Advances in Production Management Systems

"The path to digital transformation and innovation of production management systems"
August 30 - September 3, 2020
Novi Sad, Serbia
Dear Members of the IFIP WG5.7 and the Participants of the APMS2020,

On behalf of the Organizing Committee, the Program Committee, and the hosting institution – the University of Novi Sad, Faculty of Technical Sciences, Department of Industrial Engineering and Management – it is our great pleasure to welcome you to Novi Sad, Serbia for the 2020 IFIP International Conference on Advances in Production Management Systems (APMS2020). We are looking forward to inspiring presentations and fruitful discussions during this “mixed-media” event in its 41st Edition.

APMS2020 in Novi Sad, Serbia brings together leading international experts from academia, industry, and government in the area of digital transformation and innovation to discuss globally pressing issues in digital and smart manufacturing, operations management, and supply chain management in the Industry 4.0 era. Under the influence of COVID-19, the event was also digitally transformed and for the first time in its history, the APMS International Conference was organized in a “hybrid-mode”, meaning face-to-face as well as online conference sessions. A large international panel of experts reviewed all the submitted papers and selected the best ones to be included in two volumes as part of the APMS2020 conference proceedings. The topics of interest in APMS 2020 included Digital Supply Networks; Data-Driven Production Management; Sustainable Production Management; Cloud and Collaborative Technologies; Smart Manufacturing, Industry 4.0 and the Operator 4.0; Data-Driven Services; Digital Lean Manufacturing; and Digital Transformation Approaches.

We thank the local staff, participants, session chairs, keynote and plenary speakers for helping us build this exciting conference program. The APMS2020 Organizing Committee made every possible effort to make sure that your participation, either online or face-to-face, will be scientifically rewarding and a pleasurable experience. We appreciate the generous support from both the Ministry of Education, Science and Technological Development and Provincial Secretariat for Higher Education and Scientific Research of the Republic of Serbia.

Thank you all for (e-)attending APMS2020 and welcome to Novi Sad!

Bojan Lalić
Conference Chair

Vidosav Majstorović
Program Chair

Uglješa Marjanović
Organizing Committee Chair

Gregor von Cieminski
WG5.7 Chairperson

David Romero
WG5.7 Secretary
Objectives and Scopes

APMS 2020 in Novi Sad, Serbia brings together leading international experts from academia, industry, and government in the area of production systems to discuss globally pressing issues in smart manufacturing, operations management, supply chain management, and Industry 4.0. The conference features several sessions filled with original, high-impact academic contributions, which will be published in the Springer Series ACIT and indexed on SCOPUS and Web of Science. Industrial viewpoints and insights will be shared through industry keynotes by world renown industry leaders. High quality papers will be fast tracked to several peer reviewed archival journals, including Production Planning & Control (PPC) and International Journal of Production Research (IJPR). The conference is supported by the International Federation of Information Processing (IFIP) and is organized by the IFIP Working Group 5.7 on Advances in Production Management Systems which was established 1978.

Program

APMS 2020 in Novi Sad, Serbia brings together leading international experts from academia, industry, and government in the area of production systems to discuss globally pressing issues in smart manufacturing, operations management, supply chain management, and Industry 4.0. The conference features several sessions filled with original, high-impact academic contributions, which will be published in the Springer Series ACIT and indexed on SCOPUS and Web of Science.
General Information
1 - The Rectorate building of the University of Novi Sad
2 - Faculty of Technical Sciences
3 - Danube river
CONFERENCE VENUE

Conference Dates

The APMS 2020 International Conference - Advances in Production Management Systems will be held on August 30th through the September 3th in Novi Sad, Serbia.

Venue

The Rectorate building of the University of Novi Sad

Dr Zorana Djindjica 1, 21102 Novi Sad, Serbia

APMS 2020 will be held at the Rectorate building of the University of Novi Sad. Rectorate building is located at the central campus on the left bank of the Danube, across the famous 18th century Petrovaradin fortress, and the walking distance from the city old town. Novi Sad, the city on the Danube, the city of European history and Balkan hospitality. It is the city of museums, galleries, and events such as EXIT Music Festival that has been awarded international rewards and that has acquired international recognizability. New creative energy brought about by youth groups and organizations has contributed, along with the already recognizable traditional platform, to turn Novi Sad into the European Capital of Culture 2021.
Ground Floor

- ENTRANCE
- READING ROOM
- AMPHITHEATER
- HALL (COFFEE BREAK)
- STAIRS
Registration Desk

The registration desk will be located on the ground floor of Rectorate building. The registration desk will be open during the following hours:

- Sunday: August 30th, - 8:30 a.m. to 5:30p.m.
- Monday: August 31st, - 9:00 a.m. to 6:00p.m.
- Tuesday: September 1st, - 9:45 a.m. to 5:00p.m.

Instructions for Presentations

Presenters are allotted 15 minutes for presentation and 5 minutes more for Q&A. Session chairs have been instructed to retain control of the schedule. The preferred file type for presentations is Microsoft Power Point (.pptx-Format recommended). All presenters are instructed to bring their presentation on a USB memory stick if they present face-to-face, or to store it on their personal computer if present online. All presenters are responsible for the correct display of their presentations. We recommend to test the presentation before the session.
Social Activities

Welcome Reception
August 30th, 2020
PLACE: The Rectorate building, ground floor
TIME: 5:30 p.m.‒ 8:00 p.m.
DRESS: Casual
All participants and accompanying guests are cordially invited to an informal gathering at the welcome reception of APMS 2020. Drinks and snacks will be served.

Novi Sad city guided tour
August 31st, 2020
PLACE: Hotel Centar lobby
TIME: 7:00 p.m.‒ 8:00 p.m.
DRESS: Casual
ADDRESS: Uspenska 1, Novi Sad

Gala Dinner
September 1st, 2020
PLACE: Aqua Doria (Carda Aqua Doria)
TIME: 6:30 p.m.‒ 8:30 p.m.
DRESS: Smart Casual
ADDRESS: Kamenički put bb, Petrovaradin 21000

Wine tour and dinner at Sremski Karlovci
September 2nd, 2020
PLACE: Sremski Karlovci
TIME: 6:30 p.m.‒ 10:00 p.m.
DRESS: Casual
MEETING POINT: Hotel Centar lobby
Monday, August 31st, 2020

CUBO concept bar and restaurant
12:15 p.m. to 13:15 p.m.
Strumička 16, Novi Sad

Tuesday, September 1st, 2020

CUBO concept bar and restaurant
12:15 p.m. to 13:15 p.m.
Strumička 16, Novi Sad

Wednesday, September 2nd, 2020

CUBO concept bar and restaurant
12:15 p.m. to 13:15 p.m.
Strumička 16, Novi Sad
RESTAURANT LOCATIONS
KEYNOTE SPEAKERS

Dr. Ivanka Višnjić
Associate Professor, ESADE
Ramon Llull University, Barcelona, Spain
How to execute digital transformation? Lessons from manufacturing industry

Dr. Marco Ulrich
Head of "Software Technologies and Applications"
Department Manager of Software Technologies (DECRC/S)
ABB Corporate Research Center Germany
Ladenburg, Germany
Industrial digitalization - the way to autonomous systems

Dr. Jin Chen
Professor, Department of Innovation, Entrepreneurship and Strategy
Tsinghua University, Beijing, China
Innovation for industry key technologies: Evidence from China
Industrial Tours

The conference program includes three tours with site visits to 3Lateral, Continental, and TTTech (RT-RK).

**Thursday, September 3rd, 2020**

3Lateral

- Departure from hotel Centar: 9:00 a.m.
- Tour: 9:15 a.m. - 10:05 a.m.
- Arriving at hotel Centar: 11:00 a.m.

**Thursday, September 3rd, 2020**

Continental

- Departure from hotel Centar: 9:00 a.m.
- Tour: 9:05 a.m. - 10:05 a.m.
- Arriving at hotel Centar: 10:10 a.m.

