

UNIVERSIDADE NOVA DE LISBOA
UNINOVA



**GROUP OF
ROBOTICS AND CIM**

**SUMMARY OF ACTIVITIES
1998**

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1. ORGANIZATION

1.1 Affiliation

From the institutional point of view, the group of Robotics and CIM 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 group is integrated in the Department of Electrical Engineering. At UNINOVA the group is integrated in the Center for Intelligent Robotics.

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

1.2 Members

- ◆ Prof. Luis M. Camarinha-Matos – Group Coordinator cam@uninova.pt
www.uninova.pt/~cam
- ◆ José Barata Oliveira – Assistant jab@uninova.pt
- ◆ Tiago Cardoso – Trainee Assistant tomfc@uninova.pt
- ◆ Luis S. Lopes – PhD Student (till May 98)
- ◆ Fernando Martinelli – PhD Student fjm@uninova.pt
- ◆ Celson P. Lima – PhD Student cpl@uninova.pt
- ◆ Walter Vieira – PhD Student wv@uninova.pt
- ◆ Carlos Simões – Research student cas@uninova.pt
- ◆ Nuno Alves – Research student nma@uninova.pt
- ◆ Rosa Oliveira – Research student / secretary rfo@uninova.pt
- ◆ Paulo Compadrinho – Research student

New members:

- ◆ Prof. Walter Colombo (since Jan 99) – Auxiliary Professor wc@uninova.pt
- ◆ Luis Octavio Castollo – PhD Student (since Feb 99) lgc@uninova.pt

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
- Manufacturing Information Systems and Integration
- Agile Scheduling
- Manufacturing Systems Re-engineering
- Remote Learning

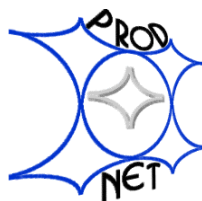
2.2 Projects

Esprit PRODNET II

Production Planning and Management in an Extended Enterprise

Oct 96 – Oct 99

Technical Coordinator.



www.uninova.pt/~prodnet

PRODNET-II aims to design and develop an open platform and the adequate IT protocols and mechanisms to support Virtual Industrial Enterprises (VE). PRODNET is focused mainly on Small and Medium size Enterprises (SMEs) in order to support them with means to inter-operate with several value chain networks. The architecture will employ the new emerging standards and advanced technologies in communication, cooperative information management, and distributed decision making.

Group's role:

- Technical coordination of the project.
- Workflow-based coordination architecture for VE.
- Partners search and selection in a VE
- Project management.

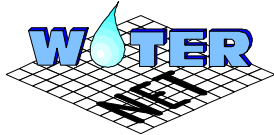
Partners:

‣ CSIN Lda., Portugal ‣ UNL – Universidade Nova de Lisboa, Portugal ‣ ESTEC Lda, Portugal ‣ Lichen Informatique Ltd., France ‣ UvA – University of Amsterdam, The Netherlands ‣ ProSTEP GmbH, Germany ‣ UFSC – Universidade Federal de Santa Catarina, Brazil ‣ MIRALAGO Lda, Portugal ‣ HERTEN Ltda, Brazil ‣ UNINOVA – Instituto de Desenvolvimento de Novas Tecnologias, Portugal

Esprit WATERNET

Knowledge Capture for Advanced Supervision
of Water Distribution Networks

Jun 96 – Jun 98



<http://www.estec.pt/waternet/index.html>

Esprit ESCN

European STEP Centres Network

Nov 97 – Oct 99



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

INCO-DC ProSME

Easy-to-Use Procedures for Quality
Management tailored for SMEs

Feb 98-Jan 2001



<http://www.atb-bremen.de/projects/prosme/Projects/projen.htm>

WATERNET aims at designing and developing an evolutionary knowledge capture and management system towards the control, optimal operation and decision support of drinkable water distribution networks, in order to minimize the costs of exploitation, guarantee the continuous supply of water with a better quality monitoring, save energy consumption and minimize natural resources waste.

Group's role:

-Machine Learning in Supervision: Water demand forecast and Alarm Handling.

