysis on Key Success Factors for IMT-2000 Business Strategy

Moon-Koo Kim; ETRI, Korea, South
Eok-Soo Han; ETRI, Korea, South
Myeong-Cheol Park; Information and Communications University, Korea, South

In the side of mobile telecom operators, IMT-2000 involves both opportunity and risk. This research was aimed at analyzing the key success factors to establish and perform business strategies. For this, we looked into the mobile telecom market climate and kept close eyes on IMT-2000 features focused on technology, service and market perspective. We also analyzed value chain, market opportunity/risk for IMT-2000 business.

ME-03.2 [A] Management Indicators Model to Evaluate Performance of IT Organizations

Alejandro Jose Bianchi; Liveware IS S.A., Argentina

There's no arguing nowadays about the importance of IT for the growth and competitive edge of organizations. But if technology is to be a true asset for a company, it must be aligned with the business strategic goals by means of a formalized system of strategic planning, maturity of development process, technology management and corporative quality vision. The accrued benefits can be manifold: the development of training and learning environments for an effective improvement of procedures and product quality, efficient use of

assets and resources, opportunity for innovation and technologic advancement, an approach to problem solving in areas critical to the organization among others. Many companies make use of these practices, but find it hard to evaluate how effective they are and what is the final quality of the achieved results at diverse customer levels both in project vision and the continuity of service. This paper presents a model of indicators to evaluate IT Performance using three well known methods: Balanced Scorecard, GQM and PSM.

ME-03.3 [R] Technology and Operations Strategies in China: Political Impediments and Future Trajectories

Paul Forrester; Aston University, United Kingdom

Despite the desire for change, China has inherited a legacy of mistrust towards the import of technology particularly within its influential political organizations. This contradiction impedes and distorts technology development at the enterprise level. This paper sets the innovation processes in Chinese companies within its wider socio-economic context, enabling technology suppliers to China to better understand the unique features underlying technology development in China.

ME-04 Technology Planning & Forecasting-4: Student Projects
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Salon D**
Chair: Tugrul U Daim; Intel Corporation

ME-04.1 [A] Innovation Forecasting: Home Networking

Sandra Haron; Trillium Software, Inc., United States
Ala'a Abunijem; , United States
Jun Ma; , United States
Sunshine Sanchez; , United States

This paper presents application of "innovation forecasting" methodologies for the home networking industry. Applied methodologies include bibliometrics.

ME-04.2 [A] Delphi Method Applied to Distance Learning Forecasting

Gloria Trujillo; Portland State University, United States
Rajesh Gopalakrishnan; , United States
Pious Michael; , United States
Nathasit Gerdsri; Portland State University, United States
Sabin Srivannaboon; Portland State University, United States

This paper presents an application of the delphi method to forecast the future requirements for the emerging long distance learning technology.

ME-04.3 [A] Complexity of Technology: Wireless Industry

Brent Douglas; Lattice Semiconductor, United States
Francis Giang; IDT, United States
Jim Bennet; Lattice Semiconductor, United States
Ozgur Koc; Portland State University, United States

This paper presents use of complexity theory in technology forecasting with an application in the wireless industry

ME-04.4 [A] Technology Forecasting with Volterra Lotka

Audrey Alvear; Portland State University, United States
Sevket Numanoglu; Portland State University, United States
Sundar Valluri; Portland State University, United States
Jonathan Ho; Portland State University, United States

This paper presents an application of Volterra Lotka methodology to forecast the competition in the wireless industry

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ME-05 E-Business-4
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Salon E**
Chair: William Woodyard; Florida State University

ME-05.1 [R] Delivering High Quality/Low-Cost Products to the Consumer and Profits to the Shareholders: Can It be Done in the e-Commerce Environment?

Dana M Johnson; Michigan Technological University, United States

Mounting pressures from industrial consumers to meet their constantly changing demands for products has impacted the ever-shortened life cycle in the Ebusiness environment. As more Ebusinesses go online with the support from venture capitalists wanting a return on their investment in short order, can the traditional business/management model support these constraints posed by this business evolution? Balancing quality, costs, delivery, and staying economically viable and profitable may only be a reality for a small few. This exploratory study will build a theoretical framework supported by qualitative and quantitative models to reshape the technology management practices of the future.

ME-05.2 [R] Government Regulation of e-Business Web Sites: A Legal Perspective

William Woodyard; Florida State University, United States
Gabrielle D'Alemberte; Florida State University, United States

As we stand on the precipice overlooking the third millenium, we peer into a future of E-commerce without boundaries and a World Wide Web as significant as Gutenberg's printing press. Reasonable estimates are that presently as many as 200 million people use the Internet. Indeed, the Internet has changed and will continue to change the way the State of Florida regulates its businesses and professionals in the soon to be 3rd largest state of the most technologically advanced nation the world has ever seen. Against this backdrop of exponential technological advancement, the Florida Department of Business and Professional Regulation licenses or registers over 900,000 individuals and entities in approximately 150 different subcategories of businesses and professions. Traditionally, licensees and unlicensed individuals have advertised their services and products in newspapers, on billboards, television, and radio or by direct marketing techniques such as telephone calls and letters. Now, the World Wide Web affords both licensed and unlicensed, residents and non-residents of Florida a relatively inexpensive medium to advertise their products and services around the world. This new medium has raised new and interesting issues and challenges for the Department to consider and resolve. At the forefront are such issues as jurisdiction over non-residents, commerce clause considerations, service of process of an administrative complaint on a web site address, encryption, collection of alcoholic beverage taxes on wine, and privacy concerns over the electronic transmission of privileged and exempt public records.

ME-05.3 [R] Moving into the e-Commerce World: Challenges that Firms are Facing in Mexico

Victoria E Erosa; Mexican Association for Electronic Commerce AMECE, Mexico

The E-Commerce wave has reached Mexico. Little, however, is known about the firm's interest and perceptions regarding this new business model and of the challenges that it faces for its adoption. The E-Commerce challenge is comprised of a variety of components including: a) the reason for going into E-Commerce; b) the type of internal problems faced for the adoption; c) the type of external barriers to overcome for the operation; and d) the perceived benefits of the E-Commerce model for the organization. Other critical components include the policy platform and the legal environment, and issues of technical standards. In order to identify these challenges, an exploratory study of E-Commerce users was conducted with 190 participant firms of different sizes and industries. Results of the research study reveal the main reason for adoption is the pressure of business partners, a finding that suggests a reactive attitude and the absence of a defined business strategy. The second reason for adoption identified is competitiveness, seeking to increase their profits through services/development by improving present services.

ME-06 New Product Development-1
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Salon G**
Chair: David Wilemon; Syracuse University

ME-06.1 [R] Improving Time-to-Market Through Investment in Design and Process Capabilities

Richard M Franza; Bentley College, United States
Janice E Carrillo; University of Florida, United States

This paper presents a normative model to assist managers in bringing new products to market quickly. Investments in both design and process related resources are optimally determined to maximize profits over a finite planning horizon. Analysis of the model offers insights into the strategic benefits of product and process development capabilities.

ME-06.2 [R] Optimal Portfolio for R&D and NPD Projects

R. Balachandra; Northeastern University, United States

For continued success in the market place firms should introduce new successful products into the market, and gradually retire older mature products. The introduction of new products should be timed properly; it should also produce an appropriate product mix so that the strategy of the firm is continued and strengthened. The portfolio of new product development (NPD) projects should be structured such that the goals of the firm are met. There has been considerable interest in this field recently. Though much has been written, there is very little theoretical work on the development of optimal portfolios. Most of the literature focuses on what some companies have been doing in this new area, which is to classify the projects into cells in a two-dimensional matrix. A wide variety of dimensions are used. Also, there is no linkage between the classification and the strategy of the firm. The paper develops a theoretical framework for relating a firm's strategy with the type of R&D and NPD portfolio it should have, based on a new classification scheme for NPD and R&D projects.

ME-06.3 [R] Managing Complexity in Product Development

Jongbae Kim; Silla University, Korea, South
David Wilemon; Syracuse University, United States

The issue of complexity is frequently not considered in evaluating a proposed new product development project and when considered, its recognition is often given limited attention. When examining why projects are late, over budget, or suffer from performance problems, complexity is frequently directly linked to the results achieved. While some work has been done in this area, more work is needed to assess the role complexity plays in the successful development and commercialization of new products. We first define complexity and discuss reasons why it can be a significant factor in managing new product development efforts. Next, we discuss several sources of complexity. These sources include technological, market, development requirements, marketing, organizational, educational/communication requirements, user adaptation requirements, and intraorganizational complexity as in the case of one company partnering with another to develop a new product or technology. We then construct a template to help product developers evaluate complexity in development projects. Finally, several suggestions for managing complexity are advanced.

ME-07 Decision Making in Technology Management-4
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Salon H**
Chair: Hsiao-Cheng Yu; National Chiao Tung University

ME-07.1 [R] Some Problems of the Forming of an Optimal Investment Portfolio

Efim M Bronshtein; UFA State Aviation University, Russia
Semyen I Spivak; Bashkirian State University, Russia

Various optimization problems of formation of portofolioes consisting of the investment projects are set up. It are taken into account both character of the investment offers, and financial opportunities of the investor. Alongside with determined the tasks taking into account investment risks are resulted also. Markov chains and indexes of condition are applied for this purpose . The effective algorithms are developed for the solution of these tasks .

ME-07.3 [R] Fuzzy MCDM Approach for IC Company's Strategy in the Semiconductor Industry

Zon-Yau Lee; National Chiao Tung University, Taiwan
Gwo-Hshiung Tzeng; National Chiao Tung University, Taiwan
Hsiao-Cheng Yu; National Chiao Tung University, Taiwan

In this paper the impacts of Global Competition on the IC corporate strategies for the semiconductor industries are studied. This research seeks to blend strategic competition with global development by addressing challenges for deterministic attitudes. It also examines critical environmental factors, technological systems and governmental policy on IC companies in the changes of the semiconductor industries. The need for a new strategy paradigm for IC companies, which comes out of new trends of the global competition, are also examined. The impacts of IC corporate strategy for the semiconductor industry are discussed and a hierarchical fuzzy multicritiria decision-making (Fuzzy MCDM) method for evaluating the propagating IC companies' strategies is proposed. Finally, an example is provided in order to show the practicability and usefulness of this method. From the results of practical applications in evaluating the IC corporate strategies, the proposed method is appropriate and appears to be ideal for a fuzzy environment.

ME-08 Entrepreneurship-4
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Salon I**
Chair: Dilek Cetindamar; Sabanci University

ME-08.1 [R] The Obstacles of Intrapreneurship Development in Iranian Companies , External & Internal Factors

Sousan Jeddi; Industrial Management Institute, Iran
Mohammad Zanjani; Industrial Management Institute, Iran

The present article is the result of a research project conducted jointly by I.M.I. and the Industrial Development and Renovation Organization of Iran (IDRO). The research show that development of intrapreneurship is effected by two internal/external factors. This matter, specially, in the developing countries where in all the frames are highly effected by external and, specially, legal factors, is of more importance. So, in this article external/internal obstacles effecting the development of intrapreneurship have been reviewed. with regard to external ones, a part of regulations/rules of the country such as labor law, social security law, taxes/duties law, export/import law and monetary/banking laws have been mentioned. with regard to internal obstacles, 7 companies have been studied and the topics such as organizational structure, goals and strategies, organizational and management support have been studied.

ME-08.2 [R] Organizational Entrepreneurs: Are They Different from Others?

Pulak Das; Indian Institute of Management Calcutta, India

Based on the reward preference survey among the R & D professionals of two national laboratories, the study found that professionals of one laboratory had high preference for innovation encouraging reward. Professionals of this laboratory enjoyed good amount of autonomy in research project both in design and in execution which the professionals of the other laboratory were denied. The other distinctive characteristics was that performance appraisal system of this laboratory measured their professionals involvement in market oriented activities. Career and demographic characteristics of the innovation preferring professionals indicated that they had higher level of education, higher organizational level, higher average age and work experience but had reached their current organizational levels at a significantly higher average age than others. Career frustration appears to be one of the important turning points for their switch to innovation and entrepreneurship. Implications are discussed.

ME-08.3 [R] Missing Link of National Entrepreneurial Business Model: Issues of High-Tech Start-up in Japan, in Comparison with US and German Model

Maeda Noboru; Kochi University of Technology, Japan

Very few R&D oriented start-ups are established in Japan in the past few decades. That is due to the weak entrepreneurial spirit of well educated researchers and engineers. However, a new wave is emerging to build up a new Japanese Entrepreneurial Business Model, which is quite different from American and German model.

ME-09 Project/Program Management-3
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Eugene**
Chair: Antonie M de Klerk; University of Pretoria

ME-09.1 [R] The Value of Project Risk Management

Antonie M de Klerk; University of Pretoria, South Africa

Managing project risk costs money. This paper considers the bottom-line justification for project risk management and the question of whether there is some optimal level of investment in this activity. Few guidelines exist as to how an appropriate balance between risks and rewards can be achieved. This paper develops a simple model based on utility theory which can be used to compare the benefits of risk-reduction with its costs. An expected utility measure is more appropriate than expected value because it reflects the risk attitude of the organisation involved. The relevance and application of the concepts of the value of information and the value of control are also examined in the context of project risk management.

ME-09.2 [R] Systematic Defects in Software Cost Estimation Models Harm Management

Stephen M Nemecek; University of Tennessee Chattanooga, United States

Software cost estimation models that are used to manage software development are shown to be defective. The defect is that the models are incommensurate, i.e., defects in dimensional analysis. An approach to correcting such defects in cost models is addressed.

ME-09.4 [R] Outsourcing of Information Technology Services: A Decision-Making Framework

Prakash S Lokachari; Tata Consultancy Services, United States
Manoharan Mohanarangan; Tata Consultancy Services, United States

The decade-old research literature on Information Technology outsourcing is replete with relationship management issues as well as risks and mitigation approaches. This paper addresses project-planning issues in a multi-vendor environment. A decision-making framework based on the Analytic Hierarchy Process model has been formulated for evaluating the alternatives pertaining to software project execution. Cost-benefit analysis further augments this methodology.

ME-10 Technology Based Organizations-2
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Portland**
Chair: Jamie Rogers; University of Texas at Arlington

ME-10.1 [A] An Assessment of a U. S. Environmental Protection Agency Information Technology Unit: Aiming for Optimal Future Performance

George Hammer; U.S. Environmental Protection Agency, United States
Susan Smith; U.S. Environmental Protection Agency, United States

The EPA assessed a procurement information technology unit in 2000. Areas reviewed included: the appropriateness of its numbers of employees, its current skill mix, and other technologically related issues. The assessment resulted in both short and long term recommendations, many of which were accepted and implemented.

ME-10.2 [R] Corporate Culture and Innovative Performance of the Firm

Holger Ernst; Otto Beisheim Graduate School of Management, Germany

It has been observed that performance gaps exist between organizations with almost identical formal organizational structures. This has led to the assumption that cultural differences between organizations may be responsible for these performance gaps. A review of the literature on success factors for innovations reveals that a profound empirical study analyzing the relationship between corporate culture and innovative performance on the firm level is lacking to date. Based on a typology suggested in the literature for measuring corporate culture a contingency framework is derived to test the relationship between four types of corporate cultures and innovative performance while taking the firm's strategy and its competitive environment into account. In order to test the validity of the suggested typology to measure corporate culture, a multiple informant approach is used. Respondents with different hierarchical and functional positions in 43 organizations are analyzed by means of multi-trait multi-method analyses. It is shown that a severe informant bias reduces the validity of results significantly. This has an impact on the attempt to quantitatively measure corporate culture as well as on assessing the relationship between types of corporate culture and innovative performance.

ME-10.3 [R] An Integration Model for the Virtual Enterprise

Byunghak Leem; University of Texas at Arlington, United States
En-chi Liu; University of Texas at Arlington, United States
Jamie Rogers; University of Texas at Arlington, United States

The virtual enterprise is a dynamic ecological business networking system of companies with many different complex system relationships formed in order to exploit their capabilities and resources, to respond to a customer driven market strategically, and finally to achieve maximum benefits in fast-changing environments. The customer tries to find content in variety of contexts delivered by a variety of infrastructures in dynamic market. Therefore, many companies are seeking partners for business networking with their core competences or strategic capabilities to gain competitive advantage. This paper provides a holistic integration strategy and integration model for virtual enterprise system on a conceptual, logical, and physical level.

ME-11 Collaboration for Technol. Mgmt.-1
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Columbia**
Chair: David H Gobeli; Oregon State University

ME-11.1 [A] External Suppliers and e-World Tools in a Large Corporate Environment

Michael E Richerson; Boeing, United States

Managing external suppliers involves not only the supplier and the services, but also the end users, products, technology and multiple site issues. Cost, quality and delivery are constant issues for both parties. Both are involved in decisions about technology. The use of e-world tools is increasingly important in this management process.

ME-11.2 [R] Enhancing Technology Management Through Alliances

Harold F Koenig; Oregon State University, United States
David H Gobeli; Oregon State University, United States

As part of a larger study, software firms in the northwest were surveyed about their alliances with 1) suppliers, 2) firms that produce related products, and 3) firms that bought their products. The structure of alliances maintained by the firm was related to new product success. In addition, the climate of trust and commitment in the relationship was assessed.

ME-12 Science and Technology Policy-1
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Willamette**
Chair: Deok Soon Yim; Science and Technology Policy Institute

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ME-12.1 [R] Spin-off in China: Why and How

Jiang Wen; The University of Electro-Communications, Japan

This paper analyses the nature of high-tech firms created by academic researchers in China and the key factors that lead to their successes. It based on author's consultance and a survey of leading academic-originated CAD companies. It demonstrates that the successful spin-offs have been those with government policy and funding support, and incubation facilities. It also reveals the major forms of spin-offs.

ME-12.2 [R] The Energy-Type Input-Output Table in the Research of Sustainable Development in China

Yuying Wu; Beijing Polytechnic University, China
Feng Yan; Beijing Polytechnic University, China

The input-output analysis of economic balance in real estate or value form only considers the input and output of the material product section. The sustainable development considers the ecological system including population, economics, natural resources and environment. The input-output analysis of sustainable development has to take them into consideration such as labor input, natural resource input, wastage brought along with the product output and the impact of wastage on the environment. The input-output tables in real estate or value form could not be applied directly in the analysis of sus-

tainable development due to the complexity of the ecological system. The ecological system including population, economics, natural resources and environment should be measured in energy, therefore, the energy-type input-output table is the extension of that in the real estate or value form. The inputs of input-output table in energy form consist of not only the material product input, but also the human resource input and the natural resource input; its outputs consist of not only the material output, but also the wastage output and the impact of wastage on the environment. The energy-type input-output model, including population, economics, natural resources and environment, is given in the paper. The model is applied in the analysis of sustainable development.

ME-12.3 [R] Regional Distribution of China's Science and Technology and Economic Development

Guisheng WU; Tsinghua University, China
Jizhen Ll; Tsinghua University, China

From a historical point of view, this paper briefly explores the development of China's science & technology and economic growth. Based on the evaluation of China's science & technology and economic development, this paper concludes that, in comparison with the economic imbalance among various regions, there exists on even larger disparity in S&T development.

ME-13 Manufacturing Management-1
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Douglas Fir**
Chair: Kathryn Stecke; The University of Michigan

ME-13.1 [R] Teamwork and Team Performance: Opportunities to Improve Manufacturing Operations

Kevin P Grant; University of Texas at San Antonio, United States

This longitudinal study examined the performance of five manufacturing teams in an electronic assembly plant. The objective of the study was to determine if factors related to teamwork were associated with improved team performance. Specifically, the study considered teamwork measures such as team flexibility, team communication, team decision-making, and team priority setting. The team performance measures included performance-to-schedule, quality and labor efficiency. The results indicate there are several significant relationships between the teamwork measures and the measures of team performance. The important implication is that initiatives that target improved teamwork can create opportunities to improve team performance in a manufacturing operation.

ME-13.2 [R] Combining and Integrating Manufacturing Innovations to Increase Manufacturing Performance

Rene Cordero; New Jersey Institute of Technology, United States
Steven T Walsh; University of New Mexico, United States
Bruce A Kirchhoff; New Jersey Institute of Technology, United States

A study of 88 manufacturing companies in the MEMS industry suggests that while manufacturing effectiveness appears a function of having innovative workers and using administrative innovation, manufacturing flexibility appears a function of having innovative workers and using technical innovation to allow changes in the manufacturing process. Surprisingly, neither measure of manufacturing performance appears a function of outsourcing specific manufacturing steps.

ME-13.3 [A] Technology Processes Management Capability Profiles of Machine Manufacturers in Turkey

O.Ugur Yildirim; Yeditepe University, Turkey
M. Atilla Oner; Yeditepe Univ, Depts of Bus Adm + Syst Engineering, Turkey
A. Nuri Basoglu; Bogazici University, Turkey

Technology Processes Management Capability Profiles Model (TPMCPM) integrates normative, strategic, and operational technology management levels with technology management sub-processes (identification, selection, acquisition, exploitation, protection, and abandonment of technology). This research aims to assess technology management capabilities and draw capability profiles of machine manufacturing industry in Turkey.

ME-13.4 [R] Adjusting Sample Size and Frequency of Sampling to Meet Quality Goals

Margaret F Shipley; University of Houston-Downtown, United States
Andre de Korvin; University of Houston-Downtown, United States

Determining the proper sample size and frequency of sampling such that quality is assured while undue inspection costs are not incurred is critical to an effective quality program. A set of fuzzy rules is given where, depending on the antecedents, the sample size may be slightly or significantly decreased or increased, while frequency of sampling is also slightly or significantly decreased or increased. At any given moment the proportion of defects in the sample determines the firing strength of the rules suggesting an appropriate sample size and sampling frequency.

ME-14 TUTORIAL: Closing the Strategic Vision / Implementation Gap for Competitive Advantage
Monday, 7/30, 5:15 PM - 6:45 PM **Room: Meadowlark**
Speaker(s) Donald E White; Cal Poly University
John R Patton; CADENCE Management Corporation

This tutorial focuses on how a firm can close the gap between its strategic vision and its operational implementation, and thereby create a sustainable competitive advantage. It presents Strategic Management By Projects (SMBP) as an approach to link and tightly integrate the strategic plan with its implementation. The approach focuses on the strategic portfolio of strategy fulfilling projects, identifies critical integrative links, processes, and metrics, and highlights case study results.

TB-01 Information/Knowledge Management-5
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Salon A**
Chair: Robert J Watts; U.S. Army Tank-Automotive & Armaments Command

TB-01.1 [R] A Brief Introduction to the Field of Data Mining

Elzbieta Trybus; California State University, United States
Ginter Trybus; California State University, United States

The purpose of this paper is to provide an overview of basic algorithms and software used in data mining. Very often the large volume of data sets requires the usage of parallel processors and adaptations of the existing statistical methods. The distinction between well known statistical methods and algorithms from the computer science field has to be done.

TB-01.2 [R] Convergence Detection in Classification Task of Knowledge Discovery Process

Bostjan Brumen; University of Maribor, Slovenia
Tatjana Welzer; University of Maribor, Slovenia
Izidor Golob; University of Maribor, Slovenia
Hannu Jaakkola; Pori School of Technology and Economics, TUT, Finland

Knowledge discovery in databases and data mining as its part has received a lot of attention lately. The fact that data hide important knowledge is a primary motivating factor. The knowledge discovery process is expensive, time-consuming and requires sifting through masses of data. In our paper, we give an idea of detecting the convergence of a classification-learning algorithm and thus determining the amount of data needed for a successful knowledge discovery.

TB-01.3 [R] Requirements-Based Knowledge Discovery for Technology Management

Robert J Watts; U.S. Army Tank-Automotive & Armaments Command, United States
Alan L Porter; Georgia Institute of Technology, United States

Exploiting information resources, particularly diverse research & development databases, presents opportunities to enhance technology management. Many such databases [e.g., Science Citation Index, Business Index] offer useful index fields to help you access documents. However, these indexes sometimes fail to address your requirements effectively. We present an approach that allows you to extract and categorize desired information from particular

datasets that lack effective indexing for your purposes. We illustrate for a U.S. Patents dataset on lightweight automotive materials.

TB-01.4 [R] Knowledge-Based View on Internationalization and Effect of Product/Service Types

Olli Kuivalainen; Lappeenranta University of Technology, Finland
Kalevi Kyläheiko; Lappeenranta University of Technology, Finland
Kaisu Puumalainen; Lappeenranta University of Technology, Finland
Sami Saarenketo; Lappeenranta University of Technology, Finland

Small infocom firms often show fast international growth. However, there are also differences in attitudes, speed and scope of internationalization within the industry and these can partly be attributed to differences in knowledge related variables like level of knowledge, its tacitness and path dependency. Results from our survey of 171 Finnish SMEs show that product or service type may act as a moderator in the relationship between the knowledge variables and internationalization.

TB-03 Strategic Mgmt. of Technology-6
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Salon C**
Chair: K. Ramanathan; University of Western Sydney

TB-03.1 [A] Too Much Too Soon? - The Saga of Industrial Enterprises, Ltd.

Keith Martin; Fairfield University, United States

This short case describes issues, both managerial and technological, that impacted a company's operations when it underwent three major "adjustments" - becoming a publicly held company, utilizing e-commerce processes for sales activities, and, therefore, entering foreign markets. It examines the bases on which these decisions were made, and the results of those decisions.