**Thursday, September 3rd, 2020**

TTTech

- Departure from hotel Centar: 9:00 a.m.
- Tour: 9:15 a.m. - 10:15 a.m.
- Arriving at hotel Centar: 10:30 a.m.
## Sessions Overview

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Session Title</th>
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<tbody>
<tr>
<td>9:00 - 10:00</td>
<td>Amphitheater – ground floor</td>
<td>Opening ceremony</td>
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<tr>
<td>10:15 - 11:15</td>
<td>Amphitheater – ground floor</td>
<td>Digital Transformation - Part I</td>
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<tr>
<td>10:15 - 12:15</td>
<td>Multimedia Hall – 1st floor</td>
<td>Data-Driven Services - Part I</td>
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<tr>
<td>10:15 - 12:15</td>
<td>Multimedia Hall – 2nd floor</td>
<td>Digital Twins &amp; Shadows - Part I</td>
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<tr>
<td>10:15 - 12:15</td>
<td>Reading Room – ground floor</td>
<td>Production Ramp-up Strategies</td>
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<tr>
<td>13:15 - 15:15</td>
<td>Amphitheater – ground floor</td>
<td>Digital Transformation - Part II</td>
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<tr>
<td>13:15 - 15:15</td>
<td>Multimedia Hall – 1st floor</td>
<td>Data-Driven Services - Part II</td>
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<td>Multimedia Hall – 2nd floor</td>
<td>Digital Twins &amp; Shadows - Part II</td>
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<td>13:15 - 15:15</td>
<td>Reading Room – ground floor</td>
<td>Reconfig., Flex. &amp; Agile Mfg. - Part I</td>
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<td>15:30 - 16:15</td>
<td>Amphitheater – ground floor</td>
<td>Keynote Address 1</td>
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<td>16:30 - 18:30</td>
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<td>Digital Transformation - Part III</td>
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<td>16:30 - 18:30</td>
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<td>Data-Driven Applications</td>
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<tr>
<td>16:30 - 18:30</td>
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<td>Collaborative Robotics Applications</td>
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<tr>
<td>16:30 - 18:30</td>
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<td>Reconfig., Flex. &amp; Agile Mfg. - Part II</td>
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### Monday

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<td>10:15 - 12:15</td>
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<td>Digital Lean Manufacturing</td>
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<tr>
<td>10:15 - 12:15</td>
<td>Multimedia Hall – 1st floor</td>
<td>Gastronomic Service System Design</td>
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<td>10:15 - 12:15</td>
<td>Reading Room – ground floor</td>
<td>Blockchain &amp; Logistics 4.0</td>
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<td>13:15 - 14:00</td>
<td>Amphitheater – ground floor</td>
<td>Keynote Address 2</td>
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<td>14:00 - 14:45</td>
<td>Amphitheater – ground floor</td>
<td>Panel I: Women in Production Management</td>
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<tr>
<td>15:00 - 17:00</td>
<td>Amphitheater – ground floor</td>
<td>Smart Manufacturing &amp; Industry 4.0</td>
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<td>15:00 - 17:00</td>
<td>Multimedia Hall – 1st floor</td>
<td>Scheduling Methods</td>
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<td>15:00 - 17:00</td>
<td>Multimedia Hall – 2nd floor</td>
<td>The Operator 4.0</td>
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<td>15:00 - 17:00</td>
<td>Reading Room – ground floor</td>
<td>Production Logistics 4.0</td>
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<td>Amphitheater – ground floor</td>
<td>Sustainable Manufacturing</td>
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<td>Quality &amp; Risk Management</td>
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<td>10:15 - 12:15</td>
<td>Multimedia Hall – 2nd floor</td>
<td>Human Resources Management</td>
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<td>10:15 - 12:15</td>
<td>Reading Room – ground floor</td>
<td>Food Supply Chains - Part I</td>
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<td>13:15 - 14:00</td>
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<td>Keynote Address 3</td>
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<td>14:00 - 14:45</td>
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<td>Panel II: Digital Transformation and the Social Factory of Things, Services and People</td>
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<td>15:00 - 17:00</td>
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<td>Circular Manufacturing</td>
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<td>Assembly Systems 4.0</td>
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<td>10:15 - 12:15</td>
<td>Amphitheater – ground floor</td>
<td>Closing Ceremony</td>
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Sunday
August 30, 2020

8:45  Doctoral Workshop Intro
9:00
9:15  Doctoral Workshop (Session 1 and 2)
9:45
10:00
10:15  Break (15 min.)
10:30
10:45
11:00  Doctoral Workshop (Session 3 and 4)
11:15
11:30
11:45
12:00  Lunch Break (75 min.)
12:15
12:30
12:45
13:00

Monday
August 31, 2020

8:45
9:00  Registration
9:15
9:30  Opening ceremony
9:45
10:00  Coffee Break (15 min.)
10:15
10:30  Parallel Session #1
10:45
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12:00  Lunch (60 min.)
**Conference Overview**

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## Conference Overview

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<th>Tuesday</th>
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<tr>
<td>September 1, 2020</td>
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<td>13:15 Keynote 2</td>
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<td>Plenary Session #5</td>
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<td>Gala dinner (Carda Aqua Doria)</td>
<td>Wine tour and Dinner (Sremski Karlovc)</td>
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DOCTORAL WORKSHOP PROGRAM

Sunday, August 30, 2020

8:45 - 10:15

Doctoral Workshop – Opening Session
Multimedia Hall – 1st floor
(Online: Cisco WebEx)
Chair: David Romero

Doctoral Workshop - Session 1
(Sustainable and Circular Manufacturing)
Multimedia Hall – 2nd floor (Online: Cisco WebEx)
Chairs: Milan Delic

Data and information valorisation towards Circular Manufacturing adoption
Federica Acerbi
Politecnico di Milano, Italy
Discussant: Mélanie Despeisse

Design and Management of Assembly 4.0 Systems
Marco Simonetto
Norwegian University of Science and Technology, Norway
Discussant: Duck Young Kim

Doctoral Workshop – Session 2 (Smart and Digital Manufacturing)
Multimedia Hall – 1st floor (Online: Cisco WebEx)
Chairs: David Romero

The impact of digital servitization on manufacturing firm performance in transition countries
Slavko Rakic
University of Novi Sad, Serbia
Discussant: Paolo Gaiardelli
DOCTORAL WORKSHOP PROGRAM

Sunday, August 30, 2020

10:30 - 12:00

Doctoral Workshop - Session 3 (Sustainable and Circular Manufacturing)
Multimedia Hall – 2nd floor
(Online: Cisco WebEx)
Chairs: Milan Delic

Sustainable deployment of lean within producing corporate groups
Sara Linderson
KTH Royal Institute of Technology, Sweden
Discussant: Milan Delic

Integrating the human factors at the human level with the system level in an order picking process
Vivek Vijayakumar
Norwegian University of Science and Technology, Norway
Discussant: Jorn Mehnen

A Tool for the Selection of Process Mining Perspectives, Types, Algorithms and Techniques
Dusanka Dakic
University of Novi Sad, Serbia
Discussant: Marco Macchi
Doctoral Workshop – Session 4 (Smart and Digital Manufacturing)
Multimedia Hall – 1st floor (Online: Cisco WebEx)

Chairs: David Romero

Industrial Asset Management in manufacturing: how to manage data and information in Maintenance?
Adalberto Polenghi
Politecnico di Milano, Italy
Discussant: Åsa Fast-Berglund

Industry 4.0 – The crucial role of Quality 4.0 and Quality management in the context of Serbian transitional economy
Stana Vasic
University of Novi Sad, Serbia
Discussant: David Romero

Sustainable, Data-Driven Food Production Planning and Control
Maggie Bresler
Norwegian University of Science and Technology, Norway
Discussant: Gyu Lee

13:15 - 13:45

Doctoral Workshop - Closing Session
Multimedia Hall – 2nd floor
(Online: Cisco WebEx)
Chair: Milan Delic
Detailed Agenda
**DETAILED AGENDA**

**Monday, August 31, 2020**

### 9:30 - 10:00

**Opening ceremony**
Amphitheater – ground floor

### 10:15 - 12:15

**Digital Transformation - Part I**
Amphitheater – ground floor

*Chairs: Bahrudin Hrnjica & Egon Lüftenegger*

A conceptual model for deploying digitalization in SMEs through capability building
Zuhara Chavez, Jannicke Baalsrud Hauge, Monica Bellgran
KTH Royal Institute of Technology, Sweden

Towards the definition of an Impact Level factor of SME features over Digital Transformation
Melissa Liborio Zapata\(^1\), Lamia Berrah\(^2\), Laurent Tabourot\(^3\)
1: Laboratoire Systèmes et Matériaux pour la Mécatronique (SYMME), Université Savoie Mont Blanc; 2: Laboratoire d'Informatique, Systèmes, Traitement de l'Information et de la Connaissance (LISTIC), Université Savoie Mont Blanc

Industry 4.0 on demand: a value driven methodology to implement Industry 4.0
Deborah Leone, Andrea Barni
SUPSI, Switzerland
Technology Adoption in the Industry 4.0 Era: Empirical Evidence from Manufacturing Companies
Nenad Medić¹, Zoran Anisic¹, Nemanja Tasic¹, Nikola Zivlak², Bojan Lalic¹
1: University of Novi Sad, Faculty of Technical Sciences, Serbia; 2: Emlyon Business School, Écully, France

