

2002 IEEE International Engineering
Management Conference

Vol. 1

F4-53
E57
2002
v.1



IEEE

IEMC-2002

2002 IEEE INTERNATIONAL ENGINEERING MANAGEMENT CONFERENCE

Managing Technology for the New Economy

St John's College, Cambridge, UK

18-20 August 2002

Supported by

Technical Cosponsor

BT exact
TECHNOLOGIES

Q²SL INDUSTRIAL &
TECHNOLOGY
MARKETING
www.q2sl.com



Proceedings: Volume I

Sponsored by the IEEE Engineering Management Society



Cooperating Entities:

IEEE UKRI Section

IEEE UK/LENIS/PC Chapter

Cambridge Centre for Technology Management



E200400226

IEMC-2002

18-20 August 2002

Cambridge, England, UK

IEEE Catalog Number: 02CH37329
ISBN: 0-7803-7385-5
Library of Congress Catalog: 2002100183

Copyright and Reprint Permission:


Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limits of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA. For other copying, reprint or republication permission, write to the IEEE Copyrights Manager, IEEE Operations Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 0885501331. All rights reserved. Copyright © 2002 by the Institute of Electrical and Electronics Engineers, Inc.

OBJECTIVES OF EMS

The objectives shall be scientific, literary, and educational in character. The Society shall strive for the advancement of the theory and practice of management of organizations with a high engineering content and the allied arts and sciences, and the maintenance of a high professional standing among its members.

Additional copies available from:

IEEE Services Center
445 Hoes Lane
Piscataway, NJ 08854
United States of America



IEEE ENGINEERING MANAGEMENT SOCIETY

FIELD OF INTEREST

The field of interest of the Society encompasses the management sciences and technology applicable to organizations engaged in or overseeing research, development, design, evaluation, production, or operation of electrical equipment/systems or allied activities. These areas of interest include: characteristics of technical people, effective laboratory, or work environments; economics of invention, innovations, and applications; relations between engineering and other functions in the organization; techniques for program/project management, including schedule and cost controls; organizational structuring; and related subjects. Also of concern are the socio-economic impacts of technology on society.

BOARD OF GOVERNORS

OFFICERS

President

Dennis Bodson

Vice Presidents

Gerald (Gus) Gaynor (*Executive*)

Larry Anderson (*Conferences*)

Tariq Durrani (*Publications*)

Irving Engelson (*Recognition/External Relations*)

David Kemp (*Education*)

Charles Rubenstein (*Member Relations*)

Treasurer Vivian Carr

Secretary Thomas Grim

MEMBERS-AT-LARGE

J Barrett

J Bellefeuille

R B Bishop Jr

M W Buckley Jr

M Eriksson

L T Gandia

P Geary

J Jaen

L K Langford

S Lockhead

L S Peters

J Reinert

J F Van Savage

W H Shaw Jr

W A Wallace

P Willis

(Ex-Officio)

A Bainbridge

C Voegtli

D Wells

IEMC-2002 CONFERENCE COMMITTEE

GENERAL CHAIR

Tariq S Durrani
University of Strathclyde
204 George Street
Glasgow G1 1XW
Scotland, UK
Tel: +44 141 548 2883
Fax: +44 141 552 2487
Email: t.durrani@ieee.org

COOPERATING ENTITIES

IEEE Region 8
IEEE UKRI Section
IEEE UKRI EMS/PC Chapter
Cambridge Centre for Technology
Management

ORGANISING COMMITTEE

Larry Anderson (USA)
Anthony Bainbridge (UK)
Margaretha Eriksson (Sweden)
Clare Farrukh (UK)
Aaron Ferguson (UK)
Sheila Forbes (UK)
Gus Gaynor (USA)
Lois Peters (USA)
Rob Phaal (UK)
David Probert (UK)
Wade Shaw (USA)
Charles Turner (UK)

Conference Website

<http://www.ieee-iemc-2002.org>

IEEE ENGINEERING MANAGEMENT SOCIETY

FIELD OF INTEREST

The field of interest of the Society encompasses the management sciences and technology applicable to organizations engaged in or overseeing research, development, design, evaluation, production, or operation of electrical equipment/systems or allied activities. These areas of interest include: characteristics of technical people, effective laboratory, or work environments; economics of invention, innovations, and applications; relations between engineering and other functions in the organization; techniques for program/project management, including schedule and cost controls; organizational structuring; and related subjects. Also of concern are the socio-economic impacts of technology on society.

BOARD OF GOVERNORS

OFFICERS

President

Dennis Bodson

Vice Presidents

Gerald (Gus) Gaynor (*Executive*)

Larry Anderson (*Conferences*)

Tariq Durrani (*Publications*)

Irving Engelson (*Recognition/External Relations*)

David Kemp (*Education*)

Charles Rubenstein (*Member Relations*)

Treasurer Vivian Carr

Secretary Thomas Grim

MEMBERS-AT-LARGE

J Barrett

J Bellefeuille

R B Bishop Jr

M W Buckley Jr

M Eriksson

L T Gandia

P Geary

J Jaen

L K Langford

S Lockhead

L S Peters

J Reinert

J F Van Savage

W H Shaw Jr

W A Wallace

P Willis

(Ex-Officio)

A Bainbridge

C Voegtli

D Wells

IEMC-2002 CONFERENCE COMMITTEE

GENERAL CHAIR

Tariq S Durrani
University of Strathclyde
204 George Street
Glasgow G1 1XW
Scotland, UK
Tel: + 44 141 548 2883
Fax: +44 141 552 2487
Email: t.durrani@ieee.org

COOPERATING ENTITIES

IEEE Region 8
IEEE UKRI Section
IEEE UKRI EMS/PC Chapter
Cambridge Centre for Technology
Management

ORGANISING COMMITTEE

Larry Anderson (USA)
Anthony Bainbridge (UK)
Margaretha Eriksson (Sweden)
Clare Farrukh (UK)
Aaron Ferguson (UK)
Sheila Forbes (UK)
Gus Gaynor (USA)
Lois Peters (USA)
Rob Phaai (UK)
David Probert (UK)
Wade Shaw (USA)
Charles Turner (UK)

Conference Website
<http://www.ieee-iemc-2002.org>

MESSAGE FROM THE GENERAL CHAIR

On behalf of the IEEE Engineering Management Society and the IEMC-2002 Organising Committee it is a pleasure to welcome you to the Conference and Cambridge in August 2002. This is the first occasion that the IEMC is being held outside North America.