TB-03.2 [A] From Neural Networks to Hypersonic Aircraft

Robert M Pap; President, Accurate Automation Corp., United States

Accurate Automation Corporation (AAC) has historically specialized in development and application of computational intelligence methods, and has grown a significant application capability in the aircraft/aerospace arena, particularly related to hypersonic flight and adaptive flight controls. AAC is making fundamental theoretical and technological innovations in the new Plasma Aerodynamic Drag Reduction technology, and is making important contributions to flight safety through application of its image compression methods to Cockpit Imagery Recording, and through application of novel ideas about satellite downlinking of video data during emergencies. While these technology developments have been primarily funded via the US government's SBIR programs, AAC recently received a $3 million private equity investment to prepare for an IPO to commercialize the Plasma Aerodynamics and Cockpit Imagery Recorder technologies. A historical overview of the technology developments will be given.

TB-03.3 [A] Strategic Advantage Through Externally Sourced Technology—Practical Management Considerations for Exploiting Global Technology Sources

Charles H Kimzey; Office of the Secretary of Defense, United States
Susumu Kurokawa; Vanderbilt University, United States

This paper will summarize a project to assess the potential of externally sourced commercial technology to meet defense requirements. Using primarily private sector practices including knowledge management and expert networks, the results and recommendations on how untapped, global commercial sources can be utilized to meet complex national security requirements will be discussed.

TB-04 Technology Planning & Forecasting-5
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Salon D**
Chair: A. Nuri Basoglu; Bogazici University

TB-04.1 [R] A Structural Approach to Corporate Technology Planning

Tufan V Koc; Istanbul Technical University, Turkey
Seckin Polat; Istanbul Technical University, Turkey
Verda C Yunusoglu; TUBITAK-Marmara Research Center, Turkey

Technological projects are generally projects which are concluded in the long term and are of a strategic character. For this reason, it is necessary to be very careful and to go into details in preparing the projects relating to processes and the final product. By doing this the long-term advantages of the technological changes to the company are analysed in detail. The developed model stresses the creation of the technological plan according to the strategic planning of the company and lays down the basics for the technical, strategic, financial and risk analysis of the projects of alternative technologies to be carried out, which are selected taking into consideration the present and future condition of the company.

TB-04.2 [A] Technology Analysis on the Information Appliances

Jin-Won Park; Hongik University, Korea, South
Jeun-Woo Lee; ETRI, Korea, South
Dong-Won Han; ETRI, Korea, South

Computers are beginning to be integrated with home electronic appliances and the internet, making the information appliances as the leading edge of the IT industry. We will discuss the demand forecast and the planning of technological development for information appliances. We will focus on building a technological tree or a structure and a roadmap ahead.

TB-04.3 [R] A System-Dynamic Simulation Game for Energy Sector of Turkey

S. Burc Turan; Yeditepe University, Turkey
A. Nuri Basoglu; Bogazici University, Turkey
M. Atilla Oner; Yeditepe Univ, Depts of Bus Adm + Syst Engineering, Turkey

There is an ineffective resource allocation in Turkish energy sector, causing a large gap between energy supply and consumption and energy cuts during critical times. A system dynamic model has been constructed to simulate progress of energy demand and supply until the year of 2050.

TB-05 E-Business-5
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Salon E**
Chair: Prakash S Lokachari; Tata Consultancy Services

TB-05.1 [R] Activity-Based Costing for e-Business

Narcyz Roztocki; State University of New York at New Paltz, United States

This paper proposes the use of Activity-Based Costing to more effectively track costs associated with E-Business. The usefulness to E-Business of Activity-Based Costing, already proven to be beneficial to manufacturing companies, is discussed. The author's extensive experience with "New Economy" business, as well as Activity-Based Costing issues in traditional "brick-and-mortar" companies, lead to the development of an Activity-Based Costing system for an Internet-based sports-goods superstore. The implementation procedure for this company can be used as an example for other E-Businesses interested in using Activity-Based Costing. Finally, this paper examines several possible benefits to the strategic decision-making process and financial performance of E-Businesses, as a direct result of implementing Activity-Based Costing.

TB-05.2 [R] Performance Measurement for Web-Based e-Commerce

Rosana C Gonçalves; University of São Paulo, Brazil
Edson L Riccio; University of São Paulo, Brazil
Raïssa A Matos; University of São Paulo, Brazil

The period of development and competitiveness that companies using E-Commerce are going through requires a control of performance that should be related to short and long term. With the objective to measure the efficacy of this use, it was developed a set of performance indicators based on Balanced Scorecard methodology.

TB-05.3 [R] Trust,Confidence and E-Commerce in Cyberspace

YILDIZ Y GUZEY; KADIR HAS UNIVERSITY, Turkey

Trust is central to any commercial transaction. As with traditional commerce

,e-commerce requires trust across the whole spectrum of users and providers of services and goods. It is an Internet application that runs on an infrastructure and uses the Internet's key infrastructure applications. This paper presents the results of survey conducted at top 250 companies in Turkish Economy and discusses trust and confidence in E-Commerce.

TB-06 New Product Development-2
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Salon G**
Chair: James Lill; Portland State University

TB-06.1 [R] Critical Success Factors for New Product Development in Hong Kong Toy Industry

Hongyi Sun; City University of Hong Kong, Hong Kong
Wong Chung Wing; City University of Hong Kong, Hong Kong

Hong Kong's manufacturers have become some of the most efficient toy producers in the world and have become the biggest exporter of toys in the world. However, the Hong Kong toy industry is mainly Original Engineering Manufacturing (OEM) and does not invest much in R&D, such as the creation of new toys or development of new toy designs. With the rising competition from Mainland China and other Asian countries, it is important for Hong Kong companies to invest more in R&D and to develop their own design capabilities or more value-added edges which cannot be substituted easily by our competitors. The research reported in this paper aims to explore the success factors for new product development in the Hong Kong toy industry. Although there is plenty of research on this issue, CSF for NPD may be country and industry specific. Research on CSF for NPD, especially at the project and functional levels, for the toy industry has not been reported. Using the Biblical Metaphor Model, this research identifies a group of critical success factors for each phase of new product development. Since the research is especially designed for the Hong Kong toy industry, the results may not be generated to other industries in other countries. However, the research design and the data analysis framework can be used to investigate the same problem in other industries.

TB-06.2 [A] Biotechnology at the Turn of the Century

James Lill; Portland State University, United States

The emergence of biotechnology as a major component of the global economy poses profound questions for those in business who plan corporate strategy and those in government who formulate regulatory policy. We will review some of the major trends, concentrating, upon the industrial transformation from chemicals to pharmaceuticals to biotechnology. This paper is based on a project conducted in a graduate course in the Engineering & Technology Management department at Portland State University. The members of the project team were Jim Lill, Edgardo Berrios, Ravee Boonbutra, Rafael Borja, Ozgur Koc, Michael Magee and Sevket Numanoglu

TB-06.3 [R] Biostatistics: The Hidden Path to Life Science Innovation

Lois S Peters; Rensselaer Polytechnic Institute, United States
Richard Burke; Rensselaer Polytechnic Institute, United States
Shreefal Mehta; Rensselaer Polytechnic Institute, United States

This exploratory paper investigates the infrastructure for life-science-based new product development. The practice of biostatistics has long been seen as a crucial element of the regulatory process for approving the release of new drugs and medical devices, but we hypothesize that it serves a larger role in the new product development process in pharmaceutical and biotechnology firms. To this end we focus on the management of biostatistics and related know how such as data mining in the discovery, testing, and commercialization of new products. Our results are drawn from a number of in-depth case studies of biostatistical practices in a variety of firms engaged in life-science product development. The findings point to the importance biostatistics in providing both technical and strategic information. To the extent that biostatistics is managed as a learning system it is critical for building core capability and enabling resource configurations that create value.

TB-07 Resource Management-1
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Salon H**
Chair: Ted Eschenbach;

TB-07.1 [R] A New Way for Pricing Commodity and Evaluating Profit of Investment Based on the Partial Distribution

Feng Dai; Zhengzhou Information Engineering University, China
Ling Liang; Zhengzhou Information Engineering University, China

In this paper, we put forward the concept and the expression of the partial distribution. Based on the Partial Distribution, some new models and methods are advanced, then we've obtained the new way for pricing commodity and evaluating profit of investment based on the partial distribution (PEPD). By PEPD, we can measure the average income, the average profits and the risk of the commodity in the market, so that we can price the commodity like material object, derivation and the one exchanged on Internet, and evaluate the profit of investment also.

TB-07.2 [R] An Interactive Method by Founding Weights via Bargaining Sets to Solve the Multiple Objective Linear Programming Problems

Mehmet Ahlatcioglu; Yildiz Technical University, Turkey
Fatma Tiryaki; Yildiz Technical University, Turkey

As known, when the decision maker wants to optimise each of his/her objectives, but in the presence of usually conflicting objectives, decision maker (DM) is willing to reduce some objective in favour of the others. DM can deal with his/her objectives as individually or in groups (coalitions). For each objective groups, DM is asked to his satisfaction levels. When each objective considers as a player, objectives will form coalitions with the other objectives to increase its individual weights. While the coalitions increase their importance, by using the powers of their members, individual (someone, somebody, one of them) will try to improve his/her weight in his/her coalition, using the possible threats such as to go to other coalitions. At the result of all bargains, the solution of game (i.e. weights of the objectives) is determined with the "nucleolus" to occur. By aiding the value function happened with weights, and at the same time interacting with the DM, the solution is proposed to the multiple objective linear programming problems.

TB-07.3 [R] Objective Space Approach for Analyzing a Multiple Criteria Capital Budgeting Model

Jerald P Dauer; University of Tennessee at Chattanooga, United States

A multiple criteria linear program model of capital budgeting is solved and solutions are analyzed by the method of objective space analysis, also known as outcome space analysis. This approach takes advantage of the relative simpler structure of objective space to obtain an optimal decision rather than using the traditional approach of analyzing the decision space, which has a complicated structure. The objective space of a multiple objective linear program is discussed in many references in the literature. Yu discussed outcome space in his book. Dauer develop the extreme point theory in objective space analysis, Dauer's collapsing theorem in objective space made significant contributions to the objective space analysis in the 80's. In the 90's, Benson and his colleagues developed several interesting methods for objective space analysis. In this work the authors extend their extreme point approach using Gal's constraint set analysis and Benson's description of extreme points in objective space to obtain a more efficient method.

TB-08 R&D Management-1
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Salon I**
Chair: Maximilian von Zedtwitz; IMD International

TB-08.1 [R] Challenges Facing Japanese Companies Achieving Innovative R&D Through Empowering Concept Creators

Kiyoshi Niwa; The University of Tokyo, Japan

The characteristics of 92 recently successful R&D projects of Japanese technology-based companies are examined. The major finding is that the key factors necessary for success are moving from the realm of the execution people to that of the planning people. Some challenges are identified for Japanese companies to effectively foster and develop concept-creation people.

TB-08.2 [R] Evaluating R&D Effectiveness: A Study on Chinese Practice and Trend

Qingrui Xu; Zhejiang University, China
Gang Zheng; Zhejiang University, China
Jingjiang Liu; Zhejiang University, China
Jin Chen; Zhejiang University, China

This article reviews and summarizes the popular theories, methods and tools being used to evaluate the R&D performance in China, as well as their limitations and drawbacks. Based on it, and refer to the practice abroad, some promising approaches and trends are introduced by which to evaluate the R&D performance effectively in the coming Knowledge-based Economy Era.

TB-08.3 [R] Managing Technology Transfer from Research to Development in International R&D Projects

Maximilian von Zedtwitz; IMD International, Switzerland

We focus on technology and knowledge transfer between internationally dispersed research and development teams with examples from Hitachi, Kao, NTT/ATR, and Unisys. We conclude that research should assume more obligation for the quality of technology transfer, and that ingenious ways facilitate overcoming language as well as trust barriers.

TB-09 Project/Program Management-4
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Eugene**
Chair: Dragan Milosevic; Portland State University

TB-09.1 [R] Collaboration Within and Between Teams in Multi-Team R&D Projects

Katharina Wurst; University of Karlsruhe, Germany
Martin Hoegl; Washington State University, United States
Hans Georg Gemuenden; Technical University of Berlin, Germany

Large-scale R&D projects are often carried out employing a number of teams working simultaneously on separate sub-tasks. Such R&D projects constitute highly interrelated team-based organizations, where the complexity of the task and the time constraint of the project make collaboration on various levels of the organization a crucial prerequisite for success. While collaboration within teams (teamwork) has been theoretically and empirically investigated both in Europe and the US, the integration of multiple teams within an R&D project, however, has received little attention in management research. Two main questions seem of particular importance in this regard: How can we conceptualize and measure the quality of collaboration within and between teams? How strong is the relationship between collaboration on both levels (within and between teams) and the performance of individual teams in the project? This paper contributes to answering these questions by developing a theoretical concept of the quality of collaboration within and between teams. Using data from 191 personal interviews relating to all 39 simultaneous engineering teams of an automotive development project in Europe, we evaluate our concept of collaboration in team-based R&D organizations and test the relationships of these constructs with relevant measures of team performance (quality of outcome, adherence to budget, adherence to schedule).

TB-09.2 [R] An Investigation of Global, Virtual and Co-located New Product Development Projects

Gloria Barczak; Northeastern University, United States
Edward F McDonough; Northeastern University, United States

Increasingly, companies are using new product development teams that are geographically separated and culturally diverse. Yet such teams face greater obstacles than traditional co-located teams. This study examines the differences between global, virtual and co-located teams and provides guidance as to how to manage each of these different types of teams.

TB-09.4 [A] Crisis on the Coast: Project Management Analysis of the New Carissa Salvage Operation

Doug Harms; Portland State University, United States
James VanHuis; A-DEC, United States
Mehmet Can Erginsoy; Portland State University, United States
Timour Khamnayev; Chiave Interactive, United States
Ozgur Koc; Portland State University, United States

On February 4, 1999, the merchant vessel New Carissa ran aground near Coos Bay, OR. This would set into motion a series of events that still do not have final resolution nearly 2 1/2 years later. At first impression, the rescue and salvage appears to be a haphazard, loosely related series of events. This is most definitely not the case. Due to recent massive oil spills, like the Exxon Valdez and the Kuroshima, contingency plans in the form of a project management structure have been put into place to react quickly to incidents and prevent such disasters. This study examines the various available reports, including material from the U.S. Coast Guard, the Oregon DEQ, and the various federal agencies that were involved, in addition to news media and Internet material. The New Carissa Review committee concluded the system worked "reasonably well." We agree that a system was in place, and that attempts were made to follow the guidelines, but we cannot support the statement that it worked "reasonably well."

TB-10 Technology Based Organizations-3
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Portland**
Chair: Rochelle K Young; University of Colorado at Boulder

TB-10.1 [R] Knowledge Management to Enhance Business Operations : A Case Study in the Malaysian Electronics Sector

Mohan V Avvari; Multimedia University, Malaysia
C. S Bong; MMU - Melaka, Malaysia

Knowledge Management is now one of the major driving forces of organizational change and wealth creation, Keeping In view of this fact this paper explores knowledge-based organizational strategy, illustrated by a case study of a firm in the electronics industry. The firm's KM process is presented to determine the effect knowledge management practice on quality improvement and increased productivity.

TB-10.2 [R] Organic Organizations: A Conceptual Framework

Hilal Hurriyet; University of Western Sydney, Australia
R. K Agrawal; University of Western Sydney, Australia

This paper aims at identifying the characteristics of being organic for organizations and makes an attempt to scale the different stages of being organic from limited sense of being organic through to being wholly organic or true natural system. The process to become an organic organisation runs parallel to the processes found in the natural systems, drawing concepts from positive sciences such as physics, chemistry, agriculture, biology, philosophy and the like. The literature that has been examined includes areas such as organization theory, technological change and models of natural systems, extending them to develop the concept of the organic organization. This paper provides a recipe for developing an organic organisation and it takes into account the views of organization builders and technically able planners. The paper uses evidences and conclusions drawn from various models of natural systems and discusses each individual concept in relation to the others, and also in terms of contribution to the concept of overall organic organizations.

TB-10.3 [R] Developing Effective Social Structures Using Information Technologies

Rochelle K Young; University of Colorado at Boulder, United States

The social architecture within the organization is best described as a university of shared realities, which contributes to a uniqueness of behavior expectations. People, who make up this structure, collectively provide value systems that help self and other organizational members understand what the organization holds as important. It also provides a basis for personal decision-making and behavior. Establishing knowledge processes in this regard would help to teach members of the organizations about what they should expect from others and what is likely expected from them. Sustaining this type of shared belief system requires the unconditional dissemination of information. One of the barriers in developing such knowledge processes for this type of system is that the social architecture in most organizations does not accommodate the unconditional dissemination of information. Since the implementation of

modern information technology is changing the workplace and the nature of work itself, alternative social structures guided by these information technologies are needed. Using the classroom as a laboratory for addressing organizational social structure development, technology, and knowledge processes, students taking a course addressing behavioral issues for engineers provided a scenario-some true, some perceived of what they face in the organization and what they believe needs attention by everyone affected.

TB-11 Collaboration for Technol. Mgmt.-2
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Columbia**
Chair: Wilma W Suen; Tufts University

TB-11.1 [R] Organizational Learning and Co-opetition

Jan G Clark; University of Texas at San Antonio, United States
Glenn Dietrich; University of Texas at San Antonio,

Technology firms are increasingly being faced with the dilemma of whether to fight or join forces with their enemy. They are being confronted with situations that they are not able to resolve, given their existing technology, skills, market share, and/or knowledge. If they collaborate with another firm that has these resources, both firms can potentially benefit, resulting in a win-win situation. However, many of the firms most likely to have these resources are also their competitors. If they choose not to collaborate, their competitor could potentially resolve the problem or seize the opportunity without them, resulting in a zero-sum game (one side wins, the other side loses). Or, both firms could lose because neither had the necessary resources.

TB-11.2 [R] Technology Management Partnerships: Knowledge Utilization as a Predictor of Success

Carol J Haddad; Eastern Michigan University, United States

Technology management as a field of study and in practice generally overlooks labor relations variables. Yet first-line employees and their union representatives are valuable sources of knowledge that can directly affect performance outcomes. This paper lays a foundation for the concept of "strategic partnership" for the management of technological change, offering case study examples in support of conceptual tenets.

TB-11.3 [R] Managing International Technology Alliances: Ballard Power and Fuel Cell Vehicle Development

Wilma W Suen; Tufts University,

Multiparty international strategic alliances are becoming popular vehicles through which firms access resources, share risk, and learn. They are particularly useful in technology-based industries where products are becoming more complex and risk of failure is high. However, firms are profit maximizing actors who may behave opportunistically or defect in order to gain a larger share of the returns. This paper argues that power and interdependence between members, and between the firm and the alliance are key to determining a member's capability to act against its partners' or alliance's interests. The more powerful and less dependent the firm, the greater its freedom to act. The case of Ballard's alliance with DaimlerChrysler and Ford finds that alliances "construct" interdependence to balance the asymmetries in their relationships and tie the firms more closely together.

TB-12 Science and Technology Policy-2
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Willamette**
Chair: Kumiko Miyazaki; Tokyo Institute of Technology

TB-12.1 [R] Managing Science and Technology Parks in Low-tech Environments: A Resource-based Strategic Mapping Framework

Vangelis Souitaris; Imperial College, United Kingdom
Timos Daskalopoulos; Credit Suisse Asset Management, United Kingdom

This paper looks at science and technology parks from the angle of low-tech environments and from a managerial perspective. The authors evaluated three Greek establishments and identified a number of serious problems in their operation. The effect of the specific political, economic, social and technological conditions of the low-tech environment on the parks' performance was then explored. Based on the case studies, the authors developed a resource-based strategic-mapping framework offered to park-managers, who are searching for a clear strategic direction.

TB-12.2 [R] Management and Policy Concerns in the Transition to the Knowledge Driven Economy in Japan

Kumiko Miyazaki; Tokyo Institute of Technology, Japan

In this paper, an analysis is made of the management and policy concerns in the transition to the knowledge driven economy in Japan. A comprehensive viewpoint is taken on what is meant by knowledge driven, embracing more than the new economy, or IT revolution. Japan has been competitive in the old economy, but may be lagging behind in the new economy. The traditional areas of strengths in the old economy is discussed. These strengths are no longer sufficient for meeting mega-competition in the era of the knowledge driven economy. Japanese firms would have to undergo major structural as well as managerial changes in order to face global competition. Japanese corporate weaknesses are linked to the weaknesses in the innovation system. An analysis is made of the weaknesses in the Japanese innovation system such as government policies to strengthen the Science and Technology bases, discussing why they have not been successful. Japan will have to overcome these weaknesses in the innovation system to successfully achieve the transition to the knowledge driven economy.

TB-12.3 [R] Technological Competitiveness of Japanese Power Industry: Essence of Power Industry Technology Strategy

Satoshi Ito; Ministry of International Trade and Industry, Japan
Kenzo Fujisue; The University of Tokyo, Japan
Ichiya Nakamura; MIT, United States

The long-term plan of Japanese electric power technology development was completed in the spirit of 2000.In this study, we explained the basic concept of this plan from a viewpoint of energy supply, economical development and environment.

TB-14 TUTORIAL: The Joy of Bibliographies: An Introduction to Bibliography Management Tools
Tuesday, 7/31, 10:00 AM - 11:30 AM **Room: Meadowlark**
Speaker(s) Timothy R Anderson; Portland State University

The literature review is frequently the least enjoyed part of doing a research project and perhaps even described as painful. We will show how to organize and conduct your literature review from the initial literature search to formatting the bibliography using EndNote. Freeing time from the busy work of formatting requirements can enable you to focus on the most interesting and valuable part of the literature review - reading the literature and structuring your write-up.

TC-01 Information/Knowledge Management-6
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Salon A**
Chair: John W Priest; University of Texas at Arlington

TC-01.1 [R] Web-Based, Real Time Protocol for Management of Change in a North Slope Oil Exploration and Production Operation

James R Hemsath; BP Exploration, United States
Jang W Ra; University of Alaska, United States

An evaluation of the existing management of change (MoC) process was conducted, at a major oil production facility, comparing existing processes against the five components of a management system - Scope, Process, Organization, Performance Measurement and Feedback. A web based architecture to support the components of a management system for the MoC process was developed and recommended.

TC-01.2 [A] Development and Implementation of a R&D Management Information System

Suzana V Lima; Embrapa (Brazilian Corp for Agricultural Research), Brazil
Antonio G Castro; Embrapa (Brazilian Corp for Agricultural Research), Brazil

José P Carvalho; Embrapa (Brazilian Corp for Agricultural Research), Brazil

Institutional planning, in its broader conceptualization, is the strongest tool to guarantee an enhanced influence by objective factors on management. Planning, nevertheless, is the application of knowledge, based on systematized information, which may be structured in management information systems (MIS). This paper focuses the development, validation and implementation of such a MIS at EMBRAPA (Brazilian Corporation for Agricultural Research). The MIS described here (named SIGER) is linked to the conceptual framework for planning, monitoring and evaluation adopted by the EMBRAPA's R&D Planning System (SEP).

TC-01.3 [R] An Organizational Behavior Approach for Managing Change in Information Systems

John R Durrett; Texas Tech. University, United States
Lisa J Burnell; University of Texas at Arlington, United States
John W Priest; University of Texas at Arlington, United States

Changes in computing infrastructure and technology are affecting the implementation and modification of information systems. In addition the implementation of more intelligence to lower levels using decision support systems, intelligent machines and embedded processors provide evidence that the computing environment will continue to change dramatically in short periods of time. This existence of a constant changing environment is causing a major transition from a design once and maintain forever style of computing to demands for a real-time distributed and constantly changing IS. The primary concern of system designers, both organizational and software, is in providing the most effective structure through which the individual activities are harmonized and directed toward the accomplishment of the organization's goals. In this paper basic principles from the science of organizational behavior are combined with well-established design principles from information systems to explore a new design model for information systems. A new model or architecture called software teams is proposed for rapidly changing, intelligent environments to facilitate the creation and ongoing evolution of a distributed IS that is fluid, just like the evolving organizations it needs to support.

TC-02 Information/Knowledge Management-13
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Salon B**
Chair: Xiaobo Wu; MIT

TC-02.1 [R] Knowledge Dynamics and Organizational Learning in Enterprise's Technology Evolution

Xiaobo Wu; MIT, United States

This paper tentatively examines the knowledge dynamics relating with firms' organizational learning modes and layers through its technology evolution. Based on the evolutionary process analysis on "late-comer's" technological innovation cycle, especially the Chinese firm's secondary innovation cycle, the dynamic matching of organizational knowledge foci to firm's learning modes and learning layers is discussed. It is revealed that the leverage of those two depends on the adequate balance between the two sides of a coin: linear-dynamics and non-linear dynamics, basically in exploitation and exploration, dynamically through the firm's technology evolution. Further, it is argued that there exists a preferable matching pattern of different knowledge foci to different learning layers and learning modes, which is the key to sustain a firm's competitive advantages. In the discussion, special attention is paid to the non-linear dynamics of learning, such as discontinuity, chaos, and crises in knowledge capturing, accumulation and retention during the transition from one technological paradigm to the next, with a standing point of developing countries. Some strategic implications are finally proposed.

TC-02.2 [R] Attitudes Towards Knowledge Management in Turkish Companies

Erol Ucdal; KADIR HAS UNIVERSITY, Turkey
Yildiz Y Guzey; KADIR HAS UNIVERSITY, Turkey

Knowledge management is a new term although it is growing rapidly in importance and gained impetus. Today companies believe that knowledge management is transforming the way their organizations do business. Knowledge and its management will become a key resource of the future. This paper presents the results of survey conducted at top 200 large leader companies' current implementation, awareness and strategic aims for knowledge management.

TC-02.3 [R] Knowledge Management and Organizational Learning: Typologies of Generic Knowledge Strategies in the Spanish Manufacturing Industry from 1995 to 1999

Patricia Ordóñez de Pablos; University of Oviedo, Spain

The purpose of this study was to analyze generic knowledge strategies in the Spanish manufacturing industry. By focusing on the resource-based view of the firm, the knowledge-based view of the firm and the organizational learning literature, and following Bierly and Chakrabarty (1996)'s pioneering study on generic knowledge strategies, we analyze the state-of-the-art in Spain.

