



By Dennis Bodson,  
President EMS

## The President's Corner

by Dennis Bodson PE, President EMS

In my last column, I made reference to the Institution of Electrical Engineers UK (IEE) Management Professional Network (MPN) as a Sister Society of the IEEE EMS. The purpose of this column is to provide insight into the IEE, IEE MPN, and the relationship between both entities. The IEE UK is headquartered in London, England on Savoy Place. It came into being in 1871 under the name of "The Society of Telegraph Engineers." In 1880, its name was changed to "The Society of Telegraph Engineers and Electricians" to indicate more clearly its scope and the eligibility of persons engaged in all branches of electrical science for membership of the society. The name of the society was changed again in 1888 to "The Institution of Electrical Engineers" The term "electrical engineer" being substituted as embracing all classes of members of the institution. The objects

and purposes for which The Institution of Electrical Engineers is hereby constituted are to promote the general advancement of electrical science and engineering and their applications and to facilitate the exchange of information and ideas on these subjects amongst members of the IEE. Thus, the IEE is a society similar in purpose to the IEEE.

The IEE has subgroups called "Professional Networks (PNs)." There are 36 such groups. The IEEE equivalent would be a Society or Council of which there are currently 42. The IEE Management Professional Network is the entity, which is similar in scope to the IEEE Engineering Management Society (EMS). While the IEE and IEEE can be viewed as similar types of organizations, the IEE MPN and IEEE EMS are considered to be sister societies.

The IEEs Management Professional Network is the professional home for engineers who are embarking upon, as well as

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## EMS Education Initiatives

by EMS Education Committee

For many years the Engineering Management Society has been committed to providing educational opportunities for its members. Most of this has been accomplished through publication of the Transactions, the Review, and the Newsletter.

We are excited to announce a new EMS Education Initiative to bring to EMS and IEEE members the training in skills and best practices needed for technical manag-

ers to be successful. EMS Education in 2003 has made commitments to serve our practitioner members more broadly. In this article we introduce programs available to you for professional business management training.

There is no doubt that "lifelong learning" is an absolute necessity for the future. A recent article in *Educause Review* (37(1): 29-38, 2002) by Donald Buckley entitled "In Pursuit of the Learning Paradigm" discusses the primary characteristics of learner centered technology. These include; interactivity, varied information formats, electronic communication, formative assessment, opened-ended assessment,

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## The President's Corner

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those who are well established in, their management track. Its aim is to grow engineers into management by supporting our members in a wide variety of ways, constrained only by the limits of our imagination and your support.

### What Does The IEE Management Professional Network Cover?

The Management PN is very different to the other PNs as it is not a primary discipline within the IEE.

It is a world-generic discipline. What is unique and highly relevant however is the way in which those members who are management professionals, as well as being professional engineers, apply the techniques developed elsewhere, and those they develop themselves, to the engineering sector.

It serves as a focus for the sharing of knowledge on the theory and practice of management in engineering business contexts, the professional development of engineers into effective leaders and senior managers, and the nurturing of specific interest groups.

It concentrates on enhancing the competence and knowledge of actual and aspiring managers, just like you.

Its community is served world-wide and is geographically independent.

### What is different / specific about the IEE Management PN?

It provides a teaching, reviewing, funneling and signposting service to the relevant information in the world of management, as well as capturing, sharing and disseminating knowledge on the specific application of relevant outside knowledge to engineering products, services and markets. It also encourages and facilitates mentoring.

It includes the management of engineering business, current management tools and techniques, the management needs of younger members, and the work of the professional manager. It covers the areas of Law, Quality, Project Management, Knowledge Management, and Marketing

It helps one to acquire knowledge and enhance specific competence and performance.

It should be noted that the Management PN is not just another web-based information service. It is a community run by, and on behalf of, professionals in management, with all the specialist and technical back up of the IEE.

### What Interactions are there with the IEEE EMS and the IEE MPN?

I met with the IEEE Management Planning Network (IEE MPN) personnel at the IEEE facilities on Savoy Place in London on August 13, 2002. Attending the meeting were Dr. Michael Rodd, Director, Knowledge Services; Kate Barnham, Professional Network Manager, Anthony Bainbridge, IEE liaison to the IEEE Engineering Management Society (EMS); and myself. Several topics of mutual interest were discussed. They fall into the following major areas:

- Membership in the IEE
- Co-Sponsorship of Conferences
- Exchange of Publications
- Expansion of IEE information on our web site and vice-versa.

Each of these areas will now be discussed in greater detail.

### IEEE Membership

Due to very recent changes in the requirements for IEE membership, it will now be less difficult for any IEEE

member to become a full member of the IEE. In the past, full membership was linked to becoming a Chartered Engineer (our equivalent would be a Professional Engineer (PE)). This is no longer the situation. In addition, an EMS member could also qualify for becoming a Chartered Engineer based upon their degree(s) and years of experience. It would also help (but not necessarily mandated) that the applicant be a PE.

### Exchange of Publications

The IEEE currently exchanges their Engineering Management Journal (EMJ) with us. It is currently distributed to the EMS Board of Governors (BOG). They are planning to prepare abstracts for some of the articles for their web site. Those articles could be linked to the EMS web site and seen by our members. We are currently preparing abstracts on articles in the Engineering Management Review (EMR), and putting them on our web site. These abstracts could then be made available to the IEE MPN. In addition, it was suggested that we could provide EMS members the opportunity to subscribe on-line to the IEE EMJ and IEE members could subscribe on-line for EMS publications.

### Ask an Expert a Question

The IEE is preparing to launch a new endeavor whereby its members can submit a question(s) to an expert(s) for guidance. The question could be a request for someone to act as a referee for a paper or a book for publication. It could also include a request for information relating to topic areas within the scope of Engineering Management. All questions submitted will be done through the web site, reviewed by the IEE staff, and submitted to the appropriate expert. No one will be allowed to go directly to the expert without their permission. The dilemma that we would need to thor-

oughly address is, “What would be the mechanism for how submitted questions would be reviewed and by whom” and “how would we develop a base of experts?” There would most assuredly be other matters as well that we would need to consider.

