

REPORT for Kick-off meeting of Modular Design of Simulation Tools (MOTTO) Working Group on 15.05.2003 – 16.05.2003

Location:

Sheffield Hallam University, Sheffield UK

The meeting will be held in room 4105 in Sheaf Building (Engineering Building) at the City Campus.

Goals of the meeting:

the meeting was organized first to discuss the work group research area, get the better image of group members' competencies and discuss the subject with representatives from industry, who use simulation, as well as with representatives of simulation software vendors. Second, the meeting served analysis and discussion regarding work packages suggested by the chairman and tasks sharing among the group members.

Participants:

1.	Jaroslav Chrobot	Centre for Advanced Manufacturing Technology (CAMT), Poland
2.	Slawomir Susz	Centre for Advanced Manufacturing Technology (CAMT), Poland
3.	Terrence Perera	Sheffield Hallam University, Systems and Enterprise Engineering group (SHU), U.K.
4.	David Clegg	Sheffield Hallam University, Systems and Enterprise Engineering group (SHU), U.K.
5.	Rosemary Gault	Manufacturing Engineering Centre (MEC), University of Wales, Cardiff, U.K.
6.	Jyrki Peltoniemi	VTT Technical Research Centre of Finland, Industrial Systems, System dynamics group
7.	Tingting Zhu	Computer Integrated Manufacturing Research Unit, National University of Ireland, Galway (CIMRU)
8.	Peter Steininger	ifab-Institute of Human and Industrial Engineering, Universität Karlsruhe (IFAB), Germany
9.	Graham Carter (first day only)	AutoLogic Systems Ltd.

Short description of the meeting

The meeting took 2 days. During the first day the goals of the MOTTO working group were discussed and presentations of simulation package vendor as well as MOTTO partners took place. During the second day the participants agreed the workpackages within the working group.

Unfortunately professor Edward Chlebus (CAMT) couldn't come to chair the meeting because of unexpected problems and has designated Jaroslaw Chrobot to represent the chairman and Slawomir Susz to be the secretary of the meeting.

Unfortunately representatives of ITM (Ruhr University Bohum) as well as of Bendit Innovative Interfaces haven't come because of some sudden difficulties. But they expressed their further interest to collaborate within the working group. So during the kick-off meeting they was also considered to participate in the workpackages.

Unfortunately the industrial simulation user couldn't come because of urgent meetings.

Day1: 15.05.2003, 10:30 – 17:00	
10:30 – 13:00	<p>At the first day, at the beginning of the meeting Jaroslaw Chrobot has presented the MOTTO Working Group objectives. WG has discussed the following problems: (a) different simulation packages don't exchange data, (b) different simulation packages represent different modeling approaches. Based on the problems all of participants have agreed two aspects of the working activity area:</p> <ul style="list-style-type: none"> - data exchange between modules of simulation packages ((a) how packages exchange data (between packages of the same vendor, between packages of different vendors, between simulation packages and other software (CAX)), (b) is it useful to have a common data exchange format ?, (c) it would lead to an interchangeable data model, which would enable transfer one model to another) - building simulation models from components ((a) how to build model and reuse components in it ?, (b) how to put together small components to a bigger model in hierarchical modular simulation). <p>MOTTO group has agreed modularity and data exchange is now the target for the most of the software from different areas. Working Group (WG) would like to focus in research on commercial software. WG has agreed first to look at the discrete event simulation, because is most used (packages like ARENA, SIMPLE ++, WITNESS, AUTOMOD). But it was rather too narrow area, because some of the group of MOTTO participants deal also with continuous production (VTT) as well as with robotic simulation (CAMT, MEC, Bendit).</p> <p>WG has discussed our competencies and simulation software, that is available at each of institution for research and commercial purposes.</p>
14:00 – 15:00	<p>Next, Graham Carter, representative of AutoLogic Systems Ltd, has presented the simulation package AutoMod focusing on modular design of the simulation model. During the presentation the MOTTO participants had opportunity to know the main modules (i.a. system movement modules: tanks and pipes, kinematics, conveyor, path mover, power and free system), AutoStat (statistics) and components of the package. There was opportunity to ask questions regarding the modularity. One of data exchange method is messaging and synchronization, which is used for communication with PLC software. With Automod Software several designers can build parts (submodels) of a big model and at the and join them into the huge model. Building from components: assembly <- transport <- store <- rack or assembly <- workcell <- robot. Unfortunately it is not possible to buy only separate modules of the package. So the package enables to build modular models, but is not modular in sense of common architecture and interchangeability.</p>
15:00 – 18:00	<p>At that time a range of presentations of MOTTO participants took place to show their competencies and to give a better picture for the task sharing within the working group. The presentations were as follow:</p> <ol style="list-style-type: none"> 1. Jaroslaw CHROBOT, Slawomir SUSZ, CAMT 2. Terence PERERA, SHU 3. Rosemary GAULT, MEC 4. Jyrki PELTONIEMI, VTT 5. Tingting ZHU, CIMRU 6. Peter STEININGER, IFAB
15:45 – 17:00	<p>After presentation the discussion took place. In summary the WG consists of users of simulation packages (robotics, mechanics, discrete event simulation – CAMT, MEC, SHU, CIMRU, Bendit, IMT), developers of simulation tools (discrete – SHU, CIMRU)</p>

