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IFAC INCOM 2024
INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

INFORMATION CONTROL PROBLEMS IN MANUFACTURING: HISTORY OF IFAC INCOM SYMPOSIUM

Prof. Dr. Alexandre Dolgui
IMT Atlantique, France

Editor in Chief of the International Journal of Production Research

18th IFAC Symposium on Information Control Problems in Manufacturing (INCOM 2024),
28-30 August 2024, Vienna, Austria

OUTLINE

- MY AFFILIATION AND DEPARTMENT
- THE INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH
- INFORMATION CONTROL PROBLEMS IN MANUFACTURING: HISTORY OF INCOM SYMPOSIUM
  - Creation and first period of INCOM
  - Growth of INCOM from 2004 to 2015
  - Maturity of INCOM after 2015
  - Next INCOM in 2027

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Institute Mines Telecom (IMT) and IMT Atlantique as a part

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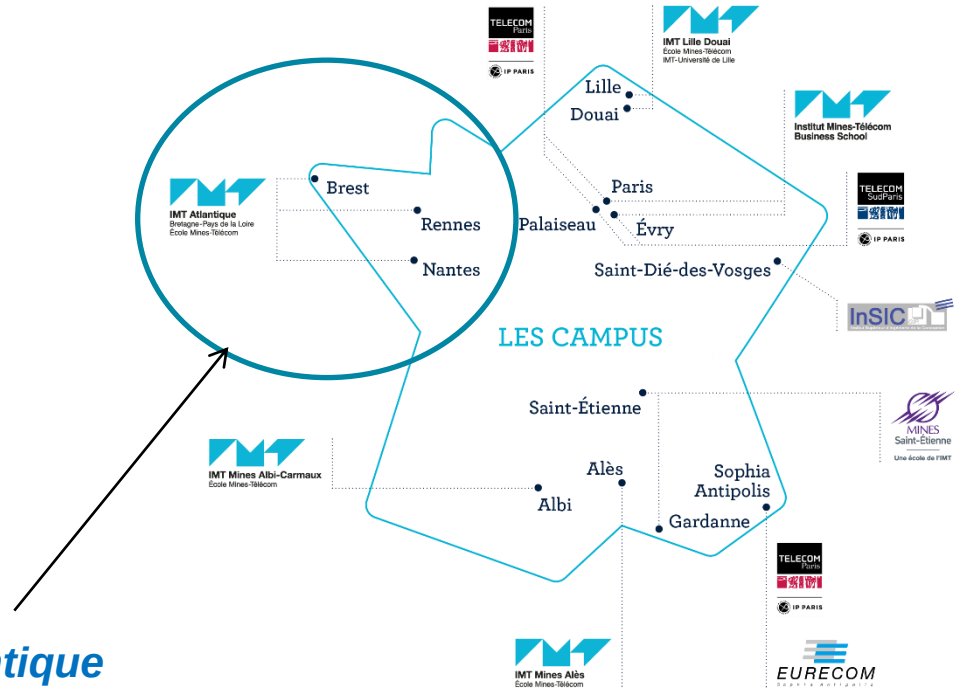
INSTITUTE MINES TELECOM (IMT)
and IMT Atlantique

IMT is composed of:

- **12** schools of engineering (Techn. Univ.)
- **1** business and economics school
- **1,450** faculty members
- **13,000** students
- **4,300** graduates per year
- **60,000** alumni
- **34%** foreign students
- **60** nationalities
- Largest enterprise incubator in France



IMT Atlantique
- a Technological University

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Department

Automation, Production and Computer Sciences (DAPI)

campus in Nantes

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DEPARTMENT DAPI, CAMPUS IN NANTES

Head: Prof. Dr. Alexandre Dolgui

Automation, Production and Computer Sciences
(116 persons including 42 Faculty Members):

Robotics and automatic control

Human factors engineering

Logistics and production systems

Constraint programming and decision making

Software engineering

Digital infrastructures management

Annual amount of contracts: 3 M Euros

6 European Projects H2020

1 ERC Project

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AUTOMATION, PRODUCTION AND COMPUTER SCIENCES DEPT. (DAPI)

Staff

116 persons:

42 Professors (10 Full Professors, 32 Asst Prof)

19 Post-docs

33 PhD candidates

20 Engineers

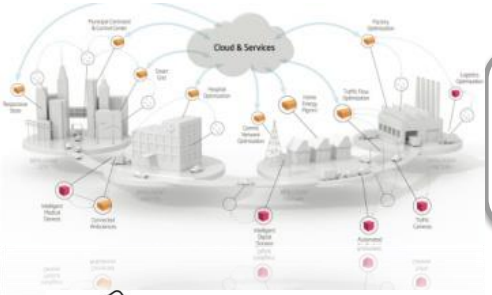
5 Technical staff

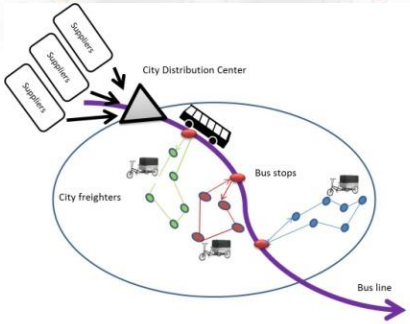
~ 50 articles in leading refereed international journals per year

DAPI - AUTOMATION, PRODUCTION AND COMPUTER SCIENCES

Main focuses

Industry of Future
Factory of the Future
Mobility of the Future
Cyber-Physical Systems





LS2N LABORATOIRE DES SCIENCES DU NUMÉRIQUE DE NANTES

Inria INVENTEURS DU MONDE NUMÉRIQUE

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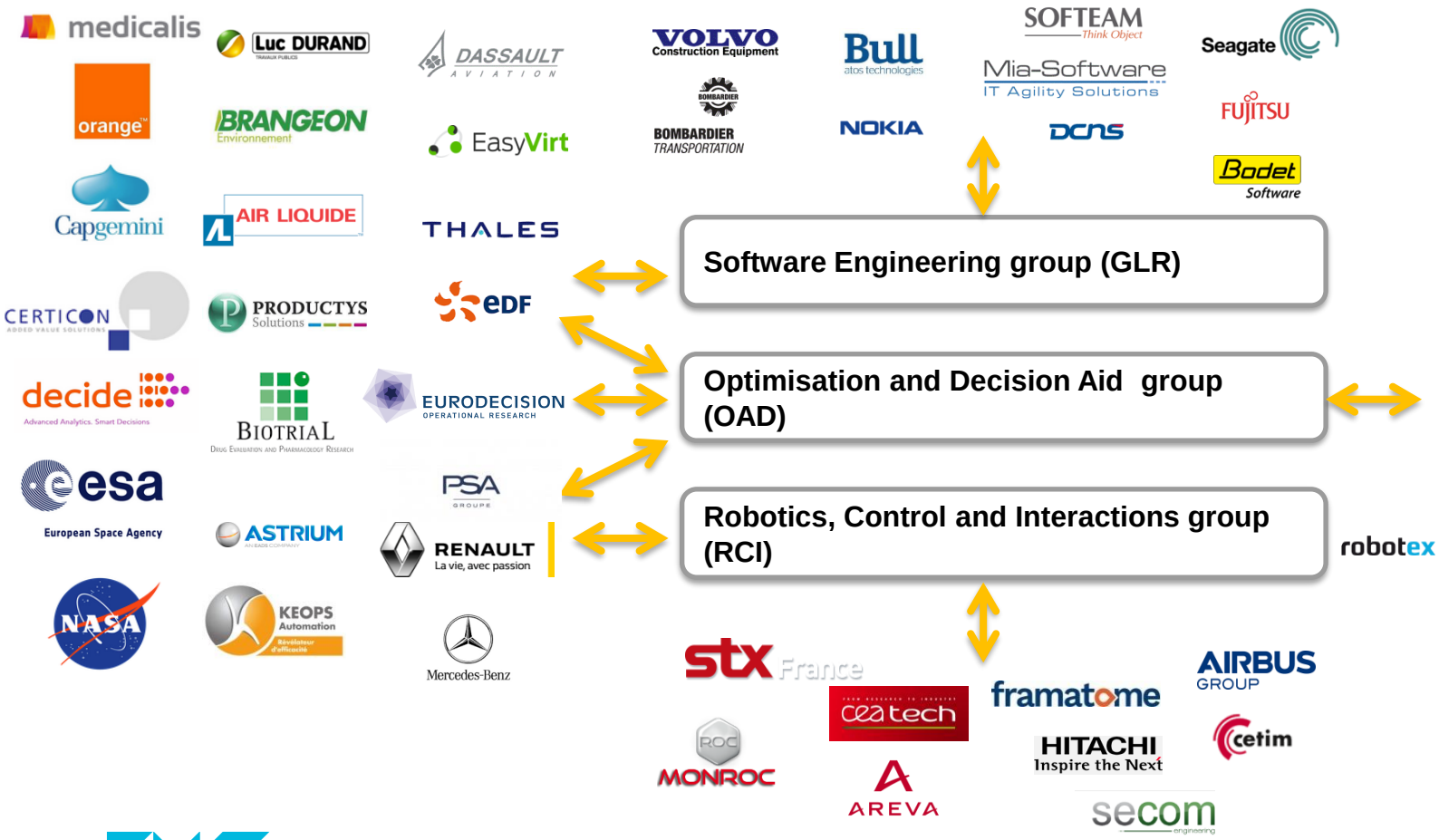
Perspectives

