Engineering Management

NEWSLETTER

The IEEE Engineering Management Society Newsletter
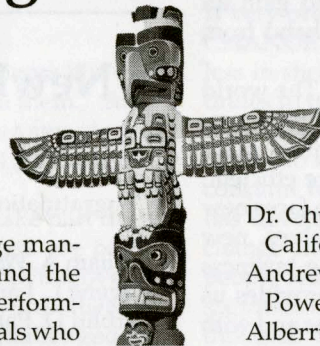
Managing Virtual Enterprises

IEMC '96
August 18-20, 1996

Vancouver, B.C.
CANADA

I EMC '96 presents you with an opportunity to bridge the gap between cutting-edge management research in virtual enterprises and the realities of maintaining sustainable business performance. The conference brings together professionals who manage technology, engineers and scientists, academic researchers from many disciplines, government policy makers, and business professionals to provide you with an opportunity to learn, to share your concerns and experiences, and to explore the opportunities and unsubstantiated threats of the Virtual Enterprise.

Your conference committee has organized a program that crosses disciplines and provides you with an opportunity to become knowledgeable about the issues that will, if not already, affect your work environment and how you function as a professional in the future. The future is really today! Qualified specialists knowledgeable about the subject and its many implications for industry, academia, and government have been selected to present their research results as well as their views on the many issues involved. IEMC 96 crosscuts the strategies, operations, resources, infrastructure, and activities of every organization and it is important that engineers and their management understand the implications.

The conference committee has organized a program that brings the realities of the Virtual Enterprise to the forefront.

IEMC '96 plenary session speakers include:

Honorable John Manley (Minister of Industry, Canada)
Wallace S. Read (President, IEEE)
Mr. Gene Banman (Vice President and General Manager, Sun Micro Systems Inc.)
Dean Robert Hawkins (Georgia Institute of Technology)

Dr. Chuck Alexander (Dean, Engineering Dept., California State University, Northridge)
Andrew M. Vessey (Vice President, Niagara Mohawk Power Corporation)
Alberrt M. Erisman (Director of Technology, The Boeing Company)

The over 150 presenters and panelists at IEMC '96 give you an opportunity to understand the implications of the Virtual Enterprise on how and where you perform your professional responsibilities. Those 150 presentations cover Information knowledge, management, and technology; International Aspects of the Virtual Enterprise; Product and Process Implications; Project Management issues; Resource and Infrastructure Requirements; Strategic Management of Technology; Implications for the Service Industries; and Research, Development, and Engineering Management.

14 Pre-IEMC '96 Tutorials will be presented on topics related to the Virtual Enterprise (see page 4 for abstracts and the registration form on page 7 for fee information).

So why not join with us in Vancouver and take advantage of this opportunity to learn about a topic that will affect your future.

Please use the attached registration form or call Bruce Prior at (604) 528 - 2736 for additional information.

Are you a Chapter Chair, or interested in serving the EMS Board? Your Board of Governors will conduct its "fall" meeting at the Renaissance Vancouver Hotel on Saturday 17 August 1996. If you would like to attend the meeting, or the Saturday evening Dinner, please contact Executive VP Bill Burke (212) 290 - 7054. As your EMS President, I look forward to seeing you there.

- Gus Gaynor

On Virtual Enterprises and IEMC '96

Gus Gaynor - EMS President

Businesses of all types are facing unpredictable and unprecedented changes. Change appears to be a way of life not only as a requirement for competitive advantage but as a means for sustaining business performance. The world is in a dynamic mode. The birth of the Virtual Enterprise, as related to business alliances and partnerships, provides a strategy to help transform the essential business competencies into a firms competitive capabilities.

As with every new idea or concept come the extremes — that continuum that includes nothing or everything. The Virtual Enterprise will not eliminate the traditional business enterprise nor will it allow the traditional to remain the same. Someplace on that continuum lies an optimum solution for a specific set of concerns and constraints. The International Engineering Management Conference (IEMC 96) gives you an opportunity to learn the requirements and to gain an understanding of the underlying principles first hand from speakers at the forefront of this emerging concept.

