

Minutes of Continuous/ Hybrid Simulation Roadmap Event, held at City University , London on March 9th 2004.

Present

The meeting was attended by 10 industrialists and academics representing eight different organizations. Interest had been expressed from two other organizations who were not able to make the date. Details are attached to the minutes.

Proceedings

The meeting followed the agenda, shown here as an attachment, with Professor Karcanias appointed as the Chairman.

After welcomes and introductions, David Boland placed the context of the meeting within the theme of the SIM-SERV project, explaining that one of the main aims of the virtual institute was to provide a network in support of rapid transfer of leading edge, simulation R&D results into industrial take-up. Further, it was hoped that creation of the intended Roadmap within this environment would provide guidance to those in government and strategic positions (etc) to facilitate future development programmes.

NK explained that the purpose was to bring together experts in the areas of continuous and hybrid modeling, simulation and related activities, in order to identify opportunities for achieving future European advantage and to define the R&D needs which would have to be satisfied to reach this goal. He pointed out that the central timeframe was the next 5 years but that views on the longer term would not be excluded. He referred to the original overview document (attached here) as a further guide as to intent.

Individual experts were then encouraged to explain and present on their particular areas of expertise and this led into a general discussion on the essential elements required for a roadmap to be effective. A series of six interrelated areas were identified where complementary "white papers" could be assembled in order to achieve a meaningful total roadmap (these areas are defined in more detail in an attachment to the present document) and a methodology was agreed for their creation. This was based on the assignment of lead responsibilities for each white paper to individuals (see attachment) but it was agreed that other group participants would also be encouraged to contribute to the development of drafts, where qualified to do so. Allocation of the time of individuals within the 40 hours maximum for each white paper would be agreed off line.

Forward Programme

The group considered that two further events would be required to achieve a worthwhile conclusion;

1. Second meeting in May (17, 18 or 19 th) to review individual white papers produced.
2. Concluding meeting in July (12, 13 or 14 th) to confirm their consolidation in a Roadmap Document with a Workshop event to disseminate the results to a wider group of modeling, and simulation specialists and users.

Attendees at Roadmap for Modeling and Simulation of Continuous and Hybrid Processes

Prof Nick Karcianas
Schools of Engineering
City University
London
N.Karcianas@city.ac.uk

Dr Jan Maciejowski
Reader in Control Engineering, Head of Control Group
Cambridge University Engineering Dept
Trumpington Street
Cambridge CB2 1PZ
England
jmm@eng.cam.ac.uk

Duncan McFarlane
dcm@eng.cam.ac.uk
Cambridge University
Cambridge CB2 1PZ
England

Calum Forsyth
Webaspx
Runcorn
Cheshire
calum.forsyth@webaspx.com

Prof Antonis Kokossis
Dept of Chemical Engineering
A.Kokossis@surrey.ac.uk

Professor Berc Rustem
Director
Centre for Process Systems Engineering
Department of Chemical Engineering
Imperial College London
tel - +44-20-75946620 (direct)
+44-20-75946627

br@doc.ic.ac.uk

Prof Heikki Koivo
University of Helsinki
heikki.koivo@hut.fi



Prof Nick Koussoulas
University of Patras
Greece
ntk@ee.upatras.gr

Dia Milioti
Schools of Engineering
City University
London
K.Milioti@city.ac.uk

Dave Boland
Process Industries Centre for Manufacturing Excellence
Wilton
Cleveland
dave@menza.co.uk

Kostas Karaoulis
Schools of Engineering
City University
London
K.Karaoulis@city.ac.uk

Non attendess expressing interest in future activities;

Gerhard Schreck
Dipl.-Ing. Gerhard Schreck
Fraunhofer-Institute for Production Systems and Design Technology (IPK)
Pascalstr. 8-9
D - 10587 Berlin
GERMANY
E-mail: Gerhard.Schreck@ipk.fhg.de

Feargal Timon
CIM Ireland Ltd.
+353-87-2558183
WWW.Simulation.IE
Feargal.Timon@Simulation.IE

Prof George Papavasiliopoulos
Electrical Engin/ Control
National Technical University of Athens,
Greece
yorgos@netmode.ntua.gr



Prof Dave Stupples
School of Engineering
City University

d.w.stupples@city.ac.uk

Prof. Stratos Pistikopoulos
Director
Centre for Process Systems Engineering
Department of Chemical Engineering
Imperial College London

e.pistikopoulos@ic.ac.uk

Continuous/ Hybrid Simulation Roadmap Event

City University 9th March

Agenda

- **Welcome with round table introductions**
NK plus all.
- **Overview of SIM-SERV**
DB
- **Objectives of Roadmapping Exercise**
NK with general discussion
- **Presentations of Specialists**
Opportunity for all to make 5
minute presentation
- **Roadmap Plan – scope and contributions**
All
- **Actions Arising**
All
- **Next Meeting**
- **Close**

The meeting will be held in the Committee Room in the Schools of Engineering, commencing at 14.00 hrs.

OHP and lap top projection facilities will be available for those wishing to present .

