Photo: Lars R. Bang

17 - 21 September

APMS 2023

IFIP INTERNATIONAL CONFERENCE ON ADVANCES IN PRODUCTION MANAGEMENT SYSTEMS

Production Management Systems for Responsible Manufacturing, Service, and Logistics Futures

ifip

NTNU

Photo: Colourbox

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WELCOME TO APMS 2023

Dear friends of APMS,

It is my great pleasure to welcome you all to Trondheim, to NTNU, and to APMS 2023. It has been some years of hoping and dreaming, some months of hard work, some days of worry, and finally some last minutes of joy before we can kick off the 2023 conference. We are now ready to present and review, network, have fun, and enjoy each other's company for some days in Trondheim.

It is with pride I present to you our scientific program, our conference facilities, our city and region, and our university. And maybe most of all; the social events where we can meet old friends and find new ones.

Hosting a scientific conference such as APMS demands many hours of voluntary work, with some intangible rewards such as being part of a team, gaining new experiences, building relationships with old and new colleagues, and the proud feeling of creating something that someone appreciates.

I want to express my gratitude to some persons in particular. Our APMS "managers" Gregor von Cieminski and David Romero do so much more than manage our IFIP WG 5.7 community; they put a lot of quality work into making the APMS conference happen. Thank you both!

My dear mentor Professor Emeritus Asbjørn Rolstadås brought me into the world of IFIP many decades ago and has supported me and our community so much since. I am very happy that he will share some of his thoughts and experience with all of us in his keynote speech.

In addition, a number of representatives from our network of Norwegian industry and distinguished colleagues from NTNU will share their experiences and insights through keynotes speeches, as well as host our industry tours. Again, this is highly appreciated.

I also want to thank Hans-Henrik Hvolby at Aalborg University and our group of 20 student volunteers. They have supported us in the preparations and will assist and guide us through six days of scientific and social events in Trondheim.

My deepest and most sincere appreciation goes to Anita Romsdal and Erlend Alfnes, my dearest colleagues. Their enthusiasm, creativity in finding solutions, and their hard and high-quality work is only beaten by their true friendly way of conducting their work. Thank you so very much!

Now it is time to work and network. And have fun!

Thank you all for attending APMS 2023 and welcome to NTNU and Trondheim!

Jan Ola Strandhagen
Conference Chair

Photo: Colourbox, Morten Normann Almeland

WELCOME TO NTNU

NTNU is an international oriented university with headquarters in Trondheim and campuses in Gjøvik and Ålesund. NTNU has a main profile in science and technology, a variety of programs of professional study, and great academic breadth that also includes the humanities, social sciences, economics, medicine, health sciences, educational science, architecture, entrepreneurship, art disciplines and artistic activities.

NTNU offers around 400 bachelor's, master's, professional, and doctoral programs as well as a wealth of continuing and further education.

The university's root goes back to 1760 with the foundation of Det Trondhiemske Selskab (Trondheim Academy). A merger in 2016 made NTNU Norway's largest, most exciting, and most innovative university.

NTNU is Norway's largest and leading provider of engineering graduates. Subject areas range from nanotechnology and IT to petroleum engineering and ship design. Partnerships with the working world and NTNU's own research communities equip students with up-to-date and relevant skills to take with them into the workplace.

NTNU has research communities within its main profile in science and technology and in the humanities, social sciences, economics, medicine, health sciences, educational science, architecture, entrepreneurship, art disciplines and artistic activities. NTNU has a special responsibility to conduct interdisciplinary research and works in close partnership with the business community. Much of this research requires advanced technical equipment, and NTNU has more than a hundred research laboratories.

Through interdisciplinary cooperation, NTNU's strategic research areas address complex challenges of great importance for society. Our aim is to meet global challenges with an interdisciplinary and flexible organization, to strengthen cooperation with the world of work and business as well as our innovative capability, and to increase our share of international research funding.

Together, we all work towards our vision of
"Knowledge for a better world".

Photo: Thomas Høstad/NTNU

43 422	8 051	398	NOK 10,5 bill
Students	Employees	Study programmes	Annual budget

CONFERENCE ORGANIZATION

Conference Honorary Chair

Asbjørn Rolstadås	Norwegian University of Science and Technology, Norway

Conference Chair

Jan Ola Strandhagen	Norwegian University of Science and Technology, Norway

Conference Co-Chair

Gregor von Cieminski	ZF Friedrichshafen AG, Germany

Program Chair

Erlend Alfnes	Norwegian University of Science and Technology, Norway

Program Co-Chairs

Heidi Carin Dreyer	Norwegian University of Science and Technology, Norway
Daryl Powell	Norwegian University of Science and Technology / SINTEF Manufacturing, Norway
Bella Nujen	Norwegian University of Science and Technology, Norway
Anita Romsdal	Norwegian University of Science and Technology, Norway
David Romero	Tecnológico de Monterrey, Mexico