ERP in Industry 4.0 Context
Vidosav Majstorovic¹, Slavenko Stojadinovic¹, Bojan Lalic², Ugljesa Marjanovic²
1: University of Belgrade, Faculty of Mechanical Engineering, Belgrade, Serbia; 2: University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Serbia

General readiness assessment of Industry 4.0: Evidence from Serbian manufacturing industry
Tanja Todorovic¹, Bojan Lalic¹, Vidosav Majstorovic², Ugljesa Marjanovic¹, Nemanja Tasic¹
1: Faculty of Technical Sciences, University of Novi Sad, Serbia; 2: Faculty of Mechanical Engineering, University of Belgrade, Serbia

Data-Driven Services - Part I
Multimedia Hall – 1st floor
Chairs: Paolo Gaiardelli & Shaun West

Industry 4.0 data-related technologies and servitization: a systematic literature review
Michela Zambetti, Roberto Pinto, Giuditta Pezzotta
Department of Management, Information and Production Engineering, University of Bergamo, Italy
Engineering of data-driven Service Systems for Smart Living: Application and Challenges
Henrik Kortum¹, Laura Sophie Gravemeier¹, Novica Zarvic¹, Thomas Feld², Oliver Thomas¹,²,³
¹: DFKI German Research Center for Artificial Intelligenz, Germany;
²: Strategion GmbH;
³: Universität Osnabrück, Informationsmanagement und Wirtschaftsinformatik

Impact of platform openness on ecosystems and value streams in Platform-based PSS exemplified using RAMI 4.0
Michela Zambetti¹, Till Blüher², Giuditta Pezzotta¹, Konrad Exner³, Roberto Pinto¹, Rainer Stark²,³
¹: Department of Management, Information and Production Engineering, University of Bergamo, Italy;
²: Technische Universität Berlin, Germany;
³: Fraunhofer Institute for Production Systems and Design Technology, Germany

Towards a Comparative Data Value Assessment Framework for Smart Product Service Systems
Lennard Phillip Holst, Volker Stich, Jana Frank, Günther Schuh
Institute for Industrial Management at RWTH Aachen University, Germany

The Data-Driven Product-Service Systems Design and Delivery (4DPSS) methodology
Roberto Sala¹, Alessandro Bertoni², Fabiana Pirola¹, Giuditta Pezzotta¹
¹: University of Bergamo, Italy;
²: Blekinge Institute of Technology, Sweden
Agile guideline for development of smart services in manufacturing enterprises with support of artificial intelligence
Mike Freitag¹, Oliver Hämmerle²
1: Fraunhofer IAO, Germany;
2: University of Stuttgart, Germany

Digital Twins & Shadows - Part I
Multimedia Hall – 2nd floor
*Chairs: Erik Flores-Garcia & Sabine Waschull*

The transformation towards smart(er) factories: integration requirements of the digital twin
S. Waschull, J.C. Wortmann, J.A.C. Bokhorst
University of Groningen, Department of Operations

Systems Engineering Approach to Identify Requirements for Digital Twins Development
Ali Gharaei¹, Jinzhi Lu², Oliver Stoll², Xiaochen Zheng¹,
Shaun West², Dimitris Kiritsis¹
1: EPFL, Switzerland;
2: HSLU, Switzerland

Analyzing the Characteristics of Digital Twin and Discrete Event Simulation in Cyber Physical Systems
Erik Flores-Garcia¹, Goo-Young Kim², Jinho Yang²,
Magnus Wiktorsson¹, Sang Do Noh²
1: KTH Royal Institute of Technology, Sweden;
2: Sungkyunkwan University
A Digital Twin modular framework for Reconfigurable Manufacturing Systems
Hichem Haddou Benderbal¹, Abdelkrim R. Yelles-Chaouche¹,², Alexandre Dolgui¹
¹: IMT Atlantique, LS2N-CNRS, Nantes, France; ²: IRT Jules Verne, Bouguenais, France

Business Process Management for Manufacturing Execution System deployment: some lessons from a bearings manufacturer experience
Hervé Verjus, Vincent Clivillé, Lamia Berrah, Romain Gandia, Claude Chapel
Université Savoie Mont-Blanc, France

Identifying Key Business Processes that Can Benefit from Industry 4.0 in the Gas Sector, The Public Gas Distribution Networks Case in Greece
Nikolaos A. Panayiotou, Vasileios P. Stavrou, Konstantinos E. Stergiou
National Technical University of Athens, Greece

10:15 - 12:15

Production Ramp-up Strategies
Reading Room – ground floor
Chairs: Stefan Wiesner & Jannicke Baalsrud

Key factors on utilizing the production system design phase for increasing operational performance
Md Hasibul Islam, Zuhara Chavez, Seyoum Eshetu Birkie, Monica Bellgran
KTH Royal Institute of Technology, Sweden
Part Selection for Freeform Injection Molding: framework for development of a unique methodology
Elham Sharifi\textsuperscript{1}, Atanu Chaudhuri\textsuperscript{1},
Brian Vejrum Wæhrens\textsuperscript{1}, Lasse G. Staal\textsuperscript{2},
Saeed D. Farahani\textsuperscript{3}
\textsuperscript{1}: Aalborg university, Denmark;
\textsuperscript{2}: Addifab company, Denmark;
\textsuperscript{3}: Maersk Mc-Kinney Moller Institute,
Southern Denmark University

Business Model Development for a Dynamic Production Network Platform
Stefan Alexander Wiesner\textsuperscript{1}, Larissa Behrens\textsuperscript{2},
Jannicke Baalsrud Hauge\textsuperscript{1,3}
\textsuperscript{1}: BIBA - Bremer Institut für Produktion und Logistik GmbH, Germany;
\textsuperscript{2}: Karlsruher Institut für Technologie (KIT), Institut für Fördertechnik und Logistiksysteme, Germany;
\textsuperscript{3}: KTH – Royal Institute of Technology, Sweden

A Model for Cost-Benefit Analysis of Production Ramp-up Strategies
Khaled Medini\textsuperscript{1}, Antoine Pierné\textsuperscript{2},
John Ahmet Erkoyuncu\textsuperscript{3}, Christian Cornet\textsuperscript{4}
\textsuperscript{1}: Mines Saint-Etienne, Univ Clermont Auvergne, CNRS,
UMR 6158 LIMOS, Henri Fayol Institute,
F - 42023 Saint-Etienne France;
\textsuperscript{2}: Mines Saint-Etienne, F - 42023 Saint-Etienne France;
\textsuperscript{3}: Through-life Engineering Services Centre, School of Aerospace, Transport and Manufactur-ing, Cranfield University, Cranfield, MK43 0AL, UK;
\textsuperscript{4}: Centre Technique des Industries Mêcaniques, 42000 Saint –Etienne, France
Machine Learning-Supported Planning of Lead Times in Job Shop Manufacturing
Kathrin Julia Kramer¹, Carsten Wagner², Matthias Schmidt³
1: PPI, Leuphana University Lueneburg, 21335 Lueneburg, Germany;
2: HAWK University of Applied Sciences and Art Hildesheim/ Holzminden/ Goettingen, Buesgenweg 1a, 37077 Goettingen, Germany

Backlog Oriented Bottleneck Management – Practical Guide for Production Managers
Roman Ungern-Sternberg, Christian Fries, Hans-Hermann Wiendahl
Fraunhofer-Institute for Manufacturing Engineering and Automation IPA, Germany

13:15 - 15:15

Digital Transformation - Part II
Amphitheater – ground floor

Chairs: Ioan Turcin & Selver Softic

Challenges in Data Life Cycle Management for Sustainable Cyber-Physical Production Systems
Mélanie Despeisse, Ebru Turanoglu Bekar
Chalmers University of Technology, Sweden

Applying contextualization for data-driven transformation in manufacturing
Sonika Gogineni¹, Kai Lindow², Jonas Nickel², Rainer Stark¹,³
1: Fraunhofer Institute for Production Systems and Design Technology IPK, Berlin, Germany;
2: Rolls-Royce Deutschland, Eschenweg 11, 15827 Blankenfelde-Mahlow, Germany;
3: Technische Universität Berlin, Chair Industrial Information Technology, Berlin, Germany

Concept of PLM application integration with VR and AR techniques
Jan Duda, Sylwester Oleszek
Cracow University of Technology, Poland

Organizational enablers for digitalization in manufacturing industry
Lars Harald Lied, Daryl John Powell, Maria Flavia Mogos
SINTEF Manufacturing AS, Norway