Software Engineering (GLR)
- Cloud, IoT, edge computing
- Energy-efficient software systems
- Low-code software development, software modelling

Optimisation and Decision Aid (OAD)
- Integration: constraint/mathematical programming/ machine learning
- Combinatorial optimisation of large scale systems (deterministic and stochastic)
- Industry of the Future

Robotics and Automatic Control (RCI)
- Soft robotics
- Autonomous vehicle, multi-energy, networked control
- Human factors engineering

INDUSTRIAL PARTNERS



solver Choco :

Insane unity
KLS-optim
Eurodécision
Google
Safran
Thales

Airbus
Medicalis
Capgemini
Certicon
Dassault aviation
Engie
Decide
EasyVirt
Orange
Biotrial
Nasa
Esa

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EXEMPLES DE PROJETS

ASSISTANT, EU, coordinator: aims to provide a set of AI-based digital twins system that helps process engineer and production planner to operate collaborative mixed-model assembly lines based on the data collected from IoT devices and external data sources.

LOWCOMOTE, EU, coordinator: Low-code development platforms allow non-programmers to build full applications by interacting through dynamic graphical user interfaces, visual diagrams and declarative languages.

In addition to these two large projects coordinated by the DAPI and finished in 2024, we participate in **6 other European projets including one also as coordinator**

We also have **6 projects** funded by the ANR (National Agency for Research), including **2 projects** as coordinators**.**

IJPR

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an **informa** business

International Journal of Production Research

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IJPR

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- Established in 1961:
  - 60th Anniversary of the Journal in 2021
  - 60th Volume Anniversary in 2022
- ~390 papers published across 24 issues per year (2023)
- 10% acceptance rate (2024)
- **Flagship of our profession!**
- **Read in more than 200 countries, 1.8 million downloads per year**

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Subject Classifications

Web of Science

- Industrial Engineering
- Manufacturing Engineering
- Operations Research & Management Science

Scopus

- Business, Management and Accounting: Strategy and Management
- Decision Sciences: Management Science and Operations Research
- Engineering: Industrial and Manufacturing Engineering

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Timothy Fry, Joan Donohue et al., (University of South Carolina, USA) analyzed 15 journal ranking studies on operations management (OM)* previously published in literature that concerned 147 best journals, then a DEA model was proposed.

Fry, T. D., & Donohue, J. M. (2013). Outlets for operations management research: a DEA assessment of journal quality and rankings. *International Journal of Production Research*, *51*(23–24), 7501–7526. https://doi.org/10.1080/00207543.2013.783245

This exciting American view gives a ranking of the 32 best OM journals and placed

IJPR** in **4th position (!)** after:
- *Management Science*
- *Journal of Operations Management*
- *Operations Research*

* IJPR covers not only OM but IE and Manufacturing issues
** The first European based journal listed

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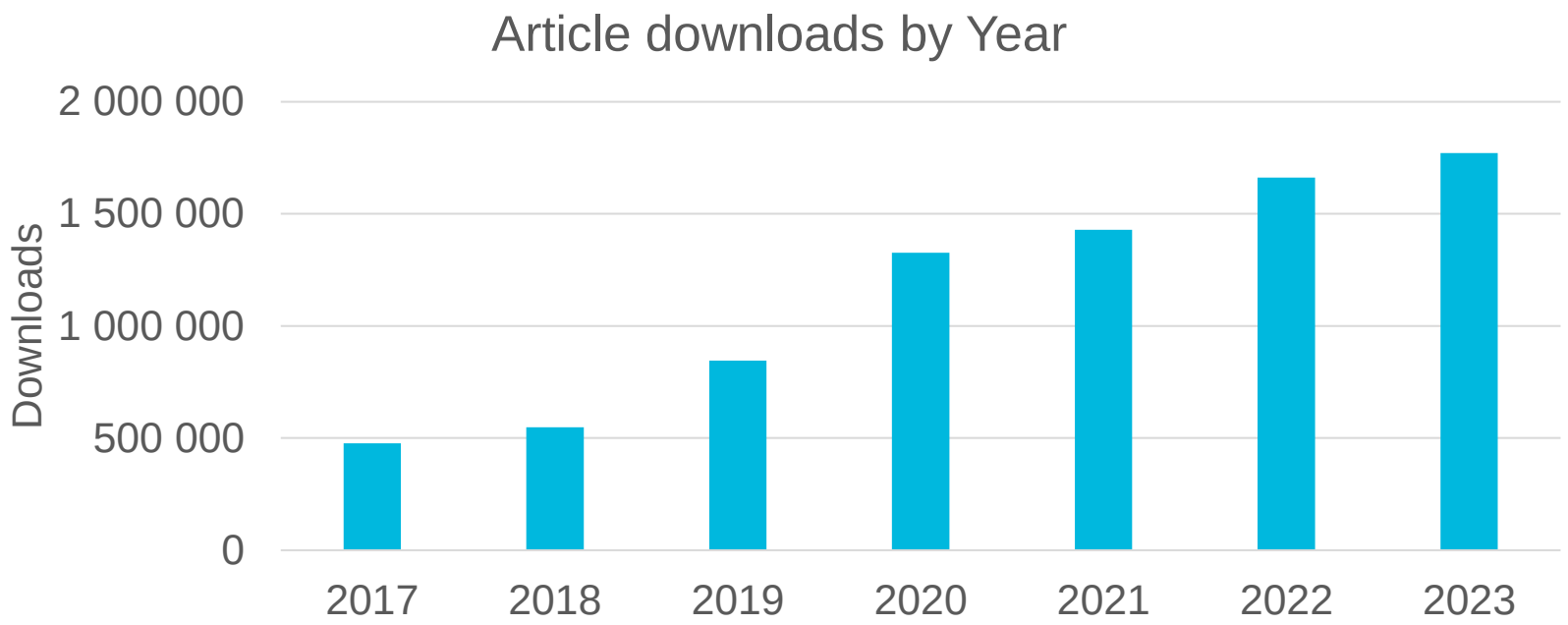
Growth in downloads



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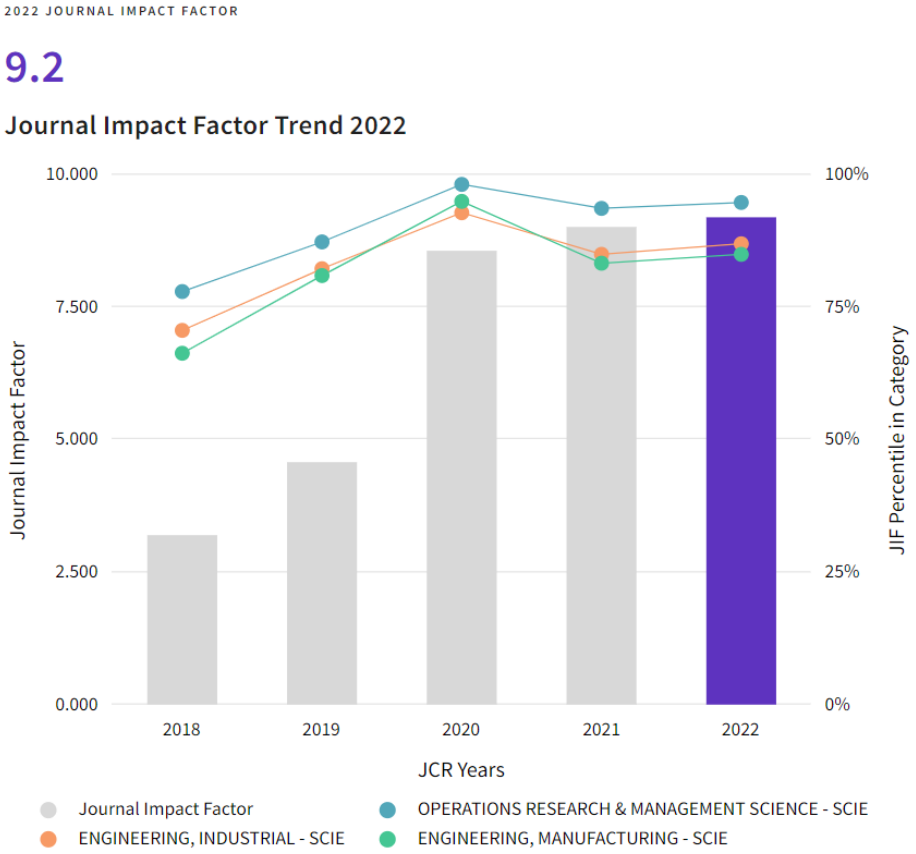
Citation metrics

(Journal Citation Reports)