Doctoral Workshop Chair

Hans-Henrik Hvolby	Aalborg University, Denmark

Doctoral Workshop Co-Chair

David Romero	Tecnológico de Monterrey, Mexico

Organization Committee Chair

Anita Romsdal	Norwegian University of Science and Technology, Norway

Organization Committee

Erlend Alfnes	Norwegian University of Science and Technology, Norway
Sven-Vegard Buer	SINTEF Digital, Norway
Heidi Carin Dreyer	Norwegian University of Science and Technology, Norway
Bella Nujen	Norwegian University of Science and Technology, Norway
Jan Ola Strandhagen	Norwegian University of Science and Technology, Norway
Jo Wessel Strandhagen	SINTEF Digital, Norway

The conference will be opened by NTNU Rector Anne Borg.

Photo: Colourbox, Sergey Vovk

KEYNOTE SPEAKERS

Torbjørn Netland

Keynote Address 1: Breaking Boundaries: New Technologies in Production Management

Head of Chair of Production and Operations Management (POM)
Department of Management, Technology and Economics (D-MTEC)
ETH Zurich, Switzerland

Prof. Dr. Torbjørn Netland is Full Professor and Head of Chair of Production and Operations Management (www.pom.ethz.ch) at ETH Zurich, Switzerland. He is a Member of the World Economic Forum's Global Future Council on Advanced Manufacturing and Value Chains, a Fellow of the European Academy for Industrial Management, President of the POMS College of Operational Excellence, and a Fellow of the European Academy for Industrial Management. His research on achieving and sustaining manufacturing excellence appears in leading scientific journals such as Management Science, Journal of Operations Management, Production and Operations Management, and MIT Sloan Management Review. Torbjørn is the recipient of the 2023 Jack Meredith Best Paper Award of the Journal of Operations Management, two Shingo Research Awards, and numerous teaching awards. He is co-author of the 800-page textbook "Introduction to Manufacturing: An Industrial Engineering and Management Perspective" (Routledge, 2022). Torbjørn is also co-founder of EthonAI (www.ethon.ai)—a startup offering state-of-the-art AI solutions for quality management.

Being a dedicated research communicator, he blogs at www.better-operations.com, tweets as @tnetland, and teaches on YouTube at https://www.youtube.com/c/POMETHZurich

Asbjørn Rolstadås

Keynote Address 2: IFIP WG 5.7: Development of the forum for cooperation in production management

Asbjørn Rolstadås is Professor Emeritus at the Department of Mechanical and Industrial Engineering at NTNU, Norway. He is former president of the International Federation for Information Processing (IFIP) and chairman of IFIP's Technical Committee (TC) 5 - Information Technology Application. He was the first chairman of IFIP's Working Group (WG) 5.7. He was also the first editor of APMS's flagship journal Production Planning & Control (PPC). His research covers numerical control of machine tools, computer-aided manufacturing systems, productivity, computer-aided production planning and control systems, and project management. For many years he was Head of the Department of Production Engineering at NTH and NTNU.

Asbjørn has been a key player in building up education and research within production management at NTNU. He has initiated and managed numerous research projects, in particular EU-funded research projects. In 2014, he was awarded HM The King's Medal of Merit for his pioneering work within project management.

Photo: Colourbox, Eugene Sergeev

KEYNOTE SPEAKERS

Asgeir Tomasgard

Keynote Address 3: Transition to zero emission for European industry and transport

Asgeir Tomasgard (Norway) is Professor of Managerial Economics and Optimization at the Norwegian University of Science and Technology (NTNU). His research focuses on energy transition strategies and energy policy, often using large scale stochastic optimization models as a fundament. He obtained his PhD in operations research at NTNU in 1998. He was director of the Centre for Sustainable Energy Studies (CenSES) from 2009-2019 and is currently director of FME NTRANS - Norwegian Centre for Energy Transition Strategies and the NTNU Energy Transition Initiative. He is also director of the Lab for computational economics and optimization at NTNU.

Tomasgard is a member of the Norwegian Academy of Technological Sciences (NTVA). He was elected chair (2010-2013) for the Committee on Stochastic programming (COSP) and is part of the management board of the EURO working group on stochastic optimization, as well as a member in INFORMS and IAEE. He is member of the management board in the European Energy Research Alliance (EERA) Joint program in Sustainable Energy Transition and serves on the board of "Norsk klimastiftelse" and Gassco AS.