Explainable AI in Manufacturing: A Predictive Maintenance Case Study
Bahrudin Hrnjica², Selver Softic¹
1: CAMPUS 02 University of Applied Sciences, Austria; 2: University of Bihac, Bosnia and Herzegovina

The big potential of Big Data in manufacturing: evidence from emerging economies
Marko Pavlović, Uglješa Marjanović, Slavko Rakić, Nemanja Tasić, Bojan Lalić
University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Serbia

13:15 – 15:15

Data-Driven Services - Part II
Multimedia Hall – 1st floor
Chairs: Xavier Boucher & Giuditta Pezzotta

A novel value driven co-creation framework
Geir Ringen, Halvor Holtskog, Torgeir Welo
NTNU, Norway
A framework to support value co-creation in PSS development
Martha Orellano¹, Xavier Boucher², Gilles Neubert³
¹: Mines Saint-Etienne, Univ Lyon, Univ Jean Moulin, Univ Lumire, Univ Jean Monnet, ENTPE, INSA Lyon, ENS Lyon, CNRS, UMR 5600 EVS, Institut Henri Fayol, F-42023, Saint-Etienne, France;
²: Mines Saint-Etienne, Univ Clermont Auvergne, CNRS, UMR 6158 LIMOS, Institut Henri Fayol, F 42023, Saint-Etienne, France;
³: emlyon business school, CNRS, UMR 5600 EVS, F-42009, Saint-Etienne, France

Value chain integration – a framework for assessment
Inger Gamme¹, Bjørn Andersen², Håkon Raabe¹, Daryl Powell¹,²
¹: SINTEF Manufacturing, Norway;
²: Norwegian University of Science and Technology, Norway

Using Service Dominant logic to assess the value co-creation of Smart Services
Oliver Stoll¹, Shaun West¹, Cosimo Barbieri²
¹: Lucerne University of Applied Sciences and Arts, Switzerland;
²: Università degli Studi di Firenze, Viale G. Morgagni 40 - 50134, Italy

The role of service business models in the manufacturing of transition economies
Slavko Rakic, Nenad Simeunovic, Nenad Medic, Marko Pavlovic, Ugljesa Marjanovic
University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Serbia
Reshoring of service operations: evidence from a Delphi study
Paolo Gaiardelli, Albachiara Boffelli, Matteo Kalchschmidt, Daniel Bellazzi, Simone Orom Samorani
University of Bergamo, Italy

Digital Twins & Shadows - Part II
Multimedia Hall – 2nd floor
Chairs: Dimitris Kiritsis & Frederick Birtel

Digital Shadows as an enabler for the internet of production
Günther Schuh, Andreas Gütlaff, Frederick Sauermann, Judith Maibaum
Werkzeugmaschinenlabor WZL der RWTH Aachen, Germany

Digital and physical testbed for production logistics operations
Jannicke Baalsrud Hauge\textsuperscript{1,2}, Masoud Zafarzadeh\textsuperscript{1}, Yongkuk Jeong\textsuperscript{1}, Yi Li\textsuperscript{3}, Wajid Ali Khilji\textsuperscript{1}, Magnus Wiktorsson\textsuperscript{1}
\textsuperscript{1}: KTH Royal Institute of Technology, Sustainable production system, Södertälje, Sweden;
\textsuperscript{2}: Bremer Insitut fur Produktion und Logistik GmbH (BIBA), Bremen, Germany;
\textsuperscript{3}: Fraunhofer-Chalmers Centre for Industrial Mathematics Gothenburg, Sweden

First Steps to the Digital Shadow of Maintenance Services’ Value Contribution
Frederick Birtel\textsuperscript{1}, Achim Kampker\textsuperscript{2}, Volker Stich\textsuperscript{1}
1: Research Institute for Industrial Management (FIR) at RWTH Aachen University, Germany;
2: Chair Production Engineering of E-Mobility Components at RWTH Aachen University, Germany

Process Mining in Manufacturing: Goals, Techniques and Applications
Darko Stefanovic, Dusanka Dakic, Branislav Stevanov, Teodora Lolic
University of Novi Sad, Serbia, Faculty of Technical Sciences

Integrated Platform and Digital Twin Application for Global Automotive Part Suppliers
Jinho Yang¹, Sangho Lee¹, Yong-Shin Kang¹, Sang Do Noh¹, Sung Soo Choi², Bo Ra Jung², Sang Hyun Lee², Jeong Tae Kang², Dae Yub Lee³, Hyung Sun Kim³
1: Sungkyunkwan University, Republic of Korea; 2: Yura, Republic of Korea; 3: DEXTA Inc., Republic of Korea

The successful commercialization of a digital twin in an industrial product service system
Oliver Stoll¹, Shaun West¹, Paolo Gaiardelli², David Harrison³, Fintan Corcoran⁴
1: Lucerne University of Applied Sciences and Arts, Switzerland; 2: Università degli studi di Bergamo, 24129 Bergamo, Italy; 3: Glasgow Caledonian University, Glasgow G4 0BA, Scotland UK; 4: Mebag, Planungs- und Bauträger AG, Cham CH-6330, Switzerland
Reconfig., Flex. & Agile Mfg. - Part I
Reading Room – ground floor

Chairs: Alexandre Dolguï & Xavier Delorme

A computational method for identifying
the optimum buffer size in the era of Zero
Defect Manufacturing
Foivos Psarommatis, Ali Boujemaoui,
Dimitris Kiritsis
École polytechnique fédérale de Lausanne,
Switzerland

A Bi-objective Scheduling Model for
Additive Manufacturing with Multiple Materials
and Sequence-dependent
Setup Time
Reza Tavakkoli-Moghaddam, Shadi Shirazian,
Behdin Vahedi-Nouri
University of Tehran

A Method of Distributed Production
Management for Highly-Distributed
Flexible Job Shops
Daiki Yasuda¹, Eiji Morinaga²,
Hidefumi Wakamatsu¹
1: Osaka University, Japan;
2: Osaka Prefecture University, Japan

Dynamic Distributed Job-Shop Scheduling Problem
Consisting of Reconfigurable Machine Tools
Mehdi Mahmoodjanloo¹,
Reza Tavakkoli-Moghaddam¹,
Armand Baboli², Ali Bozorgi-Amiri¹
1: University of Tehran;
2: INSA of Lyon
Towards a Non-Disruptive System for Dynamic Orchestration of the Shop Floor
Milan Pisarić¹, Vladimir Dimitrieski²,
Marko Vještica²,
Goran Krajoski³
1: Industrial Automation, KEBA AG, Linz, Austria;
2: University of Novi Sad,
Faculty of Technical Sciences, Novi Sad, Serbia

Balancing and configuration planning of RMS to minimize energy cost
Audrey Cerqueus, Paolo Gianessi,
Damien Lamy,
Xavier Delorme
Mines Saint-Etienne,
Univ Clermont Auvergne, CNRS,
UMR 6158 LIMOS, Institut Henri Fayol,
F - 42023 Saint-Etienne France

15:30 - 16:15

KEYNOTE I: How to execute digital transformation?
Lessons from manufacturing industry
Amphitheater – ground floor
Prof. Dr. Ivanka Visnjic
ESADE, Ramon Llull University, Spain

16:30 - 18:30

Digital Transformation - Part III
Amphitheater – ground floor
 Chairs: Vlad Bocanet & Bahrudin Hrnjica
Achieving Business Model Innovation with the Personalized Product

Business Model Radar Template

Egon Lüftnegger$^{1,2}$

1: BusinessModelRadar.com;
2: CAMPUS 02

University of Applied Sciences, Austria

Integrating electronic components into 3D printed parts to develop a digital manufacturing approach

Ioan Turcin$^{1,2}$, Ali Abdallah$^1$, Cosmin Cosma$^2$, Manfred Pauritsch$^1$, Nicolae Balc$^2$

1: CAMPUS 02
2: Technical University of Cluj-Napoca, Romania

The Application of ICT Software Solutions in Manufacturing Sector in Serbia

Danijela Ciric, Teodora Lolic, Danijela Gracanin, Darko Stefanovic, Bojan Lalic

University of Novi Sad,
Faculty of Technical Sciences, Serbia

Retrofit Concept for Textile Production

Felix Franke, Susanne Franke, Ralph Riedel

TU Chemnitz, Germany

Smart contract-based blockchain solution to reduce supply chain risks

Fabian Dietrich$^{1,2}$, Ali Turgut$^3$, Daniel Palm$^{1,4}$, Louis Louw$^2$
16:30 - 18:30