## Consultants Directory

The IEE has a consultants directory which is available on their web site. IEEE USA also has a consultants directory available on their web site. A suggestion was made that we could provide access to both databases for the IEE and IEEE members. This could be accomplished with the exchange of the appropriate URLs and indicating on our respective web sites that this capability is available.

## Joint Chapter Chairs Meeting

The IEE has the equivalent to Chapters in many countries including the US and Canada. We are currently looking into the possibility of holding a meeting with EMS Chapter Chairs in the vicinity of Albany, NY (IEMC-2003) and their IEE equivalents in and around the area of the conference.

## EMS Education Initiatives

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authoring tools, and simulation. Your IEEE EMS Education Committee is committed to utilizing the full potential of new instructional technologies that can be tailored to your learning style. Continuing education, training, and professional growth will always be with us and those who take advantage of these opportunities will be successful.

We have adopted a multi-program approach to provide the training and information you require as a technical manager in a time of challenging expectations. The programs are:

- Seminars
- Information/Knowledge Work Solutions
- eLearning
- EMS Virtual Community

## Conferences

IEE wishes to be involved with future IEEE EMS conferences from a technical as well as financial prospectus. IEE will be a Co-Operating Society with us for IEMC-2003, and will advertise it including the Call for Papers on their web site. Furthermore, they would like to be full partners (technically and financially) with us for IEMC-2004. A suggested venue was Singapore.

## What has Happened since this Meeting?

- The IEE MPN and the IEEE EMS have agreed to technically and financially co-sponsor IEMC-2004. This conference will be held in Singapore in the November-December timeframe.
- We are currently addressing the issue of linkages between the IEE and IEEE consultants' databases on our respective websites.
- Several EMS members plan to apply for membership in the IEE thereby establishing a linkage in both Societies.

## Seminars

We are delivering six seminars through Effective Training Associates Inc. (ETA). ([www.effectivetraining.com/ieee-ems](http://www.effectivetraining.com/ieee-ems)). These are instructor led workshops on topics such as Project Management, Leadership, Negotiation, Writing, Presentation and Communication skills specifically tailored for engineers and technology managers. These have been highly acclaimed over the last 14 years by IEEE engineers in the San Francisco Bay Area and now we are taking them transnational. The seminars will each consist of four courses tailored to topics of local interest and supported by EMS Chapter / Sections along with local participating corporate sponsorship.

I will keep you updated on further developments.

## Newsletter Editor's Notes:

Dennis Bodson (EMS President) was the recipient of the 2002 IEEE-Standards Association (IEEE-SA) Distinguished Service Award in recognition of his contribution to the standards development process and the objects of IEEE-SA. Mr. Bodson has been an active participant in the development of international, national, industry and federal standards for over 35 years. He has been a strong advocate and player in the development of IEEE standards and has made major contributions to the standards development process.

Professor Tariq Salim Durrani, Deputy Principle and Professor Signal Processing at the University of Strathclyde Glasgow Scotland, was awarded the Order of the British Empire in the Queens Honours List for 2002. This award was in recognition of services to Electronics Research and Higher Education. Professor Durrani was the Conference Chair for IEMC 2002 held in Cambridge, England and is a member of the EMS Board of Governors.

## Information / Knowledge Work Solutions

Our second thrust is to provide a window into best practices, working tools and practical reference information that are available to support you. Our first effort is with ProjectConnections, ([www.ProjectConnections.com](http://www.ProjectConnections.com)) a leading provider of web-delivered just-in-time knowledge on project and people management. This site provides practical easy-to-use information and work templates that assist in developing projects, running meetings, building effective team communications, and other essential business management skills.

Many site resources are free to registered site members, including items such as manuscripts, presentations, and

pointers to management sites and books. Registration is free!

The site's crown jewels are valuable, use-it-today resources including how-to information for situations such as managing conflicts and planning projects and downloadable work templates for tasks such as project planning project visions, design review agendas, and more. These resources require a Premium subscription and we have negotiated a special arrangement for EMS and IEEE members.

Our EMS and IEEE members get a Premium subscription at a 33% discount. Check out the site's resources ([www.projectconnections.com/member/ems](http://www.projectconnections.com/member/ems)) offer to take advantage of the special IEEE EMS Premium offer.

## eLearning

Recognizing that the web is a logical choice for meeting our key objectives of real time applicability and global accessibility we are initiating the IEEE EMS eLearning program as our third education thrust with the following 2 initial offerings.

Communication Skills for Managers  
Communication skills are vital for effective management. We want to provide a focused set of courses to assist you in this crucial everyday skill. EMS is making available a suite of communications eLearning courses by RGI International ([www.rgilearning.com/ems](http://www.rgilearning.com/ems)). This an eight course series of Web-based effective communication courses that are designed specifically to help technical professionals prepare better e-mails, letters, reports, and proposals. Now you can learn communication skills at your own pace, on your own time, in the office or at home. To monitor your progress they provide an optional exam and course completion certificates. If you prefer, you can choose to have a writing consultant evaluate examples of your work. A special discount for the full Communication Series is available.

EMS Collaborative Online Learning  
We are partnering with an eLearning provider, MSI Learning, ([www.msilearning.com/ems](http://www.msilearning.com/ems)) to deliver two major Web-based opportunities:

- A catalog of project management/ team building/ virtual team's workshops immediately available on line.
- An eLearning infrastructure and turnkey course development service giving us the opportunity to obtain new online courses easily and cost-effectively.

EMS will offer six unique online instruction-led interactive workshops starting this spring or early summer.

- EMS Technology Project Management Program
- Virtual Teams 1: Effective Project Communications and Control
- Virtual Teams 2: Building Teams, Commitment and Culture
- Managing Multiple Projects
- Rapid Project Development: Creating Agility and Balance in the Organization
- E-Business Rapid Application Development (RAD)

Network with other professionals and expert instructors while learning your new skills, combined with the convenience of learning online. A significant benefit here is the capacity to bring intact teams together in global communities with travel or absence from your work commitments. The results you need will be available in a timeframe of days not months. Please visit the website for course descriptions and registration information.