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Citation metrics (Scopus and SCImago)

CiteScore 2022

$$18.1 = \frac{27{,}911 \text{ Citations } 2019 - 2022}{1{,}546 \text{ Documents } 2019 - 2022}$$

Calculated on 05 May, 2023

CiteScoreTracker 2023

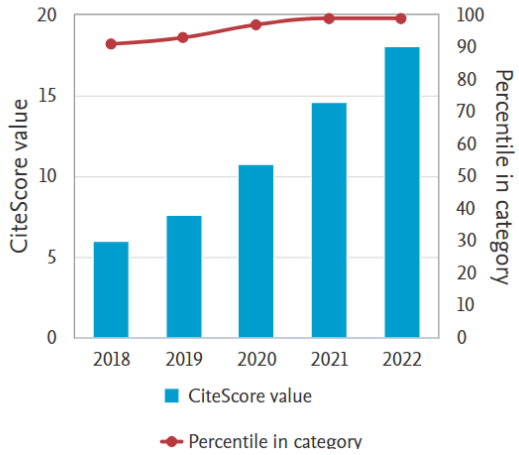
$$19.2 = \frac{30{,}184 \text{ Citations to date}}{1{,}574 \text{ Documents to date}}$$

Last updated on 05 April, 2024 • Updated monthly

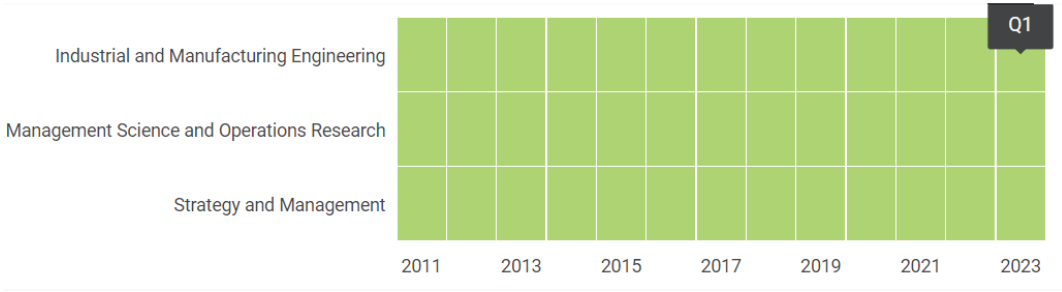
CiteScore rank 2022

Category	Rank	Percentile
Decision Sciences └ Management Science and Operations Research	#2/198	99th
Business, Management and Accounting └ Strategy and Management	#7/473	98th
Engineering └ Industrial and Manufacturing Engineering	#9/355	97th

CiteScore trend



Quartiles



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Aim & Scope of IJPR

The aims to disseminate research on ***decision aid in manufacturing, operations management and logistics***,

based on fundamental mathematical techniques from **computer, decision** and **management sciences** which can be used in the design, measurement or operation of production and logistics systems,

models for analysis of manufacturing strategies and tools as well as the contribution of ***new information technologies*** to production management and logistics are also considered.

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A ‘wordle’ based on words in IJPR article titles

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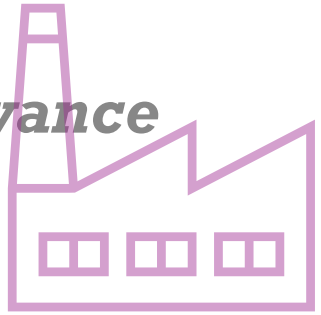
International Journal of Production Research

=

Scientific rigor **&** *Practical relevance*



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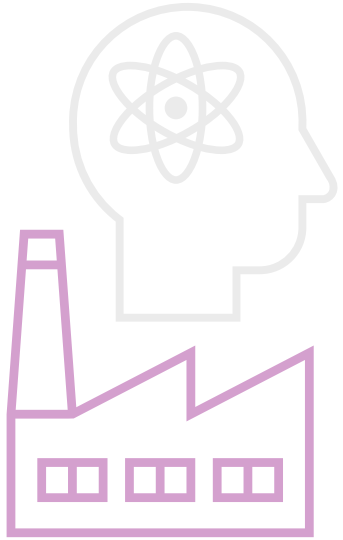
Scientific rigor & practical relevance

The reputation of IJPR was based on a **strong link with industrial applications**

Convincing scientific results **with clear real-life applications** are the principal criteria for the selection of our papers

Didactic articles, presenting new and interesting production research problems or/and new applications are also welcome



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Editor-in-Chief:
Alexandre Dolgui

I invite you to submit always your best scientific results to the International Journal of Production Research!

- Submit here
  www.tandfonline.com/tprs

- Follow us on LinkedIn
  linkedin.com/company/international-journal-of-production-research

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Information Control Problems in Manufacturing: History of INCOM Symposium

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The first IFAC Symposium INCOM

Tokyo, Japan, 1977, October 17th to 20th, Editor: Y. Oshima

IFAC Technical Committee on Manufacturing Technology

Topics considered:

- Information control issue associated with material processing such as *numerical control* and adaptive control of machine tools
- Information control issue associated with material handling such as *robotics*
- Information control issue associated with *assembly and inspection*
- Information processing such as CAD, *patern recognition and artificial intelligence* in manufacturing processes
- Micro-economic modelling of *manufacturing automation* processes

Symposium program was composed of:

2 plenary talks, 1 special lecture and 43 papers presented in technical sessions.

The first two periods for INCOM symposia

IFAC Technical Committee on Manufacturing Technology

Stuttgart, Federal Republic of Germany 22-24 October 1979, Editor: U. Rembold

Budapest, Hungary, 22-25 October 1980, Editor: T. M. R. Ellis

Maryland, USA, 26-28 October 1982, Editor: D. E. Hardt

Suzdal, USSR, 22-25 April 1986, Editor: A. A. Tal'

Madrid, Spain, 26 – 29 September, 1989, Editors: E.A. Puente, L. Nemes

Toronto, Ontario, Canada, 25 – 29 May 1992, Editor: M. Zaremba

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IFAC Technical Committee on **Advanced** **Manufacturing Technology (MIT-TC)**

TC chair: Marek Zaremba

IFAC Technical Committee on **Advanced Manufacturing Technology (MIT-TC)**

Beijing, China, 11 – 13 October 1995 (Information Control Problems in Manufacturing), 120 participants

Nancy/Metz, France, 24-26 June, 1998, Editors: G. Morel, F. Vernadat (the focus was on Information Control in Manufacturing and CIM)

This INCOM'98 program had six main themes which focused on the role of information for automating manufacturing operations; the role of information for integrating and distributing automated manufacturing activities in the whole Enterprise and; the role of information for enhancing synergies between humans and machines.

1998 Proceedings with around 200 papers

IFAC Technical Committee 5.1 on **Manufacturing Plant Control**

TC Chair: Gerard Morel

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IFAC Technical Committee 5.1 on **Manufacturing Plant Control**

Vienna, Austria, 20-22 September, 2001, Editor: P. Kopacek (the name of 1995 Information Control Problems in Manufacturing restored)

Computer integrated manufacturing, flexible manufacturing systems and human machine interfaces to more advanced topics like intelligent manufacturing systems and equipment, information technology for integration in manufacturing and multi-agent systems.

2001 Proceedings with 2 review papers and 42 regular papers.

Salvador, BH, Brazil, April 5-7, 2004, Editors: P. Kopacek, G. Morel, C. E. Pereira

Applications of automation, information and communication technologies in order to control and to manage the manufacturing plant within the e-enterprise, involving all methodological and technological aspects to embed a technical "intelligence" within the components, maintenance management.

2004 Proceedings with 7 keynote talks and 76 regular papers.

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IFAC Technical Committee 5.1 on **Manufacturing Plant Control**

TC chair: Carlos Eduardo Pereira

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12th IFAC Symposium on Information Control Problems in Manufacturing (INCOM'2006), Saint Etienne, France, on May 17-19, 2006, Editors: A. Dolgui, G. Morel, C.E. Pereira
https://events.mines-stetienne.fr/incom2006

Applications of *optimization methods, automation and IT tec*hnologies in the control of *manufacturing plants* and the entire *supply chain*: Intelligent Manufacturing System and Supply Chain paradigms *for optimisation and agile digital control*. The whole product and processes life cycle was covered, from the design, through the manufacturing and maintenance, to the distribution and service.