The events are a series of international conferences sponsored by the IEEE Engineering Management Society, devoted to all aspects of new directions and developments in engineering and technology management. Conferences of this scope are only possible because of the continuing interest and support of Society members and volunteers, expressed both by the submission of high quality papers and by their attendance at the Conference.

An exciting Conference Programme is offered that includes important and wide-ranging contributions covering state-of-the-art research results that address contemporary problems and provide new insights into 'Managing Technology in the New Economy'.

The response to the 'Call for Papers' was overwhelming, attracting submissions from some 35 countries. The Conference Organising Committee has arranged a Programme that spans 47 sessions, organised in six parallel streams each day, where delegates will deliver over 164 presentations. The papers offers stimulating insights into emerging approaches for managing technology, organisations and individuals, in order to achieve success and growth in the current turbulent business environment.

We are particularly pleased that distinguished industrialists, who have made a significant impact on the industrial landscape through their innovative and charismatic leadership, will give Plenary Addresses, and share with us their wisdom and experience in managing organisations in the New Economy.

At IEMC-2002, we are introducing an innovation for IEEE Engineering Management Conferences, by including a series of Interactive presentations, where authors hold one-to-one discussions with the audience through the medium of poster presentations. This offers the opportunity for more detailed and informal exchanges than set-piece presentations. To promote widespread discussion, the Conference Committee has ensured that the Programme consists of an almost equal distribution of interactive and oral presentations.

A series of half-day Workshops will be presented on Sunday 18 August. The Workshops will address stimulating topics, delivered by leading professionals in the field, that offer both technical skills and management development opportunities. I am indebted to Joe Bellefeuille and Anthony Bainbridge for organizing the Workshops.

In addition to the technical sessions at the Conference, a full social programme has been organised in the evenings, with Opening and Closing Receptions, and a Conference Banquet on Monday 19 August.

Cambridge, with its long history of technological innovation, scholarly ambience, and medieval charm, is an opportune location for the Conference, and the Conference venue, St John's College, is one of the prettiest of Cambridge Colleges. I hope that in addition to attending the Conference, you will take the opportunity to explore Cambridge and its environs, and if possible, extend your stay to include an enjoyable and memorable holiday in Britain.

I would like to express my appreciation to all the authors and session chairs for contributing to the success of the Conference and to acknowledge the technical sponsorship of the UK IEE, and the financial support of BT Exact, Q²SL and the University of Strathclyde. I am immensely grateful to the Conference Organising Committee for its help and support, and in particular to David Probert, Rob Phaal and Clare Farrukh of the Cambridge Centre for Technology Management for their help in arranging the Conference Programme; and finally to Sheila Forbes for her unstinting support and enormous contribution towards all aspects of Conference management.

Tariq S Durrani
General Chair : IEMC-2002

August 2002



Rensselaer Polytechnic Institute
Troy

CALL FOR PAPERS
2003 IEEE International
Engineering Management Conference

(IEMC-2003)

MANAGING TECHNOLOGICALLY-DRIVEN
ORGANIZATIONS:

"The Human Side of Innovation and Change"

Organizing Committee

General Chair

Dr. Lois S. Peters
Lally School of Management
110 8th Street
Pittsburgh Building 3214
Troy, NY 12180
Tel: 1 (518) 276-2977
Fax: 1 (518) 276-2665
Email: peterl@rpi.edu

Program Chair

Dr. Susan Sanderson
Lally School of Management
110 8th Street
Pittsburgh Building 3214
Troy, NY 12180
Tel: 1 (518) 276-2933
Fax: 1 (518) 276-8661
Email: sandes@rpi.edu

Organizing Committee

Larry Anderson (USA)
Robert A. Baron (USA)
Joseph Bellefeuille (USA)
Richard Burke (USA)
Anthony Bainbridge (UK)
Tariq S. Durrani (UK)
Margaretha Eriksson (Sweden)
Sheila M. Forbes (UK)
Gus Gaynor (USA)
Renee Lerche (USA)
Moren Levesque (USA)
Chris McDermott (USA)
Wade Shaw (USA)
Gene Simons (USA)
Al Wallace (USA)
Dan Ward (USA)
Steve Walsch (USA)

Cooperating Entities

IEEE Schenectady Section

Technical Cosponsor

Lally School of Management & Technology
&
IEE (GB)

Albany, New York USA
1-3 November 2003

Host: Lally School of Management and Technology, RPI Troy, New York, USA

Location: The Desmond Hotel & Conference Center, Albany, New York

Come to the Capital District of the Empire State ---to hear the latest about leadership and the human dimensions of the technological drivers of change---and see the resplendent colors of fall in the Northeast

The Board of Governors of the **IEEE Engineering Management Society** will hold its prestigious International Engineering Management Conference in Troy, New York, on 1-3 November 2003.

