

RIM
**ROBOTICS AND INTEGRATED
MANUFACTURING
UNIT**

**SUMMARY OF ACTIVITIES
2002**

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1. ORGANIZATION

1.1 Affiliation

From the institutional point of view, the Robotics and Integrated Manufacturing unit is part of both the New University of Lisbon (UNL), Faculty of Sciences and Technology, and UNINOVA - Institute for the Development of New Technologies.

At UNL the unit is integrated in the Department of Electrical Engineering. At UNINOVA the unit is integrated in the Center for Intelligent Robotics.

The activities described in this report were carried on in the two institutions.

1.2 Members

Research team:

- ◆ Prof. Luis M. Camarinha-Matos – Group Coordinator cam@uninova.pt
www.uninova.pt/~cam
- ◆ José Barata Oliveira – Assistant jab@uninova.pt
- ◆ João Rosas – Assistant jrosas@uninova.pt
- ◆ Rui Rodrigues – Assistant (only teaching) rmr@uninova.pt
- ◆ Tiago Cardoso – Trainee Assistant tomfc@uninova.pt
- ◆ Luis Octavio Castollo – PhD Student lgc@uninova.pt
- ◆ António Abreu – PhD Student ajfa@mail.fct.unl.pt
- ◆ Rosa Oliveira – Research student / secretary rfo@uninova.pt
- ◆ 3 undergraduate students: Pedro Santana, Orlando Branco, João Sarraipa

1.3 Contact

Prof. Luis M. Camarinha-Matos
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2. RESEARCH ACTIVITIES

2.1 Research Topics

Current research activities include:

- Virtual Enterprises and Electronic Commerce
- Machine Learning in Intelligent Supervision
- Multi-Agent Systems in Manufacturing and Elderly Care
- Remote supervision in distributed systems
- Manufacturing Information Systems and Integration
- Manufacturing Systems Re-engineering
- Remote Learning

2.2 Projects

IST TELECARE

A Multiagent Telesupervision System for Elderly Care

June 2001 – May 2004



<http://www.uninova.pt/~telecare>

The purpose of this project is to develop a framework for telesupervision of elderly people living alone towards a virtual community for elderly assistance, using a multi-agent approach including both stationary and mobile agents.

Group's role:

- Project coordination
- Architecture definition
- Design and development of the multi-agent and mobile agent system.

Partners:

- UNINOVA, Portugal
- University of Amsterdam, The Netherlands.
- Synkronix Ltd, UK
- Skill SA, Spain
- RoundRose Associates, UK
- Camera de Comércio de Navarra, Spain

enterprises to register their services in federations of services under a virtual enterprise perspective.

IST FETISH-ETF

Federated European Tourism Information System Harmonization

Jan 2000-Apr 2002

The purpose of this project is to develop methodologies to allow tourism organizations and

Group's role:

- Design and development of support system for distributed business process modeling and management.
- Support for creation and registration of value added services based on the services available on the federation.

Partners:

- Ibit, Spain
- T6, Italy
- University of Amsterdam, Netherlands
- Forth, Greece
- SUN, Spain
- ICEP, Portugal

► IASI, Italy ► UNINOVA, Instituto de Desenvolvimento de Novas, Portugal

IST VMap

Roadmap design for collaborative virtual organizations in dynamic business ecosystems

Jul 2002 – Jun 2003



www.vomap.org

VMap aims at identifying and characterizing the key **research challenges**, required **constituency**, and the **implementation model** for a comprehensive initiative to affirm the **EU leadership** on dynamic **collaborative virtual organizations**.

Group's role:

-Project coordination

Partners:

► UNINOVA, Portugal
► UNINOVA (PT), FhG-IAO (DE), University of Amsterdam (NL), CAS (DE), CeTIM (DE), VTT (FI), Virtuelle Fabrik (CH).

2.3 Networks

IFIP COVE

CO-operation infrastructure for Virtual Enterprises and electronic business

Jul 2000 – Jun 2002



<http://www.uninova.pt/~cove>

The purpose of this project is to assess research results and practices in virtual enterprises and electronic business, leading to the design of common

reference models, cooperation infrastructures, and prospects for further collaborative developments. It will be based on the creation and operation of a cluster / forum of participants and projects active in the field, covering a world-wide representation, which will facilitate the exchange and refinement of knowledge and project results on new ways of working in networks of independent but cooperative nodes.