Data-Driven Applications
Multimedia Hall – 1st floor

Chairs: Magnus Wiktorsson & Sang Do Noh

Smart Factory Competitiveness based on real time Monitoring and Quality predictive model applied to multi-stages Production lines
Nicola Gramegna\(^1\), Fabrizio Greggio\(^1\), Franco Bonollo\(^2\)
1: EnginSoft SpA, Italy;
2: Università di Padova - DTG, Italy
A framework of data-driven dynamic optimisation for smart production logistics
Sichao Liu¹, Lihui Wang¹, Xi Vincent Wang¹, Magnus Wiktorsson²
¹: Department of Production Engineering, KTH Royal Institute of Technology, 1044 Stockholm, Sweden;
²: Department of Sustainable Production Development, KTH Royal Institute of Technology,
15181 Södertälje, Sweden

Workforce Assignment with a Different Skill Level for Automotive Parts Assembly Lines
Hyungjoon Yang¹, Je-Hun Lee², Hyun-Jung Kim¹
¹: KAIST;
²: Sungkyunkwan University

A New Application of Coordination Contracts for Supplier Selection in a Cloud Environment
Reza Tavakkoli-Moghaddam, Mohammad Alipour-Vaezi, Zahra Mohammad-Nazari
University of Tehran

Decentralized Industrial IoT Data Management Based on Blockchain and IPFS
Xiaochen Zheng¹, Jinzhi Lu¹, Shengjing Sun², Dimitris Kiritsis¹
¹: École polytechnique fédérale de Lausanne, Switzerland;
²: ETSII, Universidad Politécnica de Madrid, Spain

SKOS Tool: A Tool for Creating Knowledge Graphs to Support Semantic Text Classification
Farhad Ameri, Reid Yoder, Kimia Zandbiglari
Texas State University, United States of America
Collaborative Robotics Applications
Multimedia Hall – 2nd floor

*Chairs: Åsa Fasth-Berghlund & Jan Ola*

A Literature review on the Level of Automation and new approach proposal
Hasnaa Ait Malek\textsuperscript{1,2}, Alain Etienne\textsuperscript{2},
Ali Siadat\textsuperscript{2}, Thierry Allavena\textsuperscript{1}
1: PSA Groupe, France;
2: LCFC, France

Framework for identifying gripper requirements for collaborative applications in manufacturing
Omkar Salunkhe, Patrik Fager, Åsa Fasth-Berghlund
Chalmers University of Technology,
Gothenburg Sweden

Gripper types and components in robotic bin picking
Patrik Fager\textsuperscript{1}, Stefano Rossi\textsuperscript{2}, Robin Hanson\textsuperscript{1},
Lars Medbo\textsuperscript{1}, Omkar Salunkhe\textsuperscript{1}, Mats Johansson\textsuperscript{1},
Åsa Fasth-Berghlund\textsuperscript{1}
1: Chalmers University of Technology, Sweden;
2: University of Padova, Italy

A Simulation Analysis of Part Feeding to Assembly Stations with Vertical Robotic Storage and Retrieval Systems
Elena Tappia, Emilio Moretti, Marco Melacini
Politecnico di Milano, Italy
Autonomous mobile robots in hospital logistics
Giuseppe Fragapane, Hans-Henrik Hvolby, Fabio Sgarbossa, Jan Ola Strandhagen
Norwegian University of Science and Technology, Norway

Planning environments of hospital laboratories: An exploratory study
Aili Biriita Bertnum, Marco Semini, Jan Ola Strandhagen
Norwegian University of Science and Technology, Norway

16:30 - 18:30

Reconfig., Flex. & Agile Mfg. - Part II
Reading Room – ground floor

Towards a reference model for configuration of reconfigurable manufacturing system (RMS)
Erica Capawa Fotsoh\textsuperscript{1,2}, Nasser Mebarki\textsuperscript{2}, Pierre Castagna\textsuperscript{2}, Pascal Berruet\textsuperscript{3}, Francisco Gamboa\textsuperscript{1}
1: IRT jules Verne/ LS2N, France;
2: Nantes University, IUT of Nantes, LS2N;
3: Lab-STICc Research Center, University of South-Brittany

Towards an Industry-Applicable Design Methodology for Developing Reconfigurable Manufacturing
Alessia Napoleone\textsuperscript{1}, Ann-Louise Andersen\textsuperscript{1}, Ditlev Brunoe\textsuperscript{1}, Kjeld Nielsen\textsuperscript{1}, Simon Boldt\textsuperscript{2}, Carin Rösiö\textsuperscript{2}, David Grube Hansen\textsuperscript{3}
Reconfigurable Digitalized and Servitized Production Systems: Requirements and Challenges
Magdalena Paul\textsuperscript{1}, Audrey Cerqueus\textsuperscript{2}, Daniel Schneider\textsuperscript{3}, Hichem Haddou Benderbal\textsuperscript{3}, Xavier Boucher\textsuperscript{2}, Damien Lamy\textsuperscript{4}, Gunther Reinhart\textsuperscript{1}
\textsuperscript{1}: Technical University of Munich, Germany; \textsuperscript{2}: Mines Saint-Etienne, Univ Clermont Auvergne, CNRS, France; \textsuperscript{3}: IMT Atlantique, France; \textsuperscript{4}: Mines Saint-Etienne, Institut Henri Fayol, France

Reconfigurable Manufacturing: Lesson Learnt from the COVID-19 Outbreak
Alessia Napoleone\textsuperscript{1}, Lorenzo Bruno Prataviera\textsuperscript{2}
\textsuperscript{1}: Aalborg University, Denmark; \textsuperscript{2}: Politecnico di Milano, Italy

Assembly process design: performance evaluation under ergonomics consideration using several robot collaboration modes
Anthony Quenehen, Stephane Thiery, Nathalie Klement, Lionel Roucoules, Olivier Gibaru
Arts et Metiers Institute of Technology, France

The impact of dynamic tasks assignment in paced mixed-model assembly line with moving workers
Seyyed Ehsan Hashemi-Petroodi\textsuperscript{1}, Simon Thevenin\textsuperscript{3}, Sergey Kovalev\textsuperscript{2}, Alexandre Dolgui\textsuperscript{1}
\textsuperscript{1}: IMT-Atlantique, Nantes, France; \textsuperscript{2}: INSEEC Business School, Lyon, France
Digital Lean Manufacturing
Amphitheater – ground floor

*Chairs: Daryl Powell & David Romero*

**A Learning Roadmap for Digital Lean Manufacturing**
Anja Bottinga Solheim, Daryl John Powell
SINTEF Manufacturing, Norway

**New Forms of Gemba Walks and their Digital Tools in the Digital Lean Manufacturing World**
David Romero¹, Paolo Gaiardelli², Thorsten Wuest³, Daryl Powell⁴, Matthias Thürer⁵
1: Tecnológico de Monterrey, Mexico;
2: University of Bergamo, Italy;
3: West Virginia University, USA;
4: SINTEF Manufacturing AS, Norway;
5: Jinan University, China

**Investigating the Challenges and Opportunities for Production Planning and Control in Digital Lean Manufacturing**
Daryl Powell¹-², Eirin Lodgaard¹, Heidi Dreyer²
1: SINTEF Manufacturing, Norway;
2: Norwegian University of Science and Technology, Norway

**Lean Thinking: from the shop floor to an organizational culture**
Paulo Amaro, Anabela C. Alves, Rui M. Sousa
University of Minho, Portugal

**Utilizing Lean Thinking as a Means to Digital Transformation in Service Organizations**
Felix Preshanth Santhiapillai, Chandima Ratnayake
University of Stavanger, Norway
Assessing the Value of Process Improvement Suggestions
Torbjørn Netland¹, Hajime Mizuyama², Rafael Lorenz¹
1: ETH Zurich, Switzerland;
2: Aoyama Gakuin University, Japan

10:15 - 12:15

Gastronomic Service System Design
Multimedia Hall – 1st floor
Chairs: Tomomi Nonaka & Nobutada Fujii

Human–Robot Hybrid Service System Introduction for Enhancing Labor and Robot Productivity
Takeshi Shimmura¹, Ryosuke Ichikari², Takashi Okuma²
1: Ritsumeikan University, Japan;
2: National Institute of Advance Industrial Science and Technology

Effectiveness of Vendor Managed Inventory [VMI] in Explosive Inventory Management
Alexandre Formigoni¹, Joao Gilberto Mendes Dos Reis², Roberto Moia¹, Caio Stettiner¹, Joao Maiellaro¹
1: Centro Paula Souza;
2: Universidade Paulista, Brazil