We are living in an ever more complex world. The world is not really becoming smaller as some suggest but is becoming much much bigger. Granted that lines of communication have been shortened and made significantly more efficient, but every organization as it extends its global reach faces new and unforeseen problems. New cultures, new values, new languages, new priorities, and new ways of doing business are the order of the day. The Virtual Enterprise provides us with a way to deploy the critical capabilities on-time and with effective use of resources.

With those changes come certain hopes and benefits as well as fears and frustrations. The key is that we, as managers, as engineers, and as business people responsible for maintaining sustainable business performance, understand the implications of the Virtual Enterprise and position ourselves to be active participants and shape it. That is why the Engineering Management Society has chosen to address this most important issue of Managing the Virtual Enterprise through IEMC '96, its 1996 International Conference on Engineering and Technology Management.

As you can see on the cover of this issue, IEMC '96 addresses these and other concerns. Providing over 150 plenary, tutorial and regular session presentations — an opportunity too good for you to miss — on the very topic on managers minds today, IEMC '96 is where YOU should be in August. So come up to Vancouver and expand your Virtuality with the EMS.

Gerard H. (Gus) Gaynor, a regular contributor to your newsletter, is your Engineering Management Society President for 1996. He is Editor of the Handbook of Technology Management and can be reached at G. H. Gaynor Associates, Inc., 1300 Nicollet Mall, Suite 5168, Minneapolis MN 55403. His phone number is (612) 332-8822, FAX (612) 343-3299, and can be reached via e-mail at g.gaynor@ieee.org. Gus welcomes your comments and discussion on his ideas.

Board of Governors - Class of '98

You votes have elected the following candidates to your Engineering Management Society Board of Governors for the three-year term ending December 31, 1998:

Robert B. Bishop, Jr.
Merrill W. Buckley, Jr.
Raymond D. Findlay
Gerard H. (Gus) Gaynor
Thomas H. Grim
Gerald F. Harris
K. R. S. Murthy
Cinda S. Voegtli

Members of the Board of Governors serve you by participating in two yearly meetings and in creating and administering the policies, conferences, publications, liaisons and other activities that make the EMS the Society it is today.

Why not consider submitting YOUR resume and reason for helping us to help you build an even better EMS? For further information, please contact Tom Grim at t.grim@ieee.org or (847) - 202 - 8311.

Newly Elected EMS Senior Members

Congratulations from your Board of Governors to

William A. Wallace	Troy, NY	(Region 1)
Eugene L. Lambert	Exeter, NH	(Region 1)
Parbhu D. Patel	Copthorne Crawley, ENGLAND	(Region 8)

for being elected Senior Members of the IEEE.

Are YOU qualified? Call or write IEEE for a senior member application and see YOUR name in this column. Special thanks to IEEE Staff member Deana Simonetti, Society General Activities, who compiled this information for your newsletter.

IEEE HOTLINES and URLs

HOTLINES:

EMS U.S. Toll-Free Member Service
Hotline: 1 (800) 742 -0432

IEEE Toll-Free Hotline: 1 (800) 678 - IEEE

IEEE Travel Hotline: 1 (800) TRY - IEEE

HOME PAGE URLs:

EMS Home Page http://sils.pratt.edu

IEEE Home Page http://www.ieee.org

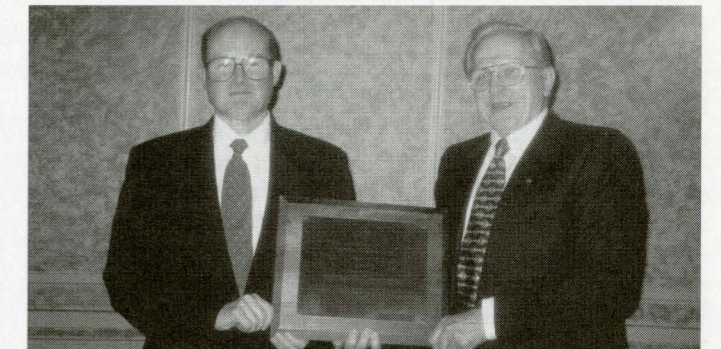PACE Home Page http://www.ieee.org/usab

EMS ENGINEERING MANAGER'S NOTEBOOK

Wood and Bodson
1994 & 1995 Engineering Managers of the Year

EMS President Gus Gaynor presents Engineering Manager of the Year awards to Dr. Wood and Bodson at Spring EMS Board Meeting.

At the Spring Board of Governors meeting on April 27, 1996 at the Sheraton Hotel in Arlington, Virginia, your Board had the pleasure of presenting not one, but two, awards for Engineering Manager of the Year. Their comments and wisdom is shared here.

Remarks of Helen M. Wood
(1994 EMS Engineering Manager of the Year)

Mark Twain said, "It is better to deserve honors and not have them, than to have them and not deserve them." Such remarks serve to keep one humble in the face of an award such as this one, the IEEE Engineering Management Society's Engineering Manager of the Year Award.

I must say that it is especially gratifying to take part in an event in which two U.S. Government managers are being recognized. I know many outstanding managers in government service. Today, these managers, like those in other organizations around the world, are being challenged to maintain quality of products and services, while accepting major funding reductions. And Government's science and technology programs are not being spared, either. While we might debate the wisdom of some of these cuts, that's not the message I want to leave with you tonight.

In spite of the downsizing facing many organizations, I believe that scientists and engineers will continue to find career opportunities at all levels of experience. But now, perhaps more than ever, it is essential to maintain current knowledge and skills, and to develop and nurture an extensive network of contacts in the field.

Personally, I credit my involvement with IEEE and its societies as having helped me in this regard — throughout my career. The Engineering Management Society fills a special role - it strives to help engineering managers, as well as those who aspire to become managers. Keep up the good work! And thank you...

Dr. Helen M. Wood (Director, Office of Satellite Data Processing and Distribution, U.S. Department of Commerce, National Oceanic & Atmospheric Administration) may be reached via e-mail at hwood@nesdis.noaa.gov

Remarks of Dennis Bodson
(1995 EMS Engineering Manager of the Year)

The topic "Challenge of Engineer's In Today's Environment" is both timely and appropriate. There is a saying that "The Old Gray Mare Ain't What She Used to Be." I believe this to be especially true with regards to management philosophy. Our management strategy today is certainly not what it was a decade ago, and probably will never be that way again. Heretofore, stability was a key factor both in terms of people, budgets, and job security. In today's environment, instability is very prevalent. The only constant we can depend upon is CHANGE. We are continuously being asked to do more with less in shorter periods of time. However, the workload continues to increase (if we are truly fortunate, perhaps this will remain approximately as it was before). Our challenge is, "How do we manage transition to our new environment in a constant turmoil of- change. Interchange International, Inc. has developed the Change-Cycle (TM) locator [from Interchange International, Inc., (800) 878-8422]. It depicts how people react, respond, and adjust to change in a sequence of six predictable stages. The Change Cycle model identifies the thoughts, feelings, and behaviors associated with each stage of change. The stages of change in sequential order are Loss, Doubt, Discomfort, Discovery, Understanding, and Integration. The Change Cycle model indicates-that you would not know whether or not a specific change can achieve its desired outcome until Stages 5 and 6. However, in our current environment, we seldom make it to Stages 3 or 4 much less Stage 6 before we have changed the thrust of the original proposal. Hence we have no real method of evaluating a proposed change. It is my opinion that the single most key factor in any environment is people. They are our greatest resource. We may have tremendous amounts of funding, but without capable people who are loyal and dedicated to the specified objective, we will not succeed. The question that we must address is, "How do you-manage people in a very turbulent environment to ensure high productivity, creativity, loyalty, with few if any rewards other that the fact that you might have job retention."