## EMS Virtual Community

Virtual Communities are the latest information sharing and learning vehicles offered by IEEE. Each community consists of a group of

individuals who have a shared purpose and a common interest. EMS has joined the IEEE Virtual Communities ([www.ieee.comunities.org/ieeems](http://www.ieee.comunities.org/ieeems)) to assist us in administrative activities and more importantly foster management topics addressing EMS member fields of interest. We will do that by establishing communities of interest around such topics as you select. IEEE EMS invites you to be our Guest and come and view the Virtual Communities. If you like what you see and are interested in joining, you can do so for FREE!

## Feedback: Your Opportunity

We seek your feedback on your needs and participation opportunities. Do you have an opportunity for an EMS educational activity? Send an email to IEEE EMS Education Vice President Dave Kemp at [d.kemp@ieee.org](mailto:d.kemp@ieee.org) or John Barrett at [johnbarrett@ieee.org](mailto:johnbarrett@ieee.org).

Help us by identifying the education needs of the working practitioner. If you want a technically focused management society responsive to those needs join us and make it happen! Tell us if you know of programs or material that we might include in our offerings.

The Engineering Management Society is your organization and we need you! You can volunteer on an ad hoc basis to participate in defining and building a technically-focused hands-on management resource for yourself and your IEEE peers within EMS.

## Congratulations to Those Elected to the Board of Governors

We are pleased to announce that the following eight candidates have been newly elected or re-elected for a three-year term beginning January 2003.

Joe Bellefeuille  
Dennis Bodson  
Vivian Carr  
Dundar Kocaoglu

Sam Salem  
Joel Snyder  
Beth Zimet  
Barbara Zirolli

The Engineering Management Society would like to thank all those who submitted their name for election to the Board. Included in this newsletter is this year's Call for Nominations to the Board. Please consider volunteering your name or that of someone else to the slate of candidates for election.

## From the Editor

by Terrance Malkinson

This is my first issue as the new editor of your EMS Newsletter. I would like to thank Dennis Bodson, Gus Gaynor and all of the EMS Board of Governors for their confidence in me. Compiling your newsletter is not an individual event; it is a team activity. Your EMS newsletter is only as good as the input that we receive from you, the EMS member. Each of us has a story to tell that will be of interest to others. Perhaps a "best practice". Perhaps reviewing an interesting book or journal article that offers new insights into

Engineering Management. Perhaps an informational article on an emerging technology. We welcome your submissions to the newsletter. You do not have to be a professional writer. The editorial staff is here to work with you to develop your story. One thousand words results in a page-and-a-half article. Longer or shorter articles are also welcome. Proposals for periodic columns or a series of articles are also welcome. It is not necessary to be an EMS member to contribute to the newsletter.

The IEEE EMS is an international organization and we particularly wel-

come submissions from throughout the world of Engineering Management. In this issue we have a contribution from our Japanese colleagues. I would like to encourage our student members to submit articles and suggest topics for articles.

I welcome your feedback on the newsletter and constructive suggestions of how it can best meet your needs. Please forward your manuscripts, suggestions for articles, and comments to [malkinst@telus.net](mailto:malkinst@telus.net).

Copy deadlines are listed at the end of this newsletter.

## IEMC 2003 - Albany New York, November 1-3

by Joseph Bellefeuille

Successful organizations – market leaders – excel at delivering value to their chosen customers. They have gained new insights about value creation through innovation in products, services, customer relations, distributions channels, business models, and manufacturing processes to name a few. This calls for technology-driven organizations to increasingly orient themselves to focus on customer and marketplace needs. As engineers and managers we are all called upon to spearhead this transformation and that invariable means more and faster innovation on many simultaneous fronts.

There are myriad books and white papers written on how to make this happen. However few touch on the "human side of innovation and change." In the race to be first in the marketplace there is no finish line and little time to celebrate. This can take a huge toll on firms' human resources. Your IEEE Engineering Management Society Board of Governors invites you to join us at IEMC 2003 in Albany, New York, November 1-3, 2003 to explore how to cope with the human issues of innovation and change.

Our previous Conference held at St. John's College in Cambridge, England was enormously successful. More than 200 papers were accepted for presentation to a registration in excess of 200 participants representing more than 35 countries.

IEEE conferences offer you a unique opportunity to meet with your peers and challenge yourself with new learning. They offer students the opportunity to meet and

build a network of individuals who can be called upon for career advice. For further information on IEEE conferences and their value to your career check out: <http://www.todaysengineer.org/Apr02/te2.htm>

The call for papers for IEMC 2003 is included in this Newsletter and visit: <http://www.ewh.ieee.org/soc/ems/committees/conferences.html> or <http://www.mgmt.rpi.edu/ieee> for more information.

### Congratulations to New Senior Members

The EMS Board of Governors congratulates and sends its best wishes to the Engineering Management Societies newly appointed Senior Members.

Gregory Watson  
Florida West Coast

Robert B. Rowen  
Central Texas

Frank D. Ledoux  
Lafayette

Sakari Mattila  
Australian Capital Territory

If you have ten or more years of experience you can apply for IEEE Senior Member status. The forms are available on the Web:

<http://www.ieee.org/organizations/rab/md/smforms.htm>

## ***...you can't afford to miss IEMC-2003***

Join your colleagues and leaders from academia, government, and industry to learn about ...

### **“The Human Side of Innovation and Change”**

Albany, New York  
1-3 November 2003

### ***IEMC-2003 offers you opportunities to:***

- Learn about the human issues related to innovation and change
- Find solutions to your problems and opportunities
- Learn about emerging management issues
- Master new tools and techniques for investing in technology
- Identify research opportunities
- Share your experiences and knowledge with colleagues

The *IEMC-2003* theme is “*The Human Side of Innovation and Change*” The Conference will address all aspects of the human side of managing technology-driven organizations focusing especially on the question of how to unleash creativity and motivate employees.

In addition to the traditional IEMC tracks such as new product development and management of technology, topics of special consideration will include: group dynamics, culture, communication in the global enterprise; leadership and change management, and the impact of technological change on employees' performance, motivation, job satisfaction, and decisions to continue or terminate their employment.

Most companies recognize that their employees are their most valuable resource but few have been able to harness them to the fullest. The “human side” of innovation is both timely and consistent with the objective of creating excellent technology-driven enterprises. Complete details are in last quarter's Newsletter and on the Conference Websites <http://www.ieee-iemc-2003.org> or <http://www.mgmt.rpi.edu/ieee>.