Per Olaf Brett

Keynote Address 4: Building sustainable marine production industry in a high cost environment – facts, myths, and challenges

Dr. Per Olaf Brett, Doctor of Business Administration (D.B.A/Dr.Oecon) from University of Reading/Brunel, Henley Management College, UK; Master of Business Administration (M.B.A), Henley Management College, UK; Advanced Postgraduate Diploma in Management Consultancy (ADIPC), The Administrative College, Henley Management College, UK; Military Academy Graduate, Royal Norwegian Navy, Bergen, Norway; Bachelor of Science w/Honours (B.Sc.), Kings College, University of Newcastle upon Tyne, UK, Certified Engineer, Maritime Technical College, Oslo, Norway.

Dr. Brett is currently a board member of Ulstein International AS and was an Executive Vice President of Ulstein Group ASA, a designer and builder of offshore, cruise and merchant vessels, Ulsteinvik, Norway. He was previously employed by Det Norske Veritas AS (DNV), a ship classification society based in Norway in many different positions and international assignments in the period 1977 until 2007. In 2002 to 2007 Dr. Brett held a position as Research Project Director for the programme Effective Maritime Transportation within the Research Department at DNV.

He has previously held positions as President and CEO of the International Loss Control Institute Inc. in Atlanta, Georgia, USA from 1991 to 1994 and Managing Director of Computas Expert Systems AS in Oslo, Norway from 1989 to 1991.

Dr. Brett was also Adjunct Professor (II) in Shipping at the Norwegian School of Management (BI), Institute for Strategy and Logistics, Oslo, Norway and is an Adjunct Professor (II) in Management of Marine Design, at the Norwegian University of Science and Technology (NTNU), Faculty of Marine Science and Technology Trondheim and Ålesund, Norway.

KEYNOTE SPEAKERS

Ingrid Schjølberg

Keynote Address 5: Digital skills for 2030

Professor Ingrid Schjølberg obtained the M.Sc. and PhD degrees in Engineering Cybernetics at NTNU, Trondheim, Norway, in 1990 and 1996.

Her main topics of research are within mathematical modeling for control, distributed control methods, automation, robotics perception and learning. The areas of application are energy systems, robotics and maritime systems. She is currently the Dean of NTNU Faculty of Information Technology and Electrical Engineering. The faculty has the responsibility for education, research and innovation within Electrical Engineering, Cybernetics, Digital Technologies, Communication Technologies, Mathematical Sciences, Digital Security and Electronic Systems.

Photo: Colourbox, Sergey Vovk

Erlend Gjønnes

Keynote Address 6: From serving farmers with repairs to worldwide export of waste compactors

Erlend Gjønnes is CEO of Orkel AS, a leading company producing world-class industrial and agricultural equipment. He obtained his M.Sc. in Production and Quality Engineering from the Norwegian University of Science and Technology (NTNU) in 2013. For over 9 years he has driven Orkel to become a future oriented company that develops and delivers solutions in sustainable technologies. Through close collaboration with leading researchers in production management at NTNU and SINTEF, the company has continued their rich history in innovation. Erlend serves on several boards and has a great interest in information technologies and the application of these in production management.

Lars Tore Gellein

Keynote Address 7: Pioneers in green solutions for the Maritime and Offshore Industry

Lars Tore Gellein is Head of Maritime and Offshore Center in Siemens Energy in Trondheim, Norway. He received his M.Sc. in Technical Cybernetics from NTNU in 2004. He subsequently started his professional career within production and R&D testing in Kongsberg Automotive. In 2008, he moved into applied research in SINTEF Manufacturing, where he worked as researcher, researcher manager and research director for over a decade. In 2019, he joined Siemens, and later Siemens Energy, as Head of Production. Here, he continues to develop and practice his passion and skills within management, manufacturing operations management, control systems, automation, robotics, and development and innovation.

CONFERENCE PROGRAM

Program at a glance

Time	Sunday, 17 September	Monday, 18 September
08:00 08:20	Registration	Registration
08:40 09:00 09:20 09:40 10:00 10:20 10:40 11:00 11:20 11:40 12:00 12:20 12:40	Doctoral Workshop (8:30 - 14:45)	Opening Ceremony Keynote Address 1 Break Parallell Session 1 & Meet the Editors (1) Break Parallell Session 2
13:00 13:20 13:40	Lunch	Lunch
14:00 14:20 14:40	Doctoral Workshop, continued	Keynote Address 2 Break
15:00 15:20 15:40	PPC Editorial Board Meeting (14:45 - 16:00)	Parallell Session 3
16:00 16:20 16:40 17:00 17:20 17:40 18:00 18:20	IFIP WG 5.7 Meeting (16:00 - 18:30)	Break Parallell Session 4 & Workshop 1; APMS Talks
18:40 19:00 19:20 19:40 20:00	Welcome Reception 19:00, Rockheim	Organ Concert 19:30, Nidaros Cathedral