In accepting this award, I would like to thank all of my colleagues who helped me achieve this recognition. I do not believe that I received it for any singular accomplishment on my own. On the contrary, it was a team effort, and I thank them and the Engineering Management Society for this recognition.

Dr. Bodson, (National Communications System, Chief, Technology and Standards Division), may be reached via e-mail at bodsond@ncr.disa.mil

IEMC '96 Papers

Representative of the 150 Being Presented at IEMC '96, August 19-20, 1996

Walt O. Anderson, Jr. (Bellcore)
"Human Resource Development Challenges in a Virtual Organization"

Michael E. Richerson
(Boeing Information & Support Services)
"Process Improvements in Distributed Computing Support in a Large Corporate Environment"

Ms. Grace Bochenek (VETRONICS Technology Center)
"Product Design Using Virtual Environments - An Innovative Approach"

Dr. Thurlings (Philips Research Laboratories Eindhoven)
"The Landscape of Innovation and Supply"

Dr. Andrew Kusiak (University of Iowa)
"Negotiation in Planning and Scheduling of Virtual Enterprises"

Dr. I. Barclay (University of Liverpool)
"Improving Competitive Responsiveness via Virtual Enterprise"

Dr. Alan Pearson (University of Manchester)
"New Organizational Structures in R & D"

Dr. Samar Saha (Silicon System Inc.)
"Organizational Visions for Virtual Manufacturing:

Dr. Karol I. Pelc (Michigan Technological University)
"Maps of Virtual Structures in R & D"

Dr. Brian M. Kleiner (Virginia Tech)
" Managing Virtual Projects, Programs and Products"

Professor Hannu Jaakkola
(Tampere University of Technology - Pori)
"Managing a Virtual Hospital"

Dr. Tim Kotnour (University of Central Florida)
"Processes and Tools to Support Knowledge Management in a Virtual Organization"

Yukinori Iwashita (Sony Systems Design Corporation)
"Engineering Management for Knowledge Amplification in Virtual Enterprises"

Dr. Jun-ichi Baba (Mitsubishi Electric Corporation)
"New Wave of Managing Innovation"

Dr. Julio Macedo (Institut de Strategies Industrielles)
"Intelligent Reference Models for Designing Virtual Factories"

Dr. Kazuo Yanagishta
"Virtual Enterprises in Japan"

Dr. Ralf E. Strauss
(Albert-Ludwigs-University Freilburg)
"The Learning Laboratory - Supporting Learning Organizations with Agent Systems"

Dr. John P. Ulhoi (The Aarhus School of Business)
"Paradoxes in Corporate Theories of Technological Innovation"

Art Hutinson (Northeast Consulting Resources, Inc.)
"Outsourcing the Network"

Dr. Cheryl Gaimon (Georgia Institute of Technology)
"The Dynamics of Manufacturing and Marketing Strategy"

Leigh Reid
(Northrop Grumman Commercial Aircraft Division)
"An Integrated Management Model for Virtual Enterprises"

Dr. C. Broadfoot (University of Strathclyde)
"A Virtual Framework for Technology Acquisition"

Cinda Voegtli (Calibrated Management)
"Real-World Challenges: Using the Virtual Enterprise for Successful Product Development Projects"

Clive Pereira (1st Reengineers International)
"Reengineering Businesses into Virtual Enterprises"

Sherif Sweha (Intel Corporation)
"The Design of an Integrated Circuit Using a Virtual Enterprise"

Dr. Regina S. Lightfoot (Bell Atlantic Corporation)
"The Impact of Information & Communication Technologies on the Strategic Decision Making Process"

Dr. David J. Wells (Clarkson University)
"Regarding Virtual Growth"

Dr. Bjorn Erik Munkvold (Telenor AS)
"Managing IT Implementation in Virtual Enterprises"

David J. Smith (IBM Consulting Group)
"Tool Support for Virtual Projects"