TC-03 Strategic Mgmt. of Technology-7
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Salon C**
Chair: Kwan Sitathani; NECTEC

TC-03.1 [A] Management of Changes in the Brazilian Competitive Standard for XXI Century

Geraldo Telles; State University of Campinas, Brazil
Claudemir Gimenez; State University of Campinas, Brazil

This paper is a report of a survey carried out in Brazil in 1999. It proposes a changing process model to be adopted by companies, which want to be competitive in the first decade of XXI century. The changing process model is dynamic, because the market is highly unstable, demanding continuous investments in technology, manpower, and so on.

TC-03.2 [A] Strategic Global Standards Management: A New Imperative in Technology Management

Jeffrey D Strauss; Northwestern University, United States
Michael Radnor; Northwestern University, United States

Globalization of markets, manufacturing, technology and information and intensifying competition accompanied by increased outsourcing, corporate interrelationships, technology convergence and a push toward harmonized standards demand sophisticated and strategic standards management. Once viewed only as the purview of engineers and lawyers, standards management is increasingly recognized as a competitive tool requiring understanding and active input from across the organization and coordination across the supply chain. Yet few appropriate training materials and exist and little has been done to compile cases and tools for corporate and school use in implementing related initiatives. The Kellogg Graduate School of Management in collaboration with the MATI Consortium of 17 leading firms, the American National Standards Institute (ANSI), several other schools, and with partial support from the US Department of Education, is launching a project to address this gap. This paper reports on the issues and challenges involved and what is being learned from best-in-class firms.

TC-03.3 [A] NTT DoCoMo: Strategic Partnerships for Growth

Matthew Freeland; Wacker Siltronic, United States
Hasnah Mat-Amin; Portland State University, United States
Khemanut Teangtrong; Portland State University, United States
Wichan Wannalertsri; Portland State University, United States
Uraiporn Wattanakasemsakul; Portland State University, United States

NTT DoCoMo is a spin off from Nippon Telegraph and Telephone Company which took place when the telecom industry was going through deregulation in Japan. Currently, NTT DoCoMo is the largest wireless provider in Japan with the number opf subscribers exceeding 10 million at the end of 2000. NTT DoCoMo's success came from its core technology, packet data switching, and its brilliant marketing strategy. NTT DoCoMo captured the market by offering contents that are easy to navigate for mobile users.

TC-04 Disruptive Technology: Issues and Analysis

SESSIONS

Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Salon D**
Chair: Suleiman K Kassicieh; University of New Mexico

TC-04.1 [R] An Empirical Analysis of Differences Between Sustaining and Disruptive Technology Innovations

Suleiman K Kassicieh; University of New Mexico, United States
Steven T Walsh; University of New Mexico, United States
Al Romig; Sandia National Laboratories, United States
John Cummings; Sandia National Laboratories, United States
Paul McWhorter; Sandia National Laboratories, United States
David Williams; Sandia National Laboratories, United States

A survey of firms engaged in the commercialization of sustaining technologies or of disruptive technologies is analyzed to determine differences in firm characteristics, situational issues and firm history.

TC-04.2 [R] Forecasting Micro Electro Mechanical Systems: A Disruptive Innovation

Jonathan D Linton; Polytechnic University, United States
Steven T Walsh; University of New Mexico, United States

Two alternative methods for forecasting MEMS - a type of disruptive innovation are offered. The first method improves upon the currently used method by considering pro-innovation bias and distributional effects of expert opinions. The second method builds upon the established forecasting literature. Both methods are described in a detailed applied manner to encourage and facilitate their future use.

TC-05 E-Business-6
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Salon E**
Chair: Ellen Domb; PQR Group

TC-05.1 [A] TRIZ in the Knowledge Era: Achieving Profitable e-Commerce

Ellen Domb; PQR Group, United States
Darrell Mann; University of Bath, United Kingdom

TRIZ is the data-based creativity method based on the work of G. Altshuller and his colleagues in the former USSR. It is becoming known in the West as a method for systematic innovation that creates useful, innovative concepts fast. Because the TRIZ research was originally based on the world patent database of the 1940's-1980's, there has been some doubt that TRIZ applies to the problems of the 21st century. Applications to e-business situations will demonstrate that TRIZ is a powerful tool for problem solving, technology forecasting, and business development for the emerging knowledge era. The strength of TRIZ as a method for developing creative solutions to problems is the removal of contradictions, rather than the conventional approach of accepting compromises or making tradeoffs.

TC-05.2 [R] How e-Businesses Can Achieve a Competitive Advantage

Namchul Shin; Pace University, United States

Despite rapid and sustained development, electronic commerce is still in its formative stage. Many companies doing e-business are still in the investment and brand-building phase and have yet to show a profit. However, as e-businesses shift their focus from building a customer base to increasing revenue growth and profitability, they should re-evaluate their current business strategies, if any, and develop e-business strategies that provide a clear path to profitability. In this study, we present a model for developing e-business strategies based on McCarthy's four marketing mix. These strategies respond to the five competitive forces proposed by Porter, thereby achieving a competitive advantage. This study provides significant new insights into the development and implementation of e-business strategies that contribute to increased profit.

TC-05.3 [R] Web Based Delivery of a Patent Management Courseware in Virtual Augmented Reality

Mary Mathew; Indian Institute of Science, India

The WWW is a powerful vehicle of interactivity. It is already popular as a medium of course instruction and delivery, interactive research, including data collection. It's utility in web based courseware delivery probably knows no limits. This paper elaborates an experiment with a Patent Management courseware developed for clients such as science and engineering students and the managerial community. It uses cognitive learning styles, fused into a virtual reality presentation using VRML, resulting in a Patent Management courseware on the web.

TC-06 New Product Development-3
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Salon G**
Chair: Paul R Newman; Cooper Mountain Research, Inc.

TC-06.1 [R] A Sector-specific Approach for New Product Idea Generation

Yong-tae Park; Seoul National University, Korea, South
Gwang-man Park; Seoul National University, Korea, South
Hyung-sik Oh; Seoul National University, Korea, South

The innovative knowledge for new product is the hallmark of commercial success. The idea generation process, however, is an exploratory and heuristic exercise and thus hard to systematize or standardize. In this article, we present a systematic scheme for idea generation, comprising such ways as additive, subtractive, change, substitutive, converse and concurrent approach. We then conduct a statistical analysis, goodness-of-fit, to identify the correlation between idea generation approaches and industrial sectors. The results may provide a useful framework for designing industry-specific knowledge generation system.

TC-06.2 [R] An Application Research of Process Management in New Product Development

Yuehong Xu; Graduate school of the Chinese Academy of Sciences, China
cuiling Feng; Management school of Tianjin University, China

In order to research the process management of New Product Development (NPD), we provide the practice analyses of Kelon Group—- the largest chilling household appliances manufacturer in china. After described the situation of Kelon Group, we analyze the organization management mode of NPD and the integrated process management of NPD by "531" mode. As a reflection of this integration, we establish the cost evaluation system of Kelon Group in early NPD process in result.

TC-06.3 [A] The Fuzzy Front End—-Technology Identification, Staging, Maturation: Where the Battle Is Often Lost Without Firing a Shot

Paul R Newman; Cooper Mountain Research, Inc., United States
Cynthia Leverhant; HTM Consulting, United States

Success in the development and introduction of new products depends crucially on managing and synchronizing the "Fuzzy Front End." The on-going process of technology identification is accomplished through the use of scouts and futurists. Scouts survey, evaluate and communicate "What is, and what will be." Futurists ask the business question, "What if?" The activities of both groups need to be synchronized carefully, and a suggested approach is through a "Technology Opportunity Panel". Finally, it is asserted that timely and robust introduction of new products is best accomplished by risk evaluation and reduction through the process of Technology Staging and market probing. These often-overlooked steps are crucial links between the Fuzzy Front End and successful New Product Introduction.

TC-07 Resource Management-2
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Salon H**
Chair: Joseph C Paradi; University of Toronto

TC-07.1 [R] Valuing Private Companies: A DEA Approach

Joseph C Paradi; University of Toronto, Canada
Burcu Anadol; University of Toronto, Canada

Abstract Traditionally company valuation methods are based on discounted cash flows and liquidation values. Our DEA model classified the firms as efficient or inefficient, for the latter, a range of market values were obtained from its inefficient and efficient peers. An upper bound on the market values of the

inefficient companies and a lower bound efficient company values were determined.

TC-07.2 [R] An Illustration of Using DEA as a Fitness Function for Evolutionary Algorithms

James Lill; Portland State University,
Garison Greenwood; Portland State University,
Timothy R Anderson; Portland State University, United States

One longstanding challenge in the use of evolutionary algorithms is the case of multiple objectives. This paper demonstrates how DEA can be used to assist with this problem and applications are discussed.

TC-07.3 [R] The Use of Data Envelopment Analysis for Stocks Selection on Istanbul Stock Exchange

Fatma Tiryaki; Yildiz Technical University, Turkey

A potantial investor who wants to pick amongst major securities traded on the ISE is faced with many options in both performance and cost.. This paper proposes a decision model to help the investor to select his/her stocks in Turkish securities market. In this article, Data Envelopment Analysis, DEA is used to identify efficient companies that provide the best combinations of financial spesifiications on the performance parameters of the companies. This model takes into consideration the fact that the performance of a company is spesified by its financial ratios.

TC-08 R&D Management-2
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Salon I**
Chair: Jacob Klein; RAFAEL

TC-08.1 [R] Neural Network Approach to R&D Projects Termination Decision and Its Application

Guan JianCheng; Beijing University of Aeronautics and Astronautics, China
Liu Quan; Beijing University of Aeronautics and Astronautics, China
Ma Ning; Beijing University of Aeronautics and Astronautics, China

On the basis of exploring the literatures related to the R&D project termination and discussing with experts in the concerned domain, a set of variables affecting greatly the implementation of the development of defense R&D project is designed. The authors combine the neural networks with the R&D project termination decision, and propose a multi-layer neural network model used to perform termination decision for ongoing R&D projects. There are some improvements in this model presented. For example, a trial algorithm used to optimize the number of nodes in the hidden layer and a genetic algorithm employed to optimize the initial values of the parameters of the neural network are put forward. Empirical results show that neural network is a promising method of identifying the patterns of R&D project in terms of accuracy.

TC-08.2 [R] Interactive R&D Portfolio Selection Considering Multiple Objectives, Project Interdependencies, and Time: A Three-Phase Approach

Christian Stummer; University of Vienna, Austria
Kurt Heidenberger; University of Vienna, Austria

Our approach supports three phases of R&D project selection: First, proposal candidates are identified by a score based screening process. Next, an integer linear programming model determines all efficient portfolios considering multiple objectives, project interdependencies, and time. Finally, an interactive procedure matches portfolios with aspired benefit and resource levels.

TC-08.3 [R] Selecting Military Weapon Systems Development Portfolios: Challenges in Value Measurement

Michael A Greiner; U.S. Air Force & Arizona State University, United States
Ross T McNutt; U.S. Air Force, United States
Dan L Shunk; Arizona State University, United States
John W Fowler; Arizona State University, United States

Economic measures such as internal rate of return (IRR), net present value (NPV), and return on investment (ROI) are commonly used in evaluating commercial-based R&D projects. However, such economic measures are of little use in evaluating weapon systems development efforts. This paper examines challenges faced by the Department of Defense in determining weapon system value during R&D portfolio selection processes.

TC-09 Project/Program Management-5
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Eugene**
Chair: Elias G Carayannis; The George Washington University

TC-09.1 [A] A Case Study: Assessment of R&D Project Management Maturity and Improvement in Project Management Process

Yasemin Kaya; Arçelik A.S, Turkey
Iffet Iyigun; Arçelik A.S, Turkey

In a changing business environment, project management is widely used in many organizations and it has become a way of doing work. This paper describes the studies of project management maturity assessment as a part of the goal of creating a mature project management culture at Arcelik R&D Center. Improvement areas are identified and discussion on Project Management Assessment methodology is presented.

TC-09.2 [R] Competencies in Practice: Revisiting Present and Anticipated Profiles for Project Managers

Hélène Sicotte; University of Quebec at Montreal, Canada
Mario Bourgault; Ecole Polytechnique, Canada

The literature reveals large differences between classic and organizations managed by projects. PMBoK provides a theoretical knowledge associated with it. Nevertheless, is there a distinctive difference between general and project managers ? A survey was conducted. Analysis from 317 respondents answers shows differences along strategic, organizational, human and technical dimensions.

TC-09.4 [R] A Pragmatic Representation of Systems Engineering Based on Technological Learning

Elias G Carayannis; The George Washington University, United States
James Forbes; Logistics Management Institute, United States
Jeffrey M Alexander; Washington Core & SBPM, GWU,

In this paper, we make the argument that the apparent tendency for large engineering projects to produce other than intended results stems not from the particulars of the projects but, more basically, from representing them as overly simplified, highly linear, and often hyper-rational schemes to begin with. As anyone who has applied systems dynamics will recognize, even linear relationships lead to non-linear behavior when feedback is included. The paper will argue that the practice of reliability engineering, logistics engineering, and systems engineering generally, rather than being bad engineering or bad application of good engineering, can instead be reformulated as an ongoing sensemaking activity embedded in an adaptive social process. When so viewed, what presently appear to be perverse outcomes are, instead, natural and expected, potentially even managed. We begin with three mini-case studies that will serve as archetypes for three fairly common results. The three cases are "Unexpected Opportunity," "Failure then Success," and "Technophobia." In the second part of each case we place what happened within a common conceptual framework. In the second part of the paper we will expand on the common conceptual framework and discuss some of the implications for systems engineering.

TC-10 Technological Innovations-1
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Portland**
Chair: Yong-In Shin; Intel Corp.

TC-10.1 [R] Technological Development and Regulation: Capability Alignment and the Electric Vehicle

Romano Dyerson; University of London, United Kingdom
Alan Pilkington; University of London, United Kingdom
Omid Tissier; University of London, United Kingdom

A new framework is presented for understanding innovation processes within periods of disruptive technological change. Using the development and commercialisation of the electric vehicle, technological capabilities of incumbents

and would-be new entrants in the auto industry are discussed and aligned with US regulatory moves towards zero emission standards.

TC-10.2 [A] Innovative Application of Existing Technology for Improving Aviation Weather Reporting Systems in Rural Alaska

James M Buckingham; U.S. Military Academy, United States

This project investigated capabilities of remote video technology to enhance aviation weather reporting at remote locations in Alaska. Live images of sky conditions were transferred every 30 minutes to a website for use by the aviation community. The project was embraced by the FAA and is being expanded throughout Alaska.

TC-10.3 [R] Benchmarking Technological Innovation Aided by Software

Jin Chen; Zhejiang University, China
Qingrui Xu; Zhejiang University, China
Xinwei Mo; Zhejiang University, China

The emerging of Informational Technology do affect the management of innovation process, and innovation process could be well monitored and guided by new and computer based toolkits. This paper introduces a new software to help the enterprise to benchmark the technological innovation, best practices and gaps among enterprises could be gained by using the new innovation management tool.

TC-11 Collaboration for Technol. Mgmt.-3
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Columbia**
Chair: Keith F Ward; Boise State University

TC-11.1 [R] Academia-Industry-Government Partnership for Value Addition to Society

Rakhman Gul; Portland State University, United States
Shahzada Iqbal; Portland State University,
Ala'a Abunijem; Intel Corporation,
Gregg P Theiss; Electro Scientific Industries,
Rami M Khalaf; Intel Corporation,
Douglas Harms; Intel Corporation,
Mohamed Moussa; Portland State University,

Academia-Industry-Government partnership is a means to an end - value addition to the society. To best understand the means and the end it is important to understand the development of the components of the means and the end. The purpose of this study is to ascertain the historical development of relationships between academia, industry and the government.

TC-11.2 [R] Virtual Collaborative Design Environments: A Review, Issues, Some Research, and the Future

Grace M Bochenek; U.S. Army National Automotive Center, United States
James M Ragusa; University of Central Florida, United States

Innovative private and public sector organizations are now using virtual collaborative design environments (VCDEs) to develop new products and weapon systems as part of their technology management initiatives. This paper reviews several commercially available virtual technologies, operational and research issues, empirical testing results comparing a CAVE Automatic Virtual Environment (CAVE) to a traditional concept design review, and identifies future needs.

TC-11.3 [R] The Impact of External Environment and Technological Learning System on the Relationship Between Technological Alliance and Performance of Korean Small Telecom Firms

Zong-Tae Bae; Korea Advanced Institute of Science & Technology, Korea, South
Jin-woo Chung; InZen, Inc., Korea, South

This study examines how external environment and internal technological competencies affect the relationship between the use of technological alliances and the performance of the firm's new product development activities. Based on the sample of 63 technology-based small firms in the Korean telecommunication equipment and device sector, proposed five hypotheses are tested by using multiple regression analysis. Major findings of this study are as follows: (1) The more severe the market competition and technological change, the stronger the impact of technological alliances on the firm's new product development, and (2) the better structured the technological learning system (knowledge acquisition process, knowledge diffusion & storage process, and knowledge assimilation & application process) related to an technological alliance, the stronger the impact of the technological alliance on the firm's new product development. In addition, some managerial implications are presented and future research directions are suggested.

TC-11.4 [R] R&D Consortia as State-based Technology Initiatives: What Types of Firms Participate and What Benefits Do they Receive?

Keith F Ward; Boise State University, United States

States establish technology initiatives such as R&D consortia with hopes of creating additional jobs and increased tax receipts through assisting high-growth technology firms. This creates two questions: 1) are these programs attracting the right firms and 2) are they delivering what the firms want? This empirical study addresses both questions.

TC-12 Science and Technology Policy-3
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Willamette**
Chair: Deok Soon Yim; Science and Technology Policy Institute

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TC-12.1 [R] Public Sector Science and 'The Strategy of the Commons'

Ajay K Agrawal; Queen's University, United States

This paper provides a game-theoretic explanation for the puzzling behavior of large firms (incumbents) whom, while sponsoring university research labs, at the same time require all inventions generated by the sponsored labs be licensed openly on a purely non-exclusive basis. Under certain conditions, this results in an intellectual property "commons" with the consequence that no firm has the incentive to innovate, despite the potential profitability of the new technology. The strategy of spoiling incentives to innovate by eliminating exclusive intellectual property rights - the strategy of the commons - is motivated by a fear of cannibalization and supported by a credible threat. The author shows that the degree of cannibalization to which the new technology exposes the old market is responsible for this market failure and the author characterizes the sub-game perfect equilibrium in which "the strategy of the commons" is played. Within this framework welfare implications as well as strategy and policy issues are also investigated.

TC-12.2 [R] Charting a Course for Science and Technology: Who is the Pilot?

Michael J Kahn; University of Cape Town, South Africa

South Africa is an anomaly on the African continent. It is the only country that generates significant amounts of nuclear power (and had the Bomb), accounts for 40% of continental GDP, and has produced a number of Nobel laureates in science, medicine, literature and peace. Like other States it displays huge disparities of wealth, and after Brazil has the second highest recorded Gini coefficient. Under apartheid mission-oriented research received generous funding and was paralleled by generous individually focussed allocations that allowed the pursuit of personal research agendas. This may be interpreted as a dual strategy - on the one hand to prosecute warlike aims, and on the other to maintain an atmosphere of normality. The transformation since 1994 has taken the country along a new path, and unsurprisingly the role, position and management of state-funded science and technology development is also an evolving and contested area. This paper considers how the S&T research agenda is being shaped and managed with reference to the conceptual frame of a national system of innovation. It uses the newly created Innovation Fund to mirror the transformation of the system and shows the limits of such intervention when budget is politically contested and small to begin with.

TC-12.3 [A] Korean Government's Dilemma in Technological Choice for the IMT-2000 Service: W-CDMA or cdma2000

Kiyong Om; ETRI, Korea, South
Sung-Chul Kim; ETRI, Korea, South
In-Kap Yeo; ETRI, Korea, South

Tae-Woong Park; ETRI, Korea, South

We examine the Korean IMT-2000 licensing process, which is characterized by the conflicting interests of government and the wireless service providers in terms of IMT-2000 technical modes. The approach is to analyze the rationale behind the different positions of major stakeholders towards IMT-2000 technical modes. By this, we draw some issues related with technological choice in the context of IMT-2000 services. We suggest the recommendations for the government to resolve the conflicting interests.

TC-13 Manufacturing Management-3
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Douglas Fir**
Chair: Wayne Wakeland; Portland State University

TC-13.1 [R] Design of Computer-Based Manufacturing Systems and Cognitive Systems Engineering

M. Kudret Yurtseven; Dogus University, Turkey
Walter Buchanan; Northeastern University, United States

The significance of Cognitive Systems Engineering in the design of computer-based manufacturing systems is explored. The conceptual framework in which the design is performed is reviewed and compared with more conventional approaches to manufacturing system design. The paper includes a summary of the design procedure and an overview of applications.

TC-13.2 [A] Increasing the Production Capacity of a Work Cell Using Modeling & Simulation

Scott Leavengood; Oregon State University, United States

A work cell was modeled and simulated using ProModel software to address the problems of low production capacity and excessive variation in capacity. Delays due to sorting and scheduling were shown to be the primary causes of downtime. Future work will involve modeling and simulating the impact of alternative approaches to sorting and scheduling.

TC-13.3 [A] Introducing Lean Manufacturing at ESI

Duncan Mottershead; Electro Scientific Industries, Inc., United States

Lean manufacturing has been recently implemented at ESI. The manufacturing process changes and preparatory steps for management and production personnel are described. The preliminary results are encouraging.

TC-13.4 [R] KANBAN Implementation at ISSPRO, Inc.

Pakdee Aunyakamol; Portland State University, United States
Tony Sandiford; Portland State University, United States
Sabin Srivannaboon; Portland State University, United States
Sittisak Maneeruttanaporn; Portland State University, United States
Wirit Kittidacha; Portland State University, United States

This paper focuses on quality, productivity, and inventory reduction to maintain the Total Quality Management Systems. The objective of this paper is to investigate a quick slice of an alternative inventory process. Inventory, labor, and space are the areas where we focused our attention. Zero inventory or Kanban is the ultimate objective of this system. To implement the Kanban system, material must be supplied frequently to allow the system to regenerate itself. An important factor to consider here is the level of quality for the parts that are delivered to the plant. To successfully implement a new inventory system it is vital that the parts arrive with minimum or zero (acceptable) defects.

TC-14 TUTORIAL: Design for the New Millennium: Internet-Centric, Information-Driven Design Processes
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Meadowlark**
Speaker(s) Scott Borduin; Autodesk, Inc.

Design in the new millennium will barely resemble the splintered cumbersome design process designers are familiar with now. Today, designers create their designs in isolation, using fax, phone, and overnight delivery to glue together the total design process. The effort is slow, laborious, and error-prone. The best design solutions often are abandoned in favor of expediency. But this is poised to change. In the design process for the new millennium, the design will emerge as the centerpiece of a vast Internet-centric information network encompassing everything from the earliest preliminary specifications and partially developed ideas to finished designs, detailed engineering documents, and data about materials, production capacity, and costs. In this tutorial, Mr. Borduin will introduce the designer's new central role as the design information integrator. He will explain how designers and others involved in the project will draw upon and contribute to the extensive web of design information. He will show how the designer will use the Internet to solve a variety of design challenges, from selecting materials to pricing suppliers. Finally, he will examine how the new design process reduces costs and speeds the design cycle through reuse of design information.

TC-16 Management of Technical Workforce-1
Tuesday, 7/31, 1:30 PM - 3:00 PM **Room: Salmon Room**
Chair: German Nunez; OHSU

TC-16.1 [R] Relationship Among Individual-Level Computerization, Organizational Commitment, and Job Performance

Itakura Hiroaki; Kagawa University, Japan

In spite of enormous improvement in IT, the benefits of IT have not been found in aggregate output statistics. This study examined relationship among individual-level computerization, organizational commitment, and job performance of sales representatives at IT Enterprises in Japan. Multiple regression analysis indicate that individual computerization is positively correlated with overall job performance. However, negative correlation is observed between computerization and job performance if organizational commitment is low.

TC-16.2 [A] Retention Of High Tech Employees

Mubarak R Alkhali; Portland State University, United States
Brian Cockrell; Intel Corp., United States
Bridget Haggerty; OHSU, United States
Khaldoun Habboub; Intel Corp., United States
Timour Khamnayev; Chiave Interactive, United States

The goal of this paper is to examine the means of talent retention within various management structures of high-tech start-up companies. Based on the results of our case study and other research we determined some of the universal attributes of a successful incentive structure for a high-tech organization. The paper is based on a project conducted in a graduate course in the Engineering & Technology Management department at Portland State University.

TC-16.3 [R] Impact of EDI on Accountants and Auditors

A. Seetharaman; Multimedia University, Malaysia
Chee Fee Min; Multimedia University, Malaysia
S. Saravanan; Multimedia University, Malaysia

Electronic Data Interchange (EDI) has conventionally been discussed from the perspective of individual corporations or industry. This view needs to be complemented by an appreciation of the accountants and auditors of the companies that implemented EDI. This paper intended to examine whether the rapid development of Electronic Data Interchange (EDI) has posed a threat to accountants and auditors or is it an opportunity for them to improve the efficiency and effectiveness of their services to clients. The role of accountants and auditors have changed due to the advent of EDI. This has been discussed and it shows that the effects of EDI can no longer be neglected. The awareness of the importance of EDI can enhance the productivity and value-added services provided by the accountants and auditors to the clients. Thus, they cannot stand aside and continue playing their traditional role anymore. To strengthen the findings in this paper, it has been supported by a survey carried out by The Institute of Internal Auditing (IIA) on 358 corporate internal auditing executives who were interviewed over the telephone.