Forecasting Customers Visiting using Machine Learning and Characteristics Analysis with Low Forecasting Accuracy Days
Takashi Tanizaki¹, Yuta Hanayama¹, Takeshi Shinmura²
1: Graduate School of Systems Engineering, Kindai University, Japan;
2: Ritsumeikan University, Japan
Product & Assets Lifecycle Mgmt.
Multimedia Hall – 2nd floor

Chairs: Irene Roda & Adalberto Polenghi

Exploring synergies between Circular Economy and Asset Management
Federica Acerbi, Adalberto Polenghi, Irene Roda, Marco Macchi, Marco Taisch
Politecnico di Milano, Italy

A conceptual model of the IT ecosystem for Asset Management in the global manufacturing context
Adalberto Polenghi, Irene Roda, Marco Macchi, Alessandro Pozzetti
Politecnico di Milano, Italy

10:15 - 12:15
Agent-Based Modeling and Analysis of Dynamic Slab Yard Management in a Steel Factory
Hajime Mizuyama
Aoyama Gakuin University, Japan

Data-driven maintenance delivery framework: test in an Italian company
Roberto Sala, Fabiana Pirola, Giuditta Pezzotta
University of Bergamo, Italy

Information flows supporting Circular Economy adoption in the manufacturing sector
Federica Acerbi, Marco Taisch
Politecnico di Milano, Italy

Bayesian Modelling for Product Testing and Release
John Wilson
Ivey Business School, Canada

10:15 - 12:15

Blockchain & Logistics 4.0
Reading Room – ground floor

*Chairs: Ugljesa Marjanovic & Chiara Cimini*

Identifying the opportunities for enhancing the digital readiness level of the supply chain
Chiara Cimini, Fabiana Pirola, Sergio Cavalieri
Department of Management, Information and Production Engineering, University of Bergamo, Italy
Evaluating a Blockchain-based supply chain purchasing process through simulation
Geraldo Jose Dolce Uzum Martins¹,
Jacqueline Zonichenn Reis²,
Benedito Cristiano Petroni²,
Rodrigo Franco Gonçalves¹², Berislav Andrlić³
1: Politecnic School, University of Sao Paulo;
2: Universidade Paulista, Brazil;
3: Polytechnic in Pozega, Croatia

Blockchain-based secured collaborative model for supply chain resource sharing and visibility
Tarun Kumar Agrawal¹, Ravi Kalaisrasan¹²,
Magnus Wiktorsson¹
1: KTH Royal Institute of Technology,
Södertälje, Sweden;
2: Scania CV AB, Södertälje, Sweden

A Robust Multi-Commodity Rebalancing Process in Humanitarian Logistics
Xuehong Gao¹, Xuefeng Jin²
1: Pusan National University, Busan, Korea;
2: Alibaba (China) Co., Ltd, Alibaba Supply Chain Platform, Hangzhou, China

Travel-Times Analysis and Passenger Transport Disutilities in Congested American Cities:
Los Angeles, New York, Atlanta, Austin, and Chicago
Helcio Raymundo, Joao Gilberto Mendes Dos Reis
RESUP/PPGEP - Universidade Paulista, Brazil
The Role of Last-Mile Delivery in the Future of E-commerce
Fernanda Alves De Araujo¹, João Gilberto Mendes Dos Reis¹², Paula Ferreira Da Cruz Correia¹
¹: Universidade Paulista, Brazil; ²: Universidade Federal da Grande Dourados, Brazil

13:15 - 14:00

KEYNOTE II: Industrial digitalization – the way to autonomous systems
Amphitheater – ground floor
Dr. Marco Ulrich
ABB Corporate Research Center, Germany

14:00 - 14:45

Panel I: Women in Production Management
Amphitheater – ground floor
Chair: Irene Roda

15:00 - 17:00

Smart Manufacturing & Industry 4.0
Amphitheater – ground floor
Chairs: Thorsten Wuest & Boonserm (Serm) Kulvatunyou

Smart Products in Smart Manufacturing Systems: An Opportunity to Utilize AR?
Thorsten Wuest, Joshua Gross
West Virginia University, United States of America
Manufacturing Operations Management for Smart Manufacturing – A Case Study
Oliver Lohse¹, Michael Meyer-Hentschel¹, Subba Rao², Raffaello Lepratti³
¹: Siemens AG, Corporate Technology, Germany; ²: Siemens Industry Software Inc., Digital Industries, USA; ³: Siemens AG, Digital Industries, Germany

Industry 4.0: maturity of automotive companies in Brazil for the digitization of processes
Sergio Miele Ruggero, Nilza Aparecida Santos, José Benedito Sacomano, Antonio Carlos Estender, Marcia Terra
Universidade Paulista Unip, Brazil

The impact of Industry 4.0 connectivity on the collaboration along Brazilian automotive supply chain
Nilza Aparecida Dos Santos¹,², Sergio Miele Ruggero¹,
Jose Benedito Sacomano¹,
Antonio Carlos Estender¹, Marcia Terra¹
¹: Universidade Paulista Unip, Brazil; ²: Fatec Cotia

An Application of a DSML in Industry 4.0 Production Processes
Marko Vještica¹, Vladimir Dimitrieski³,
Milan Pisarić², Slavica Kordić¹,
Sonja Ristić¹, Ivan Luković¹
¹: University of Novi Sad,
Faculty of Technical Sciences, Novi Sad, Serbia;
²: Industrial Automation,
KEBA AG, Linz, Austria
Digital transformation and its potential effects on future management:
Insights from an ETO context
Antoni Vike Danielsen
Norwegian University of Science and Technology, Norway

15:00 - 17:00

Scheduling Methods
Multimedia Hall – 1st floor
Chair: Toshiya Kaihara

Automatic Design of Dispatching Rules with Genetic Programming for Dynamic Job Shop Scheduling
Shady Salama, Toshiya Kaihara, Nobutada Fujii, Daisuke Kokuryo
Graduate School of System Informatics, Kobe University

A basic study on scheduling method for electric power saving of production machine
Masayuki Yabuuchi¹, Toshiya Kaihara¹, Nobutada Fujii¹, Daisuke Kokuryo¹,
Satoko Sakajo², Yoshito Nishita²
1: Kobe University;
2: Mitsubishi Electric Corporation

A dynamic hybrid Berth Allocation Problem with routing constraints in bulk ports
Hamza Bouzekri¹², Gülgün Alpan¹², Vincent Giard¹³
1: EMINES - School of Industrial Management, Mohammed VI Polytechnic University;
2: Univ. Grenoble Alpes, Grenoble INP, CNRS, G-SCOP;
3: Université Paris-Dauphine, PSL Research University
Towards inter-operable enterprise systems – graph-based validation of a context-driven approach for message profiling
Elena Jelisic¹, Nenad Ivezic², Boonserm Kulvatunyou², Scott Nieman³, Hakju Oh², Sladjan Babarogic¹, Zoran Marjanovic¹
¹: Faculty of organizational sciences, Belgrade, Serbia; ²: National Institute of Standards and Technology, Gaithersburg, MD, USA; ³: Land O’Lakes, Shoreview, MN, USA

System Architecture Analysis with Network Index in MBSE Approach - Application to Smart Interactive Service with Digital Health Modeling
Toshiya Kaihara, Nobutada Fujii, Daisuke Kokuryo, Mizuki Harada
Kobe University, Japan

15:00 - 17:00

The Operator 4.0
Multimedia Hall – 2nd floor
Chairs: David Romero & Johan Stahre

Challenges for the Operator 3.0
Addressed Through the Enabling Technologies of the Operator 4.0
Malin Tarrar¹, Peter Thorvald¹,², Åsa Fasth-Berglund¹, David Romero³
¹: Chalmers University of Technology, Sweden; ²: University of Skövde, Sweden; ³: University of Monterrey, Mexico

Knowledge Strategies for Organisation 4.0
Magnus Gerdin¹, Adam Palmkvist¹, Dan Li², Åsa Fast-Berglund²
¹: Insert Coin; ²: Chalmers
Production Management as-a-Service: A Softbot Approach
Brunno Abner Machado¹, Ricardo J. Rabelo¹, Saulo Popov Zambiasi², David Romero³
1: Federal University of Santa Catarina, Brazil;
2: University of Southern Santa Catarina, Brazil;
3: Tecnológico de Monterrey, Mexico

Improving the Safety of Using Didactic Setups by Augmented Reality
Srdjan Tegeltija, Vule Reljić, Ivana Šenk, Laslo Tarjan, Branislav Tejić
University of Novi Sad, Faculty of Technical Sciences, 21000 Novi Sad, Serbia

Facilitating Operator Participation in Continuous Improvement: An Investigation of Organizational Factors
Eirin Lodgaard, Silje Helene Aschehoug, Daryl Powell
SINTEF Manufacturing, Norway

