

IFAC TC 5.2

Manufacturing Modelling for Management and Control

Working group 1: Supply network engineering

Report period: Apr 2012-May 2013

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Specific areas of interest of the Working Group:

The working group explores and generates novel solutions for supply chain design and management. Indeed, Supply chains are emblematic examples of the renewal of production systems in the last decades. Supply Chains Engineering is an emerging field for Automatic Control applications based on analysis and comprehension of essential principles of production and distribution systems. This scientific domain concerns the precise evaluation and optimization of production systems, logistics networks, and their management policies to increase the effectiveness of multifaceted demand and supply chains. The major industrial problems and various effective approaches of inventory control in Supply chains, use of Radio Frequency IDentification (RFID) and Internet applications or intelligent storage facilities are being examined. Radical changes in the criteria that express the new objectives of production systems and logistics are on-going: Just-In-Time (JIT) requirements, dynamic scheduling, dynamic pricing, etc. In addition, the main concerns of outsourcing are being detailed. In particular, a vendor selection and evaluation models are being developed. Certainly, warehouses are critical components of supply chains. In this WG, their usefulness is highlighted and their various functions and equipment are being analysed. The design stage is also being extensively considered via developing storage algorithms as well as examining warehouse sizing static and dynamic models.

Current research in supply chain management and engineering has been increasingly focused on the issues of dynamics and decision-making under uncertainty. It has been accepted by research community that the effects of various sources of uncertainty should be considered during both supply chain planning and execution control. In addition, the issues of behavior prediction and adaptation become more and more important. The research focus is now shifting to a paradigm of performance assessment for supply networks that interrelates dynamics, adaptability, stability, resilience and resistance to critical disturbances.

Keywords: Supply Network Design, Planning and Scheduling, Supply Chain Adaptation, Supply Network Disruption Management, Inventory Control, Model-Predictive Control, Adaptive Control, Stability Analysis, Agent based Simulation, Robustness and Resilience; Event Driven Systems, risk management.

Main activities:

During the period of Jan. 2012-May 2013, the working group members were very active to promote the TC 5.2 and working group activities mainly through the organization of tracks and sessions at IFAC events and conferences, and the achievement of a book.

Organization of international conferences

- **DR-LOG 2012 (German-Russian Workshop on Logistics and Supply Chain Management)**, organized by Prof. Dmitry Ivanov

Organization of tracks and special sessions in international conferences

- **MIM2013**, Special Session: **Supply Network Optimization and Control**. IFAC 2013 Conference on Manufacturing Modelling, Management and Control (IFAC-MIM), June 19-21, Saint Petersburg, (Russia). Proposed by Dmitry Ivanov, Bopaya Bidanda, Richard Hartl, , Boris Sokolov.
- **MIM2013**, Special Session: **Coordinated Logistics and Supply Chain Optimization**, IFAC 2013 Conference on Manufacturing Modelling, Management and Control (IFAC-MIM), June 19-21, Saint Petersburg, (Russia). Proposed by Dmitry Ivanov, Alexandre Dolgui, Jörn Schönberger, and Herbert Kopfer
- **MIM2013**, Special Session: **Production Planning under Demand, Yield or Lead time Uncertainties**, IFAC 2013 Conference on Manufacturing Modelling, Management and Control (IFAC-MIM), June 19-21, Saint Petersburg, (Russia). Organized by Alexandre Dolgui, Faicel Hnaïen and Mohamed Aly Ould Louly.
- **INCOM2012**, Special Session: **Game Theory and Multi-criteria Approaches for Supply Chains**. Organized and chaired by L. Benyoucef and J.C. Hennet.
- **INCOM2012**, Special Session: **Supply Network Dynamics and Control**. Organized and chaired by Dmitry Ivanov, Prof. Alexandre Dolgui, and Prof. Boris Sokolov)
- **INCOM2012**, Track on **Supply Network Engineering**; Organized and chaired by Prof. Shimon Y. Nof, USA, Prof. Dmitry Ivanov, Germany, and Prof. Jean-Claude Hennet, France
- **INFORMS/EURO 2013**, **Stream on Supply Chain Optimization**, proposed by Prof. Dmitry Ivanov, Prof. Morales/Oxford, UK and Prof. Dr. Meissner/KLU, Hamburg)
- **INFORMS/EURO 2013**, **Session on Supply Network Disruption Management**, proposed by Prof. Dmitry Ivanov

Editors of special issues of international journals

- *International Journal of Integrated Supply Management* (**Special Issue on Intelligent Information and Product Technologies for Supply Chain Integration**), to be published in Summer 2013, Guest Editors Prof. Dmitry Ivanov and Prof. Alexandre Dolgui
- *IEEE Transactions on Industrial Informatics*, Special section on **Radio Frequency Identification**, vol. 8, n° 3, 2012, Guest Editors: A. Dolgui, J.-M. Proth.

Achievement of a book

- **Edition and reviewing of the book** “Applications of Multi-criteria and Game Theory Approaches: Manufacturing and Logistics”. [Springer Series in Advanced Manufacturing](#) 445 pages, (Springer), L. Benyoucef, J.C. Hennet and M.K. Tiwari (Eds) – ISBN: 978-1-4471-5294-1 (in press), 2013.
- **Contribution to the part on Game Theory approaches:** chapter 14 entitled “A Piecewise Linear Supply Chain Game for Manufacturing Network Formation”, by S. Mahjoub and J.C. Hennet.