TD-01 Information/Knowledge Management-7
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Salon A**
Chair: Stefan Koruna; Swiss Federal Institute of Technology Zurich

TD-01.1 [R] Knowledge Transfer and the Limits to Profitability: An Empirical Study of Problem-Solving Practices in the Semiconductor Industry

Charles Weber; MIT, United States
Eric von Hippel; MIT, United States

A broadly based empirical study of problem-solving practices in the semiconductor industry reveals that the inability to transfer knowledge rapidly is limiting the profitability of semiconductor manufacturers. Extremely high user loss rates force users and suppliers of semiconductor process and diagnostic technology to solve problems as rapidly as possible. Unfortunately, both sides possess knowledge that is required to solve problems but cannot be transferred rapidly enough for extensive losses to be avoided. Collaboration between users and suppliers, in which problem solvers physically relocate from one side's site to the other's, is minimizing losses but creating a shortage of experts that threatens the health of the industry. A series of practices that will reduce the cost of knowledge transfer is presented. Foremost among these is the establishment of an Internet-enabled toolkit for remote diagnostics and repair.

TD-01.2 [R] Transfer of Technological Knowledge—An Action and Technology Perspective

Stefan Koruna; Swiss Federal Institute of Technology Zurich, Switzerland

In managers' minds technology transfer still is being considered as something like: I put together this package, then I hand it over to you and then it's done! Often enough, as a result of such kind of transfer of knowledge the recipient will not be enabled to increase his or her ability to act. This paper focuses on how firms have can overcome the problems of traditional 'package' think-ing in the transfer of technological knowledge. Emphasizing an action perspective the objective of the transfer of technological knowledge is seen in creating actionable knowledge at the recipient while tradi-tional transfer modes too often created inert knowledge at the recipient's site.

TD-01.3 [R] Knowledge Management in International Technology Transfer

Nazmun Nahar; University of Jyväskylä, Finland
Zuhair Al-Obaidi; Helsinki School of Economics & Business Admin., Finland
Najmul Huda; Tallinn Technical University, Estonia

The research empirically explores how knowledge transfer is managed within firms by using modern information technologies (ITs) and the problems which are encountered. The results indicate that the utilization of ITs has allowed companies to store, share and distribute knowledge; facilitated worldwide collaboration; and facilitated rapid international technology transfer.

TD-02 Information/Knowledge Management-14: Manufacturing Industry
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Salon B**
Chair: Vijay Khatri; University of Arizona

TD-02.1 [R] Task-Centered Manufacturing Information System: Structure and Application

Bin Wu; Cranfield University, United Kingdom

Demands on manufacturing industry to provide flexibility and to reduce costs have put pressures on manufacturing companies to improve productivity. These demands, coupled with computer hardware and software advances, have encouraged manufacturing information system (MIS) development. As a result the role and importance of a MIS within the manufacturing environment has changed dramatically in recent years. An understanding of the new requirements is essential. In particular, traditional ways of providing manufacturing information to the shop-floor has not necessarily been task related. Rather, general information were made available but needed to be found or located as and when required. Although this has satisfied the requirements of normal operations, there are a number of problems associated with this form of documentation and display. The physical separation of the processes and their descriptions, the procedures, the poor user friendliness, the high maintenance efforts and the inability of the documentation systems to effectively capture process "know how" are some of the key problems. These have placed limitations on the use of traditional approaches. As an attempt to improve the situation, this paper discusses the structure of a task-centered, multi-media (TCMM) manufacturing information system which aims to provide a working environment to help the user collect, select and present manufacturing data according to the specific needs of managers/operators.

TD-02.2 [R] Holonic Engineering Data Management Framework for Allied Concurrent Engineering

Chengter Ted Ho; National Kaohsiung University of Applied Sciences, Taiwan
Kwo E Fu; Jen-Te Junior College of Medicine, Nursing & Mangt, Taiwan
Yuh-Min Chen; National Cheng Kung University, Taiwan

Virtual enterprise and concurrent engineering are two of the most promising business strategies to address global competition. By unifying the concepts of virtual enterprise and concurrent engineering, allied concurrent engineering aims to integrate the engineering activities and resources from different enterprises through enterprise alliances to quickly respond to customer expectations. The essence of allied concurrent engineering is a distributed and collaborative engineering process, where people in different disciplines, from different enterprises cooperate to design a product and develop related processes through remote coordination, communication, and control. This paper presents a holonic system framework for engineering data management to support allied concurrent engineering by providing functions for Product and Process Item Definition and Management, Project Planning and Management, System Configuration and Management, Activity Work Area Service, Information Service and Library management. The framework is designed based on the concepts of holonic systems to reflect the distributed, collaborative, agile, dispersed and heterogeneous natures of allied concurrent engineering processes. In the proposed framework, key elements such as information items, libraries, and information management units etc. are defined as "holons" which have autonomous, cooperative and configurable properties.

TD-02.3 [R] Capturing Spatiotemporal Semantics for Database Design and Information Integration

Vijay Khatri; University of Arizona, United States

The objective of this research is to develop a spatiotemporal semantic model that can be used for conceptual database design and information integration of geospatial datasets. Our research methodology includes developing a theoretical framework, demonstrating the practicality of the framework using prototypes, and evaluating the framework using a case study and an experiment. We define an annotation-based approach, a generic methodology that can be applied to any conventional semantic model to translate it into a spatiotemporal semantic model. We have applied our annotation-based approach to the Unifying Semantic Model (USM), a conventional conceptual model to propose the Spatio Temporal-Unifying Semantic Model (ST-USM). We have defined the annotation syntax in Backus Naur Form (BNF) and have formally defined spatiotemporal semantics using first order logic. Using ST-USM, we are developing a database design tool that helps capture the users' spatiotemporal requirements. We are also developing a prototype system that uses ST-USM as a canonical model for information integration. We are using ST-USM to develop a spatiotemporal database for a hydrogeologic application at the United States Geological Survey (USGS).

TD-03 Strategic Mgmt. of Technology-8
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Salon C**
Chair: Hugo Tschirky; Swiss Federal Institute of Technology

TD-03.1 [R] Strategic Management of Information Technology in Small and Medium Sized Electric Utilities: Bridging the Gap Between Theory and Practice

Jonas Andersson; Royal Institute of Technology, Sweden
Torsten Cegrell; Royal Institute of Technology, Sweden
Kam-Hoong Cheong; Universiti Tenaga Nasional, Malaysia
Magnus Haglind; Royal Institute of Technology, Sweden

Based on case research, this paper investigates potential benefits of using well-established Strategic Information Systems Planning frameworks as tools for decision support in strategic IT management, and obstacles in implementing such frameworks in small and medium-sized utilities. The paper also pro-

vides suggestions to circumvent the obstacles by proposing an alternative, more pragmatic, approach for strategic planning found to be suitable for organizations in which resources for strategic IT management are scarce.

TD-03.2 [R] Function and Role of Information Regarding R & D in Japan

Yoshio Sugasawa; Nihon University, Japan

This paper considers the recent trend for successful technology development is to draw support from technical advisors and consultants as well as to obtain necessary funding. This paper also introduces a perspective of computer and information literacy in Japan. In the development of new technologies, what kinds of problems do companies encounter in managing information? What kinds of information are utilized mainly for product development?

TD-03.3 [A] One Industry: Two Different Technology Management Systems

Ron B Ward; University of New South Wales, Australia

The chemical industry exists in two forms: batch processing and continuous processing, which have different technology management systems. Each system is well known to those who work in each but not across the boundary between them, and not expressed in the literature. Having worked in both forms, this author is able to see the differences. The paper based on this abstract will outline the differences, and explain why they occur and why each is appropriate to the individual form of the industry.

TD-04 Technology Planning & Forecasting-6
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Salon D**
Chair: Harold A Linstone; Portland State University

TD-04.1 [R] Corporate Planning, Forecasting, and the Long Wave

Harold A Linstone; Portland State University, United States

"Corporate Planning, Forecasting, and the Long Wave" - Harold A. Linstone My decades of experience in corporate planning (2) and professional journal editing (3) suggests a correlation of technological innovation clusters, corporate planning, and technological forecasting with the well known 50-60 year long wave cycles, specifically the knowledge consolidation associated with the upswing and the knowledge innovation corresponding to the downswing of the 4th long wave. Implications for management in the approaching 5th long wave upswing are discussed.

TD-04.2 [A] Knowledge Discovery Using the Tech OASIS: Meeting the Information Infrastructure Needs

Robert J Watts; U.S. Army Tank-Automotive & Armaments Command, United States

Access to electronic databases creates R&D profiling opportunities. However, the magnitude of information requires man-months to generate useful summaries. Managers must make timely programmatic decisions (i.e., in days or weeks, not months). The Technology Opportunities Analysis of Scientific Information System (TECH OASIS), automates profiling of thousands of literature abstracts and supports corporate memory of researched subjects. These knowledge discovery capabilities will be discussed as applied to 21st Century Truck technologies.

TD-04.3 [A] Futurist Competition: IT in SMEs in the Year 2010

Heiner Muller-Merbach; Universitat Kaiserslautern, Germany

The structure and the results of the futurist competition „IT in SMEs in the Year 2010" will be reported. The competition is carried out by the German software house "proALPHA" and guided by the author. Researchers, practitioners, and students are invited to participate.

TD-05 E-Business-7
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Salon E**
Chair: Jean-Claude Balland; JCB Associates

TD-05.1 [R] The Information Technology on Food Supply Chain Management

Flávia A Ghisi; Universidade Federal de São Carlos, Brazil
Andrea L Silva; Universidade Federal de São Carlos, Brazil

This study examines the coordination and management undertaken by a large retail chain that began buying its products via EDI and Internet. This paper discusses the difficulties and the tendencies associated with the implementation of information technology related to the relationships among partners in supermarket chains.

TD-05.2 [R] The Role of Small and Medium-Sized Enterprises in Developing Egypt's Tourism Industry Using e-Commerce

Sherif Kamel; American University in Cairo, Egypt
Ahmed El Sherif; Maastricht School of Management, Egypt

As the world moves into the information age, consumers' expectations are being radically altered with the advent of the Internet and the flow of information and knowledge it provides to the global community. Moreover, with the continuous development of e-Commerce, businesses of different sizes and from various industries can enhance their productivity and profitability in ways deemed almost impossible a decade ago. For small- and medium-sized enterprises that represents a challenge as well as an opportunity for growth and development. One such industry that can benefit from the application of e-Commerce is tourism. Tourism, travel and cultural exploration emerged as a strong industry over the last two decades, and with the advent of the Internet and e-Commerce, the industry will grow exponentially, providing a great opportunity for countries with tourism and culture attractions such as Egypt. This paper addresses the concerns of how local individual organizations, especially SMEs, can utilize the advantages offered by today's information and communication technology to better compete for incoming tourism and improve their profitability; only those organizations that capitalize on available ICT tools will succeed in the fierce competition existing in the tourism industry. The paper will demonstrate the case of King Hotel in Cairo, showing how local small- and medium-sized hospitality businesses in Egypt can prosper from emerging information and communication technology and how the technology can affect its short-term and long-term business process, strategic development and implementation.

TD-05.3 [A] Implementing Jewelry B2B e-Commerce: A Case of Jewelry Korea

Do-yeon Kim; , Korea, South
Young-Jai Lee; Dongguk University, Korea, South
Kyung-Seung Oh; , Korea, South

This paper is to illustrate a case of B2B e-commerce which is composed of jewelry maunfacturing companies and retail dealers. This case study shows how traditional supply chain dependent on only brokers and wholesale dealers has changed, and also how exporters and buyers share a variety of information related with jewelry. The effectiveness of promotion through online method is also evaluated.

TD-06 New Product Development-4
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Salon G**
Chair: Satish Nambisan; Rensselaer Polytechnic Institute

TD-06.1 [R] Products with Services - Designed Just Like Any Other Product?

Knut E Aasland; SINTEF Industrial Management, Norway
Trygve Steiro; SINTEF Industrial Management, Norway

Whereas physical products and services used to be clearly distinguished, there is a trend towards integrated products, with services included in physical products. Product design and service development have different traditions, terminology and practices. The paper will elaborate on the implications of this for future product development, and evaluate the possibilities of integrated methods.

TD-06.2 [R] Online Customer Communities: Redefining Customer Participation in NPD

Satish Nambisan; Rensselaer Polytechnic Institute, United States
David Wilemon; Syracuse University, United States

This study examines the impact of online customer communities on new product development (NPD). We identify varied customer-NPD roles that can be supported by online customer networks, and offer propositions related to (a) the impact of online customer communities on key NPD variables and (b) the organizational support strategies.

TD-06.3 [R] Information-Enhanced Product Engineering: Three Viewpoints

Kari Leppälä; VTT Electronics, Finland
Jukka Kääriäinen; VTT Electronics, Finland

We introduce a systematic product engineering framework, which we call "information-enhanced product engineering". The benefit of the framework is, that it is powered by an abundant and increasing resource (information technology) and it aims to save a sparse resource (professional experts). The framework addresses important strategic product development goals: time-to-market, product performance, and efficient use of resources. We will show, that the means to achieve these goals are all related with information. Three viewpoints of information are discussed in detail: concept structure, information processing, and knowledge.

TD-07 Technology Transfer-1
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Salon H**
Chair: James Coonan; Oregon University System

TD-07.1 [R] National Systems to Create University Spin-off Venture Businesses in Japan and Germany

Masayuki Kondo; Yokohama National University , Japan

The paper will discuss the national systems to create university spin-off venture businesses, especially in high-tech areas, in Japan where university spin-off venture businesses are not common and Germany that creates more than double number of university spin-off venture businesses these days than the United States.

TD-07.2 [R] The Technology Vicinity: A Location Based View on Technology

Harm-Jan Steenhuis; North Carolina State University, United States
Erik J de Bruijn; University of Twente, Netherlands

The issue of technology transfer has been viewed from many different perspectives. In this case the focus is on the process of (production) technology transfer. One of the difficulties in studying international technology transfer is the definition of technology. The many technology definitions that exist are either too 'loosely' formulated or they require thorough expert knowledge. This results in difficulties with measuring technology and comparing different studies meaningfully. This study on technology transfer used technology as a sensitizing concept. Four case studies were performed and during these case studies a definition of technology was developed and refined, to obtain a meaningful representation of the technology at hand. The model enables the researchers on the transfer of technology to measure what is transferred. The research also showed that a technology can not be viewed in isolation but organizational factors and environmental factors influence the productivity of a technology. Therefore the functioning of technology should be viewed as dependent on its location.

TD-07.3 [R] Stage of Technology Development, Knowledge Management and Technology Transfer

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

This paper examines the dynamics of transferring technologies in different stages of development. In general, early stage technologies require attention to and understanding of knowledge management concepts while transfers of mature technologies tend to focus more on market and factor advantages. Several case studies will be presented illustrating the different dynamics.

TD-07.4 [R] Technology Transfer and Succession Planning: The Relevance of Make-or-Buy Analysis

D. R Probert; University of Cambridge, United Kingdom
L. E Canez; University of Cambridge, United Kingdom
K. W Platts; University of Cambridge, United Kingdom

Replacement of ageing process technologies is an ongoing requirement for manufacturing business, raising the opportunity to outsource old technologies for an interim period. A structured approach to this traditional problem is given, utilising a new make or buy framework and methodology, with a case example from the domestic appliance industry.

TD-08 R&D Management-3: Strategy
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Salon I**
Chair: Ziqi Liao; Hong Kong Baptist University

TD-08.1 [R] The Challenges of International R&D to Multinational Corporations

Ziqi Liao; Hong Kong Baptist University, Hong Kong

The present paper examines the challenges associated with international R&D by multinational corporations (MNCs) in the Singapore IT and electronics industry. An empirical analysis suggests that the consistence with customer demands, the achievement of time-based competitiveness and higher-added value, and the development of research manpower are critical to international R&D.

TD-08.2 [R] The Challenge and Response of Japan's Corporate Research Institutes in the 21st Century

Hiroyuki Yamasaki; Mitsubishi Electric Corporation, Japan
Ikuo Yamada; Mitsubishi Research Institute, Inc., Japan
Jun'ichi Baba; Mitsubishi Electric Corporation, Japan

In this paper, we attempt to clarify and explain the mission of Japanese corporate research institutes in the 21st century. Our discussions focus on the important problem of "experience economy" in the development of new business models, information technology (IT) all companies should have, and the problem of knowledge creation location. We also describe some of the measures introduced by Mitsubishi Electric Corporation (MELCO) to create the practical knowledge necessary for the company's continued existence in the IT era.

TD-08.3 [R] Assessment of Quality and Maturity Level of R&D

Pekka Berg; Helsinki University of Technology, Finland
Jussi Pihlajamaa; Helsinki University of Technology, Finland
Mikko Leinonen; Tampere University of Technology, Finland
Virpi Leivo; Tampere University of Technology, Finland

The strategic importance of R&D will be emphasised even more in the future. Continuous improvement of the effectiveness of R&D requires an adequate and comprehensive assessment and measurement system. The present method, Quality and Maturity Method (QMM), for assessing the quality and maturity of R&D examines R&D from six viewpoints: R&D as part of business strategy, R&D as part of product and technology strategy, strategic implementation of R&D, R&D as a business section, R&D outputs, and implementation of R&D-projects. Procedures in each of the six viewpoints are assessed and scored by 5 maturity levels. The QMM method has been lightly piloted in about 50 companies which have had development projects in Finnish national technology programs. The verifying of the preliminary QMM method in four pilot-companies has shown that the viewpoints used in the assessment describe factors pertaining to the quality and maturity of R&D quite well, and they indicate central development needs. Development needs mainly concentrate on the development of procedure definitions and/or the development of practical implementation based on existing definitions.

TD-09 Information/Knowledge Management-19
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Eugene**
Chair: Nitin Shende; Tata Consultancy Services

TD-09.1 [A] Enterprise Framework for Knowledge Management

Santosh Mohanty; Tata Consultancy Services, United States

As the market value of enterprises is increasingly vested in corporate memory

and intellectual capital, enterprises must develop a discipline and corporate skills aimed at managing these intangible assets. The discipline of KM is accomplished through vigorous integration of three enterprise frameworks: Value, Culture and Process. Enterprises must understand, design and sustain the frameworks individually, but must integrate them with cohesion to achieve the full benefits of KM. The bottom line in all such projects comes down to making a modest start. And then gradually work on all the three components of the KM framework without losing the focus on integrating these into a suitable Enterprise wide Knowledge Management framework, which forms the foundation of a successful Knowledge Management System.

TD-09.2 [A] Real life business scenario based case study of technology and knowledge management

Akhilesh Tripathi; Tata Consultancy Services, United States

TD-09.3 [R] Ethical Issues Surrounding The Development of Business-To-Business Trading Exchanges (Marketplaces)

David J Fritzsche; Penn State Great Valley, United States

The rapid development of business-to-business trading exchanges is generating a series of ethical issues which must be addressed to insure the long-run viability of the exchanges. The issues include bribery, coercive acts, deceptive information, theft and unfair discrimination. The paper will delineate the issues and offer guidelines for dealing with them.

TD-10 Technological Innovations-2
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Portland**
Chair: Michael D Santoro; Lehigh University

TD-10.1 [R] Do Size and Slack Matter? Exploring the Multi-dimensions of Organizational Innovation

Shanthi Gopalakrishnan; New Jersey Institute of Technology, United States
Michael D Santoro; Lehigh University, United States

Innovation is complex and a key driver of firm competitive advantage. We unbundled innovation into two dimensions, innovation magnitude and innovation speed, and examine their association to organizational size and slack. Regression analyses showed organizational size and slack were related to innovation magnitude and innovation speed differently. Implications of these findings are discussed

TD-10.2 [R] Product Innovation in SMEs - Key Behaviours and Preformance Measures

Ross Chapman; University of Western Sydney, Australia
Charles O'Mara; University of Western Sydney, Australia

This paper examines the development of a facilitated questionnaire tool designed to examine the frequency and diffusion of key behaviours underpinning successful Continuous Product Innovation (CPI) in SMEs. The selection and use of innovation support mechanisms within SMEs, and the types of performance measures used to track CPI processes can also be determined. The results of initial testing of the tool in two Australian SMEs are discussed.

TD-10.3 [A] A Model for Improving Organizational Innovation

Ozgur Adiguzel; Procter and Gamble, Turkey
Alpaslan Figlali; Istanbul Technical University, Turkey

The overall purpose of this innovation model is to provide competitive advantage to an organization that will enable the organization to survive and prosper in the today's highly competitive and changeful environment. The model offers an Assessment and Tracking Tool to the organization to monitor its Organizational Innovation Quotient (IQ), and determine the gaps to be filled in order to be an innovative organization. The model also enabled the organization to strengthen its innovativeness by working on five main building blocks- strategy, organization structure, people, culture and systems.

TD-11 Technology Management Education-1
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Columbia**
Chair: Kenneth D Saul; Hewlett Packard

TD-11.1 [A] An Evaluation of the Accelerated Inkjet Mastery Workshops at Hewlett Packard

Kenneth D Saul; Hewlett Packard, United States

The Accelerated Inkjet Mastery (AIM) workshops are a series of workshops designed to accelerate the professional and technical development of the technical staff at HP's Inkjet Supplies business. This case study is an example of how technical and behavioral training can be accomplished in an accelerated program with a high payback.

TD-11.2 [A] e-Commerce in Small Rural Manufacturing Firms - Overcoming Problems and Biases

John M Amos; University of Missouri-Rolla, United States

Research and experience at UMR in working with Missouri small rural manufacturing firms during the past two years revealed that the problems and biases of these firms regarding e-commerce are many. However, the question is not if these firms will participate in this technology, but when. Moreover, this is an economic phenomenon never before experienced. Traditional training methods are ineffective in overcoming these problems and biases, especially those involving technical issues. Small networking groups are an effective alternative for assisting firms in participating in this technology. Organizing, facilitating, and managing these small network groups is important to creating an effective, meaningful training transfer training and assistance program.

TD-12 Science and Technology Policy-4
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Willamette**
Chair: Deok Soon Yim; Science and Technology Policy Institute

TD-12.1 [R] IT Innovation is the First Step on the Way to the Information Society

Hannu Jaakkola; Pori School of Technology and Economics, Finland
Ahto Kalja; Institute of Cybernetics at TTU, Estonia

Most national policies point out the strategic development of IT as one of the focus areas. "Strategic" in this context means managed paths to get maximum benefit on the ongoing information society megatrend. Every nation has had its starting point in this development path: focus areas are varying, IT utilization differs, etc. This means also that the path is different. In this paper Estonian and Finnish paths towards a more improved information society are discussed.

TD-12.2 [R] Strategically Specific Technology Fields of Korean Regions

Sunyang Chung; Sejong University, Korea, South

This paper argues that regional innovation systems that are established around "Strategically Specific Technology Fields (SSTFs)" will constitute a competent national innovation system by formulating efficient sectoral innovation system in an organic way. We identified SSTFs of Korean regions based on the harmony among industrial structure, S&T potential, and the will of the regional government. According to our analysis, advanced technology areas, especially biotechnology, information technology, and environmental technology are identified as important SSTFs of Korean regions. This indicates that Korean regions are aiming at developing future-oriented sectoral and national innovation systems.

TD-12.3 [R] The Role of Science and Technology Policy in Finland's Economic Development

Tarmo H Lemola; Technical Research Centre of Finland, Finland

Technology policy has been in most industrialized countries one the most dynamic instruments of the public sector to promote scientific and technological development. In Finland, the construction of the machinery of science technology policy began later than in large and more developed OECD countries, but its active development in the 1980s and 1990s has counterbalanced the late start. The rapid technological and economic development in Finland in recent years has mainly been a consequence of operations by Nokia and other Finnish high-tech firms. Science and technology policy has created favorable environment for innovation and provided firms with intangible resources which are vitally important in knowledge based industries.

TD-12.4 [R] Building a Food and Feed Technology Cluster

Alan L Garcia; Universidad Autonoma de Yucatan, Mexico

This paper presents a proposal for configuration and initial growth of a cluster, underpinned by research in seafood industry and previous experiences and studies in the feed and food industries. Technology and quality competence are considered in the base of this cluster indicating main firms, new and more complex business, institutions and industrial structure that determine the cluster formation.

TD-13 Manufacturing Management-4: Strategic Issues
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Douglas Fir**
Chair: Michael H Cole; University of Arkansas

TD-13.1 [R] Performance analysis of inventory management polices in a supplier hub

Gopalakrishnan Vaidyanathan; National University of Singapore, Singapore
Nukula Viswanadham; National University of Singapore, Singapore

This work develops a simulation model to analyze the performance of various inventory management policies in a supplier hub scenario. Four suppliers are considered in the model supplying to the end customer through the supplier hub following different inventory management policies with the supplier hub. The model aims at optimizing the inventory levels at both supplier and supplier hub ends and at the same time increases the operating efficiency and service levels.

TD-13.2 [R] Relating Objectives to Manufacturing Decisions in Dynamic Environments: A Study of Indian and German Manufacturing Firms

R. R. K. Sharma; Indian Institute of Technology, India
G. Seliger; Institute for Machine Tools & Factory Mgmt. (PTZ), Germany
Marion Eggenstein; Institute for Machine Tools & Factory Mgmt. (PTZ), Germany
Shobhit Shrotriya; Indian Institute of Technology, India
Anshuman Behera; Indian Institute of Technology, India

Competitive priority and corporate strategy of a firm determines the objectives of a manufacturing firm. A few of these objectives are product variety, volume flexibility, delivery, quality and cost. These objectives determine the specific decisions that must be taken on following dimensions such as plant and equipment, production planning and control, labor skills, organization structure of manufacturing divisions, level of vertical integration and nature of vendor relations. Based on the literature review, we outline the nature of this relationship between objectives and decisions for the manufacturing organization when objectives do not change. When objectives do not change and when we consider these objectives, i.e., product variety, volume flexibility and delivery performance, allowing them to vary at two levels, i.e., high and low, eight cases result. Later we consider 28 dynamic cases where manufacturing objectives change on one or more dimensions. Analysis revealed that in 16 cases it required drastic changes in manufacturing decisions, and hence it was argued that these would be difficult to achieve; in 4 cases changes involved in manufacturing decisions had moderate difficulty and only in 8 cases changes in manufacturing decisions were found to be easy to achieve. A very large number of case studies would be required to verify the framework presented here, however, a pilot study involving fourteen case studies from German firms and twenty two case studies from Indian firms lent a good support to theoretical analysis carried out in this paper.