The Conference offers a key opportunity to study and assess new directions in technology management and the strategic use of human resources to shape and enhance innovation. 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. Topics considered 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.

IEMC-2003 will offer a platform for sharing experiences, presenting new results, and reviewing recent developments with keynote addresses by some leading experts in the field. With the business and economic landscape undergoing rapid change, the human side of innovation and change management are absolutely vital to corporate revitalization and growth.

Please e-mail, fax or mail your abstract or letter of intent to participate as soon as possible to:

IEMC-2001 Secretariat, c/o Mary Curtis
IEEE - Conference Management Services
445 Hoes Lane
Piscataway, NJ 08855
Phone: 732-562-5350
Fax: 732-981-1203
Email: m.clemente@ieee.org

| IMPORTANT DATES | |
|--------------------------------|--|
| May 15 th , 2003 | Paper abstracts & proposed panels, special sessions, and workshops (with topic designations) |
| June 15 th , 2003 | Acceptance/rejection notification |
| August 15 th , 2003 | Deadline for final "camera-ready" paper & author pre-registration |

Papers are solicited on the following list of non-exclusive topics related to the conference theme:

- ☐ Approaches to unleashing creativity
- ☐ Balancing work & Family
- ☐ Communication
- ☐ Group dynamics
- ☐ Organizational Culture
- ☐ Job Satisfaction
- ☐ Leadership
- ☐ Metrics
- ☐ Motivation
- ☐ Performance
- ☐ Rewarding success and failure
- ☐ Technological change & decisions to continue or terminate employment
- ☐ Virtual teaming and the global enterprise
- ☐ Workforce projections and the pursuit of scarce talent

We welcome papers that consider the human dimension of historically important IEMC topics. These include:

- ☐ Aligning business and technology strategies
- ☐ Decision support systems
- ☐ Digital Economy
- ☐ Digital Learning
- ☐ Disruptive technologies
- ☐ E-commerce and E-technologies
- ☐ Emerging technologies
- ☐ Entrepreneurship
- ☐ Forecasting and technology prediction
- ☐ Globalization
- ☐ Industrial design
- ☐ Industrial sustainability
- ☐ Knowledge management
- ☐ Management of complex systems
- ☐ Managing information and communications technologies
- ☐ New business models
- ☐ New product development
- ☐ Project management
- ☐ R&D Management
- ☐ Real options technologies
- ☐ Software technology management
- ☐ Supply chain complexity
- ☐ Technology acquisition for new product development
- ☐ Technology assessment and resourcing
- ☐ Technology impact on business redesign
- ☐ Virtual enterprise

Submission of Papers and Workshop Proposals

The Chairs and Organizing Committee solicit papers for presentation at the conference. All interested persons should submit one page abstracts in electronic form (at least 500 words, but no more than 750). Each submission will be reviewed for technical merit and content. Papers accepted for presentation will appear in the *Conference Proceedings* provided at least one author registers for the conference. All abstracts must have a cover page containing the title of the paper along with the names, affiliations, and complete mailing addresses of all authors, as well as a list of the three designated topic areas most closely related to the paper. Correspondence will be directed to the first named author unless indicated otherwise. Six pages will be allocated in the *Proceedings* for each accepted paper. Papers that exceed this length will be charged on a per page basis. Each paper presentation should take no more than 20-30 minutes.

We also encourage individuals to submit proposals for interactive panel discussions. These could be a complement to formal sessions where Session I is devoted to presentation of papers and Session II is comprised of a panel discussion of the theme addressed by the papers. Proposals for half-day workshops related to the conference theme are also solicited. An honorarium will be provided for each workshop based on the number of registered attendees. We also request suggestions for workshop topics of interest to the EMS community. The abstract cover page or letter of intent should contain an e-mail address to which conference correspondence can be directed.

Conference Venue

Rensselaer Polytechnic Institute is located in Troy, N.Y., on beautiful a 260-acre hilltop. It is recognized to those approaching Troy from the south by the predominance of several brick buildings topped by copper roofs. Rensselaer is the first degree granting technological university in the English-speaking world. In the midst of a culturally rich population center surrounded by the Adirondack, Catskill, Berkshire, and Green mountains, the Rensselaer campus is only a few hours by car or train from Boston, New York City, and Montreal.

The venue for the Conference will be The Desmond Hotel and Conference Center located in Albany, N.Y., which is a luxurious hotel combining old-world charm with state-of-the-art conferencing technology.

Conference Website:

<http://www.ieee-iemc-2003.org>

Monday 19 August 2002

0900-0905 Welcome and Introduction Professor Tariq S Durrani, General Chair

0905-0945 Key note Address Dr Lew Terman, President, IBM Academy of Technology

| | | 10.00 - 11.00 | | | |
|----------------|---|--|---|---|--|
| Location | Palmerston | Castlereagh | Boys Smith | Pythagoras Upper | Pythagoras Under |
| Session Titles | Aligning Business and Technology Strategies - Strategy Development | Enterprise Knowledge Management | Managing Disruptive Technologies | Managing ICT | Session A E business Strategies and Processes |
| Session Chair | Professor Tariq S Durrani University of Strathclyde | Mr Joe Bellefeuille Lucent Technologies | Professor Lois Peters Rensselaer Polytechnic Institute | Professor Levent Onural Bilkent University | Session B Virtual Enterprises Professor Charles P Rubenstein Pratt Institute School for Information and Library Science |