Partners:

▸ ESTEC Lda., Portugal ▸ UNINOVA – Instituto de Desenvolvimento de Novas Tecnologias, Portugal ▸ ADASA Lda, Spain ▸ Sebetia Ltd., Naples, Italy ▸ UN – University of Naples, Italy ▸ UC – University of Catalunya, Barcelona, Spain ▸ WBE , The Netherlands ▸ UvA – University of Amsterdam, The Netherlands ▸ SMAS-Sintra, Portugal

The strategic objective of ESCN project is to establish and execute a STEP/PDT Training and Technology Transfer (TTT) program, a necessary building block to make STEP a sustainable competitive advantage for European Industry.

Group's role:

-STEP training and Technology Transfer in Portugal.

Partners:

▸ PROSTEP - PROSTEP – Produktdatentechnologie, Germany
▸ GOSET - Association GOSET, France ▸ IVF - The Swedish Institute of Production Engineering Research , Sweden
▸ SINTEF - Industrial Management , Norway ▸ TNO - TNO Building And Construction Research, The Netherlands
▸ UNINOVA - Instituto de Desenvolvimento de Novas Tecnologias, Portugal

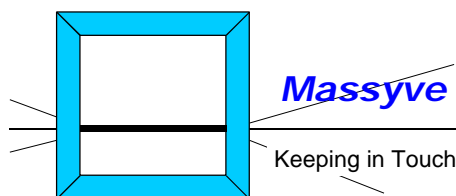
The main objectives of the ProSME project are:

- To develop/enhance innovative method(s) for the cost-effective introduction/optimisation of QM-Systems in manufacturing SMEs, in reference to relevant ISO standards, and by this to achieve a high quality and efficient manufacturing system which will result in better process control and process sustainability, higher precision and faster operation,
- -To develop/enhance IT tool(s) to support the introduction and maintenance process of QM at SMEs,
- to develop method(s) and tool(s) for efficient process improvement, as a critical aspect of TQM, in a flexible manufacturing environment as a typical problem for SMEs when introducing QM systems,
- -To test and evaluate the methods and IT tool(s) in a demonstrator in the specific SME environment in DC.
-

INCO-DC KIT MASSYVE

Multi-Agent Agile Manufacturing Scheduling Systems in Virtual Enterprise Industry

Oct 97 – Sep 2000
Prime Contractor



<http://centaurus.dee.fct.unl.pt/~massyve/>

Leonardo PostPressSIM

Computer aided training system for bookbinding, finishing and mailing areas

1995-1998

<http://www.vtt.fi/tte/samba/projects/postpres.sim/>

PostPressSIM will bring innovative multimedia and low cost three dimensional factory simulation to the education of complicated after-printing-processes. The system will be suitable for schools and companies and for different levels of basic skills. The knowledge and know-how of different partners will be combined into a new educational system.

Group's role:

-Quality-related information exchange in a Virtual Enterprise environment.

Partners:

▸ ATB - Institut für angewandte Systemtechnik Bremen GmbH, Germany ▸ IPK, Berlin, Germany ▸ UNL – Universidade Nova de Lisboa ▸ UFRGS - Universidade Federal do Rio Grande do Sul, Brazil ▸ GLOBO INOX Equipamentos Industriais Ltda. ▸ UNICEN Universidad Nacional del Centro de la Provincia de Buenos Aires, Argentina.

MASSYVE is a Keep-In-Touch (KIT) initiative in the framework of the INCO-DC programme. According to the KIT philosophy, MASSYVE was designed to facilitate and promote the scientific and technological interactions between a member of UFSC (Brazil), who has realized his PhD in the EU, and three other European partners.

The topic of this co-operative action is centered on the application of the Multi-Agent Systems paradigm to Agile Scheduling in Manufacturing Systems.

Group's role:

- Project coordination.
- Multi-agent systems in scheduling.
- Virtual Enterprise architecture.