2006 Proceedings with 7 keynote talks and 375 papers

783 participants at INCOM'06 from **45** countries
544 academics
239 industrial representatives
130 Post Graduate and PhD students

57 countries were represented via the contributors

98 sessions in the final program

42 industrial **exhibitors**

2665 pages of symposium proceedings with **950 authors**

General chair: Prof. A. Dolgui

IPC chair: Prof. G. Morel

NOC chair: Prof. X. Boucher

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Seven Academic Keynote Speeches

ROBOTICS, AGENTS, AND E-WORK: THE FUTURE OF PRODUCTION
Pr. Shimon Y. Nof, Purdue University, **USA**

INTEROPERABLE ENTERPRISE SYSTEMS
Pr. François B. Vernadat, European Commission, **Luxemburg**

HOW DO QUANTITY AND QUALITY REALLY INTERACT?
Dr. Stanley B. Gershwin, Massachusetts Institute of Technology, **USA**

SCHEDULING: NEW TRENDS IN INDUSTRIAL ENVIRONMENT
Dr. Jean-Marie Proth, INRIA, **France**

DISTRIBUTED REAL-TIME EMBEDDED SYSTEMS
Pr. Carlos Eduardo Pereira, Federal University of Rio Grande do Sul, **Brazil**

DATA MINING IN DESIGN OF PRODUCTS AND PRODUCTION SYSTEMS
Pr. Andrew Kusiak, University of Iowa, **USA**

COLLABORATIVE NETWORKS
Pr. Agostino Villa, Politecnico di Torino, **Italy**

Both Academic and Industrial Keynotes

Pr. Stanley B. Gershwin

USA
Massachusetts Institute of Technology
Mechanical Engineering

Timothy L. Johnson

USA
General Electric, Direction R&D

Pr. Carlos Eduardo Pereira

BRAZIL
Federal University of Rio Grande do Sul
Electrical Engineering

Academic and industrial leaders meet together at INCOM'06

Robert Ronchi

FRANCE
ST-Microelectronics, Direction R&D

Pr. François B. Vernadat

LUXEMBOURG
European Commission
Information Systems

James P. IGNIZIO

USA
INTEL Corporation, R&D

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Both Academic and Industrial Keynotes

Pr. Andrew Kusiak

USA
University of Iowa
Mechanical and Industrial Engineering

Roland Menassa

USA
GM Research & Development

Pr. Agostino Villa

ITALY
Polytechnico di Torino
Production Systems

Anthony Poncet

FRANCE
Renault-Trucks

Academic and industrial leaders meet together at INCOM'06

Pr. Shimon Y. Nof

USA
Purdue University
Robotics and e-Manufacturing

Mathieu Glade

FRANCE
Eurocopter-EADS

Dr. Jean-Marie Proth

FRANCE, INRIA
Operation Research and Supply Chain

Detlev Glüer

GERMANY
AMD- Advanced Micro

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Symposium Program

Scope and Topics

- Logistics
- PLM
- Mechatronic systems
- Information systems
- Reconfigurable production systems
- E-business
- Supply networks
- Web-Intelligence
- Optimization
- Artificial intelligence
- Metaheuristics
- Multi-Agents Systems
- Simulation
- Holonic systems

- e-Solutions to Plan and Design of Manufacturing Systems
- Facilities Planning and Materials Handling
- Inventory Control, Production Planning and Scheduling
- Monitoring, Diagnosis and Maintenance of Manufacturing Systems
- Web-enabled Manufacturing Control and Wireless Automation
- Process Modeling and Information Systems within the Extended Enterprise
- Socio-technical and Cognitive Aspects of Automation
- Intelligent Manufacturing Systems Modeling and Applications
- Distributed Systems and Multi-agents Technologies
- Discrete Event Systems Simulation in Manufacturing
- Operational Research Applications in CAD/CAM/CAE

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Special issues of journals after the Symposium

https://events.mines-stetienne.fr/incom2006/publication.html

- IFAC Annual Review in Control
- IFAC Engineering Applications of Artificial Intelligence
- IFAC Control Engineering Practice
- IFAC Mecatronics
- **International Journal of Production Research**
- International Journal of Production Economics
- European Journal of Operational Research
- Computers & Operations Research
- International Journal of Computer Integrated Manufacturing
- International Journal of Systems Science
- Journal of Intelligent Manufacturing (2 issues)
- Production Planning and Control
- International Journal of Information Technology and Management
- Computers in Industry
- International Journal of Mathematical Modelling and Algorithms

16 special issues were published in leading journals

IFAC Coordinating Committee (CC) 5 on **Manufacturing and Logistics Systems**

After INCOM 2006, the Symposium is at the CC level

CC chair: Shimon Y. Nof

CC 5 on **Manufacturing and Logistics Systems:**

TC 5.1 on Manufacturing Plant Control

TC 5.2 on Manufacturing Modelling for Management and Control

TC 5.3 on Enterprise Integration and Networking

TC 5.4 on Large Scale Complex Systems

IFAC Coordinating Committee 5 on **Manufacturing and Logistics Systems**

Prof. Alexandre Dolgui, IPC chair for INCOM 2009, 2012 and 2015

Chair of TC 5.2

Moscow, Russia, 3-5 May, 2009,
Editors: N. Bakhtadze, K. Chernyshov, A. Dolgui, V. Lototsky

http://incom09.org/ **654 participants**

NOC Chair: Prof. Natalia Bakhtadze

2009 Proceedings with 368 papers by approximately 900 authors

Bucharest, Romania, 23-25 May 2012, Editors: T. Borangiu, I. Dumitrache, A. Dolgui, F. Filip

NOC Chair: Prof. Theodor Borangiu

2012 Proceedings with 7 keynote talks and 344 papers

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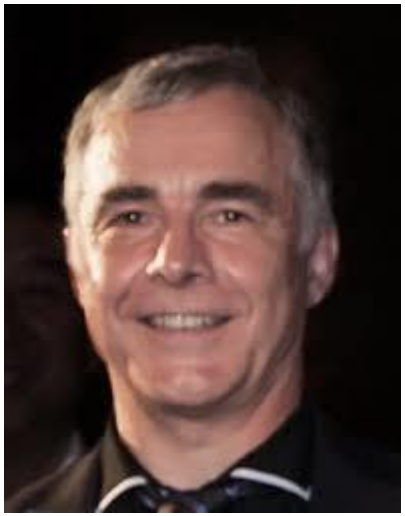
Large participation >500 academics, post-symposium special issues, scope extended to decision aid, optimization and industrial engineering

IFAC Coordinating Committee 5 on **Manufacturing and Logistics Systems**

After INCOM 2006, the Symposium is at the CC level



CC chair: Prof. Hervé Panetto

CC 5 on **Manufacturing and Logistics Systems:**

TC 5.1 Manufacturing Plant Control

TC 5.2 Manufacturing Modelling for Management and Control

TC 5.3 Enterprise Integration and Networking

TC 5.4 Large Scale Complex Systems

Prof. Alexandre Dolgui, IPC chair for INCOM 2015

Chair of TC 5.2

Ottawa, Ontario, Canada, 11-13 May, 2015,
Editors: A. Dolgui, J. Sasiadek and M. Zaremba

www.incom2015.org

NOC Chair: Prof. Marek Zaremba

2015 Proceedings with 432 papers by around 1000 authors.

INCOM 2006, 2009, 2012 and 2015:

Large participation ~500 academics on average, post-symposium special issues,
scope extended to decision aid, optimization and industrial engineering,
large place for integrated approaches (product/process, product/process/supply chain…)

IFAC Coordinating Committee 5 on **Manufacturing and Logistics Systems**

Prof. László Monostori, IPC Chair of INCOM 2018

Bergamo, Italy, Canada, 11-13 June, 2018,
Editors: Marco Macchi, Roberto Pinto, László Monostori

https://www.incom2018.org/

Co-Chairs: Prof. Sergio Cavalieri and Prof. Marco Macchi

2018 Proceedings with 297 papers

7 journals associated

Large participation,
post-symposium publications in journals,
*focus on **responsiveness***

Responsiveness depends substantially on the progress in advanced technologies and innovative methodologies at all levels of design, manufacturing and control of the industrial infrastructure

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IFAC Coordinating Committee 5 on **Cyber-Physical Manufacturing Enterprises**

CC 5 on **Cyber-Physical Manufacturing Enterprises:**

TC 5.1 Manufacturing Plant Control

TC 5.2 Manufacturing Modelling for Management and Control

TC 5.3 Integration and Interoperability of Enterprise Systems

TC 5.4 Large Scale Complex Systems

CC chair: Prof. Benoit Iung

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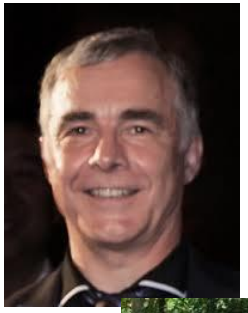
IFAC Coordinating Committee 5 on **Cyber-Physical Manufacturing Enterprises**

Prof. H. Panetto and Prof. B. Iung, IPC co-Chairs of INCOM 2021



Virtual: 7-9 June 2021, SZTAKI & EPIC CoE, Hungary
Editors: László Monostori, Botond Kádár, Ádám Szaller

https://incom2021.org

Co-Chairs: Prof. László Monostori and Dr. Botond Kádár

2021 Proceedings with 208 papers

COVID, so a virtual symposium

Cooperative control, multi-agent systems, complex adaptive systems, emergent systems, sensor networks, data mining, etc., were discussed for exchanging knowledge in this exiting and highly relevant field

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IFAC Coordinating Committee 5 on **Cyber-Physical Manufacturing Enterprises**

CC 5 on **Cyber-Physical Manufacturing Enterprises:**

TC 5.1 Manufacturing Plant Control

TC 5.2 Manufacturing Modelling for Management and Control

TC 5.3 Integration and Interoperability of Enterprise Systems

TC 5.4 Large Scale Complex Systems

CC chair: Prof. Dmitry Ivanov

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IFAC Coordinating Committee 5 on **Cyber-Physical Manufacturing Enterprises**

IPC co-chairs:

28-30 August 2024, Vienna, Austria

https://www.incom2024.org/

NOC Chair and Co-Chairs: Prof. Dr. Fazel Ansari, Prof. Dr. Sebastian Schlund, Prof. Dr. Wilfried Sihn



The final statistics will be know at the closing ceremony, proceedings published after the symposium

Thank you for the excellent organization of symposium in Vienna!