Cooperating organizations include the Lally School of Rensselaer Polytechnic Institute and IEE of the UK.

If you wish to participate or help with the conference please contact either:  
Lois Peters — Conference Chair — [peterl@rpi.edu](mailto:peterl@rpi.edu)  
or

Susan Sanderson — Program Chair — [sandes@rpi.edu](mailto:sandes@rpi.edu) both of the Lally School at RPI.

#### **IMPORTANT DATES**

- May 15, 2003 — Paper abstracts, proposed panels, special sessions, workshops
- June 15, 2003 — Notification of acceptance
- August 15, 2003 — Deadline for “camera ready” copy and author pre-registration

#### **Conference Websites:**

**<http://www.ieee-iemc-2003.org>**  
**<http://www.mgmt.rpi.edu/ieee>**

# Leadership Development: A Process of Influence (Part Four)

by Joe Bellefeuille

EMS Board of Governors Member

So far in this series of articles we have examined the problem of top executive turnover and outlined a new paradigm for executive development and leadership continuity. We also explored some of the major challenges facing executives today and a schema for business executives and managers to form partnerships with human resource managers. We also laid out the rationale for the creation of a talent pool of strategic leadership and some recommendations to aid in the development of the pool. In this fourth and final part of the series, we will develop a framework that highlights hierarchical distinctions throughout the organization to facilitate a meaningful creation of this strategic leadership talent pool.

Up to this point, we have intentionally ignored the fact that today's organizations are extremely complex social structures operating in an increasingly complex, ever changing environment. Reality suggests that it is necessary to account for the hierarchical texture that characterizes modern organizations. It is imperative to acknowledge that different levels of leadership in the typical hierarchy call for distinct skill requirements, work values, and time applications.

Creating a leadership framework is *not* just a paper exercise. It calls for significant behavioral changes by a wide spectrum of people. This can be problematic, as often top-level people are reluctant to change either the system or their personal habits that got them to the "top." Furthermore, coaching at the executive levels of many companies is not valued. Yet, a hierarchical framework can help overcome these obstacles by offering theory and tools for changing your own leadership behaviors as well as that of others. No matter where you are personally in the "leadership pipe-

line," continuing metaphor created by Charan et al. (2001) for the hierarchical schema of your organization, you can use the pipeline to think about and discuss actions needed to improve your group's talent and their contribution to the bottom line.

Consider two critical transitions along the pipeline: managing self to managing others and managing others to managing managers. A point of caution, all transitions should be critical. If one were not critical, then it would be superfluous and should be designed out of the organization.

## Managing Self to Managing Others

Success as a first-time manager requires a major transition for which people require adequate preparation. When managing self one relies on relationship building for personal benefits and achieving personal results. This *skill* needs to be sloughed off as one grows and prepares for transitioning to managing others. While there are several new skills required to manage others, relationship building takes on new dimensions – up, down, and sideways – focused on benefiting the manager's group. *Time* applications take on an annual planning dimension as well as making time available for others. Managers must also *value* the successes of subordinates and achieving results through others as well as always visibly displaying integrity.

## Managing Others to Managing Managers

Transitioning from managing others to managing managers is another major critical passage, not a mere career milestone. Failing to acknowledge the criti-

cality of and not preparing for this step usually leads to serious short-term organizational productivity and quality problems. In the long run, critical skills and values that affect leaders at increased responsibility levels are missing. Managers of managers must develop skills for finding and valuing individual contributors who have management and leadership potential. If they don't value this selection responsibility, they will have to rely on rewarding cronies and clones or some other form of particularism. Managers of managers must shift from holding people accountable for individual contributions to evaluating direct reports on selection decisions, frequency and quality of performance feedback, ability to achieve results through others, and ability to team up with other units.

## Deploying Resources Among Units

Another important skill of managers of managers is deploying resources among units. To develop and value this skill, one must seek the answers to critical questions such as:

- Can each reporting unit deliver required outputs on time at the appropriate quality? If not what additional resources are required?
- Are any units wasting resources?
- Which people should not be working here and how quickly can they be replaced?
- Which units deserve more than their fair share of resources because they will use them more effectively?

Of course, this is only a sampling. There are many more questions perti-

This hierarchical leadership framework is based on material in a 2001 Jossey-Bass book titled: "*The Leadership Pipeline: How to Build the Leadership-Powered Company*" by Ram Charan, Stephen Drotter, and James Noel. See the sidebar in this article for a very brief synopsis of the book or better yet get a copy for your leadership development HR person.

ment to managing resource allocation. Another area of value to managers of managers is boundary management. People at this level need to value the destruction of parochialism and “silo” management. This requires “blurring” department boundaries by valuing and communicating functional and business strategies as well as corporate mission.

Businesses compete as much today on intellectual capital as they do on financial capital. Those that can grow their own leadership talent and recognize the uniqueness of skills, values, and time application at each level possess an advantage for developing needed talent. This series of articles has provided insights into the principles, theories, and approaches as well as presented a framework for planning and developing leadership throughout the company.

*Joe Bellefeuille is a member of the Engineering Management Society and would appreciate your thoughts and feedback on this series. His e-mail address is j.h.bellefeuille@ieee.org*

## The Leadership Pipeline: How to Build the Leadership-Powered Company

After making the point that we are in an era in which demand for leadership at all levels of the organization far outstrips supply, the authors go on to say that internal training, mentoring, and other developmental programs aren't keeping the “pipeline” full. This forces organizations to look outside for required talent. Continuing with the pipeline metaphor, the book develops a framework that takes the unique requirements of distinct leadership levels into account. This is not a straight pipeline but one with sharp turns representing transitions from one leadership level to the next.

Passage between levels requires that people acquire new ways of managing and leading, thus leaving some of the ways of the previous level behind in the following three areas:

- Skills requirements – the unique capabilities required to execute the new responsibilities
- Work values – what people believe are important and so become focal to their effort
- Time applications – new time frames that govern how one works

While the authors' framework is constructed around six levels, hence six transitions or passages, suffice it to say that the framework can be sized and adapted to most modern situations. They devote a couple of chapters to discussing adaptations to different environments.