Partners:

▸ UNL – Universidade Nova de Lisboa, Portugal ▸ UFSC – Universidade Federal de Santa Catarina, Florianopolis, Brazil ▸ UvA – University of Amsterdam, The Netherlands ▸ CSIN Lda., Portugal

For educational needs of different groups on the sector of printing industry three dimensional virtual reality simulation system for different products and production lines and six supporting multimedia modules will be developed and tested in the project. The educational multimedia modules will be 1. Newspaper mailing systems, 2. Magazine and folder finishing machines, 3. Book binding, 4. Packaging Fundamentals and 5. Packaging Materials. Also a multimedia and virtual reality simulation demo system will be developed.

Group's role:

- Simulation of manufacturing processes.

Partners:

▸ AEL, Uuden Tekniikan Instituutti, Finland ▸ Bergische Universität Gesamthochschule Wuppertal, Germany ▸ CyberCube Oy, Finland ▸ DGH, Den Grafiske Højskole, Denmark ▸ EVITECH, Espoo-Vantaa Institute of Technology, Finland ▸ GI, Grafisk Institutt, Norway ▸ UIAH, University of Industrial Arts Helsinki, Finland ▸ UNAB, Utbildning-Näringsliv i Botkyrka, Sweden ▸ UNINOVA, Instituto de Desenvolvimento de Novas, Portugal

PRAXIS MAGMEC

Sensores de campo magnético para posicionamento e monitorização de corrente em Mecatrónica

Jun 97-May 2000

The purpose of this project is to develop precise position detection systems (e.g. > 10000 parts/rev. in case of encoders) and current sensors to monitor motor load (better than 1% of range) based in the new technologies of linear magnetic field sensors made of giant-magneto-resistive materials.

Group's role:

- Design mechatronics' applications for the new magnetic sensor.
- Develop application prototype.

Partners:

▸ INESC – Lisboa, Portugal ▸ UNINOVA, Portugal

E-LEARN

Remote training via Internet

1998-1999

The purpose of this project is to investigate the use of WWW-based technologies for remote training. In the first phase, the aim is to develop a training course for MS-WORD, suitable for secretaries of the public administration services.

Group's role:

- Design systems architecture
- Implement Internet-based training system for MS-WORD.

Partners:

▸ UNINOVA, Portugal ▸ INA, Portugal

2.3 Networks

ALFA AIR

Automatique Industrielle Robuste

1996-1999

This is a European – Latin American cooperation network focused on education in Automation and Robotics.

Group's role:

- Intelligent Supervision Systems in Robotics.
- Shop-floor re-engineering.

Partners:

▸ INSA-LAAS Toulouse, France ▸ UNL – Universidade Nova de Lisboa, Portugal ▸ Univ. Zaragoza, Spain,
▸ Univ. Oulu, Finland ▸ Univ. Magdebourg, Germany
▸ Univ. Paul Sabatier, France ▸ Univ. Andes, Colombia,
▸ UFSC, Brazil ▸ Univ. Buenos Aires ▸ Univ. Simon Bolivar, Venezuela.

Esprit ICIMS-NOE

Network of Excellence in Intelligent Control and Integrated Manufacturing Systems

1994-1999

A network of more than 350 academic and industrial nodes.

Leonardo ACOMAS-TN

1997-1999

Large European network on education in Manufacturing and Intelligent Control.

3. PUBLICATIONS 1998

3.1 Thesis

PhD Thesis: Robot Learning at the Task Level – A study in the assembly domain, Luis S. Lopes, FCT/UNL, 25 May 1998. [Supervisor: L. M. Camarinha-Matos].

3.2 Journals

Towards an architecture for virtual enterprises, L.M. Camarinha-Matos, H. Afsarmanesh, C. Garita, C. Lima, *Journal of Intelligent Manufacturing*, Vol. 9, Issue 2, Apr 1998, pp 189-199.

Application of Machine Learning in Water Distribution Networks, L.M. Camarinha-Matos, F. J. Martinelli, *International Journal of Intelligent Data Analysis*, Vol. 2(4), 25 pp, <http://www-east.elsevier.com/ida>, Oct 1998.