11.00 - 11.30 Morning Break

| | | 11.30 am - 12.30 pm | | | |
|---------------|---|--|---|--|---|
| Location | Palmerston | Castlereagh | Boys Smith | Pythagoras Upper | Pythagoras Under |
| Session Title | Aligning Business and Technology Strategies - Practical Approaches | Knowledge Management Cultural change | Sustaining Innovation | Managing ICT Telecommunications | Session A Software Technology Management |
| Session Chair | Dr Anthony F Banbridge Enigma Ventures Limited | Ms Margaretta Eriksson Irbis Konsult AB | Professor Lois Peters Rensselaer Polytechnic Institute | Professor Charles Turner Kings College London | Session B R&D Management Professor Charles P Rubenstein Pratt Institute School for Information and Library Science |

12.30 - 14.00 Lunch Break

1400-1445 Plenary Session Sir John Chisholm, Chairman, Qineliq
Chair Professor Wade H Shaw, Florida Institute of Technology

| | | 15.00 - 16.00 | | | |
|---------------|---|--|--|---|--|
| Location | Palmerston | Castlereagh | Boys Smith | Pythagoras Upper | Pythagoras Under |
| Session Title | Aligning Business and Technology Strategies - Cultural Aspects | Organisational Learning, Culture and People - Role of the Individual | Innovation in Growing Companies | Software Technology Management | Session A Managing Complex Systems |
| Session Chair | Professor Wade H Shaw Florida Institute of Technology | Professor Hans Thamhain Bentley College | Professor Alan S Carlie University of Strathclyde | Dr Samar Saha Silicon Technology Inc | Session B New Business Models Ms Clare Farukh University of Cambridge |

16.00-16.30 Afternoon Break

| | | 16.30 - 17.30 | | | |
|---------------|---|--|---|---|--|
| Location | Palmerston | Castlereagh | Boys Smith | Pythagoras Upper | Pythagoras Under |
| Session Title | Aligning Business and Technology Strategies - Value Creation | Inter-organisational Learning | Decision Support Systems | Supply Chain Complexity | Session A Managing ICT |
| Session Chair | Professor George Farris Rutgers University | Professor Hans Thamhain Bentley College | Professor Roger Manley Florida Institute of Technology | Professor James Kasser University of South Australia | Session B Technology Acquisition for NPD Dr Rob Phaal University of Cambridge |

AUTHOR INDEX

- A**
- Adamides E.. 419, 673
 Albores-Barajas P. 685
 Alderman N. 304
 Allen D. M. 90
 Alon I. 532
 Antoniadis A. 485
 Arai S. 14
 Aranski K. J. 20
 Assakul P. 794
- B**
- Baba J. 608
 Backhouse C. J. 214, 264
 Baigent D. R. 837
 Ball P. D. 685
 Banerjee N. 230
 Barber K. D. 831
 Becker I. 125
 Bellefeuille J. H. 629
 Bendell T. 643
 Bennett R. J. 30
 Bhattacharya S. 230
 Bilalis N. 485
 Bin S. 107
 Birchall D. W. 391, 397
 Birrell J. 90
 Bishop T. 196
 Bititci U. 384
 Blomqvist K. 520
 Bodensteiner N. M. 649
 Boulter L. 643
 Bowers J. 532
 Brehl A. 804
 Bromley J. T. 567
 Burns N. D. 214, 264
- C**
- Cacciatori E. 154
 Capezzuto V. 481
 Cardew-Hall M. J. 166
 Cardullo M. W. 258
 Carrie A. S. 8
 Cassaigne N. 85, 292
 Castle R. D. 25
 Cetindamar D. 443
 Chakrabarti A. K. 635
 Chen Jin 602, 719
 Chen-Tung Chen 585
 Chia Hsun Chang 930
 Chin-Bin Wang 701
 Ching-Torng Lin 465
 Chisholm J. 257
 Clark J. P. 131
 Coldrick S. 413
 Cordero R. 274
- Corley J. 372
 Costlow L. E. 854
 Coyle E. J. 900
 Crowne M. 338
 Currier E. 481
 da Costa S. E. G. 816
- D**
- Dani S. 264
 Danilotschkin-Forsman T. 125
 Das K. 538
 Davis K. A. 286
 de Lima E. P. 816
 De Souza M. M. 826
 Deasley P. 372
 Degano C. 590
 Dilts D. M. 655
 Dissel M. C. 184
 DiTomaso N. 274
 Divate V. 425
 Druilhe C. 322
 Duckles J. M. 900
 Durrani T. S. 476
 Dyerson R. 713
- E**
- Earnshaw C. 724
 Echols A. E. 894
 Eldridge S. 831
 Emiris D. 485
 Eriksson M. 459
 Evans J. P. 310
 Ezingard J-N. 391
- F**
- Fahrni F. 431
 Fairclough M. 831
 Falkingham L. T. 555
 Fang Wu 113
 Farris G. 274
 Fernandes A. S. C. 550, 810
 Ferris A. G. 90
 Finkelstein A. 143
 Fixson S. K. 131
 Fleet D. 119
 Flicker B. 905
 Forbes S. M. 476
 Franken A. R. C. 871
 Fraser P. 244
 Fujisue K. 298
 Fürst K. 96
- G**
- Garnsey E. 322
 Geisler E. 390
- Ghosh S. 101
 Gover J. 362
 Gregory M. 119, 244, 617
 Grice R. 137
- H**
- Hajnal C. 218
 Halonen H. 125
 Han I. S. 920
 Hanna V. 755
 Hardikar S. 826
 Hargrave P. 52
 Harisoulis D. 673
 Harris H. 25
 Hayashi N. 731
 Heiss M. 234
 Helokunnas T. 125
 Herman G. 731
 Hodgson P. D. 166
 Holma B. 73
 Hopson W. 804
 Huang G. Q. 107
 Hunt F. 328
 Huray P. 362
- I**
- Ibieta R. 172
 Igoshi M. 35
 Iijima J. 573
 Ioannou G. 743
 Isaza G. A. L. 909
 Ivey P. C. 250, 413, 871
 Ivory C. J. 304
- J**
- Jaakkola H. 67
 Jambak M. I. 708
 Jingjiang Liu 719
 Jonason A. 73
- K**
- Kachiang'a M. O. 437
 Kalakoski L. 125
 Kameoka A. 821
 Kanof P. R. 562
 Kasmai M. 573
 Kasser J. 510, 882
 Katzy B. R. 184
 Kelly J. C. 860
 Kerr C. I. V. 250
 Knott D. S. 860
 Koekemoer D. J. 437
 Koivuniemi J. 520
 Kruit M. 270
 Kubasa G. 234
 Kuusisto R. 368