Dr. Elias G. Carayannis (University of New Mexico)
"Valuing Radical Innovation"

Tomlinson G. Rauscher (Xerox Engineering Systems)
"The Effect of Organization Architecture on New Product Development"

Larry Warnock (Documentation, Inc.)
"Managing Virtual Enterprises"

Tutorials: Sunday, August 18, 1996

All tutorials will be held on Sunday, August 18, 1996. Pre-registration is required by August 2, 1996. Half-day tutorials will cost $95 and include handouts and one coffee break. Full-day tutorials will cost $195 and include handouts, two coffee breaks, and lunch. Please register for tutorials by number. For more information contact Ann White at (503) 725-4580 (fax: (503) 725-4667; e-mail:ann@emp.pdx.edu).

• **Internet and the World Wide Web** (full day)

The Internet is still gaining in world-wide popularity and usefulness. Even the Federal Government is endorsing activities to create new applications, especially those with information-rich resources to provide good, accurate information to the public (especially the voters!). This tutorial will describe the Internet, pitfalls to avoid, and how to access the Internet. We will also create some World Wide Web home pages in class as individual exercises to be sure you are developing useful skills, and these will be reviewed in class (time permitting). Ideally, you will have the basic skills needed when your company asks you to create a home page on the Internet. In addition, this tutorial is intended to be as interactive as possible, with relevant examples and exercises. (Presenter: Robert B. Bishop, Jr., Consultant)

• **Technical Communication** (half day)

This workshop will focus on the unique pyramid approach to help engineers and managers organize and present more effective correspondence and reports. The presenters will

IEMC '96 Tutorials: Sunday, August 18, 1996

concentrate on writing in a "technical" environment. The presenters are the authors of the IEEE Press book Writing Reports to Get Results. (Presenters: Ron Blicq and Lisa Moretto, IEEE Professional Communication Society)

• **Inside a Virtual Enterprise Tool Box** (half day)

Optimizing the performance of a virtual enterprise requires the application of new organizational approaches and tools. The workshop facilitators will present a framework for the virtual enterprise and a variety of tools that fit the unique characteristics of this model and its application. Tutorial participants will have an opportunity to experience the tools and learn how they can be applied. A feedback and open discussion period will be included to ensure maximum benefit from attendance. (Presenters: John Center, Principal Consultant, Center Associates, St. Paul, Minnesota; John W. Moran, Executive Consultant, Zenger-Miller, Harvard, Massachusetts; Joyce Thompsen, Executive Consultant, Zenger-Miller, Minneapolis, Minnesota)

• **Planning and Implementing Technology for the Virtual Office** (half day)

Technology planning can be a difficult task if you do not know where to begin. This is particularly true if you are not familiar with technology. This tutorial will guide participants through the process for implementing virtual office technology using the Technology Application Decision Model (TAD) tool kit. Participants will get an opportunity to begin planning for the technology for their organization and see some of the technology in action. The TAD model is a situational decision model for what technology to implement to optimize the potential for the virtual office environment. The decision model is based on end-user requirements, budget, existing in-house technology and available technology. The TAD tool kit includes tools for completing the technology planning process. The tutorial will be presented by the consultants of LEE consulting Services, Inc., a consulting firm which specializes in organizational development and technology solutions. (Lead Presenter: Lauri Elliott, LEE Consulting Services, Inc., Ann Arbor, Michigan)

• **Managing Distributed Project Teams** (half day)

Most traditional project management techniques were developed for co- located work teams. Increasingly, managers are faced with downsizing, mergers, acquisitions, mandated telecommuting and remotely located technical specialists. Although numerous studies confirm the majority of project managers have a strong preference for co-located teams, today's business environment makes the management of geographically distributed work teams a fact of life. Management functions such as communicating, team-building, monitoring, reporting and controlling must be performed in a dramatically different manner to be effective for distributed projects. Managers must not only re-educate themselves but also their team members. An effective "virtual office" operation requires that all the team members acknowledge and play by the new rules.