Agent- and Skill-based Process Interoperability for Socio-Technical Production Systems-of-Systems
Åsa Fast-Berglund¹, David Romero², Magnus Åkerman¹, Björn Hodig³, Anderas Pichler⁴
1: Chalmers University of Technology, Sweden;
2: Tecnológico de Monterrey, Mexico;
3: PTC, Sweden;
4: PROFACTER GmbH, Austria
Production Logistics 4.0
Reading Room – ground floor
Chairs: Jannicke Baalsrud & Gregor von Cieminski

Tools for Evaluating Human Factor Aspects in Production and Logistics System
Vivek Vijayakumar, Fabio Sgarbossa
Norwegian University of Science and Technology, Norway

Supporting the Decision of the Order Processing Strategy by using Logistic Models: A Case Study
Janine Tatjana Maier¹, Tammo Heuer², Peter Nyhuis², Matthias Schmidt¹
¹: Institute of Product and Process Innovation, Leuphana University of Lüneburg, Universitätsallee 1, 21335 Lüneburg, Germany;
²: Institute of Production Systems and Logistics, Leibniz Universität Hannover, An der Universität 2, 30823 Garbsen, Germany

Towards a unified reliability-centered information logistics model for production assets
Florian Defèr, Günther Schuh, Volker Stich
FIR e.V. an der RWTH Aachen, Germany

Streaming Analytics in Edge-Cloud Environment for Logistics Processes
Moritz von Stietencron¹, Marco Lewandowski¹, Katerina Lepenioti², Alexandros Bousdekis², Karl Hribernik¹, Dimitris Apostolou²,³, Gregoris Mentzas²
¹: BIBA - Bremer Institut für Produktion und Logistik GmbH;
Order acceptance and scheduling with a throughput diagram
Christopher Mundt, Hermann Lödding
University of Technology Hamburg, Germany

Production-storage and transport integrated planning for a multi-site mining industry
Asma Rakiz\textsuperscript{1,2}, Pierre Fenies\textsuperscript{1,2}
1: Université Mohammed VI Polytechnique;
2: Université Paris II Panthéon Assas
Sustainable Manufacturing
Amphitheater – ground floor

*Chairs: Ralph Riedel & Bojan Lalić*

Towards sustainability: The manufacturers’ perspective
Olena Klymenko, Lise Lillebrygjfjeld Halse, Bjørn Jæger
Molde University College, Norway

A methodology to integrate sustainability evaluations into vendor rating
Alessandro Fontana, Silvia Menato, Andrea Barni
SUPSI, Switzerland

Application of Virtual Reality Technologies for Achieving Energy Efficient Manufacturing: Literature Analysis and Findings
E. G. Nabati¹, M. T. Alvela Nieto¹, A. Decker², K.-D. Thoben¹
1: University of Bremen, Faculty of Production Engineering, BIK-Institute for Integrated Product Development, 28359 Bremen, Germany;
2: BIBA - Bremer Institut für Produktion und Logistik GmbH at the University of Bremen, 28359 Bremen, Germany

Characterization of energy consumers in production systems with renewable on-site power generation
Julia Schulz, Felix Rosenberg, Valerie M. Scharmer, Michael F. Zaeh
Institute of Machine Tools and Industrial Management (iwb), Technical University of Munich, Germany
Sustainable Business Model Innovation in Furniture Supply Chain: A Case Study
Mikhail Shlopak, Bella B. Nujen, Jon Halldanarson
Møre & Romsdal Research Park, Norway

10:15 - 12:15

Quality & Risk Management
Multimedia Hall – 1st floor

Chairs: Milan Delic & Ugljesa Marjanovic

Questionnaire model for paraconsistent quality assessment of software developed in Sales Force
Luiz Roberto Forçan, Jair Minoro Abe, Luiz Antonio de Lima, Samira Sestari Nascimento
Paulista University, Brazil

An Improvement in Master Surgical Scheduling using Artificial Neural Network and Fuzzy Programming Approach
Ahmad Ghasemkhani, Reza Tavakkoli-Moghaddam, Mehdi Hamid, Mehdi Mahmoodjanloo
University of Tehran

Insights from a top-down lean subprogram deployment in a corporate group:
The use of deployment tactics
Sara Victoria Linderson, Monica Bellgran, Seyoum Eshetu Birkie
KTH Royal Institute of Technology, Sweden

On the Necessity for Identifying Waste in Knowledge Work Dominated Projects: A Case Study from Oil & Gas-Related Product Development Projects
Felix Preshanth Santhiapillai, Chandima Ratnayake
University of Stavanger, Norway
De-risking investments in industrial systems using Real Options Analysis: Case of chemical industry
Imane Essaadi¹, Richard de Neufville²
1: EMINES – Mohammed VI Polytechnique University; 2: Institute for Data, Systems and Society, Massachusetts Institute of Technology

On the Need of Functional Priority and Failure Risk Assessment to Optimize Human Resource Allocation in Public Service Organizations
Felix Preshanth Santhiapillai, Chandima Ratnayake
University of Stavanger, Norway

10:15 - 12:15

Human Resources Management
Multimedia Hall – 2nd floor
*Chairs: David Romero & Johan Stahre*

Gamification of Operational Tasks in Manufacturing - A Literature Review
Makenzie Keepers¹, David Romero², Jannicke Baalsrud Hauge³, Thorsten Wuest¹
1: West Virginia University, United States of America; 2: Tecnológico de Monterrey, Mexico; 3: Bremer Institut für Produktion und Logistik GmbH at the University of Bremen, Germany

Evaluation of Augmented Reality in Industry
Tone Lise Dahl, Manuel Oliveira, Emrah Arica
SINTEF, Norway
Virtual and Augmented reality as a digital support to HR systems in production management
Danijela Lalić, Dunja Bošković, Bojana Milić, Sara Havzi, Jelena Spajić
University of Novi Sad, Faculty of Technical Sciences, Serbia

The interdependencies of Quality Management, Knowledge Management and Innovation Performance. A literature review
Marina Žižakov, Stana Vasić, Milan Delić, Marko Orošnjak, Srdan Vulanović
Faculty of Technical Sciences, University of Novi Sad, Serbia

The Use of Organizational Innovation Concepts in Manufacturing Companies
Iztok Palčič, Simon Klančnik, Robert Ojsteršek, Tone Lerher, Borut Buchmeister, Mirko Ficko
University of Maribor, Faculty of Mechanical Engineering, Slovenia

Interorganizational learning in manufacturing networks
Geir Ringen¹, Frode Paalsrud¹, Eirin Lodgaard²
1: NTNU, Norway; 2: Sintef Manufacturing

10:15 - 12:15

Food Supply Chains - Part I
Reading Room – ground floor
Chairs: Irenilza de Alencar Nääs & João Mendes
Food Bank: A Proposal for Short Agri-Food Chains
Aguinaldo Eduardo de Souza, João Gilberto Mendes dos Reis, Antonio Carlos Estender, Jorge Luiz Dias Agia, Oduvaldo Vendrametto, Luciana Melo Costa, Paula Ferreira da Cruz Correia
Paulista University - UNIP, PPGEP, Sao Paulo, Brazil

The New Frontiers in World Soybean Production: An Analysis of Savanna in Piaui, Brazil
José Alberto Alencar Luz2,1, João Gilberto Mendes Dos Reis1,2, Alexandre Formigoni3,4
1: RESUP/PPGEP - Universidade Paulista, São Paulo, Brazil;
2: Postgraduate Program in Production Engineering UNIP/UNIFSA;
3: Universidade Federal da Grande Dourados, Brazil;
4: Postgraduate Program in Gestão Tecnologia em Sistemas Produtivos, Brazil

Prediction of cold chain transport conditions using data mining
Clayton Mangini, Nilsa Lima, Irenilza de Alencar Nääs
Paulista University-Graduate Program in Production Engineering, Brazil

Economic and Environmental Performance in Coffee Supply Chains: A Brazilian Case Study
Paula Ferreira da Cruz Correia1,2, João Gilberto Mendes dos Reis1,2,3, Rodrigo Carlo Tolo1,2,4, Fernanda Alves de Araújo1,2, Silvia Helena Bonilla1, Jonatas Santos de Souza1,2, Alexandre Formigoni5, Aguinaldo Eduardo de Souza1,2,6
1: Postgraduate Program in Production Engineering, Universidade Paulista, São Paulo, Brazil; 
2: RESUP - Supply Chain Research Group, Postgraduate Program in Production Engineering, Paulista University; 
3: Federal University of Grande Dourados - UFGD, PPGA, Dourados, Brazil; 
4: Federal Institute of Mato Grosso Campus Rondonópolis, Mato Grosso, Brazil; 
5: Postgraduate Program in Gestão de Tecnologia em Sistemas Produtivos, Centro Paula Souza; 
6: UNIBR, São Vicente, Brazil