## Managing Critical Infrastructure Interdependencies

by William A. Wallace,  
David Mendonça, Earl Lee,  
and Joe H. Chow

Civil infrastructure provides the services necessary to support the nation's economy and our quality of life. It is of vital importance that the services provided by these infrastructures not be compromised, particularly in the case of malevolent acts, such as terrorism, or more natural or random events, such as earthquakes, landslides, floods, high winds or design faults, aging materials, and inadequate maintenance. Infrastructures are now recognized to be part of highly coupled systems that increasingly rely on information and communications technologies to provide key public and private services. The 11 September 2001 attack on the World Trade Center (WTC) illustrates the importance of understanding and managing relationships among infrastructure systems and the conse-

quences to key services of disruptions of these systems.

We were fortunate to receive a grant for exploratory research from the National Science Foundation to investigate the impact of critical infrastructure interdependencies on the restoration or continuation of key services following the WTC attack. Part of this project involves cataloguing and describing examples of service disruption and the role of infrastructure interdependence in them.

An infrastructure is a linked set of physical components with associated activities. Physical components are the built part of an infrastructure. Activities are tasks necessary to operate physical components of the infrastructure. A service is something made available by the infrastructure for use or consumption. Services may be used by people or by other infrastructures; they are provided in order to meet a real or perceived need. Services typi-

cally rely on the combined operation of multiple infrastructure systems. Dependency refers to relying on another for support. If each of two infrastructure systems depends on the services of the other, the two infrastructure systems are said to be interdependent.

An example service is public transportation. Provision of this service requires a number of infrastructures (e.g., power, transportation, telecommunications) operated by one or more responsible public or private organizations (e.g., New York City's Metropolitan Transit Authority). Continuing the example, if subway trains require electric power for operation, the transportation infrastructure is said to be dependent on the power infrastructure. However, since subway operation does not affect the ability of the power infrastructure to deliver power, the two systems are not interdependent. As a second example, if an electric generating plant is dependent on natural gas as a source of fuel and the

natural gas system relies on electricity from the generating plant to power the pumps in its system, failure of one results in failure of the other. Therefore, the two are said to be interdependent.

A disruption is said to occur when one or more of the physical components and one or more of the associated activities cannot operate at prescribed levels. Disruption may or may not result in service degradation. Service degradation is said to occur when the service itself cannot be provided at its prescribed level.

Our project involves documenting and categorizing the impact of the WTC attack on infrastructures in and around Ground Zero, with a focus on infrastructures involved in dependency or interdependency relationships. A review of New York Times articles from 12 September 2001 to 30 December 2001 resulted in approximately 269 instances of disruptions to services provided by critical infrastructures. A list of critical infrastructures was taken from *Critical Foundations: Protecting America's Infrastructures*, a report of the U. S. President's Commission on Critical Infrastructure Protection. Of these, 120 involved interdependency or dependency relationships between two or more infrastructures. The data suggest the importance of considering relationships among critical infrastructures before, during and after disruptive events.

### How to Reduce the Impact of Disruptive Events

What can public and private organizations do to reduce the impact of disruptive events on services that are provided by dependent or interdependent critical infrastructures? To assess the impact of a potential disruption on a single critical infrastructure, one approach is to estimate service level

following the disruption and to develop appropriate contingency plans. During response operations, estimates of this type may be useful for communicating the status of restoration efforts to customers and infrastructure managers. This approach however is not sufficient for analyzing the consequences of disruptions to infrastructure systems. An estimate of service provided to each demand point in the infrastructure system must be determined. Only in this way can the impact of the service disruption on other services be measured. To conduct such vulnerability analysis, one would have to determine:

- (1) the set of all possible disruptions and their probabilities of occurrence,
- (2) the level of service prior to any disruption,
- (3) the expected reduction in service over time due to the disruption, and
- (4) the expected length of time service is below the previous service level.

The objectives of any program to reduce the vulnerability of a service are to:

- (1) eliminate the cause of a disruption or reduce the probability of occurrence,
- (2) reduce the probability of any expected loss of service due to the disruption,
- (3) reduce the expected loss of service due to the disruption, and
- (4) restore the service more quickly if loss of service occurs.

A major consideration in managing the critical infrastructure interdependencies is to eliminate threats that cause disruption to a service. Assuming that the probability of occurrence can only be reduced for some disruptions, additional management strategies are required to

address consequences (i.e., loss or degradation of service).

The Table below provides a construct that has been found useful in emergency management.

### Managing the Impact of Disruptions to Infrastructures

From this Table, it can be observed that only strategies 1 and 2 are designed to reduce the impact from threats before disaster occurs. This occurs either by reducing the impact of the disruption caused by the threat or by providing the human populace with advance warning so as to ensure avoidance or partial avoidance of its impact. Strategies 3 and 4 deal with the impact of the disruption caused by the threat after it has occurred. Casualty/response teams attempt to reduce the impact by containing the effects of disruptions whereas disaster funds are primarily last resort financial reimbursements. Strategy 4 does not reduce the total impact but can ameliorate the burden on affected individuals and organizations.

An important observation to be made here is that there are two stages involved in the management of threats, the pre-event phase and the post-event phase. Management strategies are available to combat threats both before and after they occur. In order to manage the threats to our critical infrastructure interdependencies, we need to first identify these interdependencies, then eliminate each threat to the extent possible – and provide effective response and recovery to the disruptions that do occur.

*William A. Wallace is an EMS Board of Governors member. David Mendonça is from the New Jersey Institute of Technology; the other authors are from Rensselaer Polytechnic Institute.*

	Strategy	Examples	When is Impact Reduced
1	Mitigation	Building codes, insurance programs	Before occurrence, reducing the consequences, partially or in total
2	Preparedness	Warning systems, inventories of food and medical supplies	Before occurrence
3	Response	Rescue teams, fire fighting	After occurrence, as impact is being felt
4	Recovery	Disaster Relief Funds, rebuilding assistance	After occurrence, when full impact is felt

# Conference Call for Engineering Managers

by Terrance Malkinson

This feature is one of a number of new initiatives that I would like to incorporate into your EMS newsletter. The concept being to ask in each issue a question of current interest and then printing a selection of the responses received in the subsequent newsletter.