This half-day tutorial overviews the foundation management skills and technologies required for the virtual office. The focus is on new and more disciplined styles of communication. Topics include managing by objective, providing new communication skills for remote team members, monitoring remote team members, team building in a distributed environment, and addressing the cultural and logistic issues

associated with international development. (Presenter: Martha Haywood, Management Strategies, San Francisco, California)

• **Client-Server Model: A Viable Re-engineered Tool for Project Management** (half day)

The client-server computing model has become a major breakthrough in data processing as it offers a critical and powerful framework for aligning technology and various business processes. It offers a major improvement in cost-performance and processes an essential flexibility for future growth. In this tutorial, we will discuss the following topics: downsizing, rightsizing and client-server; client-server computing; clients and their roles; servers and their roles; taxonomy of Graphical User Interface (GUI) tolls; an overview of networks (LAN, WAN, MAN); client-server databases; client-server LAN implementation; and case studies. (Presenter: Gurdeep S. Hura, Nanyang Technological University, Singapore)

• **The Internet and its Various Services** (half day)

This tutorial includes a video tape of hands-on demonstrations of some of the services on the Internet. The following topics will be covered: an overview of the Internet; TCP/IP protocols; e-mail; gopher; file transfer protocol (FTP); Telnet; Usenet; and Mosaic. (Presenter: Gurdeep S. Hura, Nanyang Technological University, Singapore)

• **Theory of Constraints and Policy Management** (half day)

The combination of Theory of Constraints and Policy Management brings together the philosophy and guidelines of the Theory of Constraints and the highly structured approach of Policy Management. Together, these two tools are used to construct a process of continuous improvement that provides a single-minded, uninterrupted focus on the long-term bottom line. Moreover, they show that we must recognize, understand and implement changes needed to improve the corporate or global bottom line. This closely follows W. Edwards Deming's admonition that real quality improvement is not possible without profound knowledge which includes an appreciation for systems.

Systems have goals which may be unattainable because constraints exist. When a system is viewed as a chain or as networks of chains, the constraints can be viewed as weak links. In the Theory of Constraints, we do a core cause or fault tree analysis to identify the weakest link and focus on that one. This is the first of the five focusing steps of the Theory of Constraints.

In the implementation of Quality Function Deployment, a structured methodology, based upon decision matrices, is used to assign priorities to resource deployment. The methodology extends to other situations as well and may be considered as an umbrella which includes Quality Function Deployment. Policy Management uses decision matrices and other features which overlap those of the Theory of Constraints.

The integration of the Theory of Constraints and Policy Management is covered in the workshop. (Presenters: Clarence J. Maday, North Carolina State University; and A.Y. Jonah, Goldratt Institute)

• **Technological Forecasting** (half day)

This tutorial will provide an introduction to technological forecasting. Topics to be covered will include Delphi, growth curves, trend extrapolation, mathematical models, and sto-

IEMC '96 Tutorials: Sunday, August 18, 1996

chastic methods. Applications in R&D planning, technology management, government and business will also be covered. The presentation will be at an introductory level, and a background in engineering or science will be sufficient to prepare the attendees to benefit from the material. (Presenter: Joseph P. Martino, University of Dayton, Dayton, Ohio)

- **Enhancing Horizontal Coordination in Virtual New Product Development Teams** (half day)

This tutorial will focus specifically on new product development teams working under the paradigm of the global organization. What kind of information needs to be communicated? How can electronic workflow support dispersed NPD teams? How can the progress of these teams be accessed? (Presenters: Anne Massey and Mitzi Montoya-Weiss, North Carolina State University, Raleigh, North Carolina)

- **Virtual Teams and Work Groups: A Paradigm Shift in Organizational and Communication Strategy** (half day)

Corporations worldwide are evolving into virtual enterprises. Using integrated computer and communications technologies, corporations will increasingly be defined by collaborative networks linking hundreds, thousands, even tens of thousands of people together. These collaborative networks make it possible to draw upon vital resources as needed, regardless of where they are physically and regardless of who "owns" them- supplier or customer. Several factors are driving businesses toward virtual enterprising. For example, global competition puts corporations under tremendous pressure to cut the time it takes to deliver a product from the workbench to the showroom. Another important factor is an increasingly mobile work force. Traditional offices will shrink to mere landing sites, where mobile workers dock for an hour or so at a communal electronic desk. Virtual enterprises will develop not in the image of the factory floor 100 years ago, but as a new business ecosystem characterized by flexible relationships.