	based on commercial packages as well as developers of simulation software (discrete, continuous - VTT).
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Day2: 16.05.2003, 9:00 – 12:00

At that day WG determined MOTTO Work Packages and shared tasks among partners. WG has agreed that the participants could benefit from the group with possible publications and extensive interactions, which could lead to further projects. At the beginning WG agreed, that there are two subjects to make clear: (1) what does modular simulation mean ?, (2) how could we use simulation modularity, do people need it ?

WG has agreed to focus on 2 aspects of modularity within the working group: (1) data exchange between modules, simulation packages, (2) modular development of simulation models.

First WG has to get opinion from the simulation community (software vendors, simulation practitioners): do they really see a value of doing data exchange between different packages ?

MOTTO participants made comments:

- modular design is needed; it is useful to have a neutral data exchange format; to publish the idea of such open interface (pipe) could be the good idea; general to have only one database and different views is desirable (**Peter Steininger, IFAB**)
- it is doubtful, that it is to manage and needed to exchange data between packages; we try to transfer model made in ARIS into ARENA and it is possible only regarding a skeleton, but the data are to insert additionally into ARENA; we can look at what kind of data we should have to create the common database, but it is simulation software specific to write data in an open database (**Terrence Perera, SHU**)
- we had problems to get satisfied results with one robotics simulation package; we had to build twice the same simulation model using two packages, instead of having one interchangeable model (**Rosemary Gault, MEC**)
- the focus of WG should be clear at the beginning; modular design is a very broad area; in whole life cycle of simulation project we use different simulation tools and we have problems with data exchange, therefore there is a need for standard data exchange format (**Jyrki Peltoniemi, VTT**)

Regarding the workpackages WG has worked out 3 general steps:

1. Getting opinion from simulation community regarding data exchange and building models from modules
2. Model building from modules (different packages can do it, some not: Arena (limited), ProModel (not)). It will require benchmarking of known simulation tools, which are at disposal of each of MOTTO participant or are known to them.
3. What kind of tools from simulation area exchange data? In Arena it is possible in three ways: (1) one can export the whole model into MS Excel, change data and import

from MS Excel again, (2) using VBA, (3) using Read/Write module to write and read from text files.

After that we WG agreed more detailed workpackages and their duration time (overall scheduled for 6 – 7 months) in form of Gantt chart were worked out:

Workpackage number	Workpackage name and description	Duration
WP0	Outline document (2 weeks)	2 weeks
WP1	<p>Survey of data exchange and modular model building for vendors, developers, users</p> <ul style="list-style-type: none"> - WG will ask about opinion regarding neutral data format and building models from components - WG will ask about needs, benefits of modular design from the area of robotics, continuous simulation, discrete event simulation <p>Tasks:</p> <p>T1.1 Preparing questions (3 weeks)</p> <p>T1.2 Conduct survey (4 weeks)</p> <p>T1.3 Analyzing surveys (4 weeks)</p> <p>T1.4 Preparing a deliverable (1 week)</p> <p>Web page survey is to consider.</p>	3 months
Milestone - Meeting in Poland		
WP2	Benchmarking on simulation tools: modular building of models from the area of robotics, continuous simulation, discrete event simulation	8 weeks
WP3	Benchmarking on data exchange capability of simulation tools (how do simulation packages exchange data?)	8 weeks
WP4	Benchmarking on data exchange between simulation packages from different areas: for example robotics <-> discrete event simulation	
MILESTONE - Final meeting		