Group's role:

-Project coordination
-Creation and maintenance of web site
-Contribution to reference models definition.

Partners:

► UNINOVA, Portugal
► 21 Partners from 14 countries.

IST CE-NET II

Concurrent Enterprise Network of Excellence

Jan 2000-2002



<http://www.ce-net.org/>

The prime aim of this second phase of the CE-NET is to establish and further develop a well-coordinated and effective support infrastructure throughout Europe in order to share and exchange the latest developments in the CE domain.

Partners: 38 members from Europe

IST THINKcreative

Thinking network of experts on emerging smart organizations

Jul 2001 – Dec 2003



www.thinkcreative.org

THINKcreative aims at establishing a working group to act as a European advisory group in the area of smart and emerging organizations in the framework of the "knowledge and skills economy".

The general goal is to identify and characterize the emerging organizational forms, the required infrastructures, modeling and application tools, and socio-organizational needs for the next 5, 10, and 20 years.

Group's role:

- Project coordination
- Identification and characterization of new collaborative forms and required IT infrastructures.

Partners:

UNINOVA (PT), FhG-IAO (DE), University of Amsterdam (NL), RoundRose Associates (UK), Czech Technical University (CZ), CAS (DE), SKANDIA (SE), CeTIM (DE), FhG-FOKUS (DE), Cranfield University (UK), INESC-Porto (PT)

IST VOSTER

Virtual Organizations Cluster

Duration: Dec 2001 – May 2004



<http://cic.vtt.fi/projects/voster/public.html>

The aim of VOSTER is to collect, analyse and synthesize the results from a number of leading European research projects on Virtual Organisation (VO), i.e. geographically distributed, functionally and culturally diverse, dynamic and agile organisational entities linked through ICT.

Group's role:

-Coordination of the work package on infrastructures for VE/VO.

Partners:

VTT (FI), FhG-IAO (DE), CeTIM (DE), UNINOVA (PT), University of Aachen (DE), Loughborough University (UK), YIT Corporation (FI), Technical University of Dresden (DE), University of Salford (UK), Computas (NO), CAM-I, University of Amsterdam (NL), CE Consulting (IT), Silesian University of Technology (PL).

GROWTH ASSEMBLY NET

Duration: 1 Oct 2001 – 31 Aug 2004



www.assembly-net.org

The prime aim of the Assembly Net Thematic Network is to establish a well co-ordinated and effective support infrastructure throughout Europe in order to share and exchange the latest developments

in Assembly System Applications and Design. The project partners would like to create a network in which existing national and international projects, and available solutions, are linked to urgent industrial needs.

Group's role:

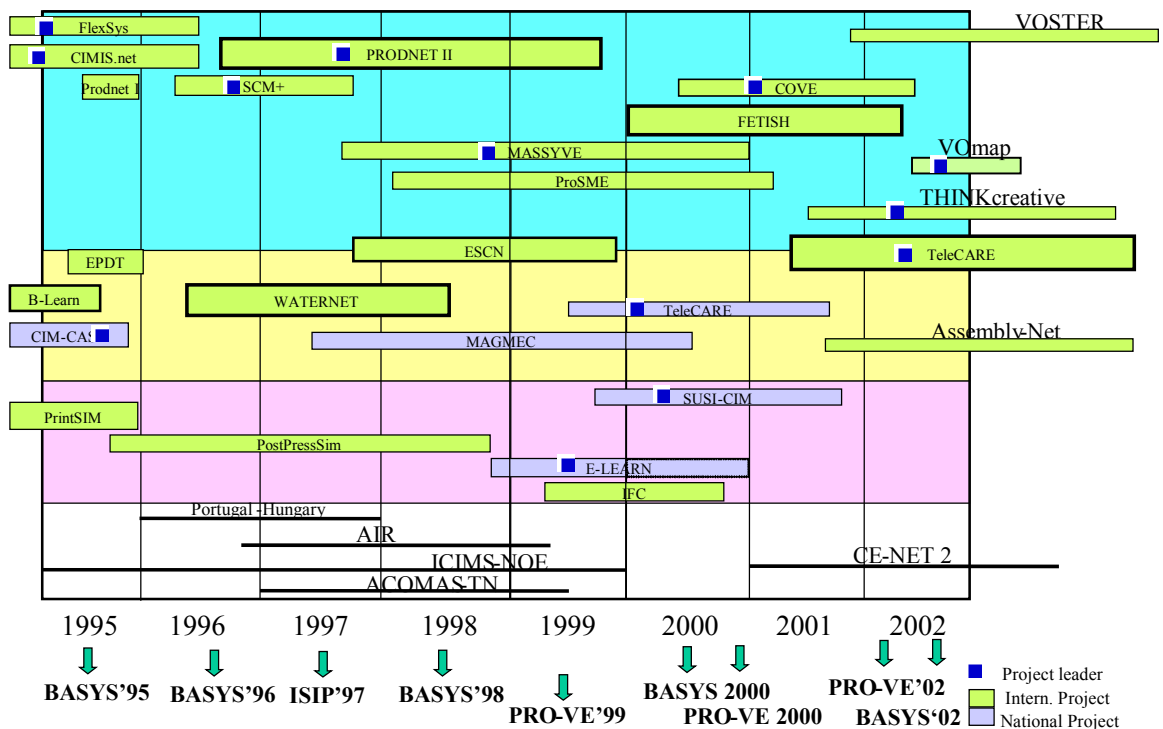
-Develop strategies towards distributed assembly networks.
- Re-engineering and agile manufacturing topics