TD-13.3 [A] A Framework For the Design of World-Class Reliability Through Advanced Management Technology

Hassan Farsijani; Shahid Beheshti University, Iran
Farhad Farzad; Shahid Beheshti University, Iran

Today's competitiveness and turbulent markets require higher quality and reliability levels. The range of techniques associated with competitive manufacturing has expanded rapidly since the inception of MRP in the early 1960s. Schonberger (1987) integrated these techniques into the generic term advanced management technology (AMT). Although the range and sophistication of these techniques place AMT beyond the aspirations and competence of many industrial organizations, there has been a considerable increase in the application of AMT in industry over the past decades. The paper is based on an ongoing research programme designed to identify how the concept of AMT techniques can be made more relevant to achieve world-class reliability (WCR). The question in this paper is which problems the management of manufacturing may encounter when it wants to organise the WCR management of the professional manufacturing more systematically. The paper uses a case study to illustrate its findings based on companies experiencing both rapid growth and increasing international competition.

TD-15 PANEL: IEEE Transactions on Engineering Management: Strategic Directions and Critical Issues
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Mt. Hood**
Panelist(s) R. Balachandra;
Frederick Betz; University of Maryland University College
Alok Chakrabarti; New Jersey Institute of Technology
Burton V Dean; San Jose State University
George F Farris; Rutgers University
Thomas R Gulledge; George Mason University
Dundar F Kocaoglu; Portland State University
Jeffrey Liker; University of Michigan
Ann Marucheck; University of North Carolina at Chapel Hill
V. Sambamurthy; University of Maryland, College Park

Published quarterly since 1954, the IEEE Transactions on Engineering Management is the oldest refereed research journal providing leadership in the field of Engineering and Technology Management. The editor in chief and department editors will discuss the strategic issues and directions of the journal and answer questions from participants in this session.

TD-16 Management of Technical Workforce-2
Tuesday, 7/31, 3:30 PM - 5:00 PM **Room: Salmon Room**
Chair: German Nunez; OHSU

TD-16.1 [A] Assessing Ohio's Edison Technology Program: Lessons for the Future

Keith F Ward; Boise State University, United States

Ohio's Edison Technology Center Program is designed to assist technology-based enterprises. Embedded within this program are R&D centers scattered across the state — each with their own approach to assisting technology development. The author examines the effectiveness of their approaches and then extrapolates lessons for future technology-development assistance programs.

TD-16.2 [A] Electronic Technicians in the U.S. High-Tech Industries: An Industry View of Issues and Possible Remedies

Karl D Schorr; Tektronix, Inc., United States

Discusses the role electronic technicians play in the high-tech industry, critical shoratges that exists today and forecasted to continue, and reviews some proposed and implemented solutions. Addresses industry and government programs, and the need for non-traditional approaches and re-training of existing technicians.

TD-16.3 [R] High-tech, High-touch: Reconstructing the Human Element in High-tech Companies

Loïck Roche; Grenoble Graduate School of Business, France
John Sadowsky; Grenoble Graduate School of Business, France

The said purpose of the new technologies of information and communication is to diffuse knowledge. Many analysts - Vastel (1999), Saramago (1999) and Barber (1999) foremost - are wondering, however, if these technologies haven't finally surpassed their optimum state and if this new "all NTIC" ideology won't now become a source of oppression for men and women (Ramonet, 1999). In order to counterbalance this oppression, people are developing a resistance with the aim of "reconstructing the human element" (Roche, 1997 and Sadowsky, 1999). Rather than attempting to suppress this resistance, the modern manager - who understands that it helps individuals to feel better and

thus work better - must learn to be a humanist and under certain conditions, encourage some of these developments so as to be able to use them.

WB-01 Information/Knowledge Management-8
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Salon A**
Chair: Kiyoshi Niwa; The University of Tokyo

WB-01.2 [R] Using Enterprise Modeling to Facilitate Knowledge Management in Organizational Transformation Efforts

George Wagner L Sousa; Virginia Polythecnic Institute & State University, United States
Eileen M Van Aken; Virginia Polythecnic Institute & State University, United States
Antonio F Rentes; University of São Paulo, Brazil

In response to competitive challenges, many organizations are implementing large-scale transformation initiatives. A frequent obstacle present in these efforts is how to effectively capture, organize, and utilize the knowledge needed to effectively execute the transformation. To address this obstacle, this paper presents a structured approach and case application for using enterprise modeling technology within an organizational transformation methodology. This combination creates a transformation knowledge management system capable of providing shared access to knowledge to those involved in designing and executing the transformation process, thus enabling the execution of complex tasks among geographically dispersed groups.

WB-01.3 [R] Establishment of Knowledge Dynamics Engine with Corpus Linguistics for Technology Management

Ken Ito; University of Tokyo, Japan
Takeshi Imai; University of Tokyo, Japan
Seiichi Ariga; University of Tokyo, Japan
Tetsuya Yonezawa; University of Tokyo, Japan
Yoichiro Matsumoto; University of Tokyo, Japan

We propose “Knowledge Dynamics Engine” that enables us to pick up various structures from knowledge database. After Natural Language Processing, i.e. Corpus Linguistics, which is also used for human genome analysis, we introduce “Ontology” and “Thesaurus” into “Knowledge Phase Space”, and find out rich implicit “Knowledge Structures” for Computer Aided Entrepreneurship (CAE).

WB-02 Information/Knowledge Management-15: Financial Sector
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Salon B**
Chair: Joseph C Paradi; University of Toronto

WB-02.1 [R] A Method to Reengineer Banking Business By Using Information Technology

Jiang Dehong; , China

Based on the analysis of necessity for financial industry to re-engineer business process flow, this paper proposed a kind of framework and model of customer service system. Towards the end, a personal finance management system based on WEB technology is also put forward.

WB-02.2 [R] Managing Information in Financial Markets: A Comparison of Intraday Distributions of Trades on Good, Average and Bad Days

John R Norsworthy; Center for Financial Technology, United States
Ding Li; Center for Financial Technology, United States
Dona Siregar;

Generated distributions of financial time series are used to test portfolio selection algo-rithms, risk management and arbitrage strategies. Bootstrapped daily or higher frequency financial data must include autocorrelation to be useful for such purposes. We show how to bootstrap distributions of autocorrelated time series and measure the fit to original dis-tribution.

WB-02.3 [R] Studies of Fingerprint Imaging Systems in Social Service Applications

Burton Dean; San Jose State University, United States
Roger Salstrom; San Jose State University, United States
James Wayman; San Jose State University, United States

This paper describes the studies leading to implementation of fingerprint imaging systems in a number of states. An initial pilot study was done in Los Angeles and identified savings that were significantly greater than the costs. Other states, including Texas, implemented pilot programs with very mixed results on the savings identified. Internal studies initially identified significant savings largely due to people leaving the systems. Despite only marginal savings identified in the Texas pilot, Texas decided to implement the fingerprint imaging system statewide. After several years of use with significant costs and very little tangible savings from actual fraud cases, Texas is considering terminating their system.

WB-03 Strategic Mgmt. of Technology-9
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Salon C**
Chair: Guido Reger; University of Applied Sciences Brandenburg

WB-03.1 [R] Technology Management: Today’s Main Business in Management

Hans-Joerg Bullinger; University of Stuttgart, Germany
Udo-Ernst Haner; University of Stuttgart, Germany

An increasing technology density in the competitive environment requires a different perspective on Technology Management (TM). Today, TM has an integrating function, it is an integral part of R&D, IT, Production and Marketing, as well as of Human Resources, Finance and Services. The article presents TM as central decision criteria and consistency assurance in a knowledge-driven, e-influenced service economy.

WB-03.2 [R] Quantitative Analysis of Business-Model

Takahisa Yamaguchi; University of Tokyo, Japan
Kiminori Gemba; University of Tokyo, Japan
Fumio Kodama; University of Tokyo, Japan

This research analyzes quantitatively the characteristic of market which has been growing up rapidly by creation of new business model. _We did case study for new business model and in order to analyze the characteristic of market , we made a new market growth model.

WB-03.3 [R] Strategic Management of Technology in a Global Perspective: Differences Between European, Japanese and US Companies

Guido Reger; University of Applied Sciences Brandenburg, Germany

This paper analyses how European, Japanese and US companies strategically manage their technologies in a worldwide perspective. The research is based on a global survey among 209 of the Top R&D spending companies. The empirical results show large differences in the extent and the style of global technology management of the firms in the Triad.

WB-04 Technology Planning & Forecasting-7
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Salon D**
Chair: Timothy R Anderson; Portland State University

WB-04.1 [R] Assessing the Rate of Change in the Enterprise Database System Market Over Time Using DEA

Timothy R Anderson; Portland State University, United States
Keith Hollingsworth; Morehouse College, United States
Lane Inman; Portland State University & VERITAS Software Inc., United States

This paper uses Data Envelopment Analysis, DEA, to measure the rate of incremental innovation in the enterprise database system market. Data was gathered from the Transaction Processing Performance Council consisting of 191 systems from 1995-2000 and the annual rate of change was determined to be 44.4%.

WB-04.2 [R] Applying BP Method to Allocate Budget for Aerospace R&D Projects

Benjamin Yuan; National Chiao Tung University, Taiwan
John Hsieh; Industrial Technology Research Institute, Taiwan
David Chin; Ministry of Economic Affairs, Taiwan

This research is applying the business plan method (BP method) to forecast the future five-year (2001~2005) world production value production value and Taiwanese production value (PV) of aerospace industry. Further more, BP method is used for evaluating the performance of three government-sponsored aerospace projects in the past five year (1995~2000) as well as in the decision making to allocate the budget for three projects. The process of this research is divided into two steps. The first step is to evaluate the performance of three aerospace projects, the subsidiaries of government-sponsored Technological Development Program (TDP), executed by a non-profit organization "X" from 1995 to 2000 (called In-loop). The second step is applying the BP method to forecast the world production value of aerospace industry as well as forecast the production value of Taiwan aerospace industry in 2001~2005 (called Out-loop). Then, the conclusion of In-loop and Out-loop analysis was applied to a decision making of the budget allocation for three projects. In results, the avionics project in the past five-year is quite successful, and the development of upgrade industry of future five-year is promising in a certain growth rate. And the most dynamic growth of aerospace production value by sub-industry will be Avionics Industry, which potentially offers a growth rate more than 20% per year. Finally, this research has shown that BP method and two-loop check are effective tools for technological forecast (production value) and decision making (for budget allocation), which reduce the risk and cost of selecting a R&D projects and enhance the profitability of governmental R&D project to industry.

WB-04.3 [R] Preliminary Analysis of an Adaptive Smoothing Factor for Lumpy Demand Forecasting

Rolando Quintana; University of Texas at El Paso, United States
Jose Tomas Arredondo; University of Texas at El Paso, United States
Rafael Gutierrez; University of Texas at El Paso, United States

A smoothing factor based on the Kalman Filter weighting function is developed and applied to forecasting techniques that have been found useful in lumpy demand environments. The forecasts on the modest demand data set used revealed that, irrespective of the forecasting technique used, each produced forecasts with smaller MSE when using the adaptive smoothing factor rather than a constant chosen via trial and error.

WB-05 E-Business-8
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Salon E**
Chair: Juan Acosta; Universidad de Monterrey

WB-05.1 [R] MNCs Versus the Chinese Government in Chinese Internet-Business

Ping Lan; Queensland University of Technology, Australia, Australia

The proliferation of the Internet technologies and increasing integration of the world economy enable both MNCs and Chinese firms to compete and cooperate on a new platform. Are there new features emerging from the interaction between MNCs and local firms in Chinese Internet-business? In this paper, I argue that the interaction pattern between MNCs and the host region has changed. In fact, the new business environment emphasises three interaction channels, i.e. government intervention, technological leverage and e-business structural gap. Corresponding to the environment, there are three types of MNCs operating in Chinese Internet business: overseas e-commerce infrastructure builders aim to hold the main stakes in e-commerce by using their dominant technological advantage; foreign Internet gateways target a wide range of b2b and b2c markets by exploiting government endorsement; and overseas e-business applicants are seeking niche markets by combining their proprietary technologies and special leverage capabilities. Facing the new interactive trend, MNCs have to formulate more operating alternatives to reap market opportunities, while the Chinese government has to encourage competition among MNCs to obtain more intervention leverage.

WB-05.2 [R] The Development of E-Business in China

Feng Yan; Beijing Polytechnic University , China
Yuying Wu; Beijing Polytechnic University, China

The e-Business in emerging in China. The industrial composition in China is changing rapidly with the development of e-Business. The present situation and the future development of e-Business is examined and the industrial composition of China is predicted.

WB-05.3 [A] A Framework for Successful Consulting Interventions

Juan Acosta; Universidad de Monterrey, Mexico
Adriana Lira; NEORIS, Mexico
Elena C Gonzalez; NEORIS, Mexico
Martin Bacopulos; Universidad de Monterrey, Mexico

This paper describes general principles, required elements and a methodology to approach and carry out successful consulting intervention in businesses. It includes an application of the proposed framework to review and to supplement the methodology used by an IT and e-business international consulting firm. Its content may be used to guide formal and informal consulting interventions. Since these are forms of knowledge leveraging to foster innovation, many firms are including consulting skills as desired core competencies for their staff. This paper contributes to this aim.

WB-06 New Product Development-5
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Salon G**
Chair: Michael M Beyerlein; University of North Texas

WB-06.1 [R] The Correlation Between Product Development Strategy and Business Performance: An Investigation of UK SMEs

Alan Lewis; University of Wales Institute, United Kingdom
Robert Brown; University of Wales Institute, United Kingdom

The paper reports the outcomes of a study of over 100 small to medium sized enterprises (SMEs) in the UK manufacturing sector aimed at examining the relationship between a company's business performance in terms of the success of its new product development activity and the nature of the product and business strategies that are in place within that company.

WB-06.2 [R] Product Development Strategies for Mature Products

Masaru Ishioka; Ishinomaki Senshu University, Japan
Kazuhiko Yasuda; Tohoku University, Japan
Koichi Iwata; Ishinomaki Senshu University, Japan

This paper proposes four types of product development strategies applying to the maturity stage in a product life cycle. To categorize new products into these strategies we suggest two product factors, "Degree of Product Competitiveness" and "Ability of Product Development", as the measure. The results show that the suggested strategies are applicable. The audio cassette player industry is selected as the sample market to apply this analysis and strategy. The organization in the market is ranked by product development ability and product competitiveness of their products. After analysis of these factors, each organization is classified into four types of strategies: Innovative strategy, Offensive strategy, Defensive strategy, and Negative strategy. Organizations recognize their own level of product development ability and competitiveness in the market by this analysis. In addition, the strategies suggest the next steps in product development management by following the market trend and product development characteristics of each organization. The developed strategies and analysis method are effective as a product development management tool.

WB-06.3 [R] Leadership of Technical Professionals in Teams

Michael M Beyerlein; University of North Texas, United States
Susan T Beyerlein; University of North Texas, United States
Dallen Miner; OD Shell Services Int'l, United States

Leadership plays one of the most critical roles the success or failure of a team. Leadership represents a system of guiding influences that may be embodied in people at different levels of the organization or in the cultures and support systems of the organization. The leadership system must be carefully crafted.

WB-07 Technology Transfer-2

SESSIONS

Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Salon H**
Chair: Jacob Klein; RAFAEL

WB-07.1 [R] Technology Transfer and Its Role In The Industrialization of Less Developed Countries (LDCs) Such As Iran

Reza Salami; Iran Research Org. for Science and Technology, Iran

This paper will attempt to suggest a model for effective technology transfer and development for a LDC like Iran to achieve a successful technological development. Firstly, some of the relevant literature regarding technology transfer and development will briefly be reviewed. The pre and post-revolutionary experience of Iran in technology transfer and development is explained. A framework of policies and strategies for the effective and successful technology transfer and development for LDCs in general and Iran in particular will finally be proposed.

WB-07.2 [R] Strategic Repositioning: Moving into Radically Unfamiliar Markets: The Experience of the Defense Sector

John A Bers; Vanderbilt University, United States

This paper reports on a multiyear study of how defense contractors successfully reposition their technologies into commercial markets. It analyzes the key technology, market, and organizational success factors, and draws strategy implications for the defense industry. Data sources include a survey of 52 contractors and interviews with 40 others.

WB-07.3 [R] A Research Methodology and Comparative Study to Determine Differences in Technology Transfer Needs Between Rural and Metropolitan Small Manufacturing Enterprises

Terry R Collins; University of Arkansas, United States

The purpose of this paper was to present research findings of a study conducted in Oklahoma to identify the different technology transfer characteristics unique to rural and metropolitan small manufacturing enterprises (SME's). Rural and metropolitan manufacturers across Oklahoma in various SIC codes were asked to determine the importance of five technology transfer dimensions. Frequency Data Analysis was conducted between the two specified manufacturing regions in the state according to the five selected technology transfer dimensions of: Technical Assistance, Research and Development, Governmental Compliance, Business Assistance, and Human Resource Management Assistance. T-tests were conducted between the two locations of rural and urban on the demographic variables of AGE, SIZE, and SIC code of the enterprise.

WB-08 R&D Management-4: Evaluation
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Salon I**
Chair: Mario Coccia; National Research Council

WB-08.1 [R] A New Method for Valuing R&D Investments: A Qualitative and Quantitative Evaluation

Olli Naukkarinen; Outokumpu Poricopper Oy, Finland
Timo Palomäki; Pori School of Technology and Economics, Finland
Hannu Vanharanta; Pori School of Technology and Economics, Finland

Managers need to evaluate R&D investments to maximize the future cash flows. As the innovation generating resources get fewer and more expensive, this is even more important in the new economy. A framework to understand and quantify the factors affecting the value of the R&D investments is presented.

WB-08.2 [R] Empirical Assessment of R&D Strategies and Technology Stocks in the Korean Gas Industry

Seungmin Park; Korea Gas Corporation, Korea, South
Kyungjoon Oh; Korea Gas Corporation, Korea, South
Jeong-Dong Lee; Seoul National University, Korea, South
Tai-Yoo Kim; Seoul National University, Korea, South
Eunyoung Heo; Seoul National University, Korea, South

This paper evaluates R&D strategy of the Korean natural gas industry. We combine two separate methodological tools; the technology relation analysis and the measurement of the technology stock. Based on the empirical results, we provide several policy implications for future technology development in the industry.

WB-08.3 [R] A Tool for Measuring the Performance in the R&D Organisations

Mario Coccia; National Research Council, Italy

The purpose of this work is to build a quali-quantitative method for measuring the endogenous performance in R&D organisation which supports the process of evaluation. The method is alike to the Delphi procedure; it consists of proposing a number of themes to a group of researchers in order that they may offer quantitative estimates on the performance of every single research activity carried out in their institutes. The methodology has been tested on the institutes of National Research Council located in Piemonte, a highly industrialised region in North Western Italy. They carry out research activities in the technology and its industrial uses, environment and economics areas. The method built shows the research performance: it can be used in the analysis of the behaviour's institutes and it is useful to the management for increasing the efficiency of their organisations.

WB-09 Software Process Management -1
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Eugene**
Chair: Terttu Orci; Stockholm University

WB-09.1 [R] Diffusion and Infusion of Software Process Improvements

Hannu Jaakkola; Tampere University of Technology, Finland
Timo Varkoi; Pori School of Technology and Economics, Finland
Marion Lepasaar; Pori School of Technology and Economics, Finland
Jukka Mäkinen; Pori School of Technology and Economics, Finland

The adoption of new work practices in a software company is a complicated process depending, in an unmanaged way, on several factors. Modern software process improvement models (e.g. SPICE and SW-CMM) provide a well-defined framework for step-by-step development of these practices. However, practical development activities and the path to better process quality is not defined by the framework. The success of these improvement efforts seems to vary on a company basis, too. This paper discusses the adoption process of new practices; the analysis is partly based on diffusion and infusion theory as a tool for better change management.

WB-09.2 [R] Requirements for a Software Process Improvement Support and Learning Environment

Timo K Varkoi; Tampere University of Technology, Finland
Timo K Mäkinen; Tampere University of Technology, Finland
Hannu Jaakkola; Tampere University of Technology, Finland

Small organizations require external support to initiate software process improvement (SPI). Obstacles in using international SPI models could be lowered with a collection of appropriate tools and information. The described support and learning environment covers steps, tools and roles needed to rapidly achieve effective improvement of software processes.

WB-09.3 [A] Key Success Factors of a Regional Software Process Improvement Programme

Marion Lepasaar; Pori School of Technology and Economics, Finland
Ahto Kalja; Tallinn Technical University, Finland
Timo Varkoi; Pori School of Technology and Economics, Finland
Hannu Jaakkola; Pori School of Technology and Economics, Finland

The aim of this article is to provide support for software process improvement related activities on regional basis. Our experience has shown that although there is a strong western influence in the field of software process improvement in Eastern-European countries, the key success factors for software process improvement program in Finland (one of the Nordic countries) differ greatly from that of Estonia (an Eastern-European country). The article discusses the possibilities of transferring technology know-how and experience from Finland to Estonia and describes the prerequisites for successful soft-

ware process assessment and improvement.

WB-10 Technological Innovations-3
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Portland**
Chair: Qingrui Xu; Zhejiang University

WB-10.1 [R] Technological Innovation System and Strategy in China's Western Regions

Huang Lucheng; Beijing Polytechnic University , China
Yang Baojun; Harbin Engineering University, China
Dong Shibo; Harbin Engineering University, China

China's Western Regions' (CWR) grand development is just becoming the focus of the Chinese government, theory circle and enterprise border concerns. This article approaches how to develop the economy of CWR by establishing innovation systems and choosing innovation strategy. It combines the theories of regional economic development with those of innovation systems, and presents the basic outline of innovation systems and innovation strategy in CWR. It includes (1) why we chose "Technological Innovation System and Strategy in CWR"as the title of this discussion; (2) what functions should be provided within the innovation systems; (3) the key factors of innovation system in CWR; (4) how to choose innovation strategy in developing CWR.

WB-10.2 [R] Dynamic Capabilities-Based Strategy Innovation: A New Paradigm of Growth for Chinese Enterprises

Qingrui Xu; Zhejiang University, China
Jingjiang Liu; Zhejiang University, China
Gang Zheng; Zhejiang University, China
Shen Shouqin; Zhejiang University, China

Based on investigations of 112 Chinese firms and studies on foreign leading corporations, a theoretical framework of dynamic capabilities-based strategy innovation (SI) is put forward and several larger firms in China winning through SI are studied empirically. This paper complemented previous publications on the theories of innovation and strategy. These findings will be useful for Chinese enterprises' managers interested in adopting this approach when they highlight the importance of SI for it to succeed and the major pitfalls to avoid in the innovative processes. Implementing dynamic capabilities-based strategy innovation can effectively cultivate and developing core competence of corporation. It is concluded that implementing SI is the only path of Chinese enterprise growth in intensified competition in knowledge era.

WB-10.3 [A] Pervasive Computing: Business Opportunities and Challenges

Matthew Freeland; Wacker Siltronic, United States
Hasnah Mat-Amin; Portland State University, United States
Khemanut Teangtrong; Portland State University, United States
Wichan Wannalertsri; Portland State University, United States
Uraiporn Wattanakasemsakul; Portland State University, United States

Pervasive computing is a technology of the future and allows computing across the platforms from any device at any time. Today, pervasive computing is still in the hands of industrial and academic resarchers; and, when it arrives, pervasive computing will change the way we do our business commercially or personally. Businesses need to integrate pervasive computing into their business strategies to realize the benefits of the technology. Consumers will enjoy continuous mobile computing regardless of physical location or platform.

WB-10.4 [R] The Key Factors of Successful Innovation in China

Qingrui Xu; Zhejiang University, China
Xiaoqing Zhao; Zhejiang University, China

This paper introduces the evolutionary process of technological innovation and technology management in Chinese firms since 1949. Basing on the view of dynamic capability and knowledge management, this paper is to analyze the structure of technological innovative capability and the paths for enhancing it. As a result, lessons and factors for successful innovation in Chinese firms are concluded to gain some inside looks into the management of technological innovation.

WB-11 Technology Management Education-2
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Columbia**
Chair: Satish Nambisan; RPI

WB-11.1 [R] ETM Trends in Education and Research

Dundar F Kocaoglu; Portland State University, United States
Halime Sarihan; Portland State University, United States
Iwan Sudrajat; Portland State University, United States
Ivan P Hernandez; Portland State University, United States
Ozgur Koc; Portland State University, United States

This paper presents the preliminary results of a study on educational trends and research directions in Engineering and Technology Management (ETM). It is part of a longitudinal study being conducted since mid-1970s. The previous segments of the study had revealed a very strong growth pattern for the educational component of ETM. In 1994, the number of educational institutions offering degrees in ETM was 162. It is anticipated that the number has reached 200 now.