To get us started in this the first issue of 2003 I asked a number of the leaders of the EMS to answer the question: “Who is the Engineering Manager?” Specifically what are the essential role and responsibilities of the engineering manager and what distinguishes Engineering Management from other types of management.

The goal of this feature is to stimulate the readership to think about issues of importance to our profession, and make the newsletter interactive. Please submit your questions to the newsletter editor and they will be used in subsequent issues.

Responses received to this issue’s question, “Who is the Engineering Manager?” follow. We are interested in your opinion on this question. Please submit 300 words or less to the newsletter editor for possible publication in the next issue.

## From Wade H. Shaw

The engineering manager is the person responsible for insuring that the detail engineering completed by skilled professionals is integrated into a technically sound system that achieves a business goal. The engineering manager is expected to capture and communicate the requirements that drive a design effort and then effectively manage the risks to bring a product or service to the marketplace. The engineering manager uses project organizations to foster a culture of teamwork to address technical chal-

lenges that cross discipline boundaries and influences the strategic direction of the project’s parent organization. Frankly, I don’t think you will get this person by adding an MBA to an engineer. Somehow you do have to address the integration issues that are themselves usually technical. I think most existing management training is designed to take the engineer away from engineering and place them in a functional management role. Having said that, I do appreciate that in some organizations where the vast majority of the workforce is engineers or scientists, then engineering management may well indeed be equivalent to the “management” of anything else.

## From: Linda Kosmin Langford

Engineering management requires a special blend of creativity and skills. In particular it requires coupling the following: (1) the ability to select, guide, mentor, and motivate people in a team environment; (2) the expertise to integrate and maximize technological innovation and performance so that assigned projects consistently meet highest customer expectations for quality, design, timely completion, and budgets; and, (3) the ability to keep on top of and apply all regulatory and legal requirements. Traditional

management requires application of many of the above attributes and skills as well, but may not require as often the rigorous combining of all these input factors to satisfy output.

## From: T. Scott Atkinson

In considering the answer, It depends upon the context in which the question is asked. The REAL short answer is (If you don’t consider formal titles): any person who feels responsible for:

- seeing that tasks are completed effectively and efficiently,
- encouraging others to do their best
- giving credit when deserved
- maintaining a positive attitude
- encouraging continuous learning
- applying scientific analysis to the tasks at hand
- ensuring that all by-products are identified and
- seeing that all new ideas are considered in the overall process.

## From: N.M. Anders

In most particulars, engineering management differs little from more general management. The biggest headaches still come from attempts to manage people problems, supplier problems and so on. These tend to loom larger for the technically trained engineering manager who is often more “thing” than “people” oriented. Engineers are problem solvers and one of the biggest hurdles that a new engineering manager faces is letting go and learning how to coach his/her people to solve problems for themselves and not be seen as their technical competitor. To serve as an effective technical coach, the engineering manager need not have an in-depth understanding of the technological details involved in a given project, but he/she must have a grasp of the underlying fundamentals adequate for him/her to ask probing questions. This means that the engineering manager, more than the general business manager, is challenged to stay current with the technical state-of-the-art while still finding the time to attend to all of the usual people and project management details.

# Education of Management of Technology

by Hajime Yamada  
Secretary, Japan Chapter

**O**n December 13, 2002, the IEEE Japan Chapter of Engineering Management Society held a meeting at the Center for Global Communications of the International University of Japan. Reflections on this meeting follow.

**Michiyuki Uenohara, Professor Emeritus, Tama University, delivered the keynote address:**

Our manufacturing industry seems to have lost self-confidence despite the fact that the fundamentals of Japan are good; its technology is leading the world, citizens are wealthy, and daily necessities are abundant.

Education in Management of Technology (MOT) must be increased in order to catch up with other countries. Industrial management in the era of mass-production of standardized goods remains the status quo, while today's consumers seek unique products suitable to individual needs. Japan must construct an economy based on the sales of services with its foundations in manufacturing. Technology and product development must unite with the humanities and social sciences in order to understand the complexities of the marketplace.

MOT in my definition means corporate strategies that would be led by research and development, creation of need-driven new technology, efficient utilization of existing technology, strengthening corporate competitiveness resulting in profits that will support healthy development. The focus of MOT in the 21st century lies in how to deal with the information-oriented and increasingly global economy. Our ability to handle competition from neighboring countries is especially important. Our technological superiority will decline if we continue as we are doing. What is important is how to build human resources that can

grasp the relationship between the market and technology.

**Masahiro Hashimoto, Director, Academia-Industry Cooperation Promotion Division, Ministry of Economy, Trade and Industry (METI), expressed his expectation for government policy and academia-industry cooperation:**

One third of the researchers in Japan belong to universities, where one fifth of the government's research budget is spent. Academia-industry cooperation policy however is 15 years behind that of the United States. The former Ministry of International Trade and Industry (MITI), established the office for promotion of academia-industry cooperation, proceeded with cooperative research and technology transfers, and promoted growing talented people. In 1998 MITI led the formation of Technology Licensing Organizations (TLOs) by establishing the TLO law in cooperation with the Ministry of Education, Science and Culture. Regulations prohibiting professors' holding concurrent jobs were relaxed so that professors are now able to work at companies established by their own technology. Start-up companies that originated from universities are allowed to use the facilities of national universities and to register within universities. Internship programs to support nurturing human resources have been provided. METI has started a plan for creating one thousand university-originated start-ups within three years.

The biggest challenge in establishing a start-up company is recruiting skilled staff who can handle financial, legal and managerial matters. The Industrial Structure Council of METI has proposed fortifying growth of venture capitalists and managers. Japan must tackle the education of MOT. Only 345 MOT graduates are graduating yearly in Japan, yet it is estimated that we need at least 4700. Providing our students with marketing and management skills is es-

sential. Industry must work with our schools informing them about their human resource requirements in order that education reflects today's needs. A MOT consortium consisting of industry and educational organizations is under development.