Comments:

- WP3 and WP4 will be done in parallel and it will take together 8 weeks.
- Each of benchmarking workpackages will have the same tasks: preparing criteria (2 weeks), conduct benchmarking (4 weeks), analyzing results (2 weeks), preparing a deliverable (1 week).
- Each of benchmarking workpackages will require analysing simulation packages, which are known to MOTTO participants.

- Each of workpackages will regard 3 areas of simulation and to this areas particular MOTTO partners were assigned: robotics (MEC, CAMT, Bendit, IMT), continuous (VTT), discrete event simulation (CAMT, SHU, IFAB, CIMRU).
- WG has agreed, that the work will be not well-balanced, so chairman will enhance other Sim-Serv members to join the WG within the areas of continuous simulation to help VTT.

Problems and questions:

At the end there some questions were asked Sim-Serv Core Group to be made clear in the near future:

- how much time do we have for the project ?
- we have to use Sim-Serv contacts to distribute the survey fro the WP1
- we have to consider 6th Framework Programme time table to end our project
- we have to seek financial sources for ongoing work
- we should use Sim-Serv web page to exchange data
- meeting with other working groups will be surely useful
- chairman will contact simulation network of excellence
- what is the general goal of working groups; how Sim-Serv will benefit from that and how will be support ongoing work ? Do Sim-Serv has any authority to promote working group activity ? Mission statement of each of Working group as well as the Sim-Serv mission statement for working groups is needed.
- Who will coordinate the future project?

ID	Task Name	Start	Finish	Duration	2003											2004		
					May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan					
1	M0.1 Kick-off meeting in Sheffield	15.05.2003	16.05.2003	2d														
2	D0.1 Outline document	16.05.2003	29.05.2003	2w	■													
3	WP1 Survey of data exchange, modular model	30.05.2003	18.08.2003	11w 2d	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4	T1.1 Preparing question	30.05.2003	19.06.2003	3w	■													
5	T1.2 Conduct survey	20.06.2003	17.07.2003	4w		■												
6	T1.3 Analysis survey	18.07.2003	07.08.2003	3w			■											
7	M1.1 Meeting in Poland	08.08.2003	11.08.2003	2d														
8	D1.1 Report from Workpackage 1	12.08.2003	18.08.2003	1w														
9	WP2 Benchmarking on modular building of models	19.08.2003	20.10.2003	9w														
10	T2.1 Preparing benchmarking criteria	19.08.2003	01.09.2003	2w														
11	T2.2 Conduct benchmarking	02.09.2003	29.09.2003	4w														
12	T2.3 Analysis of benchmarking results	30.09.2003	13.10.2003	2w														
13	D2.1 Report from Workpackage 2	14.10.2003	20.10.2003	1w														
14	WP3 Benchmarking on data exchange capability (external)	21.10.2003	22.12.2003	9w														
15	T3.1 Preparing benchmarking criteria	21.10.2003	03.11.2003	2w														
16	T3.2 Conduct benchmarking	04.11.2003	01.12.2003	4w														
17	T3.3 Analysis of benchmarking results	02.12.2003	15.12.2003	2w														
18	D3.1 Report from Workpackage 3	16.12.2003	22.12.2003	1w														
19	WP4 Benchmarking on data exchange between packages from different areas (for example robotics <-> discrete event simulation)	21.10.2003	22.12.2003	9w														
20	T4.1 Preparing benchmarking criteria	21.10.2003	03.11.2003	2w														
21	T4.2 Conduct benchmarking	04.11.2003	01.12.2003	4w														
22	T4.3 Analysis of benchmarking results	02.12.2003	15.12.2003	2w														
23	D4.1 Report from Workpackage 4	16.12.2003	22.12.2003	1w														
24	D0.2 Final Report	23.12.2003	29.12.2003	1w														
25	M0.2 Final meeting - future work proposals	30.12.2003	31.12.2003	2d														

Gantt chart of the MOTTO working group activities