WB-11.2 [R] Impact of ETM education on the Graduates' Careers

Dundar F Kocaoglu; Portland State University, United States
Jaclyn Danh; SEH America, United States

This paper presents the results of a survey conducted among the graduates of the Engineering and Technology Management (ETM) department at Portland State University to determine the impact of the ETM education on their career. 169 alumni who received their graduate degrees from the ETM department between 1987 and 1998 were contacted, and asked to answer questions about their jobs before, during and after their graduate studies, their reasons to pursue a degree in ETM, the impact it has made on their careers, and the degree of their satisfaction with the various aspects of the program.

WB-11.3 [R] Management of Technology Educational Programs: A Global Survey

Satish Nambisan; RPI, United States
David Wilemon; Syracuse University, United States

The last decade has seen a significant growth in the number of universities which offer educational programs in the management of technology. This paper presents a state-of-the-art view of MOT Programs worldwide.Special emphasis will be devoted to program structures,themes,faculty research, and the role of external support.Suggestions for implementing MOT Programs also will be given as well as the major lessons learned to date.

WB-12 Science and Technology Policy-5
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Willamette**
Chair: John W Peterson; Lucent Technologies

WB-12.1 [R] Thematic Centers of Innovation for the Development and Diversification of the Economy in Venezuela

Miguel A Briceño Gil; Universidad Central de Venezuela , Venezuela

The objective is to install, thematic Centers for the Development of Adapted and Appropriate Technologies to the Sustainability and the Local Productivity, that replace the old production units, by means of the grant of consultancy facilities and training necessary for the transformation in competitive companies at national and international level.

WB-12.2 [R] Integrating the Jordanian Industrial Sector and Management Consulting Services in A New Era

Ghaleb Y Abbasi; University of Jordan, Jordan

In today's global economy competition is pressuring the industry to produce more at lower prices and better quality. Nowadays, there are more than 25,000 industrial facilities in Jordan employing more than 150,000 employees and over 30 consulting firms. The industrial production counts for 22% of the total local production and the industrial exports 90% of the total natural exports. The Jordanian economy is dependent on the industrial sector for its development. Also, Jordan has joined the General Agreement for Tariffs and

Trade, which should pressure the industrial sector to compete in global markets. A survey of the industrial sector and the services provided by the management consulting firms was conducted in Jordan to evaluate the industrial sector and to investigate to what degree the consulting firms meet their needs. SPSS was used to analyze the questionnaires and draw conclusions.

WB-12.3 [A] A Technology Based Alternative to 'WARFARE BEYOND BOUNDARIES'

Michael S Loescher; The Copernicus Institute, United States
John W Peterson; Lucent Technologies, United States

Some of China's military strategists appear to believe that American technological competence has created a sustainable competitive advantage that, under certain conditions, may preempt China's sovereignty by eliminating traditional military options. They argue that countering American technological superiority requires the creation of an asymmetric threat capability. The authors offer a different perspective. By creating and leveraging a flexible and adaptable knowledge infrastructure at the national policy level and using the MATI project (Management of Accelerated Technology Insertion) tool set, sufficient strategic global alignment, congruity, and intellectual interdependence can be created to help reduce the value of asymmetric threats as instruments of national policy.

WB-13 PANEL: Technology Commercialization
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Douglas Fir**
Panelist(s) Jonathan D Linton; Polytechnic University
Steven T Walsh; University of New Mexico
Tugrul Daim; Intel Corporation
Jeff Butler; University of Manchester
David Williams; Sandia National Laboratories

The translation of science and technology to a market accepted product is a difficult journey. Experts from industry, government laboratories and academe will be assembled to discuss the recent advances in this field and to consider the challenges that still remain

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WB-14 TUTORIAL: Project Management Office (PMO): Implementation Issues
Wednesday, 8/1, 10:00 AM - 11:30 AM **Room: Meadowlark**
Speaker(s) Parviz F Rad; The George Washington University

PMO is the organizational entity with full-time personnel to provide a focal point for administrative, training, and consulting in the area of project management. Because of the beneficial effects of implementing a project management office, increasingly more organizations opt to establish project management office (PMO) to support and manage the project management efforts. This paper addresses the issues involved in forming and managing the PMO

WC-01 Information/Knowledge Management-9
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Salon A**
Chair: Wilhelm Dangelmaier; Heinz Nixdorf Institut

WC-01.1 [R] Knowledge Diffusion and Management in the Case of Taiwan's Scanner Industry

Yee-Yeen Chu; National Tsing Hua University, Taiwan
Shih-How Liu; National Tsing Hua University, Taiwan
Kans Tseng; National Tsing Hua University, Taiwan

In this study, we further explore the role and the impacts of knowledge diffusion on the scanner technology system as witnessed in the evolutionary paths of Taiwan's scanner industrial innovation from the viewpoint of knowledge flow. Through industrial data collection and interviews with industrial experts, we try to illustrate the engineering knowledge flow, including the diffusion models, paths and impacts. Moreover, we have constructed a firm-level dynamic simulation model of knowledge flow based on the evolution theory, and discuss the mechanism linking knowledge diffusion, innovations and firm growth. We try to explore the mechanisms of the innovation system of Taiwan's scanner industry by comparing the simulation outputs with industrial data. Through the systematic analysis and simulation, the complex, nonlinear relationships in system mechanisms can be presented, and the qualitative features of the system dynamics can be observed. Comparing the results and the industrial data, we can gain insights in the system structures and processes of the interactions among the knowledge diffusion, industrial innovation and growth.

WC-01.2 [R] Using CBT for Organizational Knowledge Management

Matthias F Uebel; University of Paderborn, Germany
Wilhelm Dangelmaier; University of Paderborn, Germany
Dörte Brinker; University of Paderborn, Germany
Stefan Helmke; Heinz Nixdorf Institut, Germany

The effective use of organizational knowledge is an important requirement for the sustainable prospering in a high dynamic environment. Institutionalizing knowledge networks and applying practical methods for process defining are decisive necessities to profit from the inherent intellectual capital. Information technology supports the knowledge management at several stages efficiently and effectively.

WC-01.3 [A] Technology in Knowledge Based Value Chain

Carlo Turati; SDA Bocconi , Italy
Cataldo Dino Ruta; SDA Bocconi , Italy

After a benchmarking process, we identified 15 "lessons learned" in the traditionally activities of value chain and observed technology as enabler of the creation and transfer of knowledge. We identified the evolution of technology practices and the differences among activities. Every activity has a knowledge based solution driven by technology.

WC-02 Information/Knowledge Management-16: Patents & Intellectual Property
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Salon B**
Chair: Stefan Koruna; Swiss Federal Institute of Technology Zurich

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WC-02.1 [R] The Knowledge Network of Patenting and Technology Studies

Yender Lee; McGill University & Nat'l Taipei Coll of Business, Taiwan
Hamid Etemad; McGill University, Canada

This paper is based on 29,556 citations of some 1,142 scholarly journal-articles related to patents and technology studies published between 1992 and 1999. We examine if there is a knowledge network associated with these areas of study. All key-features point to the presence of the necessary essentials for a knowledge network to support this emerging interdisciplinary field.

WC-02.2 [R] Profiting from Innovations in Digital Information Goods: The Role of Intellectual Property Rights

Lee Davis; Copenhagen Business School, Denmark

Advances in digital technology have substantially reduced the costs of reproducing and distributing digital information goods such as computer programs and games, documents, and works of music. Yet while abuses of intellectual property rights are difficult to trace, and infringement suits are expensive and uncertain to prosecute, innovation in these goods has continued unabated. This paper asks: How do firms appropriate the rents from their investments in R&D in digital information goods? To a certain extent, developments in digital technology fundamentally challenge commonly accepted precepts of how firms profit from investments in R&D. Yet software firms have made extensive use of traditional intellectual property rights like patents, copyrights, and trademarks. They have also adopted other approaches to appropriability, including cooperation with academic researchers, first-mover advantages, technical methods to restrict access such as encryption, cross-subsidization, price differentiation, and exploiting network externalities. Given the complexity of appropriating the rents from digital information goods, how effective are the different approaches, and what is the role of intellectual property rights?

WC-02.3 [A] External Technology Commercialization: Policy Guidelines

Stefan Koruna; Swiss Federal Institute of Technology Zurich, Switzerland

Hans Jung; Swiss Federal Institute of Technology Zurich, Switzerland

In recent years a growing number of publication is addressing the issue of intellectual capital. Patents are one form of intellectual capital. Patents play an important role in the appropriation of rents for firms. This is exactly what makes them valuable. However, the question arises: What is constituting the value of a patent? What is discerning a valuable from a non-valuable patent? In the past, economists were measuring the value of a patent in an ex-post way by counting the number of renewals: A patent which was renewed 15 times was seen to be more valuable than a patent which was renewed a mere 5 times. However, such ex-post analysis is not of use to the people in firms who are challenged with managing portfolios of patents. This paper addresses this problems and provides a so-lution to the patent manager.

WC-03 Strategic Mgmt. of Technology-10: Information Technology
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Salon C**
Chair: Chaiho Kim; University of Santa Clara

WC-03.1 [R] Using Information Structures to Gain Competitive Advantage
Vassilis Agouridas; University of Leeds, United Kingdom
Mark Allen; University of Leeds, United Kingdom
Alison McKay; University of Leeds, United Kingdom
Alan de Pennington; University of Leeds, United Kingdom
Scott Holland; Brush Electrical Machines Limited, United Kingdom

This paper describes the results of a preliminary study concerning the introduction of product data management (PDM) in an engineer-to-order (ETO) company. One of the main aims was to formulate an overall plan for the introduction of PDM in the given company while considering the imperatives dictated by the company's strategic intent and business trends of extended enterprises.

WC-03.2 [R] The ERP Paradox: Understanding the Impact of Enterprise Resource Planning Systems on Firm Performance

Andrea Masini; INSEAD, France

This paper presents a theoretical framework that explains why, through which mechanisms and under what environmental conditions the adoption of an Enterprise Resource Planning system may increase or reduce the profitability of a business organization. The framework proposed is built on the key intuition that the business process reengineering required by the ERP adoption interferes with the knowledge evolution cycle through which a firm generates and maintains effective dynamic capabilities.

WC-03.3 [R] The Information Technology and the Critical Success Factors

Flávia A Ghisi; Universidade Federal de São Carlos, Brazil
Adriana B Noronha; Universidade de São Paulo, Brazil
Tabajara Pimenta Jr; Universidade de São Paulo, Brazil

This work identifies the Critical Success Factors (CSF) in the Information Management Area in a company, and evaluates its Information Technology level. The research explored the Information Management and SCF, from the points of view of the management, employee and customer of the Information Management Area.

WC-04 Technology Planning & Forecasting-8
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Salon D**
Chair: Pascal Savioz; ETH Zurich

WC-04.1 [A] In Search for Critical Technologies: A Network and Process Perspective

Guido Reger; University of Applied Sciences Brandenburg, Germany

A study among 21 multinational corporation shows that the search for new critical technologies is often done in an unsystematic and unconscious way. A systematic process for identifying and analyzing critical technologies will be presented. A need for success hereby are internal and external as well as formal and informal networks.

WC-04.2 [R] Technology Vision for India upto 2020 : A new facet of Technology Management - A Case Study in Agriculture & Education Sectors

D. N Singh; Tech. Information, Forecasting & Asses. Council, India
T. Chandrasekhar; Tech. Information, Forecasting & Asses. Council, India

Technology Vision for India up to 2020 envisages the road map of 'Developed India by 2020' through economic and social development (with technology as a tool) of key sectors of Indian economy. Agriculture is one of the important sectors, and the key issue to be addressed is food sustainability & security. The Mission REACH envisages achieving new heights in the Education Sector through establishing "Centres of Relevance and Excellence (CORE)," having triangular partnership with Industry, Institutions & TIFAC. It will provide quality man-power in areas of societal and industrial relevance. So far, nine educational institutions have been networked under this programme. The target is to network about 100-120 educational institutions in 2-3 years. The mission approach transcends beyond traditional working methodologies and synergises institutions both public and private. The tools of information technology are used to manage the technological inputs at disposed locations. Thus implementing technology projects in mission mode embraces a new facet of technology management incorporating technical, administrative and interpersonal and social subsystems.

WC-05 E-Business-9
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Salon E**
Chair: Fred Phillips; Oregon Graduate Institute

WC-05.1 [R] InterMediator Agent to Obtain 'Condensed Information' for 'i-Business'

Takuro Munezawa; Niigata University, Japan
Takashi Ishikawa; Nippon Institute of Technology, Japan

The new trend to execute business by using i-mode mobile phones in Japan is going to burst to the world wide culture facing the new IMT-2000 based phones.The proposal is to present a new idea to develope the intermediate agent to obtain "Condensed Information " usable for new businesses.

WC-05.2 [R] The Vizzavi Joint-Venture: An Exogamic Marriage Between Vivendi and Vodafone as a Way of Entering the e-Economy

Dominique Jolly; Groupe ESC Grenoble, France

The deal combines idiosyncratic resources from partners with very different technological profiles in order to launch the first European Multi Access Portal on the Internet. This paper analyzes the alchemy of the joint activity, the advantages gained by the partners and the rules adopted for preserving their own identities.

WC-05.3 [R] Selecting the Best e-Commerce Product for a Retail Chain - The Analytic Hierarchy Process Model

Prakash S Lokachari; Tata Consultancy Services, United States
Gunavardhan Raju; Tata Consultancy Services, United States
David D'lima; Tata Consultancy Services, United States

B2C E-Commerce initiatives undertaken by a firm necessarily include evaluation of commerce servers. This paper focuses on evaluation of the e-commerce products in terms of their technical features and services offered as well as exploring their suitability to meet the specific business priorities of a retail firm. The Analytic Hierarchy Process Model has been employed for the product selection.

WC-06 New Product Development-6
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Salon G**
Chair: Juliana Hsuan Mikkola; Copenhagen Business School

WC-06.1 [R] Decision-making Structure of Time-conditioned Cost Performance Curve in Product Development

Yasuo Kusaka; Dokkyo University, Japan
Hisashi Yamamoto; Tokyo Metropolitan Institute of Technology, Japan

-Product development (PD) requires considering characteristics such as multiple and qualitative criteria, cost and time constraints and combinatorial structure of development alternatives , that is, combinatorial alternatives (CAs).

Especially, time factor plays a critical role in PD in rapidly changing environment. Kusaka has proposed a model on the title of "PD using Time-conditioned Cost Performance Curve (TCPC) ". TCPC represents change in optimal total performance when changing target cost under several target time constraints. Though his model is essential in introducing a concept of concurrent degree and practical in using TCPC, its decision-making structure and use method have not been clarified sufficiently. This paper examines the structure, presents the method by newly introducing a concept of target concurrent degree (TCD) and shows the effects of TCPC and TCD on PD decision-making through theoretical and numerical analyses.

WC-06.2 [R] Modularity and Interface Management of Product Architecture

Juliana Hsuan Mikkola; Copenhagen Business School, Denmark

The management of innovation through modular product architecture strategies is gaining increasing importance for firms, not only in practice but also from a theoretical perspective. It is argued that the degree of modularity inherent in a given product architecture is sensitive and highly dependent upon the number of components and the interface constraints shared among the components, modules, sub-systems, and systems. This paper applies a mathematical model for analyzing dynamics and the degree of modularity of a given product architecture by taking into account the following variables: number of components, number of interfaces, new-to-the-firm component composition, and substitutability factor. The application of the modularization function is illustrated with two elevator systems from Schindler Lifts of Switzerland: traction and hydraulic elevators. The comparative analysis of the elevators captures the sensitivity and dynamics of product architecture modularity created by three types of components (standard, neutral, and unique) and two types of interfaces (fundamental and optional).

WC-06.3 [R] Revisiting Moore's Law: Measuring Technology Change Using DEA

Timothy R Anderson; Portland State University, United States
Rolf Fare; Oregon State University,
Shawna Grosskopf; Oregon State University,
Xiaoyu Song; Portland State University,

Moore's Law is one of the mostly widely recognized and influential technology forecasts ever made. This paper develops a more complete model of microprocessor performance and then applies data envelopment analysis to evaluate the rate of change using data on 54 microprocessors introduced between 1992 and 2000.

WC-07 Technology Transfer-3
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Salon H**
Chair: Glenn B Dietrich; University of Texas at San Antonio

WC-07.1 [R] Innovation Support: The Obstacles to Growth among Welsh SMEs in the Manufacturing Sector

Alan Lewis; University of Wales Institute, United Kingdom
Wendy Phillips; University of Wales Institute, United Kingdom
Robert Brown; University of Wales Institute, United Kingdom

Despite a well-funded infrastructure of knowledge transfer programmes aimed at increasing expertise and improving competitiveness, Welsh SMEs appear reluctant to take up such programmes. This paper adopts a bottom-up perspective to highlight the issues confronting policy makers in attempting to stimulate SME growth through exploitation of new knowledge and technology.

WC-07.2 [A] Lessons Learned in Commercial Product Realization in a University-Affiliated Research Institute

Ronald A Bohlander; Georgia Tech Research Institute, United States

Can a university group become a vital partner in bringing new product designs to market rapidly? Dr. Bohlander will present an insider's view of a virtual corporation headed up by a start-up high tech firm in Connecticut. His R&D group's part has been to provide contract services to develop commercial telecommunications products and prepare them for high volume production by a well-known contract manufacturer. This fast-paced work has focused heavily on system and electronics design, including embedded software and system management software. The Georgia Tech Research Corporation has several patents pending for the technology, which is exclusively licensed to the customer in exchange for on-going royalties. Lessons learned will include experiences in interfacing with the corporate world, intellectual property protection, personnel development in a dot.com world, strategic planning of product evolution, and the development of computer-based infrastructure to support a distributed design team handling and developing product designs and information.

WC-07.3 [R] Advanced Manufacturing Technology Implementation in Small and Medium Size Enterprises in A Newly Industrializing Country: The Case of Turkey

Sitki Gozlu; Istanbul Technical University, Turkey
Hasan K Gules; Selcuk University, Turkey
Thomas F Burgess; The University of Leeds, United Kingdom

Small and medium size enterprises (SMEs) play a very important role in the development of national economies all over the world. For SMEs involved in manufacturing there are particular problems to be faced in successfully implementing Advanced Manufacturing Technologies (AMTs). However, although key problems have been investigated for SMEs in developed countries, such problems have not been as clearly focused on in more-recently developing countries. This paper focuses on SMEs in Turkey's manufacturing sector and examines recent changes in levels of AMT implementation, looks at the success of implementation and links current levels of AMT to the competitiveness of the market environment that the firm faces. The findings of the study involving 181 SMEs in the Turkish manufacturing sector have indicated low, but increasing levels of AMTs over the five-year horizon of the study. Soft technologies, such as TQM, are more prevalent than harder technologies.

WC-08 R&D Management-5: Process
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Salon I**
Chair: David R Probert; University of Cambridge

WC-08.1 [R] Front-End Idea Generation for Innovation: Empirical Evidence from German Industrial Corporations

Soeren Salomo; University of Kiel, Germany
Nils Mensel; University of Kiel, Germany

For outstanding company performance, successful new product development is essential. Prior research in innovation and technology management has concentrated on success factors of new product development. Especially on the project level a wealth of empirical evidence has been presented on how to manage an innovation process effectively. While these later stages of the innovation process have been subject to intensive studies, the early stages of the innovation process are rarely investigated. To access this front end of the innovation process we examine the "ignition" of the innovation process, and present empirical evidence for the existence of qualitative types of initiatives. We employ a multivariate analysis of cross-sectional data on German industrial corporations applying for the "Innovationspreis der Deutschen Wirtschaft" in 1999. We identify three types of initiatives which are determined by combining the degree of front end idea specification and final realization measured along five dimensions. These types of initiatives are related to different issues of the innovation process (e.g. degree of innovativeness). Implications for future research and management of innovation are drawn.

WC-08.2 [R] Distributed Engineering Change Management for Allied Concurrent Engineering

Yuh-Min Chen; National Cheng Kung University, Taiwan
Wei-Shin Shih; National Cheng Kung University, Taiwan
Chung-Yen Shen; National Cheng Kung University, Taiwan

Effectively managing engineering change is a critical task in engineering management. Meanwhile, in allied concurrent engineering, the importance and difficulty of engineering change management is increased. This study presents a distributed engineering change management approach for the practice of allied concurrent engineering (ACE). An ACE-based engineering change

management methodology was developed under the concepts of enterprise integration to manage the processes, systems and information of engineering changes in an integrated fashion both within an individual enterprise and the enterprise alliance. The methodology includes a life cycle model for engineering change management, a hierarchical and distributed management framework, and a reference model for engineering change management. Based on this methodology, an ACE-based engineering change management system is developed using Unified Modeling Language (UML) modeling techniques. Besides the methodology and the system for engineering change management, this work also demonstrates a systematic approach for enterprise system development. Results in this investigation will enable the practice of allied concurrent engineering and subsequently increase product development capability and quality, reduce development cycle time and cost and ultimately increase product marketability.

WC-08.3 [R] Innovation Processes Within the Healthcare Industry: Determining Critical Success Factors Aligned to Product Strategies

Scott Wilson; University of Cambridge, United Kingdom
David R Probert; University of Cambridge, United Kingdom

Modern day healthcare companies are becoming increasingly circumspect with regards to providing sufficient levels of R&D investment that will enable the continuous introduction of new products to the marketplace. Hence many firms deliberately pursue product strategies that can be viewed as "late entrant", as opposed to "pioneering", to avoid the risks and costs associated with breakthrough products. With this in mind this paper attempts to illustrate the impact of differing product strategies on product innovation processes pursued by healthcare firms. Two in-depth case studies with healthcare firms were carried out and a set of innovation success factors has since emerged for both pioneers and late entrants. These factors were originally grouped together on a framework developed from literature that was subsequently tested empirically. The findings from the study are far from conclusive and need to be treated with some caution. However there seems to be some evidence that in defining themselves as pioneers or late entrants, firms (in some cases unknowingly) are also defining the processes they use for innovation.

WC-09 Software Process Management-2
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Eugene**
Chair: Cynthia Brown; Portland State University

WC-09.1 [A] Documentation as a Software Process Capability Indicator

Marion Lepasaar; Pori School of Technology and Economics, Finland
Timo Varkoi; Pori School of Technology and Economics, Finland
Hannu Jaakkola; Pori School of Technology and Economics, Finland

In a small software organization, a close and intense relationship with its customers is often the substitute for documentation along the software processes. Nevertheless according to the quality standards, the inadequacy of required documentation will retain the assessed capability of software processes on the lowest level. The SPICE (ISO/IEC TR 15504) assessment results of small software organizations will be analyzed and improvement ideas will be provided with the focus on documentation, traceability and change management.

WC-09.2 [R] Autonomous Workgroup Memory Establishment

Robert T Leskovar; University of Maribor, Slovenia
József Györkös; University of Maribor, Slovenia

Information society workgroups face many information-related problems lately. The purpose of this paper is to propose a solution to them, in a form of an autonomous workgroup memory model, which employs software agents as mediators between users and workgroup-oriented information retrieval engine. In the introduction the motives for our ongoing research are discussed, followed by the description of related work. The third section explains our original approach with the stress on its central aspect of information retrieval. The plan for our future work concludes the paper.

WC-09.3 [R] Assessment of a Software Process Assessment Process

Timo K Mäkinen; Tampere University of Technology, Finland
Timo K Varkoi; Tampere University of Technology,
Hannu Jaakkola; Tampere University of Technology,

A software process improvement (SPI) initiation framework was developed for small enterprises to be used in setting SPI priorities, conducting assessment and planning process improvement activities. During the development the assessment process of the framework was assessed against both the normative and informative criteria of SPICE (ISO/IEC TR 15504). As an outcome the defined assessment process ensures assessment results comparability and conformance to process goals.

WC-10 Technology Assessment and Acquisition-1
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Portland**
Chair: Hugo Tschirky; Swiss Federal Institute of Technology

WC-10.1 [A] Real Option Approach for R&D-Projects Applied by ABB

Hans-Helmuth Jung; Swiss Federal Institute of Technology Zurich, Switzerland
Friedrich Pinnekamp; ETH Zurich, Switzerland

Real Options in a new method, derived from financial theory, to valuate R&D-projects. This new method leads to more defensible valuations and allows insights for the value-based management of technology-intensive companies. ETH Zurich and ABB Corporate developed together a real option-based model which incorporates the managerial flexibility and the risk of R&D-projects. This industry application shows how the model itself is realized and how it is used for the valuation of R&D-projects.

WC-10.2 [R] Systems Engineering Approach in Make-or-Buy Technology

Louis Doukas; RMIT University, Australia
Tota Simatupang; RMIT University, Australia

Technology is one of the strategic factors in an enterprise. Sooner or later, every organisation will be faced with the problem of how to acquire the needed technology. An enterprise can acquire technology either through 'making' (the pursuit of new technology development though internal R&D) or 'buying' (acquisition from external sources). This is known as the "make-or-buy" or "sourcing" problem. This paper will discuss how and what role systems engineering discipline can play in approaching this problem. The results show that systems engineering approach can play a major role in solving this problem especially through the requirements and decomposition analysis.

WC-10.3 [A] Computer-aided R&D-Portfolio Valuation

Philip Bucher; ETH Zürich, Switzerland
Hans-Helmuth Jung; ETH Zurich, Switzerland

Various companies are currently redesigning their process to estimate the value of an R&D project, focussing more on techniques such as Real Options or Monte Carlo Simulation. This paper presents an approach how to use these techniques to evaluate an entire portfolio of projects, taking into account characteristics, such as pull-through or substitution effects. Based on this approach, a simulation software was developed and tested at ABB Asea Brown Boveri Ltd.