Roadmap for Modeling and Simulation of Continuous and Hybrid Processes

In the new era of global manufacturing competition, there has developed an unprecedented emphasis on product development, cost, customization, market responsiveness, etc, which demands, new agile approaches underpinned by ICT. One of the key enabling tools now emerging is the use of formal modeling and simulation approaches in almost all areas of manufacturing and business processes and activities. This is a prerequisite for the development of advanced measurement/diagnostics and control/decision making techniques for such processes and problems which may lead to optimization of overall performance.

Traditionally, modeling and simulation has found outlet into manufacturing plants either in the form of discrete event or continuous treatments. The EU has now asked the SIM-SERV project partners to take a closer look at these areas with a view to confirming present state of art and identifying key areas for future R&D. The requirement is to produce Roadmap documents for use in future strategic planning.

SUMMARY OF IDENTIFIED KEY THEMES

After some discussion on the problems and issues a number of key topics have been identified and leaders for the activities have been appointed, which are as follows:

1. INFORMATION AND DECISION MAKING STRATEGIES AND ORGANISATION
Leader: **DUNCAN McFARLANE**
2. HETEROGENEOUS PROCESSES AND MODELLING
Leader: **NICK KOUSSOULAS**
3. MODELLING POWER AS A UTILITY
Leader: **ANTONIS KOKOSSIS**
4. CHALLENGING PARADIGMS IN MODELLING AND SIMULATION
LEADER: **HEIKKI KOIVO**
5. MODELLING METHODOLOGY AND ISSUES
Leader: **BERC RUSTEM**
6. EXPLOITATION OF MODELLING
Leader: **CALUM FORSYTH**

For each of the theme areas a list of topics has been identified and all members of the group can contribute by sending their contribution to the leader of the activity who will eventually integrate all contributions and produce the “white paper” of the area. The structure of every theme is detailed below:

THEME(T.1): INFORMATION AND DECISION MAKING STRUCTURES AND ORGANISATION

- T.1.1 Centralisation/Decentralisation
- T.1.2 Hierarchical/Holonic/Heterarchical
- T.1.3 Coordinated, Cooperative, Competitive
- T.1.4 Evaluation Methodologies
- T.1.5 Goals, Objectives
- T.1.6 Domains of Applicability

THEME (T.2): HETEROGENOUS PROCESSES AND MODELLING

- T.2.1 Multimodelling in an integrated enterprise
- T.2.2 Global Control/Diagnostics
- T.2.3 Features and Properties of Hybrid/Herogeneous model
- T.2.4 Management infra-structures to enable access integration and Automated diagnostics
- T.2.5 Multi-layer Organisations

THEME (T.3): MODELLING POWER AS A UTILITY

- T.3.1 Utilisation of existing models
- T.3.2 Grid and Internet Access
- T.3.3 Simulation/services on demand. (Modelling on demand)
- T.3.4 Asset Register
- T.3.5 Interoperability/Query Service
- T.3.6 Business Services using Modelling
- T.3.7 Enabling Technology and Methodology (e.g agents and semantics)

THEME (T.4): CHALLENGING PARADIGMS IN MODELLING AND SIMULATION

- T.4.1 Multidomain Modelling (Micro Systems)
- T.4.2 Invention/New Products/Processes through Modelling.
- T.4.3 Strategy, Management Processes (Modelling objects that have not been Modelled)
- T.4.4 Internet/Network Modelling
- T.4.5 Modelling for re-engineering processes

THEME (T.5): MODELLING METHODOLOGIES AND ISSUES

- T.5.1 Data – Information – Knowledge?
- T.5.2 First principle based Models
- T.5.3 Data driven Modelling
- T.5.4 Design of Experiments
- T.5.5 Modelling and Uncertainty
- T.5.6 Pattern Recognition/Data interpretation, Mining
- T.5.7 Clusters of Models
- T.5.8 Computational issues
- T.5.9 Integrated Modelling
- T.5.10 Life Cycle Modelling
- T.5.11 Model Nesting (Early-Late)
- T.5.12 Variable Complexity Model
- T.5.13 On line – Off line – Near Line

THEME (T.6) : EXPLOITATION OF MODELLING

- T.6.1 Inter-operability issue
- T.6.2 Soft Issues: Modelling Culture, Skills in Companies, Human aspects
- T.6.3 Communication of value of modeling
- T.6.4 SMEs and modelling exploitation
- T.6.5 Dissemination, Financial Input
- T.6.6 Impact Metrics and Evaluation
- T.6.7 Potential Impact on Competition at EU level
- T.6.8 Traditional/New Domain Modelling. Moving to new domains

TIMETABLE OF ACTIVITIES:

1. Agreeing the minutes and proposals by 22nd March 2004.
2. Expression of interest to contribute in the particular tasks of the main themes by 26th March 2004 (communication of intention to theme leader and to DB,NK)
3. Contributions sent to theme leader by 26th April 2004.
4. First draft of white papers to be circulated before the second meeting (middle May)
5. Final draft of white papers to be submitted by 7th June 2004.
6. First draft of Road Map to be circulated by 28th June 2004.
7. Road Map and White Papers to be presented in the Patras Workshop (middle July).