The virtual organization is built on the resource foundation of virtual teams. Virtual teams are groups of people assigned to work together on a job or project even though they may be physically far apart. Geographically dispersed team members can work close together through the use of telephones, fax machines, electronic mail, video conferencing, and the powerful new software called "groupware." The virtual work group is a relatively new practice that has emerged as a result of the efforts of U.S. companies to improve their competitiveness in the global marketplace. To succeed in this environment, companies have found out that they need to be able to complete projects as soon as possible and to harness the skills and know-how of the best people, wherever they may be. However, there is a downside to virtual teams. One significant disadvantage is the interpersonal problems associated with the practice. Members of virtual groups tend to feel alienated from the organization.

This tutorial will address the people, organizational, communication and team issues and present recommendations for overcoming interpersonal barriers. The tutorial leader will present the basics of a virtual corporation, invoke the creative

thinking of the participants, and conduct break-out team sessions. The break-out teams identify organizational and communications issues and opportunities and develop recommendation. The recommendations are integrated by the teams, facilitated by the session leader. (Presenter: K.R.S. Murthy, AT&T Business Communications, Pleasanton, California)

- **Connecting with People: Building Business Partnerships in the Virtual Environment** (half day)

In today's virtual work place one of the greatest challenges people face is making a personal connection with others. This environment is often ambiguous as people work more independently and are further distances apart. So how do we talk to each other? If an individual is in a different location from others (i.e. project team, clients or co-workers), how does that person create a spirit of teamwork, build commitment, or identify and address people's concerns?

For over six years, the presenters have consulted with companies with virtual environment cultures in the use of their "Consultative Approach" process. The approach focuses on understanding the needs and expectations of others and building a sense of trust and partnering. The Consultative Approach process is effective in either small or large projects, tasks or assignments and with both internal and external clients. The phases are Create the Work Agreement; Identify Issues and Solution Ideas; Gain Commitment for Recommendations; and Implement and Follow-up.

Combining the personal element of partnering with technology can produce amazing results. Without a clear process for how people work effectively with their internal and external clients even the latest, greatest technology can never be fully utilized. (Presenters: Suzanne Saxe and Virginia LaGrossa, Principals, Advance Consulting, Inc., Mill Valley, California)

- **Multimedia for Presentations and Course Design** (half day, Option A; or full day, Option B)

Advances in technology are making multimedia educational materials increasingly practical. Using multimedia effectively, however, requires an understanding of the principles of design and the process of developing interactive presentations. The morning session of this tutorial will focus on two areas: principles of effective visual communication and how to design an interactive presentation. Topics include the use of color, presenting quantitative information, storyboarding, considerations in choosing an authoring tool, and incorporating images, text, video, sound, and animation into a presentation.

The optional afternoon session is for participants who want to work on developing a multimedia educational tool for a specific presentation or course. Participants in this work session will develop storyboards, that is, detailed descriptions of graphics, text, and interactivity, for a particular topic. Participants are encouraged to bring partially developed outlines and sketches to this session. Please register for either Option A (morning session only) or Option B (both morning and afternoon sessions). (Presenter: Laurie Waisel, Rensselaer Polytechnic Institute, Troy, New York)
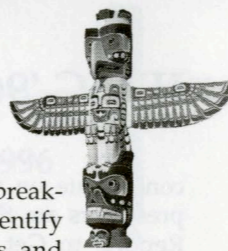
IEMC'96