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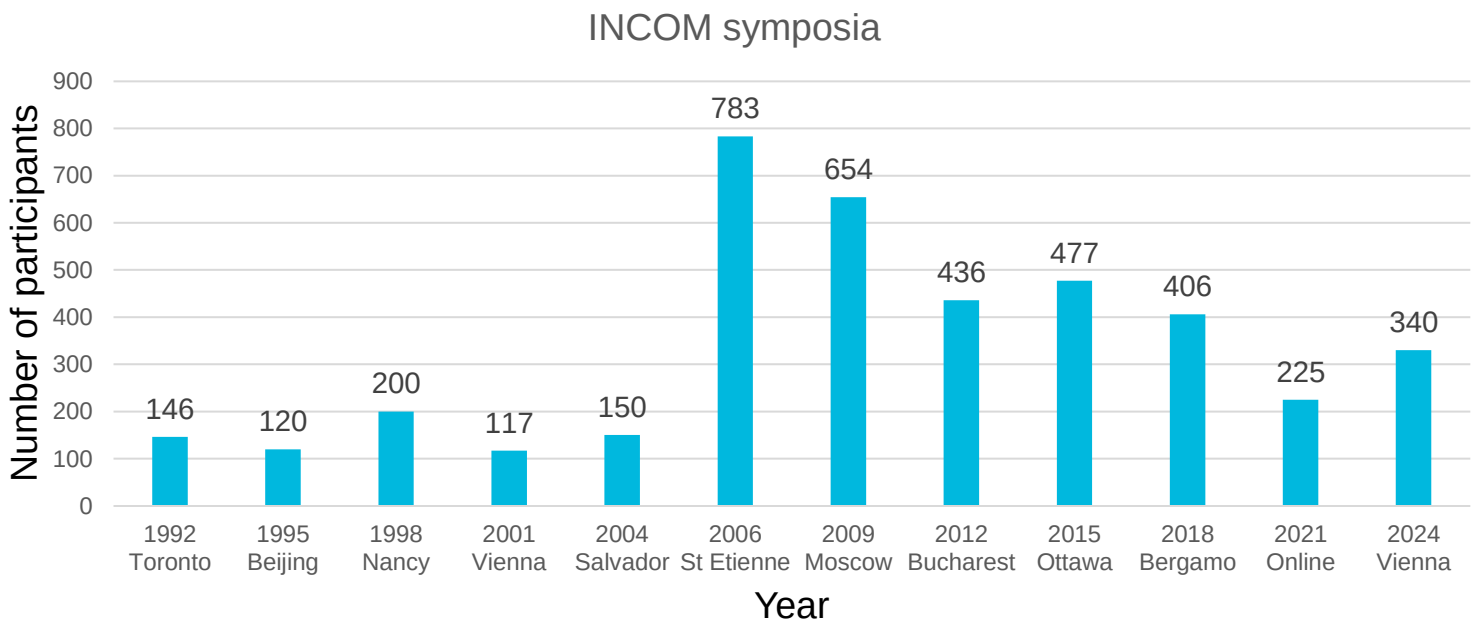
Number of participants at INCOMs last 20 years



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Scope and topics over the time

- Creation and first periods of INCOM
- Growth of INCOM from 2004 to 2015
- Maturity of INCOM after 2015

1977 – 1986 Machine level: CAD/CAM, NC for machine tools, Control issues in Robotics (for material handling), Pattern recognition and Artificial Intelligence in manufacturing processes (especially for quality control), FMS

1986 – 1992 Cell level: FMS, Simulation, Petri nets, Layout, Scheduling

1992 – 2006 Enterprise level: information for automating manufacturing operations; CIM, multi-agent approaches, synergies between humans and machines.

Since 2006 The entire Supply Chain: integration of control, optimization and industrial engineering approaches, the whole product, processes and system life cycle are covered (design, manufacturing, maintenance, distribution and services).

Strong publications

Strong selection and publication of the Proceedings in *IFACPapersOnLine* by Elsevier (indexed in Scopus and by WoS)

Special issues of leading international journals with extended versions of best papers selected at INCOM:

IFAC Annual Review in Control

IFAC Engineering Applications of Artificial Intelligence

IFAC Control Engineering Practice (why not in IFAC Automatica)

but also in traditional partner journals:

International Journal of Production Research

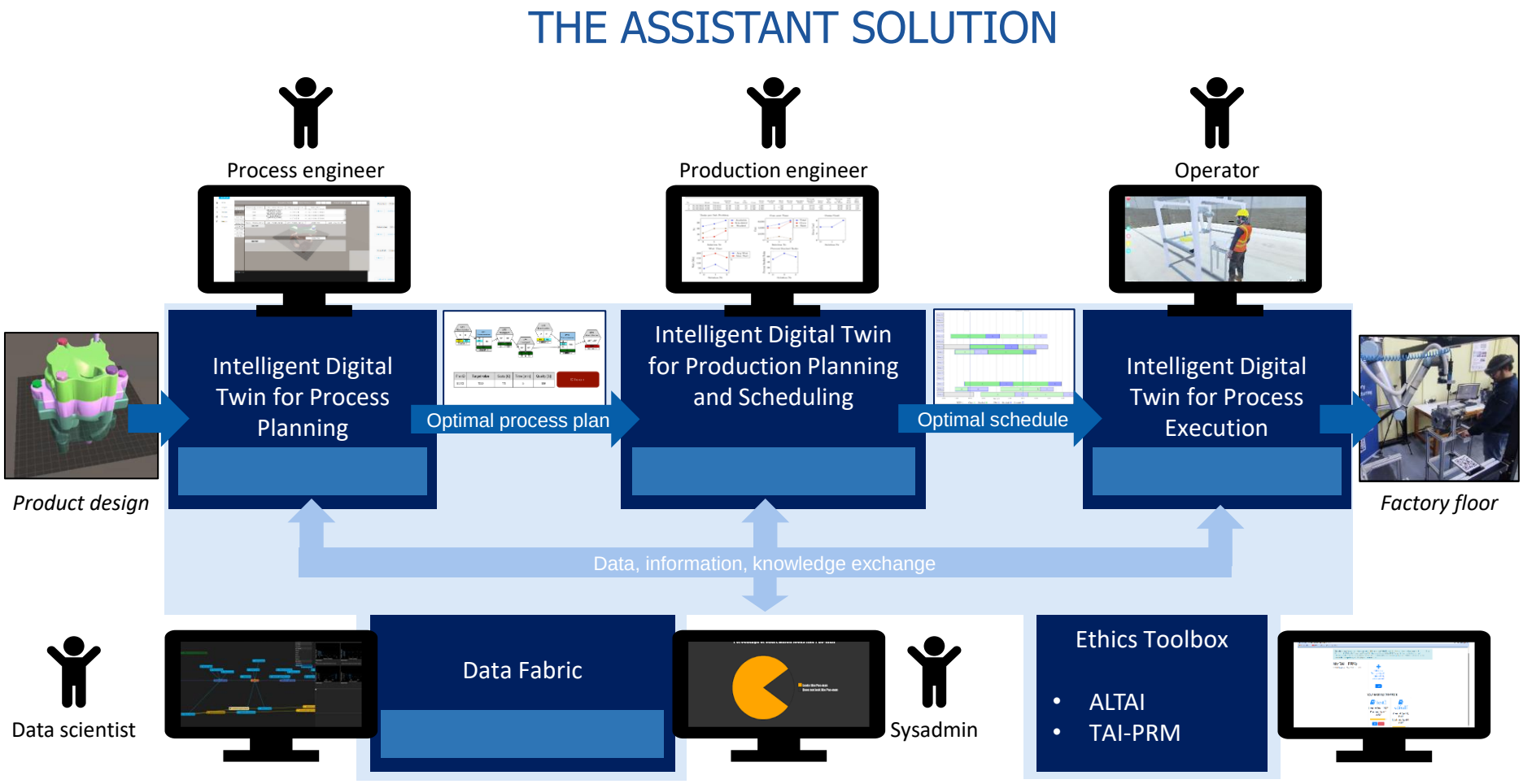
Journal of Intelligent Manufacturing

Computers in Industry

etc.