Partners:

33 partners from 8 countries (Universities, research institutes, users of assembly systems, assembly system providers, and industrial consultancy groups).

2.4 Recently finished projects

- Esprit PRODNET II - Production Planning and Management in an Extended Enterprise (Sep 1996-Oct 1999). www.uninova.pt/~prodnet
- Esprit WATERNET - Knowledge Capture for Advanced Supervision of Water Distribution Networks (Jun 1996-May 1998).
- INCO SCM+ - Beyond Supply Chain Management in Food Industry (Apr 1996 – Sep 1997). www.uninova.pt/~scm
- Esprit ESCN - European STEP Centres Network (Nov 1997 – Oct 1999). www.uninova.pt/~escn/
- TSER IFC - Further training funds as an impulse for new models of life long training - Integrated Funding Concept (Mar 1999 – Jun 2000).
- INCO MASSYVE – Multi-Agent Agile Manufacturing Scheduling Systems in Virtual Enterprise Industry (Oct 1997 – Dec 2000).
- PRAXIS MAGMEC – Sensores de campo magnético para posicionamento e monitorização de corrente em Mecatrónica (Jun 1997 – Mai 2000).
- E-LEARN – Remote learning through Internet (Nov 1998-Dec 2000).
- INCO-DC ProSME - Easy-to-Use Procedures for Quality Management tailored for SMEs (Feb 98-Jan 2001)
- PRAXIS TeleCARE - A Multi-Agent Tele-Supervision System for Elderly Care (Jun 1999-Nov 2001)



3. PUBLICATIONS 2002

3.1 Journals

International:

- ❑ A Mobile Agents Approach to Virtual Laboratories and Remote Supervision, L.M. Camarinha-Matos, O. Castolo, W. Vieira, *Journal of Intelligent and Robotic Systems*, ISSN 0921-0926, Vol. 35, Issue 1, pp. 1-22, Sept 2002.
- ❑ Trends in Virtual Organizations and Support Infrastructures, L.M. Camarinha-Matos, H. Afsarmanesh, **invited paper**, *Journal Systems, Control and Information*, Journal of the Institute of Systems, Control and Information Engineers, Japan, Vol. 46, N° 10, Oct 2002.
- ❑ Infrastructure developments for agile virtual enterprises, L.M. Camarinha-Matos, H. Afsarmanesh, R. Rabelo, accepted for publication in *Int. Journal of Computer Integrated Manufacturing*.
- ❑ Elements of a base VE infrastructure, L.M. Camarinha-Matos, H. Afsarmanesh, accepted for publication in *J. Computers in Industry* (Elsevier).
- ❑ European Assembly – Status report, M. Onori, L.M. Camarinha-Matos, J. Barata, to appear in *J. Assembly Automation* (Emerald, UK).