The IEEE Engineering Management Society

1996 INTERNATIONAL CONFERENCE ON ENGINEERING & TECHNOLOGY MANAGEMENT

August 18 - 20, 1996 in Vancouver, B.C., Canada
Renaissance Vancouver Hotel

MANAGING VIRTUAL ENTERPRISES:
A Convergence of Communications, Computing and Energy Technologies

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CONFERENCE REGISTRATION

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- ❑ Author — Paper Number: _____
- ❑ Student — University Affiliation: _____
- ❑ Non-member

Fee Worksheet: Conference Registration fee (all fees in U.S. Dollars):

	Advanced*	Regular	
IEEE Members	$320	$375	$_____
Authors	$320	$375	$_____
Non-members	$400	$475	$_____
Students	$ 75	$100	$_____

(*Advanced fees must be received by 31 May 1996.)

Tutorials ($195 for full day, $95 for half day tutorials) No._____ $_____

No._____ $_____

Total $_____

Payment Method: ❑ Visa ❑ MasterCard ❑ AMEX ❑ Cheque/Money Order (please include with registration form)

Card Number: _____ Expiration: _____ Signature: _____

❑ Please send me more information on the tutorials to be held on Sunday, August 18, 1996.

For all inquiries regarding registration please contact:

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CALL FOR PAPERS
PICMET '97

Portland International Conference on Management of Engineering and Technology

"Innovation in Technology Management: The Key to Global Leadership"

July 27-31, 1997   **Portland Oregon, USA**

SPONSORED BY:
Portland State University Engineering Management Program

COOPERATING SOCIETIES:
IEEE-Oregon Section; IEEE-Engineering Management Society; INFORMS Technology Management Society;
Japan Society for Science Policy & Research Management.

The focus of PICMET '97 is on the critical issues in a changing world. It will bring together researchers, educators, and practitioners at the cutting edge of technology management. The PICMET '97 technical program consists of plenary sessions, paper sessions, panel discussions, workshops, tutorials and poster presentations. Particular emphasis is placed on research, education, and implementation of technology management in the Pacific Rim, North and South America, Europe, and other countries, and the interactions among them.

Major tracks for the technical sessions include Management of Engineers and Scientists; Management of R&D and Engineering Projects; Management of Technical Organizations; Management of Critical Resources; Management of New and Emerging Technologies; Management of Technological Innovation and Strategic and Policy Issues

CONFERENCE MANAGEMENT: Dundar Kocaoglu, Portland State University, Portland, Oregon, USA is the PICMET '97 Conference Chair. Conference vice-chairs are William J. Burke, IEEE-Engineering Management Society; Ray Gehani, INFORMS- Technology Management Society; Ryo Hirasawa, Japan Society for Science Policy & Research Management and Nancy C. Vincent, IEEE-Oregon Section. The Program Co-chairs are Timothy R. Anderson, Portland State University, Portland, OR, USA; Michael J. Gregory, Cambridge University, Cambridge, U.K. and Kiyoshi Niwa, University of Tokyo, Tokyo, Japan.

Please mail, fax, or e-mail your proposal by July 15, 1996 to:

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     Engineering Management Program   (E-Mail: picmet@emp.pdx.edu)
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Indicate whether you want to organize a session, propose a (half-day) (full-day) tutorial, organize a panel discussion, or are submitting a paper for PICMET '97. Submit your Title and a 50 word abstract of your paper, or description of the proposed tutorial/session/panel discussion, followed by a list of keyword terms. Include your Name, Affiliation, Address, Phone, Fax and E-Mail.

Authors will be notified August 30, 1996. Papers are due for review by October 31, 1996, acceptance will be by December 3l, 1996 with a March 15, 1997 date for Camera-ready papers.

Newsletter Deadlines

Month of Issue	Quarter	Deadlines
July 1996	Third	3 July
October 1996	Fourth	16 September
January 1997	First	15 November
April 1997	Second	19 February
July 1997	Third	14 May
October 1997	Fourth	13 August

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