Tendencies and challenges for the next INCOMs

Challenge 1: Artificial Intelligence and Digital Twins (see European Project ASSISTANT)



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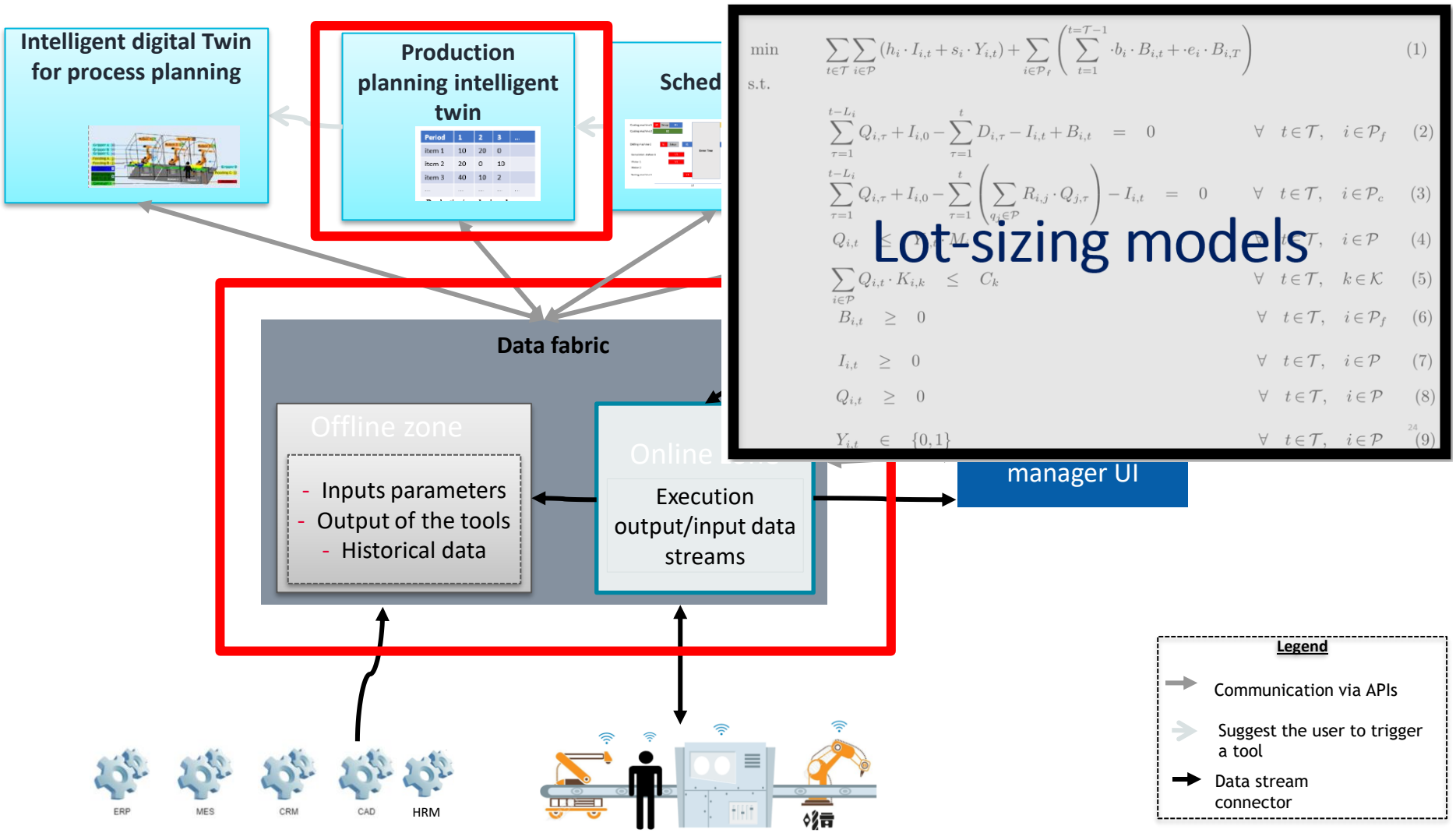
G. Castané, A. Dolgui, N. Kousi, B. Meyers, S. Thevenin, E. Vyhmeister, P-O Ostberg, The ASSISTANT project: AI for high level decisions in manufacturing, *International Journal of Production Research*, vol. 61, n° 7, 2023, pp. 2288-2306.

Tendencies and challenges for the next INCOMs:

Challenge 1: Artificial Intelligence and Digital Twins (European Project ASSISTANT)



$$\min \quad \sum_{t\in\mathcal{T}}\sum_{i\in\mathcal{P}}(h_i\cdot I_{i,t}+s_i\cdot Y_{i,t})+\sum_{i\in\mathcal{P}_f}\left(\sum_{t=1}^{t=\mathcal{T}-1}\cdot b_i\cdot B_{i,t}+\cdot e_i\cdot B_{i,T}\right) \quad (1)$$

$$\text{s.t.}$$

$$\sum_{\tau=1}^{t-L_i} Q_{i,\tau}+I_{i,0}-\sum_{\tau=1}^{t} D_{i,\tau}-I_{i,t}+B_{i,t} = 0 \qquad \forall\ t\in\mathcal{T},\ i\in\mathcal{P}_f \quad (2)$$

$$\sum_{\tau=1}^{t-L_i} Q_{i,\tau}+I_{i,0}-\sum_{\tau=1}^{t}\left(\sum_{q_i\in\mathcal{P}} R_{i,j}\cdot Q_{j,\tau}\right)-I_{i,t} = 0 \qquad \forall\ t\in\mathcal{T},\ i\in\mathcal{P}_c \quad (3)$$

$$Q_{i,t} \leq M \qquad \forall\ t\in\mathcal{T},\ i\in\mathcal{P} \quad (4)$$

$$\sum_{i\in\mathcal{P}} Q_{i,t}\cdot K_{i,k} \leq C_k \qquad \forall\ t\in\mathcal{T},\ k\in\mathcal{K} \quad (5)$$

$$B_{i,t} \geq 0 \qquad \forall\ t\in\mathcal{T},\ i\in\mathcal{P}_f \quad (6)$$

$$I_{i,t} \geq 0 \qquad \forall\ t\in\mathcal{T},\ i\in\mathcal{P} \quad (7)$$

$$Q_{i,t} \geq 0 \qquad \forall\ t\in\mathcal{T},\ i\in\mathcal{P} \quad (8)$$

$$Y_{i,t} \in \{0,1\} \qquad \forall\ t\in\mathcal{T},\ i\in\mathcal{P} \quad (9)$$

Lot-sizing models

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D. Tremblet, S. Thevenin, A. Dolgui. Makespan estimation in a flexible job-shop scheduling environment using machine learning, *International Journal of Production Research*, 2024, pp. 1-17

Tendencies and challenges for the next INCOMs:

Challenge 2. Supply chain viability (slide from INFORMS meeting 2023, Dolgui, Ivanov)

Supply Chain Resilience

Supply chain resilience is the firm's capability to withstand, adapt, and recover from disruptions to meet customer demand and ensure the target performance.

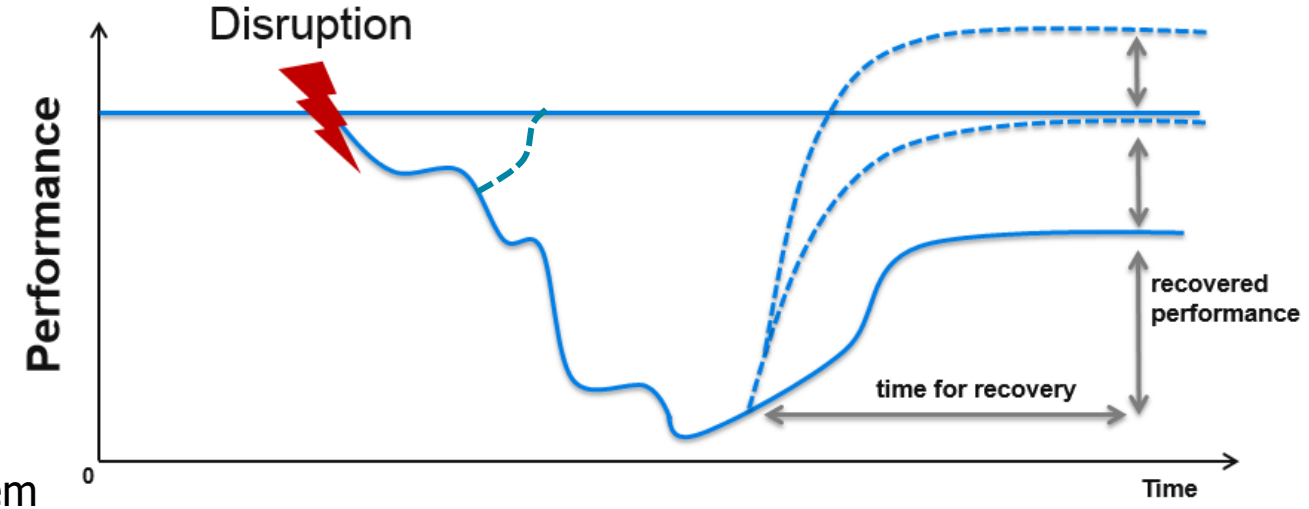
Two essential views on resilience:

1. **Performance-deviation** based – resilience is a *quantity* / outcome measured by **recovery** effects and performance deviations
2. **Adaptation**-based – resilience is a system property / *quality* aiming at the **persistence of the system performance**

Only a resilient supply chain can be profitable.