L

| | |
|-----------------|---------|
| Lambert M. H. | 148 |
| Lamberti T. | 725 |
| Lawson C. P. | 413 |
| Lawson K. | 143 |
| Lebcir R. M. | 737 |
| Ledwith A. | 767 |
| Lepasaar M. | 224 |
| Lester R. K. | 635 |
| Lev L. | 378 |
| Levene R. | 372 |
| Lightfoot R. S. | 779 |
| Lilliesköld J. | 459 |
| Lo Storto C. | 41, 697 |
| Lockwood C. | 413 |
| Lolos D. | 485 |
| Lookabaugh T. | 316 |
| Luong H. S. | 25 |

M

| | |
|-------------------|----------|
| MacBryde J. | 685 |
| Madni A. A. M. | 854 |
| Maheshwari B. | 218 |
| Mak K. L. | 107 |
| Mäkinen T. | 224 |
| Malakis T. | 419, 673 |
| Malhotra R. | 356 |
| Malkinson T. J. | 280 |
| Manley T. R. | 160 |
| Mann M. M. | 498 |
| Manning B. W. | 454 |
| Martínez J. | 749 |
| Martínez V. | 384 |
| Martinich L. | 58 |
| Martowidjojo A. | 8 |
| Marxi C. | 471 |
| Matsushima K. | 35, 298 |
| Matsuura K. | 876 |
| Mawby D. | 344 |
| McCarthy I. | 761 |
| McKinven A. T. | 476 |
| McLoughlin I. P. | 304 |
| Medeisis A. | 202 |
| Meijer B. R. | 661, 888 |
| Millbank J. H. | 407 |
| Mittermayer M.-A. | 596 |
| Moguilnaia N. A. | 826 |
| Molinari P. | 924 |
| Moultrie J. | 244 |

N

| | |
|--------------------|-----|
| Naka Y. | 35 |
| Nakamura Y. | 239 |
| Narayanan E. M. S. | 826 |
| Ngwendson L. K. | 826 |
| Nironen E. | 403 |
| Nobre F. S. M. | 788 |

O

| | |
|-------------------|----------|
| O'Callaghan S. H. | 797 |
| O'Connor G. C. | 612 |
| Ohwada A. | 172 |
| Ojanen V. | 520, 647 |
| Onassis I. | 196 |
| Oota Y. | 35 |

P

| | |
|--------------------|----------|
| Pandya K. V. | 190 |
| Pantano V. | 166 |
| Papalexandris A. | 743 |
| Papavramides T. C. | 924 |
| Pathak S. D. | 655 |
| Pechter K. | 46 |
| Pellegrino A. | 590 |
| Peters L. S. | 612 |
| Petrick I. J. | 894 |
| Phaal R. | 794 |
| Pilkington A. | 713 |
| Piller F. T. | 773 |
| Pirkanen T. | 125 |
| Pliniusen J. | 799 |
| Plukka S. | 125 |
| Popovic D. | 431, 471 |
| Pramongkit P. | 79 |
| Prastacos G. P. | 743 |
| Pretorius L. | 577 |
| Probert D. R. | 184, 328 |
| Prough S. D. | 172 |

R

| | |
|------------------|-----|
| Ranta P. | 125 |
| Rask M. | 125 |
| Reed F. M. | 137 |
| Reeves R. | 555 |
| Reger G. | 178 |
| Reid S. | 799 |
| Rice J. B. | 629 |
| Rouse M. J. | 826 |
| Rowe A. | 372 |
| Ruohomaa H. | 491 |
| Saengpongpaew P. | 425 |

S

| | |
|-----------------|----------|
| Saha S. | 691 |
| Sallie F. | 556 |
| Saxby R. | 497 |
| Schmidt T. | 96 |
| Schofield M. E. | 617 |
| Sengupta S. | 2 |
| Shaw B. | 148 |
| Shaw W. H. | 160, 504 |
| Shawyun T. | 79 |
| Shehabuddeen N. | |
| T. M. H. | 328, 794 |
| Shi Y. | 119 |
| Shibao K. | 35 |
| Sida D. | 214 |

| | |
|-------------------|----------|
| Siekkinen R. | 125 |
| Siemieniuch C. E. | 783 |
| Sinclair K. V. | 190 |
| Sirinaovakul B. | 842 |
| Smart P. | 372 |
| Smith J. | 526 |
| Soderquist E. | 743 |
| Songer A. D. | 286 |
| Spinks N. | 391 |
| Spulber O. | 826 |
| Stamboulis Y. | 419, 673 |
| Steiner S. J. | 788 |
| Stodder J. | 544 |
| Stotko C. M. | 773 |
| Strnadl C. F. | 208 |
| Stupples D. | 344 |
| Suarez C. A. | 623 |
| Surujlal S. | 556 |
| Suzuki H. | 608 |
| Suzuki T. | 35 |
| Suzuki Y. | 821 |
| Sweet M. | 826 |
| Swirski M. | 350 |