**Atsushi Kaneko, who serves as the Secretary-General of the MOT professional consortium among industry, academia and the government, a project commissioned by METI to Mitsubishi Research Institute, Inc., explained the policies of the consortium:**

Attention is now being focused on MOT, but our efforts have only started. We are creating programs while running. Japan's ability of MOT is quite low among advanced countries. Japanese manufacturers in the past were led either by philosophy of a charismatic manager or by technology without having MOT.

Since the late 1990's, free competition has accelerated and therefore a common language about management is necessary. Education programs within corporations have been developed however external recruitment is also increasing. Investment in human resources is important as we have few teachers in Japan who can teach at levels equivalent to Europe or the United States.

Clarification of market needs and organizational mission as well as skilled MOT leadership is required. Skills and judgments are required for identifying and utilizing effectively outside resources and for handling more than one project at a time. We should establish the standard of skills and support the universities that prepare teaching materials. We utilize programs that each university prepares and develops on its own, as well as virtually-developed schools. Eventually, we aim to distribute programs developed uniquely by corporations or industry as well.

There are two parts in the MOT professional program. One is the core section that aims to build up literacy to communicate globally, the other is the selective section that trains specialists.

It was pointed out from the floor that Japanese universities do not seem to have enough qualified teachers in this field, and therefore more talented people should be transferred from industry to universities, and that a measure is also required for university students to take these courses. Mr. Kaneko answered that although all the desired people in industry were too busy to teach whole courses, a plan was developing to include them for giving lectures and text preparation.

**Akio Kameoka, Chair of the Japan Chapter of IEEE EMS made the following presentation:**

Although Japanese competitiveness is decreasing, we retain strength in technology with which we can compete against Asian, American or European countries. MOT is our issue to be solved because we are weak in concept creation and management ability for merchandizing. Product concept is the key point to change investment to

technology, and then to goods for sale, and eventually to returned money. That is the role of MOT. We need innovators who can create the concept to develop a market. Now it is an era for a techno-producer who can build a concept, coordinate, has strong will for achievement and a long range of vision just like a talented technocrat, architect, or designer.

**To conclude the proceedings, Hajime Yamada, who serves as Secretary of IEEE EMS Japan Chapter, mentioned that a short-term view is also important while taking time to nurture human resources, and asked Kazuhiro Goto of GLOCOM, IUJ for practical topics concerning how cooperation of industry-academia-government should be promoted.**

Goto explained that Japan is at a crucial point in terms of technological competitiveness and employee motivation. Goto pointed out the necessity of cooperation of industry, academia and government. On the other hand, he also noted that universities were in the middle of

change along with their turning into independent sectors.

Goto then made 15 proposals, including that dispersed handlers and projects for industry-academia-government cooperation should be cleared and integrated, and 20 to 30 percent of professors at technology institutes should establish and maintain their own small-scale companies to conduct research for private companies. There was a favorable response from the floor mentioning these proposals as quite substantial and essential, and acknowledging the problem of an annual-based budget prevented from distributing budgets for research and education in the true sense. Another response from the floor pointed out that the reason for the drop of popularity in engineering departments is due to a lack of flexibility at universities, which were slow in catching up with the change of industrial structure in society.

The meeting concentrated on discussing how MOT education should be, and was judged to be beneficial to all.

## Call for Nominations: EMS Board of Governors

The nomination process for the 2004-2006 Board of Governors has now begun. To nominate yourself or any one else for consideration for election to the Board please email the name, contact information, and a biography of no more than 500 words to the chairman of the nominating committee listed

below. Please confirm that your nominee is willing to serve if elected. Nominations will be accepted until June 1, 2003. All nominees must be members in good standing of the IEEE and a member of the Engineering Management Society. Should you have any questions please contact the chair of the Nominating Committee.

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## Board of Governors Meeting

Your EMS Board of Governors held their winter meeting January 24-26 in Orlando, Florida. All members of the Board were in attendance along with special guests from the IEE UK. Friday's agenda consisted of orientation, with the goal of ensuring a common understanding of the

IEEE organization and its various administrative, technical, and regional entities by all Board members. This was followed by a discussion of the EMS including its fields of interest and responsibilities of those volunteers elected to serve the membership. Facilitators for this session included Dennis Bodson,

Gus Gaynor, Wade Shaw, and Vivian Carr. The day concluded with a presentation by Irving Engelson and discussion on tips for conducting effective meetings and the essentials of Robert's Rules of Order, a subject important for the effective conduct of the societies business.

Saturday's agenda started at 7:00 am and continued until late into the evening. Four break-out sessions occurred. The two in the morning focused on Conferences and Membership and the two in the afternoon focusing on Publications and Education. All participants engaged in brainstorming and lively discussion that resulted in a number of strategies and action items designed to broaden the appeal and value from our annual conferences, maintain and recruit new members, add value to our publications, and facilitate the continu-

ous professional development of our members through education. Stay tuned for further information on these important new initiatives published on the EMS website and in the newsletter.

Sunday was another full agenda consisting of the formal Board of Governors business meeting. Agenda items included vice-presidential committee reports on the budgeting and financial challenges facing the society, the EMS awards available to our members, our activities in support of our chapters,

and the development of an EMS logo. Other important reports included past and future conference status reports, and activities associated with education, and publications.

Thanks to all of the meeting participants for taking time out of their busy schedules and spending their weekend attending this meeting. The next Board of Governors meeting will be held in Ottawa Canada, July 25-27, 2003. EMS members are welcome to attend.

## Recognition and External Relations

Recognizing outstanding performance and rewarding achievers was and continues to be an essential of good management practice. The Engineering Management Society recognizes excellence in engineering and technology management in many different ways. The Society needs your input. As practitioners in the field you know the outstanding performers not only in your organizations but also through your network of colleagues and peers. By taking the initiative and making a recommendation you not only recognize the outstanding performance of a colleague, but provide a valuable service to the EMS.

So, think about your colleagues who are deserving of an award and submit your recommendations to any Board

of Governor member. You can share in honoring a colleague for outstanding performance. The various awards available, their scope, and nomination process are listed on the EMS website. <http://www.evh.ieee.org/soc/ems/committees/recognition.html>

### Engineering Manager of the Year Award

At this time of the year we are seeking nominations for the Engineering Manager of the Year Award.