Towards an open platform for supply chain management in the agribusiness sector, L.M. Spinosa, A. P. Klen, R. J. Rabelo, L.M. Camarinha-Matos, A. C. Ferreira, *RBI-Agro Revista Brasileira de Agroinformática*, Vol. 1, N.1, p.28-40, May-Aug 1998.

3.3 Conferences

Cooperative Systems Challenges in Virtual Enterprises, L.M. Camarinha-Matos, H. Afsarmanesh, *Proc. CESA'98 – IMACS/IEEE Multiconference on Computational Engineering in Systems Applications*, Vol. 3, pp. 403-408, Nabeul-Hammamet, Tunisia, 1-4 Apr 98.

Using multiagent systems and the internet in care services for the ageing society, L.M. Camarinha-Matos, W. Vieira, *Proc. Of BASYS'98, Intelligent Systems for Manufacturing* (Kluwer Academic), ISBN 0-412-84670, pp. 33-47, Prague, Czech Republic, Aug 98.

Multiagent perspectives to agile scheduling, R. Rabelo, L.M. Camarinha-Matos, H. Afsarmanesh, *Proc. Of BASYS'98, Intelligent Systems for Manufacturing* (Kluwer Academic), ISBN 0-412-84670, pp. 51-66, Prague, Czech Republic, Aug 98.

Application of Machine Learning techniques in water distribution networks assisted by domain experts, L.M. Camarinha-Matos, F. J. Martinelli, *Proc. Of BASYS'98, Intelligent Systems for Manufacturing* (Kluwer Academic), ISBN 0-412-84670, pp. 121-136, Prague, Czech Republic, Aug 98.

Concurrent Engineering in Virtual Enterprises: The extended CIM-FACE architecture, A.L. Osório, N. Oliveira, L.M. Camarinha-Matos, *Proc. Of BASYS'98, Intelligent Systems for Manufacturing* (Kluwer Academic), ISBN 0-412-84670, pp. 171-184, Prague, Czech Republic, Aug 98.

A framework for cooperation in virtual enterprises, L.M. Camarinha-Matos, C. Lima, *Proc. of DIISM'98 – IFIP Int. Conf. On Distributed Information Infrastructures for Manufacturing*, USA, 1998.

Configuration and coordination issues in a virtual enterprise environment, L.M. Camarinha-Matos, C. Lima, *Proc. Of PROLAMAT' 98, Globalization of Manufacturing in the Digital Communications era of the 21st century* (Kluwer Academic Publ.), ISBN 0-412-83540-1, pp 685-696, Italy, Sept 98.

Virtual Enterprising: The way to global manufacturing and its challenges, L.M. Camarinha-Matos, *Proc. of IFIP World Computer Congress 1998*, Vol. Telecooperation, ISBN 3-85403-121-1, pp. 419-424, Vienna-Budapest, Sept 1998.

- Adaptive mobile agents for telerobotics and telesupervision, L.M. Camarinha-Matos, W. Vieira, *Proc. of INES98 – IEEE Int. Conf. On Intelligent Engineering Systems*, pp. 79-84, Vienna, Austria, Sept 98.
- Manufacturing Systems life cycle support and shop floor reengineering, L.M. Camarinha-Matos, J. Barata, *Proc. of INES98 – IEEE Int. Conf. On Intelligent Engineering Systems*, pp. 269-274, Vienna, Austria, Sept 98.
- Flexible Coordination in Virtual Enterprises, L.M. Camarinha-Matos, H. Afsarmanesh, *Proc. of IMS'98 - 5th IFAC Workshop on Intelligent Manufacturing Systems*, Gramado, Brasil, 9-11 Sept 1998, pp 43-48.
- Workflow Support for Management of Information in PRODNET II, H. Afsarmanesh, C. Garita, L. M. Camarinha-Matos, C. Pantoja-Lima, *Proc. of IMS'98 - 5th IFAC Workshop on Intelligent Manufacturing Systems*, Gramado, Brasil, 9-11 Sept 1998, pp 49-54.
- Generic Framework for Conflict Resolution in Negotiation-Based Agile Scheduling Systems, R. J. Rabelo, L. M. Camarinha-Matos, *Proc. of IMS'98 - 5th IFAC Workshop on Intelligent Manufacturing Systems*, Gramado, Brasil, 9-11 Sept 1998. Pp 187-192.
- A system for Data Mining in Water Distribution Networks, L. M. Camarinha-Matos, F. J. Martinelli, *Proc. of CIT'98 – International Conference on Trends in Information Technology*, Bhubaneswar, India, 21-23 Dec 1998, Tata McGraw-Hill Publ. Company Ltd, ISBN 0-07-463726-6. Pp 118-125.