3.2 Conferences

International:

- ❑ Multi-agent systems in Virtual Enterprises, L. M. Camarinha-Matos (**invited keynote**), Proceedings of AIS'2002 – International Conference on AI, Simulation and Planning in High Autonomy Systems, SCS publication, ISBN 1-56555-242-3, pp 27-36, Lisbon, Portugal, 7-10 Apr 2002.
- ❑ Contract management in agile manufacturing systems, J. Barata, L.M. Camarinha-Matos, *Proceedings of PRO-VE 2002 – 3rd IFIP Working Conference on Infrastructures for Virtual Enterprises*, Kluwer Academic Publishers, ISBN 1-4020-7020-9, pp.109-122, Sesimbra, Portugal, 1-3 May 2002.
- ❑ Design of a virtual community infrastructure for elderly care, L. M. Camarinha-Matos, H. Afsarmanesh, *Proceedings of PRO-VE 2002 – 3rd IFIP Working Conference on Infrastructures for Virtual Enterprises*, Kluwer Academic Publishers, ISBN 1-4020-7020-9, pp.439-450, Sesimbra, Portugal, 1-3 May 2002.
- ❑ Contract-governed agents in agile manufacturing, J. Barata, L.M. Camarinha-Matos, Proceedings of CARS&FOF 2002 – E-Manufacturing: Advances in business paradigms and supporting technologies (J. Pinto Ferreira, Ed.), INESC Porto, ISBN 972-95194-5-5, Porto, Portugal, 3-5 Jul 2002.
- ❑ Virtual organizations in manufacturing: Trends and challenges, L.M. Camarinha-Matos, (**invited keynote**), in *Proceedings of FAIM 2002, 12th Int. Conf. On Flexible Automation and Intelligent Manufacturing*, Editora Oldenbourg (Munich), ISBN 3-486-27036-2, pp. 1036-1054, Dresden, Germany, 15-17 Jul 2002.
- ❑ Implementing a contract-based multi-agent approach for shop floor agility, J. Barata, L.M. Camarinha-Matos, *Proceedings of DEXA 2002 – 13th Int. Workshop on Database and Expert Systems Applications /*

HoloMAS – 3rd Int. Workshop on Industrial Applications of Holonic and Multi-Agent Systems, Aix-en-Provence, France, 2-6 Sept 2002, IEEE Computer Society, ISBN 0-7695-1668-8, pp. 639-645.

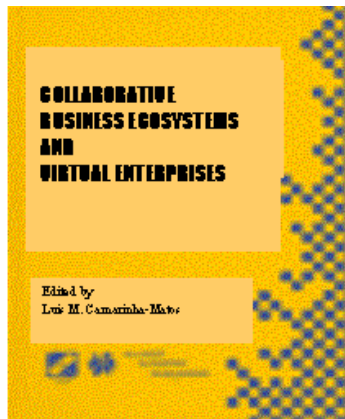
- Dynamic Virtual Organizations, or not so dynamic?, L.M. Camarinha-Matos, H. Afsarmanesh, in *Proceedings of BASYS'02 - Knowledge and technology integration in production and services*, Kluwer Academic Publishers, ISBN 1-4020-7211-2, pp. 111-124, Sept 2002.
- Shop floor re-engineering using agents, J. Barata, L.M. Camarinha-Matos, in *Proceedings of 33rd ISR – Int. Symposium on Robotics*, pp 635-640, Stockolm, Sweden, 7-11 Oct 2002.

3.4 Book chapter

- Designing the information technology subsystem for enterprise integration, L. M. Camarinha-Matos, H. Afsarmanesh, invited chapter to appear in *Handbook of Enterprise Architecture* (Springer).

3.5 Books edition

- Collaborative Business Ecosystems and Virtual Enterprises, (L.M. Camarinha-Matos, Editor), Kluwer Academic Publishers, ISBN 1-4020-7020-9, May 2002.
- Knowledge and technology integration in production and services, (V. Marik, L.M. Camarinha-Matos, H. Afsarmanesh, Editors), Kluwer Academic Publishers, ISBN 1-4020-7211-2, Sept 2002.



3.6 Journal editorials (invited)

- Interoperabilidade em sistemas de manufactura, L. M. Camarinha-Matos, *Revista ROBÓTICA*, N° 44, 3° Trim. 2001, pp. 6-7.
- Por um programa de investigação e desenvolvimento em organizações virtuais dinâmicas e sustentáveis, L. M. Camarinha-Matos, *Revista ROBÓTICA*, N° 45, 4° Trim. 2001, pp. 6-8.