Disruption: An event which is not planned or anticipated and may affect the structure or dynamics of systems.

Economic and political shocks or changes, Terrorist attacks, Natural disasters, Epidemics, Labor strike, Legal disputes



Risk = Virus

Resilience = Immune System

Hosseini S., Ivanov D., Dolgui A. (2019). Review of quantitative methods for supply chain resilience analysis. **Transportation Research: Part E,** 125, 285-307.

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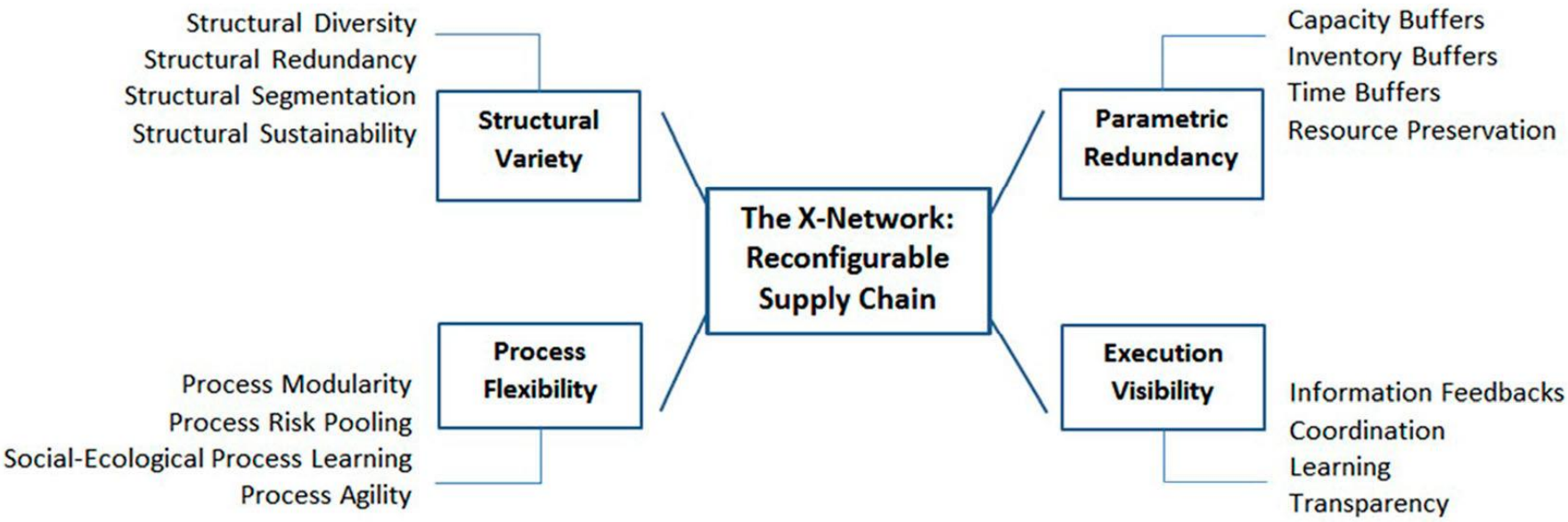
Tendencies and challenges for the next INCOMs:

Challenge 3. Reconfigurable Supply Networks (Dolgui, Ivanov, Sokolov)

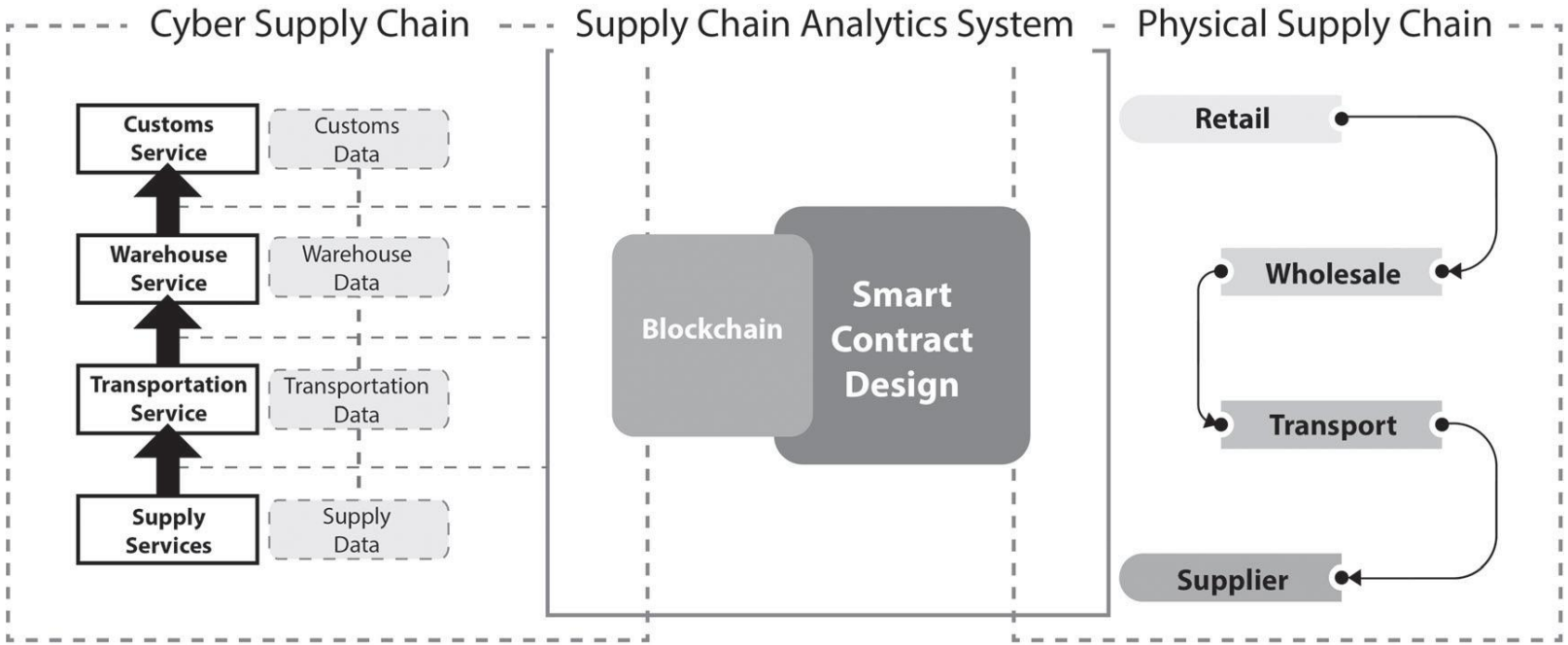
Reconfigurable Supply Chain: the X-Network



Alexandre Dolgui , Dmitry Ivanov & Boris Sokolov (2020) Reconfigurable supply chain: the X-network, International Journal of Production Research, vol. 58, n°13, pp. 4138-4163