WC-11 Technology Management Education-3
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Columbia**
Chair: Thomas Gulledge; George Mason University

WC-11.1 [A] Development of a 'True' e-Commerce Technology Course for an MIS or e-Commerce Program

Mohammad A Rob; University of Houston, Clear Lake, United States
Naveed Saleem; University of Houston, Clear Lake, United States

In recent years, many universities have been developing programs or courses in the area of electronic commerce (e-commerce). One of the important courses that address the technology issues of electronic commerce is "e-commerce technology." This course should not only address the theoretical understanding of the technology, but it should also provide hands-on opportunity for "true" e-commerce applications developed in the industry. Most educational

institutions have existing technology that can be configured to set-up an e-commerce applications development environment. This paper outlines the process of launching and managing a live e-commerce application within an existing university network using readily available Microsoft software such as the Internet Information Server, Microsoft SQL server, and Visual InterDev.

WC-11.2 [R] Ready for On-Line Education.com? Exploring Technology Use Disposition of Potential Users

Victoria E Erosa; Mexican Association for Electronic Commerce AMECE, Mexico

In its truest sense, the popular term "Online Education" really means educational models built around information technology (telecommunications, networks, computers, and systems) from the ground up. In order to help educational planners understand the technology use disposition of potential Long Distance Graduate Programs users, a research project was conducted and key findings are presented here. With that knowledge as a base, educators should examine appropriate ways for their institutions to exploit IT and wield it as a strategic asset, and develop programs to deal successfully with the online educational services characteristics of low compatibility and high complexity.

WC-12 Science and Technology Policy-6
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Willamette**
Chair: Elias G Carayannis; The George Washington University

WC-12.1 [R] Measuring Stocks of Technological Knowledge to Enable Decisions on R&D Investment

Yoshiki Nakamura; Aoyama Gakuin University, Japan
Masashige Tsuji; Aoyama Gakuin University, Japan

There is a growing awareness in Japan that the country's industries must invest in basic technological development. Against this backdrop, this paper attempts to analyze both Research and Development investment strategies and their investment effects in the context of Japanese industries. It provides an ideal model of investments, which focuses on the "black box" that stands between initial investment inputs and their new technology outputs. That "black box" comprises three different kinds of technological knowledge with a transportation mechanism: 1) Basic Research; 2) Technological Developments; and 3) New Product Developments. Although the hypothesis is constructed as a mathematic model, this paper has put this frame of reference into actual simulation. The outcome proves that the model is both valid and relevant to future investment decisions for Japanese industries.

WC-12.2 [R] Strategy, Structure and Performance Issues of Pre-competitive R&D Consortia: Insights and Lessons Learned from SEMATECH

Elias G Carayannis; The George Washington University, United States
Jeffrey Alexander; The George Washington University, United States

This paper utilizes documentary and primary source research to examine the change in the role of SEMATECH in supporting the competitiveness of U.S. semiconductor industry between the late 1980s and the late 1990s. This change has broad implications for future relations between SEMATECH and the semiconductor industry as a whole and the government and university research systems. Some of these implications are explored by detailing recent strategic developments at SEMATECH and the emergence of other semiconductor research efforts involving government, university and industry collaboration. An analysis is conducted to link the requirements for sustaining the current global competitive position the U.S. semiconductor industry; the new strategic role of SEMATECH within the industry; and the expectations for existing and future government-university-industry (GUI) partnerships focused on semiconductor technology research and development. This analysis is then extended to explore the implications for GUI partnerships in supporting U.S. global competitiveness in other high-technology industries which share particular salient characteristics with the semiconductor industry.

WC-12.3 [R] Management of Technology Policy: Changing Roles of National R&D Programs of Korea

Seungwoo Seo; ETRI, Korea, South

In the environment of rapid technological progress, the technology policy measures should be carefully designed and managed along with the industrial and technological changes. It analyzes how the roles of national R&D programs of Korea were changed and whether they were effective or not for industrial growth and digital economy.

WC-12.4 [R] A Strategy for Agribusiness Demands Prospective Analysis in Agricultural R&D in Brazil

Antônio M Gomes de Castro; Admário Gomes de Castro Filho e Dália Pires de Cas, Brazil
Suzana M Valle Lima; , Brazil
Bruce B Johnson; , Brazil

This paper has the objective of introducing a conceptual and methodological framework, as well as strategy for setting agricultural R&D priorities based on client demands, in a large public agricultural research organization in Brazil, Embrapa (Brazilian Agricultural Research Corporation). It is a result of a five year project aiming to develop strategy, conceptual framework and methodology for determining R&D client demands using technological demands prospective analysis in agricultural production chains (APC). Besides the strategy, conceptual framework and methodology development, the project also included results validation, training of key personnel and application of technological demands analysis in determining R&D demands in several Embrapa R&D centers. This paper also discusses results of some studies carried out on R&D demands determination and further applications of prospective analysis of production chains, in the environment of agricultural research as well as in planning of other development organizations.

WC-13 TUTORIAL: Accelerating Innovation with TRIZ
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Douglas Fir**
Speaker(s) Ellen Domb; PQR Group

The participants of this tutorial will be able to use the TRIZ tools to solve real technical problems in their own organizations. They will be familiar with the basic precepts of TRIZ, and will be able to recognize situations where TRIZ can be of use. They will be able to recognize the need for TRIZ in conjunction with the tools that they are already using. and to use them together. Description: "TIPS" is the acronym for "Theory of Inventive Problem Solving," and "TRIZ" is the acronym for the same phrase in Russian. TRIZ was developed by Genrich Altshuller and his colleagues in the former USSR starting in 1946, and is now being developed and practiced throughout the world.

WC-14 TUTORIAL: Creating an Environment That Fosters Innovation
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Meadowlark**
Speaker(s) Gerard H Gaynor; Innovation Management Institute

This tutorial explores the challenges facing organizations that depend on innovation for sustained business performance. Innovation can only survive in an environment that understands the management of risks and uncertainties, an environment that stimulates and energizes the organization, and an environment that balances freedom with discipline. The session focuses on what it takes to build an environment that supports innovation-no mysteries, just applying the fundamentals.

WC-16 Technology Marketing-1
Wednesday, 8/1, 1:30 PM - 3:00 PM **Room: Salmon Room**
Chair: Robert Harmon; Portland State University

WC-16.1 [R] The Process of External Technology Exploitation as Part of Technology Marketing: A Conceptual Framework

Jean-Philippe Escher; BWI, Switzerland

Even in the area of technology, firms are increasingly contracting in from external sources, or contracting out their own work to third parties. This involves the areas of licensing, R&D cooperation, production and OEM briefs and commerce in technologically demanding components and part-products. The carrying out of such technology business, here christened 'Technology Marketing', is dependent upon new processes and concepts, because known

marketing methods do not sufficiently take into account the knowledge-defined uniqueness of technologies as the object of commerce. This paper is the result of a cooperative research study carried out by the ETH Center for Enterprise Science (formerly BWI, Section for Technology and Innovation Management) in collaboration with Swiss industry partners.

WC-16.2 [R] Marketing in the Broadband Era: A Strategic Analysis

Bharat Rao; ITE, Polytechnic University, United States

Broadband connectivity is radically altering how businesses acquire, retain and interact with customers. In this paper, we present a discussion of the key marketing and managerial issues involved in addressing broadband innovation. In this paper, we examine the impact of this burgeoning broadband infrastructure for businesses hoping to attract, reach, retain and transact with customers, and what it means to compete in such a media-rich environment. We propose that the creation, delivery and customization of superior customer experience will be critical to long-term success. We also examine the role of content and infrastructure providers, and their interaction with end-customers in this evolving domain.

WC-16.3 [R] An Application of Data Mining for Marketing in Telecommunication

Hyun-Moon Shin; ETRI, Korea, South
Dong-Heon Jeong; ETRI, Korea, South

In traditional consomer service support of a telecommunication environment, a consumer service database usually stores two types of service information:: (1) unstructured customer service reports and (2) structured data on long-distance call, local air time and billing type for day-to-day management operations. This paper investigates how to apply data mining techniques to extract knowledge from the database to prevent from churning.

WD-01 Information/Knowledge Management-10
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Salon A**
Chair: Lois S Peters; Rensselaer Polytechnic Institute

WD-01.1 [R] Business Management with Knowledge Management as the Core under Knowledge Economy

Wanling Feng; Tsinghua University, China
Jiasu Lei; Tsinghua University, China
Jinyu Wang; Tsinghua University, China

This paper elaborates on the goal and function of knowledge management; the scope of knowledge management; the development and construction of knowledge management system; and the structure of knowledge management, namely internal and external knowledge management.

WD-01.2 [R] Towards a Definition of 'Functions' in 'Knowledge Management' Practice

John P Kawalek; Sheffield Hallam University, United Kingdom
Nimal Jayaratna; Curtin University of Technolology, Australia

An examination of the meaning of the practice of 'Knowledge Management' would seem to reveal a number of weaknesses. For instance, practitioners have attempted to tackle a range of issues, make various claims for their actions, and use the term 'Knowledge Management' to describe or justify them. As a result the field in practice is highly fragmented and there is little cohesion in the guidance offered by the literature, on how to do 'Knowledge Management' in practice. This paper provides : (i) some 'positional assertions' which are used as definitional statements about the nature of 'Knowledge Management'; these are used to help derive, (ii) three core functions of 'Knowledge Management' practice. In doing this, the paper provides a basis upon which the functions of 'Knowledge Management' can emerge, and therefore give guidance to practice.

WD-01.3 [R] Developing Competencies and Capabilities Through Knowledge Management: A Contingent Perspective

Christopher M Lucarelli; Rensselaer Polytechnic Institute, United States
Lois S Peters; Rensselaer Polytechnic Institute, United States

This paper develops the concept of management capabilities and competencies as a bridge between the current thinking on the resource-based theory of the firm and knowledge management that allows us to propose a model linking management development activities and firm performance through the development of managerial capabilities and competencies. Further, we propose that a consideration of the contingencies requiring different types of managerial capabilities will inform about the required dimensions of management development to achieve competitive advantage.

WD-02 Information/Knowledge Management-17: Knowledge Generation
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Salon B**
Chair: Corrado lo Storto; University of Naples Federico II

WD-02.1 [R] The Fit Between Problem Solving Style and Perceived Problem Complexity as a Major Determinant of Knowledge Generation During Product Innovation

Corrado lo Storto; University of Naples Federico II, Italy

This paper presents the findings of an empirical study aimed at investigating the influence that some factors describing the context pattern perceived by individuals and some other factors shaping the problem solving style have on the generation of new knowledge during technical problem-solving in small manufacturing firms. In a previous study, these factors were identified. Here the effect that the fit between the first and the second group of factors has on the amount and type of knowledge generated during technical problem-solving is explored.

WD-02.2 [R] Architecture-Component Knowledge Creating Circle in Chinese Firms

Yi Wang; Tsinghua University, China
Guisheng Wu; Tsinghua University, China
Jiang Wei; Zhejiang University, China

Knowledge creation is source of competitive advantage. This paper pays attention on the knowledge-creating mechanism in Chinese firms. In section two, architecture knowledge and component knowledge are defined. In section three, a framework of architecture-component knowledge-creating circle is suggested. In section four and five, case study on Hangzhou Boiler Manufacturer and Handan Steel are respectively discussed.

WD-02.3 [R] Applied Knowledge Management in Innovation Processes

Anja Schulze; Universität St. Gallen, Switzerland

Innovation processes of the postindustrial knowledge e-conomy have to focus on the efficient creation of new knowledge. Analyzing knowledge creation in innovation processes from an integrating perspective lead to the following finding: Approaches to knowledge management that are useful in one phase of the innovation process might be useless or even harmful in other stages of the process.

WD-03 Strategic Mgmt. of Technology-11: Manufacturing
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Salon C**
Chair: Kathryn Stecke; The University of Michigan

WD-03.1 [A] The Impact of 'Digital Manufacturing' on Technology Management

Takehisa Seino; Toshiba Corporation, Japan
Yoshio Ikeda; Toshiba Corporation, Japan
Masaharu Kinoshita; Toshiba Corporation, Japan
Tetsuo Suzuki; Toshiba Corporation, Japan
Koichiro Atsumi; Toshiba Corporation, Japan

Although the usefulness of digital technology is well known, its net effect in the manufacturing field still remains minimal. A major reason for this is the existence of hidden knowledge. We attempted to unveil this knowledge systematically throughout manufacturing processes from the viewpoint of product development and supply-chain management. In this study, we extracted five major modes for application of digital technology to manufacturing, and established the "Digital Manufacturing" methodology. We shall show the

impact of this methodology on technology management with examples which have been accomplished successfully.

WD-03.2 [R] A Strategic Review of Manufacturing: Lessons from Hong Kong Experiences

Kwai-Sang Chin; City University of Hong Kong, Hong Kong
K F Pun; Middlesex University, United Kingdom

Global manufacturing has brought along the industrial transformation pressures that stressed the design and service-oriented competitions and technology-based developments. Such transformation has offered numerous opportunities as well as problems for manufacturing industry in Hong Kong and elsewhere in the globe. A strategic review of manufacturing in both industry and firm levels constitutes a powerful contribution to enhance managerial decision making and long-range planning. This paper presents a strategic manufacturing review of Hong Kong's industry from both pessimistic and optimistic perspectives. Incorporating the empirical findings obtained from two recent studies, it also discusses the success factors, problematic areas and strategy choices in manufacturing industry. The paper shares some Hong Kong manufacturers' experiences in managing industrial transformation. In order to attain sustainable manufacturing competitiveness, firms need to become more technologically advanced and move up-market with the provision of value-added products and services. The strategic manufacturing review of internal and external environments helps firms determine their core competency, and develop viable strategies and tactics for global manufacturing.

WD-03.3 [R] e-Agile Enterprising : The Manufacturing and Marketing Strategies to Enhance Global Competitiveness for Hong Kong Manufacturing Industry

Richard C Yam; City University of Hong Kong, Hong Kong
William Lo; Hong Kong Productivity Council, Hong Kong
Pui Y Tang; Hong Kong Polytechnic University, Hong Kong

The twenty-first century manufactures are those who make effective use of their own resources and the resources of their marketing and manufacturing partners, suppliers and customers in an intelligent, flexible and agile manner responsive to the ever-changing market needs. This suggests a new type of enterprise and viable manufacturing and marketing strategies described in this paper, i.e. e-agile enterprising.

WD-04 Technology Planning & Forecasting-9
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Salon D**
Chair: Louis Doukas; RMIT University

WD-04.1 [R] Technology Choice: A Soft Systems Perspective

Frank Stajnko; RMIT University, Australia
Louis Doukas; RMIT University, Australia

The art and science of technological forecasting is the greatest weakness of strategy making. In dynamic and complex environments it is extremely difficult and perhaps even impossible. This is because the future tends to emerge from these situations in ways that defy conventional forecasting techniques. In fact systemic emergence is often considered impossible to model in this way. Most of these techniques are linear, deterministic and inflexible in nature, which is why they are often described as being hard. A soft perspective is required in order to understand the subtle complexities involved and to show how existing models them selves can change with time. This paper looks at the common forecasting techniques used, the problems encountered and how the application of Soft Systems Engineering can make a difference.

WD-04.2 [R] Lumpy Demand Forecasting Using Neural Networks

Luis F Luna; University of Texas at El Paso, United States
Rafael Gutierrez; University of Texas at El Paso, United States
Rolando Quintana; University of Texas at El Paso, United States

This study presents an application of neural network methods for forecasting three different items that exhibit lumpiness in their trend pattern. Using sixty periods of simulated data for each time series, forecasts were prepared for the next thirteen periods. Forecasting models included three neural architectures: (1) Three-layer backpropagation; (2) Five-layer backpropagation; and (3) General Regression with genetic adaptive training. Forecasts were compared for accuracy against actual values of demand for the period. The findings suggest the potential value of neural networks for producing accurate forecasts and strengthening the decision making process.

WD-04.3 [R] Media Content Analysis by MORN to Determine Anticipated Megatrends in Turkey: A Factor-Analytic Approach

Mehmet S Kok; Yeditepe University, Turkey
A. Nuri Basoglu; Bogazici University, Turkey
M. Atilla Oner; Yeditepe Univ, Depts of Bus Adm + Syst Engineering, Turkey

The objective of National Foresight Studies is to reduce uncertainty, more accurately countries use foresight studies to manage uncertainty. This research aims to propose an interdisciplinary approach combining "media content" and "factor" analyses to discover many ways Turkey is restructuring and what the new society will look like.

WD-05 E-Business-10
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Salon E**
Chair: Frederick Betz; University of Maryland University College

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WD-05.1 [A] A Customer-Centric e-Business Model for an Efficient Customer Relationship: Management in the Semiconductor Industry

Samar K Saha; Silicon Storage Technology, Inc., United States

A business model using the Internet channel for world commerce in the semiconductor industry and an effective digital strategy to implement this model are presented. The proposed business model offers online customers shopping convenience, products of their choice, meets their demands rapidly and cost-effectively, and improves customer satisfaction.

WD-05.2 [R] Strategy Planning Reexamined

Frederick Betz; University of Maryland University College, United States

The theory of strategic planning is reexamined under the impact of electronic commerce.

WD-06 New Product Development-7
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Salon G**
Chair: Dragan Milosevic; Portland State University

WD-06.1 [R] Exploiting e-SE for e-World Systems

Lawrence D Pohlmann; Strategics Consulting, United States

Electronic systems engineering (e-SE) offers promise for facilitating development of e-world systems. This paper provides guidance on developing and using web-based 'project portals' to facilitate managing system and project knowledge. Portal content and implementation concepts are related to ways to increase development effectiveness and efficiency for e-world systems. The evolution of e-SE is also discussed.

WD-06.3 [R] Systemic Understanding of New Product Development: Multiple Perspectives Approach

Peerasit Patanakul; ETM, Portland State University, United States

The purpose of this study is to use multiple perspectives as a framework to understand new product development literature. By utilizing multiple perspectives, the literature will be categorized under its subsystems. As a consequence, a more systemic understanding of new product development will be obtained.

WD-07 Technology Transfer-4
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Salon H**
Chair: William T Flannery; University of Texas at San Antonio

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WD-07.1 [R] The Challenge of Inter-Organization System Design Comparative Case Study of Videoconferencing Systems

Dong Hee Shin; Syracuse University, United States

A comparative case study was conducted to assess the consequences of implementing a videoconferencing system in three organizations developing two inter-organization systems (IOS): County-Hospital and County-Nursing home. Respondents reported radically different experiences with the video-conference technology (VT). We posit that these divergent outcomes are associated with different organizational activities. These different activities lead to different level of IOS. This study concludes that IOS design is a humanizing process of technology trying to include human activity into IOS system.

WD-07.2 [A] Molecular Computing: A Research Proposal

Brent Capps; Sharp Labs of America,
Sundar Valluri; Portland State University, United States
Mike Ferrigno; Intel Corporation, United States
Ravee Boonbutra; Portland State University, United States

This paper presents a strategy for deploying molecular computing technology into industry. The plan includes building strategic alliences with exisiting players.

WD-08 Strategic Management of Technology-12
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Salon I**
Chair: John W Peterson; Lucent Technologies

WD-08.2 [R] Is Technological Learning a Firm Core Competence? An Empirical Study of Multi-level Learning & Performance

Elias G Carayannis; The George Washington University, United States
Jeffrey Alexander; The George Washington University, United States

This paper proposes the conceptual outline for a general theory of higher order technological learning within and across firms and attempts to empirically test the power of correlation between technological learning and market performance in select multi-industry firm clusters over multi-year periods. After reviewing relevant extant literature, this paper constructs an integrated, multi-dimensional framework for the analysis of technological learning activities and their associated impact on firm market performance. Using a subset of the concepts in this framework, a pilot study was conducted to test the relationship between technological learning effort and firm market performance. The analysis combines traditional quantitative indicators of learning with a qualitative index constructed through inductive examination of corporate annual reports. The empirical analysis shows some strength in the relationship between technological learning and market performance, but this relationship is dependent upon temporal, non-linear, firm-specific factors. The results of the study are discussed in the context of expanding research to integrate all aspects and levels of technological learning, especially differentiating between higher-order (strategic and tactical) and basic (operational) learning

WD-08.3 [A] More On The Technology Value Chain: Leveraging a MATI Insight

John W Peterson; Lucent Technologies, United States
Michael Radnor; Northwestern University, United States

Effective strategic management involves the process of formulating and executing the means to create relative perceived value. Such value creation depends on successful balancing of returns to the owners and investment in growth. As industry transitions to the knowledge age, the technology centered firm must realign both the business and technology value chains to assure congruity as the business models change, the organization flattens out and a supply chain metastructure emerges. Using lessons learned from the MATI project (Management of Accelerated Technology Insertion), the means to achieve this will be described.

WD-09 Software Process Management-3
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Eugene**
Chair: Dick Lytle; Oregon Masters in Software Engineering

WD-09.1 [R] Software Process Improvement: Operations Perspectives

Woonghee Tim Huh; Cornell University, United States

Software development is increasingly becoming important in today's businesses as an enabler of their business processes and services. However, software improvement processes are still unsatisfactory and not mature. This paper examines software process improvements from the perspective of new product development and operations management, and suggests how research in these fields may be used to guide improvement initiatives in software development.

WD-09.2 [R] An Organizational Learning Model of the Software Development Process

Christopher L Huntley; Fairfield University, United States
Christina M Majors; Fairfield University, United States

This paper examines the development process from an organizational learning perspective, classifying events into two types of learning activity: i) the elimination of process bugs or defects; and ii) introduction of new features and enhancements. A network queuing model is presented with an application to the Mozilla browser project.

WD-09.3 [R] 5 Critical Steps for Adopting CMM in an ISO Environment

Eugene G McGuire; American University, United States
Karen A McKeown; Keane, Inc., United States

To maintain a competitive edge in today's global economy, many IT organizations are seeking ways to decrease costs while improving efficiency and effectiveness. There are various software quality and process improvement models that can be employed to help achieve this goal, but the two most commonly adopted are the Software Engineering Institute's (SEI) Capability Maturity Model (CMM(r)) for software and the ISO 9000 series of standards. This paper explores one US company's experiences in implementing the software CMM(r) in an ISO 9000 certified European organization.

WD-10 Technology Assessment and Acquisition-2
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Portland**
Chair: Alan Pilkington; Royal Holloway, University of London

WD-10.1 [R] Manufacturing System of the Information Era for Uncertain Marketplace

Hideo Fujimoto; Nagoya Institute of Technology, Japan
Alauddin Ahmed; Nagoya Institute of Technology, Japan

This paper discusses the importance of identifying the key locations in the Supply Chain and then introduces a new model for planning technology acquisitions for manufacturing facilities in the face of uncertainties in product and technology evolution, and products' life cycles. Product mix resulting from the stochastic product stream and overlapping of the lifecycles, and technological evolution are simultaneously considered for acquisition decisions.

WD-10.2 [R] Patent Data as Indicators of Technological Development: Investigating the Electric Vehicle

Alan Pilkington; Royal Holloway, University of London, United Kingdom
Romano Dyerson; Royal Holloway, University of London, United Kingdom
Omid Tissier; Royal Holloway, University of London,

We explore patenting activity as an indicator of technological development, using US patents to analyse responses to regulatory change in the automobile industry. We identified the development of complex networks of firms developing electric vehicles and discuss the limitations of defining patent searches in terms of products rather than technologies.

WD-11 Technology Management Education-4
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Columbia**
Chair: Antonie M de Klerk; University of Pretoria

WD-11.1 [R] Challenges in Implementing e-Learning

Larry A Mallak; Western Michigan University, United States

Today's technology affords many new options to design and deliver educational and training content. However, the adoption rate, cost, features, and infrastructure supporting these technologies can inhibit e-learning effectiveness. This paper draws from the literature and from recent uses of e-learning technologies in engineering management courses to identify ways of teaching and learning more effectively.

WD-11.2 [R] Washington State University's Engineering Management Program Distance Education Industry Partnership Success Stories

E. Ray Ladd; Washington State University, United States
James R Holt; Washington State University, United States
Hal A Rumsey; Washington State University, United States

This paper concentrates on the relationship of Washington State University's Engineering Management Program with The Boeing Company based in Seattle, Washington, which has students and facilities across the country. Students complete class projects as a normal part of every course and as a final end-of-program project. This paper explores the successes and benefits received from the student projects.

WD-11.3 [R] Transforming Technology Management Courses for Web Delivery

Wayne Wakeland; Portland State University, United States

This paper explores the ramifications of using web technology in teaching technology management courses, computer-based modeling and simulation courses in particular. The emphasis is on what works, but disappointments are also mentioned. Web technology is being used to supplant lectures with self-paced materials and lab exercises that enable students to take courses remotely and asynchronously. Web-based exams are also discussed.

WD-12 PANEL: Special Session: Engineering Management Program Heads
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Willamette**
Panelist(s) Dundar F Kocaoglu; Portland State University

Educational programs in engineering and technology management are offered under various titles, with a variety of organizational structures. Some are departments, some are programs, some are offered in the schools of engineering, some in business schools, while some are joint programs. The common framework underlying this activity is the strategic direction of the education and research thrusts. As this discipline continues its growth, the problems and opportunities surrounding that framework are emerging as crisp issues that will have major impacts on its future. The objective of this special session is to raise those issues and develop strategies for the success of Engineering and Technology Management as a growing discipline. Directors, chairs and faculty members of the engineering and technology programs, and others interested in the academic issues of this discipline, are invited to attend.

WD-13 TUTORIAL: Intel's Path to Becoming 100% e-Corporation
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Douglas Fir**
Speaker(s) Bud Stratton; Intel Corporation
Bill Giard; Intel Corporation
John Cartwright; Intel Corporation

During this tutorial session we will address three related topics: First, we will provide an overview of Intel Corporation's efforts to evolve toward a 100% e-Corporation. Second, we will look at technological advancements in both the Internet medium and thin-client technology that have enabled Intel to provide its suppliers with real-time data in a quick and cost effective manner. We will highlight two solutions that are helping to shape the way Intel is doing business. Lastly, we will address industry efforts to drive the development and adoption of data exchange standards referred to as RosettaNet standards. Specific attention will be given to the progress being made in two of the seven RosettaNet business clusters-Product Data and Manufacturing.