3.4 Book chapters

- Virtual Enterprises: Life cycle supporting tools and technologies, L.M. Camarinha-Matos, H. Afsarmanesh, in *Handbook of Life Cycle Engineering: Concepts, Tools and Techniques*, A. Molina, J. Sanchez, A. Kusiak (Eds.), Chapman and Hall, June 1998, ISBN 0-412-81250-9.
- Feature Transformation: Strategies for a Robot Learning Problem, L. Seabra Lopes, L.M. Camarinha-Matos, in *Feature Extraction, Construction and Selection: A data mining perspective*, H. Liu, H. Motoda (Eds.), Kluwer Academic Publishers, Aug 1998, chap. 23, pp. 375-391, ISBN 0-7923-8196-3

3.5 Edition

- Intelligent Systems for Manufacturing, (L.M. Camarinha-Matos, H. Afsarmanesh, V. Marik), Kluwer Academic, Jul 1998, ISBN 0-412-84670-5.

4. EVENTS

4.1 Organization

4.1.1 Chairing

BASYS'98- 3rd IEEE/IFIP Int. Conf. On Information Technology for Balanced Automation Systems in Manufacturing, Prague, Czech Republic, 26-28 Aug, 1998.

L.M. Camarinha-Matos: Chairman of the International Program Committee.

Panel on Virtual Enterprising: IFIP'98- IFIP World Computer Congress, Vienna, Austria, Sept, 1998.

L.M. Camarinha-Matos: Chairman.

4.1.2 Participation in the Program Committee

L.M. Camarinha-Matos:

- Electronic Commerce on the Internet (em associação com EUROMED-NET'98), 4-7 Mar 98, Nicosia, Cyprus.
- CESA'98 - 2nd IMACS International Multiconference on Computational Engineering in Systems Applications, Hammamet, Tunisia, April 1-4, 1998.
- DIISM'98 – 3rd International Conference on Design of Information Infrastructures for Manufacturing, USA, May 1998.
- ISoCE'98 – Conference of the European Society of Concurrent Enterprising, Sinaia, Romania, 4-5 Jun 1998.
- EURISCON'98 / SOFTCOM'98 – 3rd European Robotics, Intelligent Systems & Control Conference, Athens, Greece, 22-25 Jun 98.
- DEXA'98 - 9th International Conference and Workshop on Database and Expert Systems Applications, Vienna, Austria, 25-28 August 1998.
- PROLAMAT'98 – 10th IFIP Int. Conf. On The Globalization of Manufacturing in the Digital Communications Era of the 21st Century: Innovation, Agility, and the Virtual Enterprise, Set 9-11, 1998, Trento, Italy.
- LCA'98: 5th IFAC Symposium on Low Cost Automation, Shenyang, China, Sept 1998.
- MENDEL'98: 4th International Conference on Genetic Algorithms, Brno, Czech Republic, 1998.
- INES'98 - IEEE International Conference on Intelligent Engineering Systems, Vienna, Austria, Sept 1998.
- Mechatronics'98, Skovde, Sweden, 9-11 Sep 1998.
- IFAC IMS'98 – 5th IFAC Workshop on Intelligent Manufacturing Systems, Gramado, Brazil, 9-11 Nov 1998.

4.2 Participation in Conferences

- *CESA'98- 2nd IMACS International Multiconference on Computational Engineering in Systems Applications*, Hammamet, Tunisia, April 1-4, 1998.
-L.M. Camarinha-Matos
- DIISM'98 – 3rd International Conference on Design of Information Infrastructures for Manufacturing, USA, May 1998.
-C. P. Lima
- *BASYS'98- 3rd IEEE/IFIP Int. Conf. On Information Technology for Balanced Automation Systems in Manufacturing*, Prague, Czech Republic, 26-28 Ago, 1998.