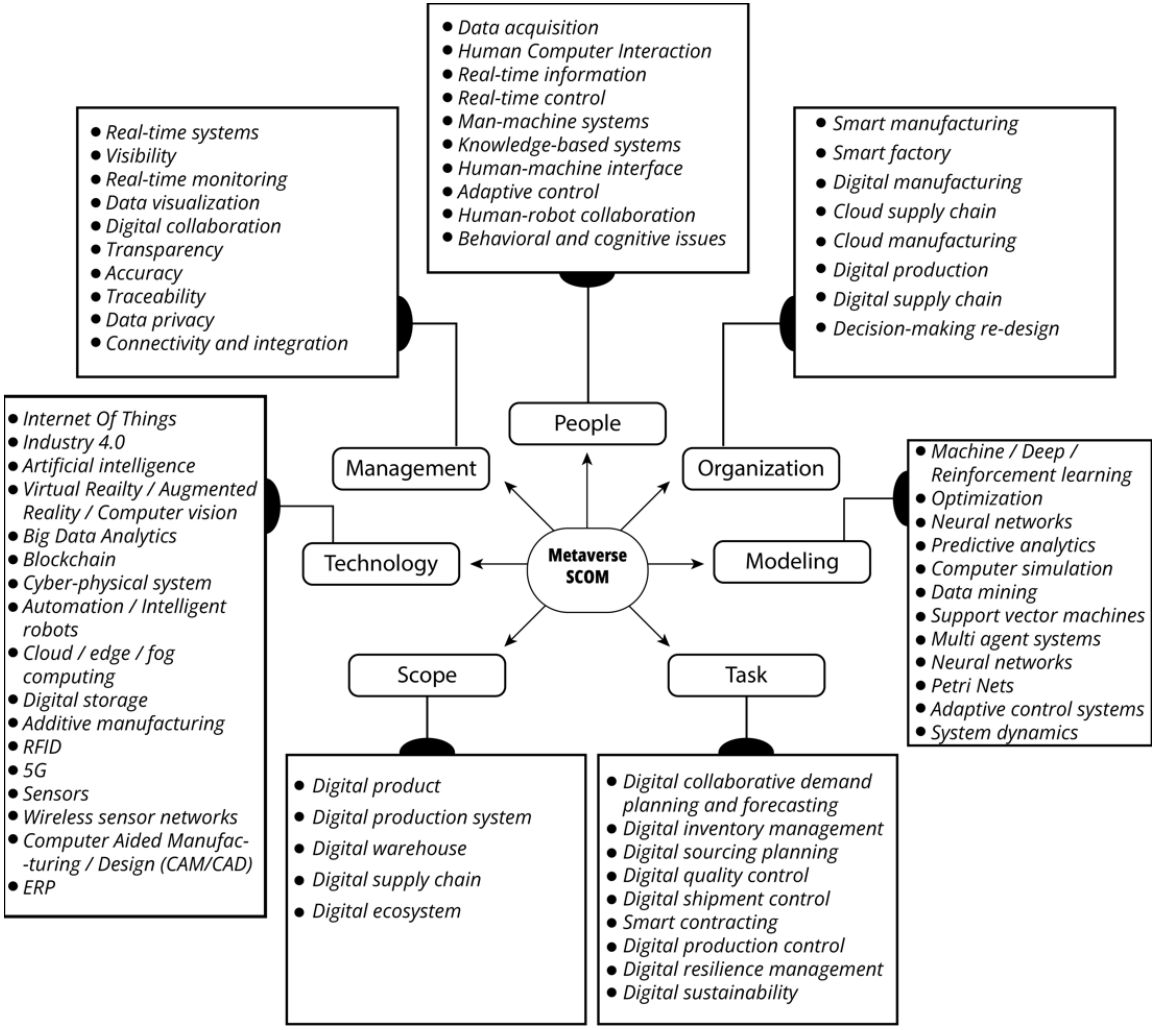
Tendencies and challenges for the next INCOMs:

Challenge 4. Blockchains and smart contracts (see Dolgui, Ivanov, et al.)



A. Dolgui, D. Ivanov, S. Potryasaev, B. Sokolov, F. Werner. Blockchain-oriented dynamic modelling of smart contract design and execution in the supply chain, *International Journal of Production Research*, 2020, vol. 58, n°7, pp. 2184-2199.

Tendencies and challenges for the next INCOMs:
Challenge 5. Metaverse (see Dolgui, Ivanov)



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Alexandre Dolgui & Dmitry Ivanov (2023) Metaverse supply chain and operations management, International Journal of Production Research, vol. 61, n° 23, pp. 8179-8191

IFAC MIM Conference (TC 5.2) also every 3 years

Since 2013 the IFAC MIM Conference relaunched (stopped in 2007) by TC 5.2 with more reduced scope than IFAC INCOM but with the similar ambition of large visibility for a part of our community

So the Symposium INCOM evolutes now, since 2015, in *a different environment* than in the period 2006 – 2015

St Petersburg, Russia, **455 participants**
http://mim2013.org/

Berlin, Germany, **740 participants**
https://blog.hwr-berlin.de/mim2019/

Troyes, France, **540 participants**

Nantes, France, **767 participants**
https://hub.imt-atlantique.fr/mim2022/

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Chairs: N. Bakhtadze, A. Dolgui, D. Lemoine, D. Ivanov, A. Yalaoui, F. Yalaoui, F. Sgarbossa

Large and complete offer of events for our community by IFAC

- IFAC INCOM Symposium, CC 5, every 3 years, current Incom 2024 in Vienna, Austria, next will be in 2027

- IFAC MIM Conference, TC 5.2, every 3 years, next MIM 2025 is Norway, Trondheim, 30 June – 3 July, NOC chair: Prof. Fabio Sgarbossa fabio.sgarbossa@ntnu.no

- IFAC World Congress 2026, every 3 years, Korea, 23 – 28 August, 2026

This offer is completed, of course, with more focused events as:
LSS symposium, **IMS** and **EI2N** workshops

CALL FOR CONTRIBUTIONS – IFAC MIM2025

IFAC
INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

2025 mim
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NTNU
Production Management Research Group

11th IFAC Conference on Manufacturing Modelling, Management and Control
Trondheim, Norway, 30 June - 3 July 2025
Research and Innovation on Manufacturing and Logistics for a better world

conferences.ifac-control.org/mim2025

SAVE THE DATES!!!

15/09/2024 - Invited sessions and tracks submission deadline
30/11/2024 - Full regular papers, papers for invited tracks/sessions, extended abstracts deadline

SUBMIT YOUR CONTRIBUTION VIA https://ifac.papercept.net/

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INCOM 2027

The 19th IFAC Symposium on Information Control Problems in Manufacturing

June 28 – 30, 2027
Nantes, France

https://en.wikipedia.org/wiki/Nantes

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Local Organizer

Organizer: IMT Atlantique – An Elite Technological University, campus in Nantes

LS2N

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Nantes' research expertise in computer science and cybernetics to develop digital sciences, inclusive of other disciplines

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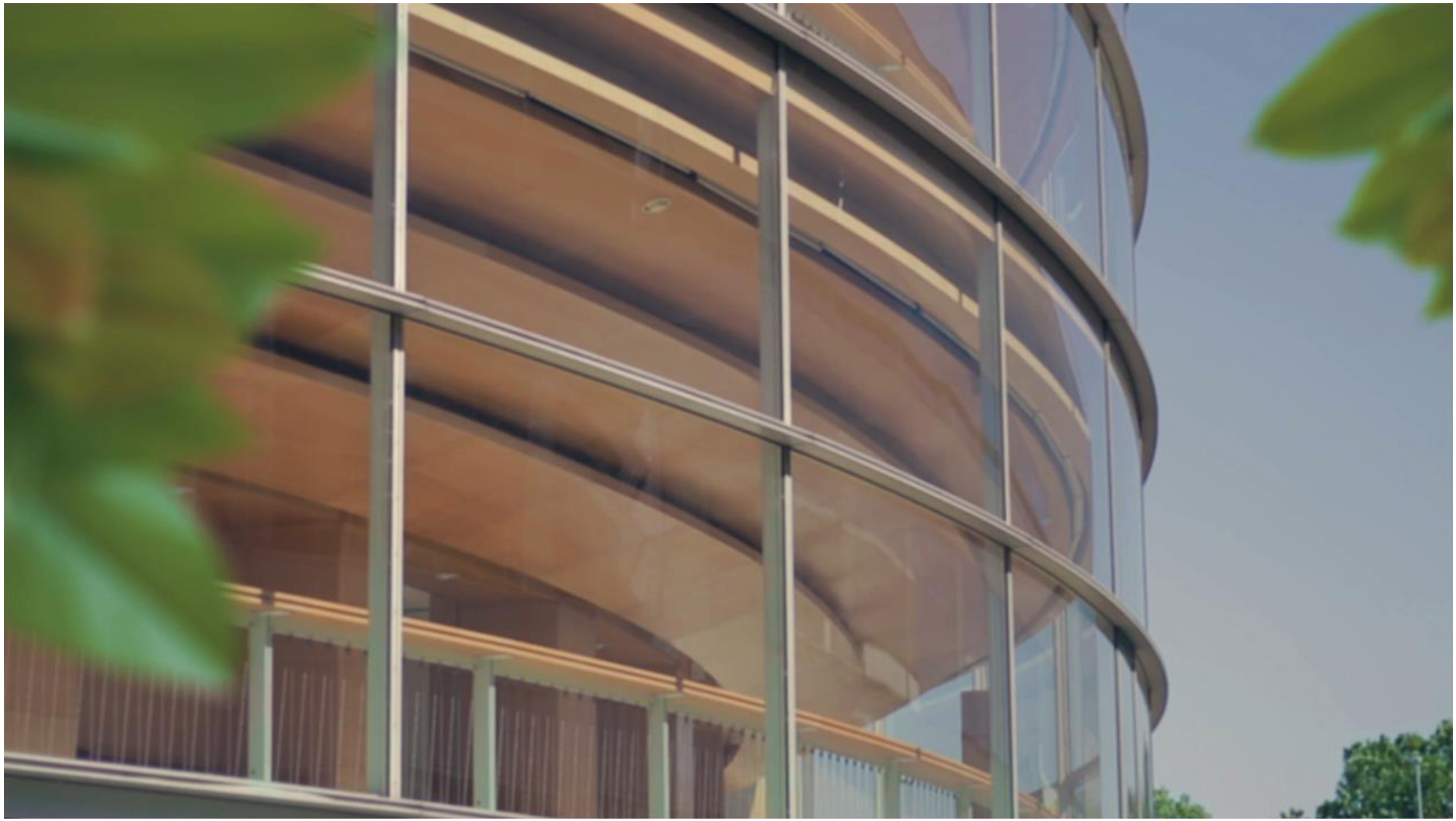
Welcome in Nantes!



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Thank you very much for your attention!