3.7 Newsletters

- COVE News – The Newsletter of the IFIP COVE project (www.uninova.pt/~cove/Newsletter.html), ISSN 1645-0582:
 - Issue 4: October 2002.
- THINKcreative News – The Newsletter of the IST THINKcreative project (www.thinkcreative.org):
 - Issue 2: April 2002.
 - Issue 3: October 2002.

4. EVENTS

4.1 Organization

- PRO-VE'02 – 3rd IFIP Working Conference on Infrastructures for Virtual Enterprises, Sesimbra, Portugal, 1-5 May 2002. www.pro-ve.org



4.2 Chairing

L.M. Camarinha-Matos:

- PRO-VE'02 – 3rd IFIP Working Conference on Infrastructures for Virtual Enterprises, Sesimbra, Portugal, 1-5 May 2002 (Program Committee Chair).
- CARS&FOF 2002 – 18th International Conference on CAD / CAM, Robotics and Factories of the Future, 3-5 Jul 2002, Porto, Portugal (Program co-chair).
- BASYS'02 – 5th IEEE/IFIP International Conference on Information Technology for Balanced Automation Systems in Manufacturing and Services, Cancun, Mexico, 25-27 Set 2002 (Program co-chair).

4.3 Participation in Scientific Committees

L.M. Camarinha-Matos:

- AIS'2002 – 12th International Conference on AI, Simulation and Planning, Lisboa, Portugal, 7-10 Apr 2002.
- ICEB 2002 – International Conference on E-Business, 23-26 May 2002, Beijing, China.
- INES 2002 – 6th International Conference on Intelligent Engineering Systems, 26-28 May 2002, Opatija, Croatia.
- ICE 2002 – 8th International Conference on Concurrent Engineering, 17-19 Jun 2002, Rome, Italy.
- DEXA'02 - 13th International Conference on Database and Expert Systems Applications, 2-6 Sept 2002, Aix-en-Provence, France.
- HoloMAS 2002 – 3rd International Workshop on Industrial Applications of Holonic and Multi-Agent Systems, in conjunction with DEXA'02, 2-6 Sept 2002, Aix-en-Provence, France.
- APMS-2002 IFIP International Conference on "Collaborative Systems for Production Management", Eindhoven, Netherlands, 8-13 Sept 2002.
- DIISM 2002 - The 5th International Conference on Design of Information Infrastructure Systems for Manufacturing, 18-20 Nov 2002, Osaka, Japan.
- ICMA 2002 – International Conference on Manufacturing Automation, 10-12 Dec 2002, Hong Kong.

José Barata:

- PDT 2002 - Product Data Technology Europe 2002, Turin, Italy, 7th - 9th May 2002.

4.4 Participation in Conferences and Events

- *AIS 2002 – International Conference on AI, Simulation and Planning in High Autonomy Systems*, Lisbon, Portugal, 7-10 Apr 2002.
-L. M. Camarinha-Matos (invited lecturer)
- *PRO-VE'02– 3rd IFIP Working Conference on Infrastructures for Virtual Enterprises*, Sesimbra, Portugal, 1-3 May 2002.
-L.M. Camarinha-Matos, José Barata, Octávio Castolo, Tiago Cardoso, João Rosas, Rui Rodrigues, António Abreu
- *FAIM'02- 12th Int. Conf. On Flexible Automation and Intelligent Manufacturing*, Dresden, Germany, 15-17 Jul 2002
-L.M. Camarinha-Matos (invited lecturer)
- *HoloMAS 2002 – 3rd International Workshop on Industrial Applications of Holonic and Multi-Agent Systems*, in conjunction with DEXA'02, 2-6 Sept 2002, Aix-en-Provence, France.
-José Barata
- *BASYS'02- 5th IEEE/IFIP International Conference on Information Technology for Balanced Automation Systems in Manufacturing and Services*, Cancun, Mexico, 25-27 Sept 2002
-L.M. Camarinha-Matos
- *Net.ObjectDays 2002 – Specialized Conference for ObjectOriented and WebBased Technologies*, Erfurt, Germany, 7-10 Oct 2002.
-José Barata
- *33rd ISR – Int. Symposium on Robotics*, Stockholm, Sweden, 7-11 Oct 2002.
-José Barata