T

| | |
|----------------|----------|
| Tamminen K. | 125 |
| Tapper S. | 556 |
| Teichert T. | 596 |
| Temponi C. | 356, 725 |
| Terman L. | 1 |
| Thamhain H. | 935 |
| Thomas S. L. | 649 |
| Thompson J. A. | 515 |
| Thwaites A. | 304 |
| Tovstiga G. | 397 |
| Tranfield D. | 372 |
| Tsinopoulos C. | 761 |
| Tsuji M. | 239 |
| Tuominen M. | 403, 647 |

V

| | |
|---------------------|-----|
| Van Der Merwe G. J. | 577 |
| Van Der Merwe L. | 577 |
| Van Wyk J. D. | 577 |
| Varkoi T. | 334 |
| Vaughan R. | 304 |
| Vershinin K. V. | 826 |
| Vincentelli A. J. | 749 |
| Vlad R.-C. | 491 |
| Vojak B. A. | 623 |
| Voûte J. H. | 888 |

W

| | |
|-----------------|-----|
| Walsh K. | 137 |
| Wang M.-Y. | 930 |
| Wang Yong | 602 |
| Watts J. J. S. | 837 |
| Wen-Shan Lin | 85 |
| Wigglesworth J. | 866 |

| | |
|-------------------------|-----|
| <i>Wilkie S.</i> | 915 |
| <i>Wilkinson J. M.</i> | 64 |
| <i>Wilson S.</i> | 184 |
| <i>Wippel G.</i> | 96 |
| <i>Wiseall S. S.</i> | 860 |
| <i>Wood-Kline A. H.</i> | 310 |

| | |
|-------------------|----------|
| X | |
| <i>Xu Qingrui</i> | 602, 719 |

| | |
|-----------------------|---------|
| Y | |
| <i>Yamasaki H.</i> | 608 |
| <i>Yen-Chun Wu</i> | 848 |
| <i>Yi-Kuan Lee</i> | 113 |
| <i>Yogendra S.</i> | 2 |
| <i>Yoon T.</i> | 35, 298 |
| <i>Yoshinaga T.</i> | 35 |
| <i>Yudilevich E.</i> | 679 |
| <i>Yuh-Chuan Shih</i> | 465 |

| | |
|---------------------|-----|
| <i>Yuy-Min Chen</i> | 701 |
| <i>Yuy-Zen Chen</i> | 701 |

| | |
|----------------------------|-----|
| Z | |
| <i>Zafrane-Bravo C.-E.</i> | 178 |
| <i>Zhang L.</i> | 350 |
| <i>Zheng Gang</i> | 602 |
| <i>Zhou D</i> | 448 |

LIST OF CONTENTS

VOLUME 1 : Monday 19 August 2002

PLENARY ADDRESS

Nurturing Innovation

Dr Lew Terman

President, IBM Academy of Technology, IBM Somers, Somers, NY, USA

1

ALIGNING BUSINESS AND TECHNOLOGY STRATEGIES - STRATEGY DEVELOPMENT

Aligning Business and Technology Strategies: A Comparison of Established and Start-up Business Contexts

Shefaly Yogendra, Syllogise Limited, Bourne End, England, UK

Suvojoy Sengupta, Booz Allen Hamilton, London, England, UK

2

A Model for Technology Strategy Development

Aryantono Martowidjojo, Alan S Carrie

University of Strathclyde, Glasgow, Scotland, UK

8

New Technology and Corporate Strategy: The International Management of R&D by Multinational Firms

Seiko Arai

University of Oxford, Oxford, England, UK

14

ORGANISATIONAL LEARNING, CULTURE AND PEOPLE - LEADERSHIP DEVELOPMENT

A Framework for Technical Leadership

Karl J Aranski

Raytheon, Garland, TX, USA

20

A Holistic Approach to Organisational Learning for Leadership Development

Rick D Castle, H S Luong, Howard Harris

University of South Australia, Adelaide, Australia

25

The Last Mile - The Technology Manager as Innovation Salesperson

Ronald J Bennett

University of St Thomas, St Paul, MN, USA

30

ENTERPRISE KNOWLEDGE MANAGEMENT

Knowledge Fusion Among the Virtual Production Enterprises Within the Technological Information Infrastructure Environment

TaeSung Yoon, Katsumori Matsushima, University of Tokyo, Tokyo, Japan

Yoshimi Oota, Hitachi Limited, Japan

Toshiaki Yoshinaga, Hitachi Plant Engineering Co Limited, Japan

Yuji Naka, Tokyo Institute of Technology, Tokyo, Japan

Koishi Shibao, AIE Research Inc, Tokyo, Japan

Masanori Igoshi, Tokyo Metropolitan University, Japan

Takahiko Suzuki, Kyushu University, Japan

35

| | |
|---|-----------|
| Efficient Strategies for New Knowledge Creation in Small Manufacturing Firms during Product Innovation: Concepts, Methodological Issues and Empirical Findings | 41 |
| <i>Corrado Lo Storto</i> | |
| <i>University of Naples Federico II, Naples, Italy</i> | |

| | |
|--|-----------|
| Dis-organizing Structure as a Policy Reform Objective: Public-Private Networks in Japan's Innovation System | 46 |
| <i>Kenneth Pechter</i> | |
| <i>University of Tokyo, Tokyo, Japan</i> | |