Managing Perishable Multi-Product Inventory with Supplier Fill-Rate, Price Reduction and Substitution
Flemming Max Møller Christensen, Kenn Steger-Jensen, Iskra Dukovska-Popovska
Aalborg University, Denmark

Potential benefits of Reverse Blending in the fertilizer industry
Latifa Benhamou¹, Pierre Fenies², Vincent Giard³
1: Mohammed VI Polytechnic University, Morocco; 
2: Panthéon Assas Paris II University, France; 
3: Paris-Dauphine University, France

13:15 - 14:00

KEYNOTE III: Innovation for industry key technologies: Evidence from China
Amphitheater – ground floor

Prof. Dr. Jin Chen
Tsinghua University, China
14:00 - 14:45

Panel II: Digital Transformation and the Social Factory of Things, Services and People
Amphitheater – ground floor
Chair: Gregor Von Cieminski

15:00 - 17:00

Circular Manufacturing
Amphitheater – ground floor
Chairs: Mélanie Despeisse & Federica Acerbi

Economy and its symbiosis with Circularity
Abelino Reis Guimarães Neto,
Jacqueline Zonichenn Reis, Julio Cesar Raymundo,
Rodrigo Franco Gonçalves, Rodrigo Rodrigues
UNIP, Brazil

Knowledge and practices towards sustainability and circular economy transitions:
A Norwegian manufacturing perspective
Jon Halfdanarson¹, Nina Pereira Kvadsheim¹²
1: Møreforsking Molde AS, Norway;
2: Molde University College, Norway

Finding and Capturing Value in e-Waste for Refrigerators Manufacturers & Recyclers
Clarissa A. González Chávez¹, Mélanie Despeisse¹,
Björn Johansson¹, David Romero²
1: Chalmers University of Technology, Sweden;
2: Tecnológico de Monterrey, Mexico
Changeable Closed-Loop Manufacturing Systems: A Case Study of Challenges in Product Take-Back
Markus Thomas Bockholt¹, Ann-Louise Andersen¹, Thomas Ditlev Brunoe¹, Jesper Hemdrup Kristensen¹, Michele Colli¹, Peter Meulengracht Jensen², Brian Vejrum Waehrens¹
¹: Department of Materials and Production, Aalborg University, Aalborg, Denmark; ²: Group Environment CoE, Group EHS, GRUNDFOS Holding A/S, Bjerringbro, Denmark

The Potential for Purchasing function to Enhance Circular Economy Business Models for ETO production
Deodat Mwesiumo¹, Nina Pereira Kvadsheim¹,², Bella Belerivana Nujen²,³
¹: Molde University College, Norway; ²: Molde University College, Norway, Møreforsking Molde AS; ³: Møreforsking Molde AS, Norwegian University of Science and Technology

Sustainability in fabric chains and garments for a circular economy
Solimar Garcia¹, Irenilza de Alencar Nääs³, Pedro Luiz de Oliveira Costa Neto¹, João Gilberto Mendes dos Reis³, Valdice Neves Polvora¹, Luiz Antonio de Lima³, Angel Antonio Gonzalez Martinez³, Vanessa Santos Lessa²
¹: Paulista University, Brazil; ²: Universidade Presbiteriana Mackenzie, Brazil
Assembly Systems 4.0
Multimedia Hall – 1st floor

Chair: Vidosh Majstorovic & Åsa Fasth-Berglund

Assembly issue resolution system using machine learning in aero engine manufacturing
Jörg Brünnhäußer¹, Sonika Gogineni¹, Jonas Nickel², Heiko Witte², Rainer Stark¹,³
1: Fraunhofer IPK, Pascalstraße 8-9, 10587 Berlin, Germany;
2: Rolls-Royce Deutschland, Eschenweg 11, 15827 Blankenfelde-Mahlow, Germany;
3: Technische Universität Berlin, Pascalstraße 8-9, 10587 Berlin, Germany

A simulation model supporting the production optimization for high-precision machines assembly
Andrea Monti, Donatella Corti, Dario Pietraroia
Scuola universitaria professionale della Svizzera Italiana (SUPSI), Switzerland

Cycle Time Estimation Model for Hybrid Assembly Stations based on Digital Twin Concept
Dimitris Mourtzis, John Angelopoulos, Vasileios Siatras
Laboratory for Manufacturing Systems and Automation, Department of Mechanical Engineering and Aeronautics, University of Patras, Greece

A stochastic model for a two-level disassembly lot-sizing problem under random lead time
Lhem Slama¹, Oussama Ben-Ammar², Alexandre Dolgui¹, Faouzi Masmoudi³
1: IMT Atlantique, France;
2: Mines Saint-Etienne, France;
3: Engineering School of Sfax, Tunisia
Introduction to Material Feeding 4.0: strategic, tactical, and operational impact
Marco Simonetto, Fabio Sgarbossa
Norwegian University of Science and Technology (NTNU), Norway

Data-driven Replenishment Method Choice in a Picking System
Simon Hummelshøj Sloth, Magnus Abildsten Bøgh, Christian Møller Nielsen, Konstantinos Panagiotis Konstantinidis, Inkyung Sung
Aalborg University, Denmark

15:00 - 17:00

ETO Manufacturing
Multimedia Hall – 2nd floor
Chairs: Erlend Alfnes & Martin Rudberg

Factors affecting shipyard operations and logistics: A framework and comparison of shipbuilding approaches
Jo Wessel Strandhagen¹, Yongkuk Jeong², Jong Hun Woo³, Marco Semini¹, Magnus Wiktorsson², Jan Ola Strandhagen¹, Erlend Alfnes¹
1: NTNU – Norwegian University of Science and Technology, Norway;
2: KTH Royal Institute of Technology;
3: Seoul National University

Exploring the Path Towards Construction 4.0: Collaborative Networks & Enterprise Architecture Views
Ovidiu Noran¹³, David Romero², Sorin Burchiu³
1: Griffith University, Australia;
Wednesday, September 2, 2020

2: Tecnológico de Monterrey, Mexico;
3: Technical University of Constructions Bucharest, Faculty of Installations Engineering

**Using the Smartphone as an Augmented Reality Device in ETO Industry**
Niklas Jahn, Axel Friedewald, Hermann Lödding
Hamburg University of Technology, Hamburg, Germany

**Planning procurement activities in ETO projects**
Kristina Kjersem¹, Marte F. Giskeødegård²
1: Møreforensic Molde AS, Norway;
2: NTNU Ålesund

**Maturity model for successful cost transformation in ETO companies**
Johann Gregori, Ralph Riedel
Chemnitz University of Technology, Germany

**Cross-functional coordination before and after the CODP: an empirical study in the machinery industry**
Margherita Pero¹, Violetta Giada Cannas²
1: Politecnico di Milano, Italy;
2: Carlo Cattaneo University - LIUC

15:00 - 17:00

**Food Supply Chains - Part II**
Reading Room – ground floor
*Chairs: João Mendes & Irenilza de Alencar Nääs*

**Principles and Research Agenda for Sustainable, Data-Driven Food Production Planning and Control**
Maggie Bresler, Anita Romsdal, Jan Ola Strandhagen, Olumide E. Oluyisola
Norwegian University of Science and Technology, Norway
Digital Technology Enablers for Resilient and Customer Driven Food Value Chains
Christos Emmanouilidis$^1$, Serafim Bakalis$^2$
1: Cranfield University, United Kingdom; 2: University of Nottingham, United Kingdom

Software-based Assistance System for Decision Support on Supply Chain Level
Maria Linnartz, Volker Stich
Institute for Industrial Management at RWTH Aachen University, Germany

17:15 - 17:45

Closing Ceremony
Amphitheater – ground floor
CONFERENCE COMMITTEES

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Conference Chair - University of Novi Sad, Serbia

Gregor von Cieminski
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## International Scientific Committee

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<td>International Islamic University Malaysia</td>
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<td>Adolfo Crespo Marquez</td>
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Catherine Da Cunha  
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Frédéric Demoly  
Université de Technologie de Belfort-Montbéliard  
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Harbin Institute of Technology  
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Texelia AG  
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Bernard Grabot  
INP-ENIT (National Engineering School of Tarbes)  
France

Gerhard Gudergan  
FIR Research Institute for Operations Management  
Spain

Thomas R. Gulledge Jr  
George Mason University  
USA
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<td>Hironori Hibino</td>
<td>Tokyo University of Science</td>
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