4.4 Presentations in Seminars and Panels

- VOmap – Roadmap design for collaborative virtual organizations in dynamic business ecosystems, “Roadmapping session”, organized by the European Commission in the eBunissess and eWork 2002 conference, Prague, Czech Republic, 17 Oct 2002

5. OTHER ACTIVITIES

5.1 Academic management

L.M. Camarinha-Matos:

- Member of the Scientific Council of FCT/UNL.
- Member of the Council of the Electrical Engineering Department.
- Branch counselor of the IEEE Student Branch at UNL.
- Member of the “International Scientific Advisory Board” of INESC-Porto

5.2 Project proposals evaluation

L.M. Camarinha-Matos:

- Program IST, European Commission.
- “Reviewer” of the projects IST SOL-EU-NET and CAWICOWS, European Commission.
- “Reviewer” of the projects XPLAN, ICPME program, Agência de Inovação, Portugal.
- Program “Investigación Científica y Tecnológica”, Agencia Nacional de Promoción Científica y Tecnológica, Argentina.
- Assessment of the portfolio of current projects on Smart Organizations, European Commission.

José Barata:

- Program “Investigación Científica y Tecnológica”, Agencia Nacional de Promoción Científica y Tecnológica, Argentina.

5.3 Evaluation boards of academic exams

L.M. Camarinha-Matos:

PhD Thesis defense:

- ❑ Member of the evaluation board for the PhD exam of Joaquim A. Marques Reis [A multi-agent scheduling model for the extended enterprise], ISCTE, Lisbon, Portugal, 18 April 2002.
- ❑ Member of the evaluation board for the PhD exam of Ammar Benabdelkader [Information integration among heterogeneous and autonomous applications], University of Amsterdam, Netherlands, 12 Nov 2002.

MSc Thesis defense:

- ❑ Member of the evaluation board (main examiner) for the MSc thesis of Emanuel Fernando Cunha Silva [Intelligent decision support for production operational planning], University of Porto, Portugal, 8 May 2002.

- Member of the evaluation board (and supervisor) for the MSc thesis Tiago Cardoso [Activity coordination system in tourism virtual organizations – A service-oriented approach], FCT/UNL, Portugal, 4 Dec 2002.

“Habilitation” (Agregação) exam:

- Member of the evaluation board for the “habilitation” exam in Industrial Management of Virgílio Machado, New University of Lisbon, Portugal, 29 Jan 2002.

5.4 Membership in professional associations

L. M. Camarinha-Matos:

- IFIP TC5 (national representative), WG5.3, WG5.5 (chairman and founder), WG6.11.
- IEEE Robotics & Automation, Systems, Man & Cybernetics
- APPIA – Portuguese association for Artificial Intelligence
- API – Portuguese Informatics Association
- Portuguese Association of Engineers

J. Barata Oliveira:

- IEEE – Computer, Robotics & Automation, Systems Man & Cybernetics
- ACM – Association for Computing Machinery
- AAAI – American Association of Artificial Intelligence
- ASME – American Association of Mechanical Engineers
- APSIOT – Portuguese Association for Industrial Sociology, Organisations, and Labour

João Rosas:

- Portuguese Association of Engineers

5.5 Teaching activities

The group was responsible for the following teaching activities:

Electrical Engineering Course (UNL):

- Data Modeling in Engineering
- Real Time Systems
- Robotics
- Intelligent Supervision
- Systems Integration
- Multimedia Information Systems
- Virtual Enterprises
- Telerobotics and Autonomous Systems
- Project of Robotics and CIM

Life-long training activities (National Institute for Administration):

- Basic programming
- Advanced Programming
- Systems Programming
- IT infrastructures engineering

5.6 Other activities and events

- Chairman and founder of the new IFIP Working Group 5.5 – COVE: CO-operation infrastructure for Virtual Enterprises and electronic business - L.M. Camarinha-Matos
- Organization of IFIP TC meeting, Sesimbra, Portugal, 3 May 2002.

5.7 Visitors

- Maria do Carmo Freitas, Federal University of Santa Catarina, Brazil.
- Prof. Heinz Erbe, Technical University of Berlin, Germany
- Dr. Hamideh Afsarmanesh, University of Amsterdam, The Netherlands
- Prof. Mauro Onori, The Royal Inst. of Technology, Sweden
- José Lastra, Tampere University of Technology, Finland