WD-14 TUTORIAL: What Does It Take to Be An Innovator?
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Meadowlark**
Speaker(s) Gerard H Gaynor; Innovation Management Institute

This tutorial explores the challenges facing innovators and prepares them to accept those challenges. Innovation involves more than coming up with the next idea-it involves taking the idea and pursuing it relentlessly to successful implementation. The session focuses on the personal characteristics of an innovator; the innovation process; overcoming resistance to innovation; the role of resources and organizational infrastructure; and how to put it all together.

WD-15 TUTORIAL: Creative R, D, & E Teams
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Mt. Hood**
Speaker(s) Michael M Beyerlein; University of North Texas
Jill Nemiro; Cal Poly Pomona

Technical professionals work increasingly in a variety of team forms to be able to contribute most effectively to the work of an organization. This workshop examines team designs, the factors that make them succeed or fail, and the conditions that promote creativity and innovation in teams and team-based organizations.

WD-16 Technology Marketing-2
Wednesday, 8/1, 3:30 PM - 5:00 PM **Room: Salmon Room**
Chair: Tom Gillpatrick; Portland State University

WD-16.1 [R] Neural Networks in Action: An Engine for the Marketing Information System

Harri Tuominen; Leonia Bank plc, Finland
Kenneth Halin; Marknadsanalys Finland Ltd, Finland
Hannu Jaakkola; Tampere University of Technology, Finland

This paper is the last paper of our trilogy. The first paper of our trilogy describes efficiency of MLP Decisions vs. human being in selection of new prospects [1]. The second is describing the mathematics behind the classification process [2]. The third paper is concentrating on the IT construction of the Neural Network DSS. This paper describes the construction of NN classification process as a part of marketing decision support system, as a part of business process and its added value for the whole customer relationship management process. Account managers will get significant information for their use via MDSS (marketing decision support system) to make investment decisions concerning new potential enterprise prospects. This means classified information, which are modeled by using external general data. Linking the external data with the behavior information of the customer with effective IT construction it is possible to create added value for marketing requirements. In this study we examine how three different models are created with a Standard Back-Propagation MLP and a strong pre-processing of the variables competing against human decision-making. We demonstrate how difficult it is even for experts to evaluate information and how we can improve the process with mathematical methods.

WD-16.2 [R] CRM-Systems as Technology Enabler for a Customer-Oriented Knowledgemanagement

Stefan Helmke; Heinz Nixdorf Institut, Germany
Wilhelm Dangelmaier; Heinz Nixdorf Institut, Germany
Matthias F Uebel; University of Paderborn, Germany

Contemplating nowadays dynamic market environments the quality of companies´ knowledge about their customers´ needs and their satisfaction becomes more and more decisive for the economic success. CRM (Customer Relationship Management)-systems with their various functions provide the technology in order to cope with these challenges.

WD-16.3 [R] External Technology Commercialization: Policy Guidelines

Stefan Koruna; Swiss Federal Institute of Technology Zurich, Switzerland

When Anderson (1979) as well as and Ford & Ryan (1981) started promoting the idea of selling technologies (external technology commercialization), this idea represented a disruption from the point of seeing and conceiving the traditional technology licensing process. Before, licensing technologies was primarily seen as a means to acquire technology or technological knowledge developed outside of a firm's boundaries. With the introduction of the idea of

external technology commercialization (technology marketing) a new perspective was given: from pull to push, from the demand and technology acquisition side to the supply and external technology commercialization side. This paper explores the challenges firms are facing when they are confronted with the question and the challenge of whether or not to commercialize technological knowledge outside of the firm's boundaries.

HB-01 Information/Knowledge Management -11: E-Commerce
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Salon A**
Chair: K. Ramanathan; University of Western Sydney

HB-01.1 [R] Strategic Questions of the e-Commerce Analyzed by the Knowledge Management Theory

Sandra L Pereira; Universidade Federal de Santa Catarina, Brazil
Lucinaldo S Rodrigues; Universidade Federal de Santa Catarina, Brazil

The world is nowadays highly competitive with the new digital technologies, associated to the leveraging of the knowledge economies, and essentially with the search of how to take competing advantages of the created knowledge and the shared knowledge. In general, three strategic questions support the electronic commerce - the generation of a refined knowledge on how to compete in the future, how to commercialize in the future, and how to use the internet to reformulate organizations. The purpose of this paper is to discuss these questions which form the E-commerce area, using the knowledge management theory as the analysis focus.

HB-01.2 [R] e-Strategies for Technological Capability Development

K. Ramanathan; University of Western Sydney, Australia

Technological capability may be looked at in terms of strategic, tactical, and supplementary capabilities, all of which shape the management, business processes, and competitiveness of a firm. This paper presents a preliminary analysis of how information technology and e-commerce can accelerate technological capability development, and highlights strategic issues in formulating e-strategies for upgrading technological capability.

HB-01.3 [R] Management of e-Technology in China

Yi Wei; University of Twente, Netherlands
Sirp J De Boer; University of Twente, Netherlands
Jin Chen; Zhejiang University, China

The "e" technology is bringing about many challenges for companies, in particular for their managers. This concerns a vast range of business processes in many sectors of the economy and in nearly every country of the world. In rapidly industrializing China companies and other organizations are actively finding their way by adapting, developing and exploiting new e-technologies. The paper's focus is the identification of the management issues in implementing e-technology in China. The paper reports on research into difficulties of establishing and operating e-business in China. In particular, it discusses management related to e-technology sharing and application. A brief review of literature is followed by the analysis of three recent case studies: an international IT services alliance, a financial services provider and an international manufacturing joint venture. All case companies are applying e-technology in China, but the role of e-technology differs in the three cases: adding a service line to the existing business processes, developing a new business process and increasing efficiency and effectiveness in business processes. The conclusions present the emerging management issues: cooperation is a key asset in networking; the choice of business models plays an important role; adequate management attention for details such as training program is required.

HB-02 Information/Knowledge Management-18: Modeling
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Salon B**
Chair: Kiyoshi Niwa; The University of Tokyo

HB-02.1 [R] Modeling an Integrated System: Organizational Knowledge and Data Warehouse

Young-Jai Lee; Dongguk University, Korea, South
Jaemyong Choi; Dongguk University, Korea, South

This paper is to illustrate the possibility to use organization knowledge and data warehouse simultaenously for a decision-maker. Organization knowledge is produced for qualitative decision making and data warehouse is used for quantative decision making. KMS and data warehousing are currently implemented separately in many organizations although two systems are needed together for a decision maker. This research will show a model of integrated system and a prototyping system based on the model. And its effectiveness will be discussed.

HB-02.2 [R] Knowledge Activity Processes and Knowledge Management System: An Empirical Examination of the Relationship Between Behavioral Features of Knowledge Management Systems

Seungkwon Jang; Sungkongheo University, Korea, South
Jong-In Choi; Hanbat National University, Korea, South
Kilpyo Hong; Chonan University, Korea, South
Joan Jung; SamsungSDS, Korea, South

The paper explores the relationship between behavioral features of knowledge management processes and IT-based knowledge management system. Knowledge management processes consist of four activities, namely knowledge acquisition, creation, sharing/diffusion, and utilization. We compare the different sets of data — the questionnaire data and the log data of Knowledge Management System. These are collected from ARISAM (Knowledge Management System in Samsung SDS).

HB-02.3 [A] Knowledge Management in a Technology-Driven Supplier Company

Yuka Baba; Mitsubishi Chemical Corporation, Japan
Eiichi Watanabe; Mitsubishi Chemical Corporation, Japan
Makoto Morita; Mitsubishi Chemical Corporation, Japan

Innovation and creativity are becoming increasingly important for the sustainable growth of technology-driven companies. Authors shall introduce examples of knowledge management methodologies such as tools to support simplify and structure "thoughts", systematic linkage of various tools and knowledge to gain speed in evolution of knowledge quality, lessons learned, and the future insights for activities.

HB-03 Strategic Mgmt. of Technology-13
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Salon C**
Chair: Dilek Cetindamar; Sabanci University

HB-03.1 [R] Technological Networks as Complex Systems: Their Management by Application of the Control Theory

Juan C Fdez. de Arroyabe; ESIC. Esc. Sup. de Gestión Comercial y Marketing , Spain
Nieves Arranz; UNED. Fac. CC. Económicas y Empresariales, Spain

The phenomenon of collaboration between economic agents, and more specifically in technological areas, is characterised by the ambiguity of the terminology, the multiple analytic approaches, the diversity of objectives and the multiple organisational forms, among which the networks constitutes the most novel example of "common organization" in international collaboration for the development of technology projects. In this paper we described the main factors which make technological networks a complex phenomenon and analysed these from a systemic perspective, through the diverse economic factors which affect technological network efficiency and stability. Also is suggested the need to develop dynamic control systems for proper technological network management and to mitigate possible disturbances.

HB-03.2 [R] High-Tech Business Development

Verda C Yunusoglu; TUBITAK-Marmara Research Center, Turkey
Seckin Polat; Istanbul Technical University, Turkey
Tufan V Koc; Istanbul Technical University, Turkey

In this era, need for higher levels of technology and new business development has risen greatly along with the increase in global industrial competition. The methodology of decision-making in business development is very

important for long-term corporate success. This paper describes the key elements, those are the basis of the methodology of decision-making in high-tech business development, and how they form a comprehensive and consistent platform for the dynamic growth.

HB-04 PANEL: Engineering & Technology Management Journals
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Salon D**
Panelist(s) Dundar F Kocaoglu; Portland State University
Ted Eschenbach; TGE Consulting
Harold A Linstone; Prof. Emeritus, Portland State University
Abbie Griffin
Bob Mason, Florida State University
Mike Wolff, Industrial Research Institute

Editors of the leading journals in Engineering & Technology Management will discuss the philosophy and strategies of each journal, and answer questions from the audience

HB-05 E-Business-11: Implementation
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Salon E**
Chair: Mei Qi; INSEAD

HB-05.1 [R] Impacts of EDI on the Supplier

Mei Qi; INSEAD, Singapore

In the new era of Electronic Commerce (EC), Electronic Data Interchange (EDI) is continuously playing a critical role for many businesses. EDI can reduce cost and improve service and thus is a valuable tool in enhancing a company's competitiveness. In this paper, we use a simple EDI adoption model to capture a supplier's decision process in adoption of EDI, and to study the impacts of EDI on the supplier. Results show that the supplier may exercise price discrimination towards its downstream buyers, due to EDI adoption and the heterogeneity of each buyer's EDI system. Depending on the supplier's economic behavior and EDI adoption cost, the supplier may benefit the most by adopting all, a fraction, or none of its buyers' EDI systems. As a result, buyers whose EDI systems are not adopted by the supplier may lose their competitiveness. Consequently, the supplier's buyers' base may be reduced due to EDI adoption. This result is consistent with the scenario in the retailing industry observed by Schiller and Zellner (1992), and it is also reported in European Commission (1997).

HB-05.2 [R] A Suggested B2B e-Commerce Integrated Model

Elif Baktir; ASELSAN Inc., Turkey

How does e-commerce affect a company? What kind of changes does it bring? What kind of opportunities and threats does it cause? Understanding e-commerce is necessary to answer these questions. This study provides an interpretation of e-commerce by developing integrated model for business-to-business e-commerce.

HB-06 Telecommunications-3
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Salon G**
Chair: Ilsue Roh; ETRI

HB-06.1 [A] WAP: Wireless Application Protocol - Wireless Wave of the Future

Salvatore P Savino; Cap Gemini Ernst & Young, United States

In the present dynamic business environment, companies are forced to become more competitive in order to survive. Demand for user mobility has sparked tremendous growth in wireless communication systems. The demand has been for access to more information and services on mobile phones. It is estimated that in the near future, there will be about one billion mobile phone subscribers with a substantial portion of the phones having multimedia capabilities. This means there will be an explosion in the number of services that will be provided to mobile phones. WAP provides a universal standard for bringing Internet content and advanced added services to wireless devices. This paper looks at the important role WAP will play in the mobile e-commerce revolution and on corporations as part of the wireless future.

HB-06.2 [R] The Triple Helix Model in Korean Mobile Communications Technology Innovation

Sang-Young Han; ETRI, Korea, South
Yun-Bong Auh; ETRI, Korea, South
Yeong Wha Sawng; ETRI, Korea, South

This study analyzes the process of the CDMA technology innovation which is supported by Triple Helix, a cooperative body of Government-Industry-Government Research Institute in Korea. In a very high uncertainty of high-end telecommunications technologies and market conditions, the Korean government provided corporate participants with various subsidies and administrative supports to reduce the risk of the CDMA technology standard. Also, the government's policy concerns were given to a new technology development via the cooperative body of Government Research Institute-Industry and its commercialization through the industry. This paper insists that the successive CDMA technology development was resulted from efficient functioning of the Government, Industry and Government Research Institute, and the cooperative relationship of these groups.

HB-06.3 [R] Radio Resource Requirements in the IMT-2000 Network

Ilsue Roh; ETRI, Korea, South
Myung-Hwan Rim; ETRI, Korea, South
Sungsik Shin; ETRI, Korea, South
HEE-SEON JANG; Chonan College of Foreign Studies, Korea, South

We present the model to obtain the radio resource requirements in the IMT-2000 network by using the ITU-R recommendation. The scheduled services in the year 2010 are classified into circuit and packet switching modes, and three types of environments such as central business district (CBD), pedestrian (PED) and vehicle (VEH) are considered. To determine the number of service channels in a cell, the Erlang-B (Erlang loss) formula for the circuit switching services and Erlang-C (Erlang delay) model for the packet switching services have been adopted.

HB-07 Technology Transfer-5
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Salon H**
Chair: Ronald A Bohlander; Georgia Tech Research Institute

HB-07.1 [R] Determining Optimal Partnership in Technology Transfer: A Theoretical Framework

Veerappan Jayaraman; University of Western Sydney, Australia
Rakesh Agrawal; University of Western Sydney, Australia

One of the most important problems facing countries in transferring technology is the selection of a transferor. A methodology to evaluate the technology transfer potentials at the industrial level between the transferor and transferee would help to gain insights into the complex process of technology transfer and identify the optimal partnership for an effective technology transfer. From the transferee's point of view, the transferor to be selected should be able to provide the optimum level of such technology compared to other potential transferors.

HB-07.2 [R] IT Supported Complex Technology Transfer in High-tech Sector

Kalle Lyytinen; Case Western Reserve University, United States
Nazmun Nahar; University of Jyväskylä, Finland
Najmul Huda; Tallinn Technical University, Estonia

Most of the high-tech companies are unable to transfer their complex technology to developing and emerging markets due to the characteristics of technology, receiver and receiving country. By utilizing the diffusion of innovation theory and a case study method, a framework for new and innovative IT-enhanced technology transfer is presented which facilitates improved performances of transferred complex technology.

HB-07.3 [R] IT Aided Training in International Technology Transfer

Nazmun Nahar; University of Jyväskylä, Finland

Vesa Savolainen; University of Jyväskylä, Finland
Najmul Huda; Tallinn Technical University, Estonia

Traditional methods of training for international technology transfer require travelling, high amounts of human resources, time and money, and may not be affordable for many companies. By utilizing the learning theories, business process improvement theory and a case study method, this study presents a framework that facilitates training to technology recipients around the world, increases technology transfer capacity and improves effectiveness.

HB-08 PANEL: SPECIAL SESSION: Engineering and Technology Management Students Colloquium
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Salon I**
Panelist(s) Timothy R Anderson; Portland State University

Critical issues in Engineering and Technology Management education will be raised from the students' perspective. Opportunities, challenges and commen concerns will be addressed. The session will have a free-flowing discussion format with questions from the audience.

HB-09 PANEL: Organizational Mechanics of the Open Source Movement
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Eugene**
Panelist(s) Muir Lee Harding; Autodesk

The Open Source software movement is at once baffling and inspirational. Rapid growth along with the transient nature of its contributors have resulted in novel organizational structures and mechanics. Panel discussions will focus on their application in commercial enterprises, ala. "democratic" models of R&D and development.

HB-10 Technology Assessment and Acquisition-3
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Portland**
Chair: Tugrul U Daim; Intel Corporation

HB-10.1 [R] Technological Capability Assessment as a Strategic Tool: Cases in Chinese Manufacturing Firms

Wei Jiang; Zhejiang University, China

By the view of technological innovation strategy, technological capability is the essential basis for the firm to get access to the technological competitiveness. This paper aims to propose the methodology to assess and measure the components of technological capability so as to help the firm to appraise its strength and weakness. The paper first addresses the concept of technological capability. Second, it presents the assessment indicators to evaluate technological capability. Third, it uses the Radar analysis tool to ascertain the bottleneck of technological capability enhancement. Finally, the paper uses some cases of Chinese manufacturing industry to address the application of technological capability assessment methodology.

HB-10.2 [A] Knowledge Management Benchmarking for Organizations with and without ISO-9000 Certificate in the Period of Organizational Transition

Violeta Subeska-Todorovska; University 'STS. Cyril and Methodius', Macedonia
Radmil Polenakovik; University 'STS. Cyril and Methodius', Macedonia
Todor Kralev; University 'STS. Cyril and Methodius', Macedonia

After the process of education for quality managers and auditors and ISO-9000 certification, a research was done to see the results in the fields of Human Resource Management, Information Management, Organizational Learning and Knowledge management.

HB-11 Product Development at Hewlett-Packard
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Columbia**
Chair: Michael Menke; Hewlett-Packard Co.

HB-11.1 [A] The Result of Testing is Not Quality

Joni T Ohta; Hewlett Packard, United States

The result of testing is not quality, it's information. You can have the best test system, ignore the information, and still ship "crappy" products. Product quality is directly related to the quality of information-driven decisions. This presentation overviews the decision and information driven approach to integrated test strategies.

HB-11.2 [A] ABC's of Product Development Lifecycle Selection

Joni T Ohta; Hewlett Packard, United States

Product development lifecycles are processes designed to meet certain requirements and constraints. However, these are often not considered in selecting lifecycles. Management then feels they're fighting a process that is not working for them. This presentation presents an overview of common lifecycles/PG paradigms and method for selection based upon business requirements and constraints.

HB-12 Human Resource Development in the Network Economy
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Willamette**
Chair: Alptekin Erkollar; Universität Klagenfurt
Heinrich C Mayr; Universität Klagenfurt

HB-12.1 [R] Experiences in Using an E-Learning Environment at the University of Klagenfurt

Jürgen Wickl; University of Klagenfurt, Austria

Web-based training and teaching is a means to enhance the on-going upgrade of knowledge and skills of human resources within an enterprise. To analyze the functionality and effectiveness of existing e-learning environments, a number of such tools have been compared and specific tests were performed using Lotus Notes LearningSpace. This paper gives an overview of the compared tools, the established criteria and the results obtained from that study.

HB-12.2 [R] University Enterprise Cooperation for Human Resource Development

Heinrich C Mayr; Universität Klagenfurt, Austria
Maria Th. Semmelrock-Picej; Universität Klagenfurt, Austria

This paper reports some results of the European Leonardo Program project DUET (Developing University Enterprise Teaching) which focussed upon the effects a University can have in interaction with industry in the realm of vocational training, life-long learning and thus, human resource development. Special attention is given to the aspect of 'organizational learning'.

HB-12.3 [R] e-Business Strategy Guidelines For a Heterogeneous Enterprise Consortium

Alptekin Erkollar; Universität Klagenfurt, Austria

This paper discusses guidelines for the development and implementation of an e-business strategy which have been worked out for the members of a network of heterogeneous enterprises. It will be shown, how a generalized set of guidelines may be customized w.r.t the goals and needs of a specific enterprise.

HB-13 Supply Chain Management-3
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Douglas Fir**
Chair: Michael H Cole; University of Arkansas

HB-13.1 [R] The Software Supply Chain for Manufactured Products: Reassessing Partnership Sourcing

Lynne F Baxter; Heriot-Watt University, United Kingdom
John E Simmons; Heriot-Watt University, United Kingdom

Suppliers of software are often of strategic importance, and the preferred mode for managing strategic suppliers is partnership sourcing. Using a case drawn from industry the paper demonstrates that software supply relationships share many of the characteristics of partnerships without the performance levels and reassesses this mode of managing supply relations.

HB-13.2 [R] Supply Chain Model Based Simulation and Optimization

Wilfried Krug; Dualis, Germany
J. Liebelt; Dualis, Germany

B. Baumbach; Dualis, Germany

Supply chain model based simulation and optimization needs planning, production scheduling, and distribution. Transportation is becoming more and more important, especially for companies which are strictly or mainly driven by customer orders. Customers ask for ever shorter delivery times, and delivery reliability has become a critical success factor for many companies, particularly for many SMEs. However, conventional planning tools do not support reliable planning because of several weaknesses. The paper deals with an intelligent toolset for modelling, simulation and optimization of supply chain management in connection with just-in-time production processes and distributions for user companies, which currently has considerable problems with their capacity utilisation: They have to reject many customer orders because they are often not sure if they have sufficient capacity available to meet the required delivery dates. On the other hand, capacity utilisation is in general only 60%. They expect that better planning and forecasting tools will enable them to take approx. 30% more customer orders, thus reaching a capacity utilisation of approx. 80% on average.

HB-13.3 [R] A Simulation Game to Analyze Impact of Information Technologies on Supply Chain Management

Zafer Kılıç; Yeditepe University, Turkey
A. Nuri Basoglu; Bogazici University, Turkey
M. Atilla Oner; Yeditepe Univ, Depts of Bus Adm + Syst Engineering, Turkey

If information technologies are properly implemented, they can substantially reduce paperwork, lead time, inventory, cycle time and non-value-added activities as well as improve communication and minimize costs. In this study, a model of a archetypal firm in supply chain is formed by using system dynamics methods to investigate effects of information technologies.

HB-14 Technology Marketing-3
Thursday, 8/2, 10:00 AM - 11:30 AM **Room: Meadowlark**
Chair: Tom Gillpatrick; Portland State University

HB-14.1 [R] Market Growth Model in Which the Potential Market Size Increases with Time

Masayuki Osaki; University of Tokyo, Japan
Kiminori Gemba; University of Tokyo, Japan
Kodama Fumio; University of Tokyo, Japan

This research analyzes market growth models, whose potential markets increase with time stepwise or continuously. There is no research paying attention to expansion of potential market. "N-step logistic model" and "Double logistic model" are presented as the new model. This research verifies the validity of the models by quantitative analysis.

HB-14.2 [R] Database Marketing Applications in Ready-to Wear Retailing Sector in Turkey

Erol Eren; Dogus University, Turkey
Irem E Erdogmus; Marmara University, Turkey

This paper covers formation of a knowledge management system and use of databases in new product development, other marketing activities and distribution channels. The results of a research covering the topic conducted among cloth retailers in Turkey will be discussed in the end.

HB-14.3 [A] Building a Brand in the World of Deep Technology

Kerry McClenahan, McClenahan Bruer Communications

Many studies have shown that customers prefer to buy from companies with strong brand awareness rather than those with low or ambiguous brand identities. In today's economic climate, with marketing, PR and advertising budgets being slashed, a strong brand can make a big difference in how technology companies weather the storm and position their products to increase sales. Unfortuantely, what most companies know about branding comes directly from the consumer world, where branding originated. Branding technology companies, particularly deep technology companies, is significantly different than branding in the consumer arena. This presentation will address the unique requirements of branding deep technology companies and will outline the essential components of a brand and the process for developing a strong identity in the deep technology world.

HC-05 PANEL: SPECIAL SESSION: PICMET '03 Strategies
Thursday, 8/2, 1:30 PM - 3:00 PM **Room: Salon E**
Panelist(s) Dundar F Kocaoglu; Portland State University

Planning for PICMET '03 will begin immediately after PICMET '01. The scope, theme and strategies of the next PICMET will be discussed, and preliminary assignments will be made in this session. All participants interested in taking an active role in the next PICMET are invited to attend.

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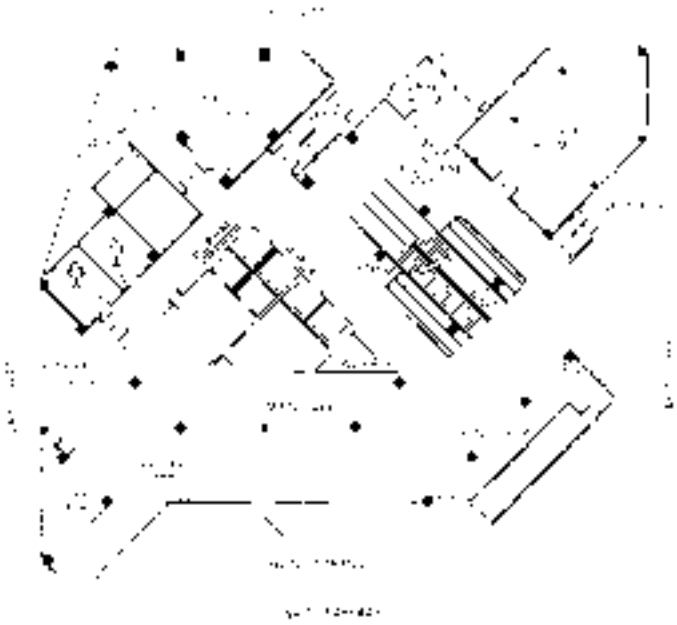
Marriott Floor Layout



Lobby Level

Lower Level 1

Third Floor

Restaurant Level

It is not too early to start planning for

PICMET '03

July 23-27, 2003

Portland, Oregon–USA

You are invited to participate
in the
PICMET '03 Planning Session
at
13:30-15:00
Thursday, August 2
in the
Mt. Hood Room