Those who meet the criteria of being a Senior Member or IEEE Fellow, Member of EMS for at least 3 years, and an Engineering Manager for at least 10 years are eligible for this award. The award consists of \$1000.00 and a plaque with the ap-

propriate citation in recognition of the recipient's contributions to the field of engineering and technology management. The award is presented Annually, to the recipient the year following selection at the IEEE Engineering Management Society Conference, or other meeting authorized by the Society.

Nominations and all references must be received by the EMS Awards Committee Chair by June 15, 2003. Please use the nominating information available on the IEEE EMS website: <http://www.evh.ieee.org/soc/ems/committees/recognition/emya-award.html> For further information please contact Merrill W. Buckley, Vice President Recognition & External Relations. [m.buckley@ieee.org](mailto:m.buckley@ieee.org) or at 610-544-1876.

## Social Science Research Training Fellowship

Social Science Research Training Fellowship for Junior Faculty applications are being solicited from junior faculty for a unique research training program aimed at fostering the next generation of social scientists addressing societal considerations related to natural hazards and extreme events. This program, "Enabling the Next Generation of Hazard Researchers," is funded by the National Science Foundation and is being undertaken by the University of North Carolina

at Chapel Hill in collaboration with faculty from seven other universities. The program will consist of a two-year series of workshops, tutorials, and discussions focusing on practical advice about research initiation and research proposal development for social science research addressing hazards and extreme events. This is a unique opportunity for junior faculty who are early in their research careers. Participants will receive an honorarium and travel expenses to workshops and meetings with senior

faculty mentors. Two workshops will be held, the first a summer workshop, July 25-29, 2003 at Woods Hole, MA, and the second a summer workshop, July 16-20, 2004 at Estes Park, CO.

Deadline for applications: March 1, 2003.

For more details, please visit our website at <http://enabling.unc.edu/> Please contact Leanna Hush [hush@email.unc.edu](mailto:hush@email.unc.edu) or Dr. Raymond Burby [burby@email.unc.edu](mailto:burby@email.unc.edu) for more information.

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## Pivotal Moments - Our Covenant with You

by Terrance Malkinson

The recent tragic loss of the Columbia crew and previously that of the Challenger; the John F. Kennedy and Martin Luther King Jr. assassinations; Neil Armstrong's first step on the moon; birth, marriage, festivals, and death; are all examples of pivotal moments. On the same day that the Columbia was lost, seven young Canadians died suddenly in an avalanche doing what they passionately loved while on a school cross-country skiing wilderness expedition. This occurred, as with the case of the space shuttle despite applying the best of man's knowledge.

These events cause us to stop and reflect upon what is really important in life. We show respect for those who perished, learn from the experience, and move forward. Those who perished would expect us to do so, just as we would, should it have been one of us. Pivotal moments may be tragic and bring sadness; pivotal moments may also be joyous and bring great happiness. Pivotal moments often bring about change.

### The Transforming Workplace

Many of us are experiencing our own pivotal moment with the realization that achieving lifelong job security such as enjoyed by many employees in the past is not part of our future. Organizations are downsizing their workforces resulting in an unprecedented loss of jobs. This is causing considerable stress in the workplace. In some cases this is creating disincentives to continuing participation by many of our best and brightest people.

The principles that companies use to make decisions about the size and makeup of their workforce are radically different today from even five years ago. There are many reasons for this including outsourcing, new technologies, non-standard employment arrangements, deregulation, mergers, acquisitions, and shareholder activism. Just-in-time employment principles are creating a flexible employment system. This change in the employer/employee relationship will likely be the norm for the foreseeable future, and as history shows will be replaced in due course at some time in the future by yet another management philosophy.

### Believe in Yourself

Although it may appear that we have little control over this change, we can become informed and take strategic moves to manage our career. We can influence by example, reflecting by our actions and deeds the best of human values. Success in today's workplace requires self-reliance, entrepreneurship, flexibility, continuous professional development, a global perspective and a host of other factors to be successful. Employees today are seen as individual entrepreneurs who possess a set of skills to be marketed to any employer in need locally, nationally or internationally. Savvy employees are not coupled to any one organization. Savvy employees recognize that knowledge and applying knowledge in innovative ways is what is important.

Optimism, emotional resilience, effective communication skills, and confidence in your abilities are essential for success. This is the foundation of courage and the path of true progress. A person who envisions and embraces opportunities will be successful. Difficulty and struggle are the price for our future victories. Never allow anyone

to dissuade you from pursuing your dreams and goals, and never fear to venture down new paths of endeavor. If you fear change and do only things that you have already mastered you will never grow. We can all overcome danger, misfortune, injustice, and fear. Courage conquers all and we can all be successful as we journey through life.

### **Our Covenant with You**

One primary goal of your EMS newsletter is to help you to be successful in the transforming workplace. We plan to do this by providing you with practical tips, strategies, and sources of further information to help you proactively manage your career. We welcome brief anecdotal experiences that you are willing to share with others from which we can all learn. We welcome your comments and

suggestions on how we can best meet your needs and make you successful in your career.

EMS can help you keep abreast not only of the tools and techniques of management and provide information that advances your understanding of the issues facing all organizations in a fast paced business environment. This is our covenant with you as a valued member of the Engineering Management Society.

*Terrance Malkinson is a proposal manager/documentation specialist; an elected Senator of the University of Calgary; a member of the IEEE-USA communications committee, international correspondent for IEEE-USA Today's Engineer; and editor of the IEEE Engineering Management Society Newsletter. Opinions expressed are those of the author*

***“The man who graduates today and stops learning tomorrow is uneducated the day after”***

*Newton D. Baker*

***“I regard it as the foremost task of education to ensure survival of these qualities; an enterprising curiosity, an undefeatable spirit, tenacity in pursuit, readiness for sensible self-denial and above all, compassion.”***

*Kurt Hahn*

***“Life is either a daring adventure or it is nothing”***

*Helen Keller*

***“No man can enjoy the privileges of education and thereafter with a clear conscience break his contract with society.”***

*Isaiah Bowman*

**Visit the EMS Website at [www.ieee.org/ems](http://www.ieee.org/ems)**

**Your ideas and comments are important to us —  
they determine the future directions of EMS — your Society**

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