- L.M. Camarinha-Matos, C. P. Lima, F. Martinelli, W. Vieira
- *IFIP'98- IFIP World Computer Congress*, Viena, Austria, Set, 1998.
- L.M. Camarinha-Matos
- *PROLAMAT'98*, Trento, Italia, Set 1998.
- L.M. Camarinha-Matos
- *INES'98 - IEEE International Conference on Intelligent Engineering Systems*, Vienna, Austria, Sept 1998.
- J. Barata, W. Vieira
- *IMS'98*, Gramado, Brasil, 9-11 Nov 1998.
- L.M. Camarinha-Matos
- *Workshop "Engineers for the future"*, European Commission, 11 Dec 98.
- L.M. Camarinha-Matos
- *CIT'98*, Bhubaneswar, India, 20-23 Dez 1998.
- L.M. Camarinha-Matos

4.3 Participation in Seminars

Virtual Enterprises – The PRODNET approach, L.M. Camarinha-Matos
Czech Technical University, Mai 1998.

Intelligent Techniques in Robotics and Manufacturing - Case Studies, José Barata, *Workshop on ALFA-AIR*, Oulu, Finland, 20 - 22 Aug 1998

Cooperative Research EU – Latin America: Experiences and lessons, L.M. Camarinha-Matos
IMS'98 – Panel on Cooperative Research, Gramado, Brasil, 9 Nov 1998.

Information Technology and the Innovation in Agribusiness, *5th Seminar on Innovation in Agribusiness*, FIPA (Portuguese Federation of Agribusiness Organizations), Lisbon, 25 Nov 99, L.M. Camarinha-Matos

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.
- Chairman of the Pedagogic Committee of the Electrical Engineering course.
- Branch counselor of the IEEE Student Branch at UNL.
- Member of the “International Scientific Advisory Board” of INESC-Porto

J. Barata Oliveira:

- Member of the Council of the Electrical Engineering Department.
- Member of the Pedagogic Committee of the Electrical Engineering course.

5.2 Project proposals evaluation

L.M. Camarinha-Matos:

- Program ESPRIT / Integration in Manufacturing, European Commission.
- "Reviewer" of the Esprit COMIND project.
- Program PRAXIS XXI, Agência de Inovação.
- Program ESPRIT / Long Term Research, European Commission.
- Program “Investigación Científica y Tecnológica”, Agencia Nacional de Promoción Científica y Tecnológica, Argentina.
- Program “Iniciativa Comunitária PME (IC-PME)”, Agência de Inovação.

5.3 Evaluation boards of academic exams

PhD Thesis defense:

- Member of the evaluation board for the PhD exam of António Manuel Lucas Soares [Modeling for technico-organizational optimization of integrated manufacturing systems], FEUP, Porto, 20 Mar 1998.
- Member of the evaluation board (and supervisor) for the PhD exam of Luis Filipe de Seabra Lopes [Robot Learning at the Task Level – A study in the assembly domain], FCT/UNL, 25 May 1998.

MSc Thesis defense:

- Main examiner for the MSc of Moisés Fernando de Oliveira Pedrosa Ribeiro [Comparative study of different approaches to production control], UM, 14 July 1998.
- Main examiner for the MSc of António Manuel Ferreira dos Santos Roberto [A Workflow modeling tool], IST, 28 Oct 1998.

Selection of candidates for Associate Professor position:

- Member of the selection committee for an Associate Professor position for Management of Production and Technology of Universidade do Minho, 30 Jan 1998.

5.4 Membership in professional associations

L.M. Camarinha-Matos:

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

J. Barata Oliveira:

- IEEE
- ACM
- AAAI
- ASME

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
- Multimedia Information Systems
- Robotics Systems and CIM
- Telerobotics and Autonomous Systems
- Project of Robotics and CIM

MSc in Computer Science (UNL):

- Computer Integrated Manufacturing

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

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