MANAGING DISRUPTIVE TECHNOLOGIES

| | |
|---|-----------|
| The Management of Disruptive Technologies - Cycles of Innovation | 52 |
| <i>Philip Hargrave</i> | |
| <i>Nortel Networks UK Limited, Harlow, England, UK</i> | |

| | |
|--|-----------|
| Managing Innovations, Standards and Organisational Capabilities | 58 |
| <i>Leslie Martinich</i> | |
| <i>Competitive Focus, Austin, TX, USA</i> | |

| | |
|--|-----------|
| The Important Role of Micro and Nano-technologies in the Creation of New Products and the Difficulties Faced by SME's in Acquiring and Exploiting these Disruptive Technologies | 64 |
| <i>J Malcolm Wilkinson</i> | |
| <i>TFI Limited, Littleport, England, UK</i> | |

MANAGING INFORMATION AND COMMUNICATIONS TECHNOLOGIES

| | |
|---|-----------|
| Mobile Telephones - The Way Towards the Penetrated Markets | 67 |
| <i>Hannu Jaakkola</i> | |
| <i>Tampere University of Technology, Pori, Finland</i> | |

| | |
|--|-----------|
| Pricing for Profits on the Mobile Internet | 73 |
| <i>Andreas Jonason, Royal Institute of Technology, Stockholm, Sweden</i> | |
| <i>Bo Holma, Ericsson Radio Systems, Stockholm, Sweden</i> | |

| | |
|--|-----------|
| Strategic IT Framework for Modern Enterprise by using Information Technology Capabilities | 79 |
| <i>Prasopchoke Pramongkit, Mahidol University, Bangkok, Thailand</i> | |
| <i>Teay Shawyun, Asian University of Science and Technology</i> | |

INTERACTIVE SESSION A : E-BUSINESS STRATEGIES AND PROCESSES

| | |
|---|-----------|
| A Study of Contextual Rules for Web Storefronts Based on E-marketing in the Agent-mediated Electronic Commerce | 85 |
| <i>Wen-Shan Lin, Nathalie Cassaigne</i> | |
| <i>UMIST, Manchester, England, UK</i> | |

| | |
|---|-----------|
| Introducing E-commerce and Internet Application Development to Organisations | 90 |
| <i>David M Allen, De La Rue, Portsmouth, England, UK</i> | |
| <i>Andy G Ferris, KSCL, Edinburgh, Scotland, UK</i> | |
| <i>Jeremy Birrell, Mangosoft, Edinburgh, UK</i> | |

| | |
|--|-----------|
| e-Technologies for the Web Business | 96 |
| <i>Thomas Schmidt, Karl Fürst, Gerald Wippel</i> | |
| <i>Technical University, Vienna, Austria</i> | |

| | |
|---|-----|
| Challenges on a Global Implementation of ERP Software | 101 |
| <i>Saumyendu Ghosh</i> <i>Oracle Corporation, Columbia, MD, USA</i> | |
| Web-based Product Platform Development Using Graph Theory | 107 |
| <i>S Bin, G Q Huang, K L Mak</i> <i>Hong Kong University, Hong Kong, China</i> | |
| Determinants of Firms' Propensity to E-Enabled Communication Adoption: The Internal Push and External Pull Factors | 113 |
| <i>Fang Wu, Yi-Kuan Lee</i> <i>Michigan State University, East Lansing, MI, USA</i> | |
| INTERACTIVE SESSION B : VIRTUAL ENTERPRISES | |
| Understanding and Conceptualising the Global Manufacturing Virtual Network | 119 |
| <i>Yongjiang Shi, Don Fleet, Mike Gregory</i> <i>University of Cambridge, Cambridge, England, UK</i> | |
| Best Practices of Electronic Collaboration | 125 |
| <i>Tuija Helokunnas, Ilse Becker, Tiina Danilotschkin-Forsman, H Halonen, Liisa Kalakoski, Toivo Pirskanen, Susanna Plukka, Pirjo Ranta, Marja Rask, Raili Siekkinen, Karoliina Tamminen</i> <i>Tampere University of Technology, Tampere, Finland</i> | |
| ALIGNING BUSINESS AND TECHNOLOGY STRATEGIES - PRACTICAL APPROACHES | |
| On the Link Between Modularity and Cost - A Methodology to Assess Cost Implications of Product Architecture Differences | 131 |
| <i>Sebastian K Fixson, Joel P Clark</i> <i>Massachusetts Institute of Technology, Cambridge, MA, USA</i> | |
| Information Acquisition for Technological Innovation and Technology Strategy in Small Firms | 137 |
| <i>Fiona M Reed, Kathryn Walsh, Loughborough University, Loughborough, England, UK</i> <i>Richard Grice, Pera Knowledge, Melton Mowbray, England, UK</i> | |
| Integration of Product and Technology Development Process with R&D Portfolio Management using Efficient Frontier Analysis | 143 |
| <i>Karen Lawson, Kodak Limited, Harrow, England, UK</i> <i>Anthony Finkelstein, University College, London, England, UK</i> | |
| ORGANISATIONAL LEARNING, CULTURE AND PEOPLE - MEMORY | |
| Transactive Memory and Exception Handling in High-Performance Project Teams | 148 |
| <i>Monique Lambert, Ben Shaw</i> <i>Stanford University, Stanford, CA, USA</i> | |
| Managing Memory in Changing Engineering Design Firms: A Closer Look at the Cultural Dimension | 154 |
| <i>Eugenia Cacciatori</i> <i>University of Sussex, Brighton, England, UK</i> | |
| Action Research, Appreciative Inquiry and Organisational Learning | 160 |
| <i>T Roger Manley, Wade H Shaw</i> <i>Florida Institute of Technology, Melbourne, FL, USA</i> | |

KNOWLEDGE MANAGEMENT - CULTURE CHANGE

Technology Diffusion and Organisational Culture: Preliminary Findings from the Implementation of a Knowledge Management System 166

*Victor Pantano, Michael J Cardrew-Hall, Australian National University, Canberra, Australia
P D Hodgson, Deakin University, Geelong, Australia*

Cultural Impacts on Global Knowledge Management 172

*Steven D Prough, University of Phoenix, Austin, TX, USA
Rodrigo Ibieta, Intel Corporation, Chandler, AZ, USA
Atsushi Ohwada, Adem Limited, Saitama City, Japan*

Managerial Implications of the Research on Centers of Excellence - A Conceptual View 178

*Guido Reger, University of Applied Sciences, Brandenburg, Germany
Carlos-Eduardo Zafrane-Bravo, Daimler-Chrysler AG, Stuttgart, Germany*

SUSTAINING INNOVATION

Sustaining Product Innovation in the New Economy: The Case of Siemens Switzerland 184

*Scott Wilson, David R Probert, University of Cambridge, Cambridge, England, UK
Marcel C Dissel, Bernhard R Katzy, CeTIM at University Bw Munich, Neibiberg, Germany*

A Scenario of Innovation in a MNC and the Potential to Gain by Exploiting it 190

*K V Sinclair, University of East London, London, England, UK
Kaushik. V Pandya, University of Luton, Luton, England, UK*

Growth ... It Must Be New 196

*Iason Onassis, Arthur D Little, Rotterdam, The Netherlands
Tony Bishop, Arthur D Little, Cambridge, England, UK*

MANAGING INFORMATION AND COMMUNICATIONS TECHNOLOGIES - TELECOMMUNICATIONS

Novel Spectrum Management for Liberalised Markets: Broadband Wireless Access Case 202

*Arturas Medeisis
European Radiocommunications Office, Copenhagen, Denmark*

A Pragmatic Approach to IT Investment Appraisal for Medium-size Enterprises 208

*Christoph F Strnadl
ATOS ORIGIN Information Technology GmbH, Vienna, Austria*

Predatory Acquisition of Start-up Intellectual Property within the Communications Industry 214

*D Sida, Axxcelera Broadband Wireless UK Limited, Cambridge, England, UK
Christopher J Backhouse, Neil D Burns, Loughborough University, Loughborough, England, UK*

INTERACTIVE SESSION A : SOFTWARE TECHNOLOGY MANAGEMENT

Total Systems Flexibility and Vendor Developed Software: Exploring the Challenges of a Divided Software Life Cycle 218

*Bharat Maheshwari, Catherine Hajnal
Carleton University, Ottawa, Ontario, Canada*

Integrating Software Process Assessment Models using a Process Meta Model 224

*Marion Lepasaar, Timo Mäkinen
Tampere University of Technology, Tampere, Finland*

| | |
|---|-----|
| Creating an Agile Software Development Organisation: A Key Factor for Survival in Today's Economy | 230 |
| <i>Niloy Banerjee, Philips Digital Networks, Hasselt, Belgium</i> | |
| <i>Sukrit Bhattacharya, Philips Consumer Electronics, Brugge, Belgium</i> | |
| Distributed Face-to-Face Communication in Button-up Driven Technology Management - A Model for Optimizing Communication Topologies | 234 |
| <i>Georg Kubasa, Michael Heiss</i> | |
| <i>Siemens AG, Vienna, Austria</i> | |
| INTERACTIVE SESSION B : R & D MANAGEMENT | |
| The Utility of "Techno Dynamics Model" for the Decisions of Research and Development | 239 |
| <i>Investment: The Case of Japanese Industries</i> | |
| <i>Yoshiki Nakamura, Masashige Tsuji</i> | |
| <i>Aoyama Gakuin University, Tokyo, Japan</i> | |
| The Use of Maturity Models/Grids as a Tool in Assessing Product Development Capability | 244 |
| <i>Peter Fraser, James Moultrie, Mike Gregory</i> | |
| <i>University of Cambridge, Cambridge, England, UK</i> | |
| Competitively Driven Gas Turbine Instrumentation Technology Development - A Framework for Engineering Managers | 250 |
| <i>Clive I V Kerr, Paul C Ivey</i> | |
| <i>Cranfield University, Cranfield, England, UK</i> | |
| PLENARY ADDRESS | |
| Creating Value for Science - The New Alchemy | 257 |
| <i>Sir John Chisholm</i> | |
| <i>Chief Executive, Qinetiq Group plc, Farnborough, England, UK</i> | |
| ALIGNING BUSINESS AND TECHNOLOGY STRATEGIES - CULTURAL ASPECTS | |
| Management of Technology Enterprises: Three Case Studies Impacted by Culture | 258 |
| <i>Mario W Cardullo</i> | |
| <i>US Department of Commerce/Virginia Polytechnic Institute and State University, Alexandria, VA, USA</i> | |
| Modeling Voice and Exit Strategies within Industrial Network Relationships | 264 |
| <i>S Dani, Neil D Burns, C J Backhouse</i> | |
| <i>Loughborough University, Loughborough, England, UK</i> | |
| Understanding People, Leading through Technology | 270 |
| <i>Marco Kruit</i> | |
| <i>Delft University of Technology, Pijnacker, The Netherlands</i> | |
| ORGANISATION, CULTURE AND PEOPLE - ROLE OF THE INDIVIDUAL | |
| The Technical Supervisor as Captain and Catalyst | 274 |
| <i>Rene Cordero, New Jersey Institute of Technology, Newark, NJ, USA</i> | |
| <i>George Farris, Nancy DiTomaso, Rutgers University, Newark, NJ, USA</i> | |
| The Proposal Manager - A Value Add | 280 |
| <i>Terrance J Malkinson</i> | |
| <i>GE Capital Information Technology Solutions Inc, Calgary, Canada</i> | |