Time	Tuesday, 19 September	Wednesday, 20 September	Thursday, 21 September
08:00 08:20	Registration	Registration	
08:40 09:00 09:20 09:40	Parallell Session 5 & Meet the Editors (2)	Parallell Session 9	Industrial Tours Company allocation with departure and arrival times announced separately
10:00 10:20 10:40 11:00	Break Parallell Session 6	Break Keynote Address 6 & 7	
11:20 11:40 12:00 12:20 12:40	Break Keynote Address 3 Keynote Address 4	Break Parallell Session 10	
13:00 13:20 13:40	Lunch	Lunch	
14:00 14:20 14:40 15:00 15:20	Parallell Session 7	Parallell Session 11 Closing Ceremony	
15:40 16:00 16:20 16:40	Break Keynote Address 5 Break		
17:00 17:20 17:40 18:00 18:20	Parallell Session 8		
18:40 19:00 19:20 19:30 20:00	Gala Dinner 19:30, Clarion Hotel		

- Registration
- Lunch & Breaks
- Opening & Closing Ceremonies
- Parallell Sessions & workshops
- Keynote Addresses
- Doctorial Workshop
- Other Meetings & Events
- Social Events

DAILY OVERVIEW

Saturday 16 September

14:00 – 17:00	Mingling in the Forest	Bymarka / Lian

Sunday 17 September

08:00 - 08:30	Registration & Welcome Coffee	Space Mingling area
08:30 - 13:00	Doctoral workshop	Cosmos 3A, Luna, Sirius, Vega
13:00 - 14:00	Lunch	Restaurant Atmosphere
14:00 - 14:45	Doctoral workshop, continued	Cosmos 3A, Luna, Sirius, Vega
14:45 - 16:00	PPC Editorial Board Meeting	Cosmos 3A
16:00 - 18:30	IFIP WG 5.7 Member Meeting	Cosmos 3A
19:00	Welcome Reception	Rockheim

Monday 18 September

08:00 - 08:40	Registration & Coffee	Space Mingling area
08:40 - 09:20	Opening Ceremony	Cosmos 1&2
09:20 - 10:00	Keynote Address 1: Torbjørn Netland, ETH Zurich	Cosmos 1&2
10:00 - 10:20	Coffee Break	Space Mingling area
10:20 - 11:40	Parallel session 1 & Meet the Editors (1)	
11:40 - 12:00	Coffee Break	Space Mingling area
12:00 - 13:00	Parallel session 2	
13:00 - 14:00	Lunch	Restaurant Atmosphere
14:00 - 14:40	Keynote Address 2: Asbjørn Rolstadås, NTNU	Cosmos 1&2
14:40 - 15:00	Coffee Break	Space Mingling area
15:00 - 16:20	Parallel session 3	
16:20 - 16:40	Coffee Break	Space Mingling area
16:40 - 18:40	Parallell session 4 & workshop «APMS Talks»	
19:30	Organ Concert	Nidaros Cathedral

Tuesday 19 September

08:00 - 08:40	Registration & Coffee	Space Mingling area
08:40 - 10:00	Parallel session 5 & Meet the Editors (2)	
10:00 - 10:20	Coffee Break	Space Mingling area
10:20 - 11:20	Parallel session 6	
11:20 - 11:40	Coffee Break	Space Mingling area
11:40 - 12:20	Keynote Address 3: Asgeir Tomasgard, NTNU	Cosmos 1&2
12:20 - 13:00	Keynote Address 4: Per Olaf Brett, Ulstein International AS	Cosmos 1&2
13:00 - 14:00	Lunch	Restaurant Atmosphere
14:00 - 15:40	Parallel session 7	
15:40 - 16:00	Coffee Break	Space Mingling area
16:00 - 16:40	Keynote Address 5: Ingrid Schjølberg, NTNU	Cosmos 1&2
16:40 - 17:00	Coffee Break	Space Mingling area
17:00 - 18:20	Parallel session 8	
19:30	Gala Dinner	Cosmos 1&2

Wednesday 20 September

08:00 - 08:40	Registration & Coffee	Space Mingling area
08:40 - 10:20	Parallel session 9	
10:20 - 10:40	Coffee Break	Space Mingling area
10:40 - 11:00	Keynote Address 6: Erlend Gjønnes, Orkel	Cosmos 1&2
11:00 - 11:20	Keynote Address 7: Lars Tore Gellein, Siemens Energy	Cosmos 1&2
11:20 - 11:40	Coffee Break	Space Mingling area
11:40 - 13:00	Parallel session 10	
13:00 - 14:00	Lunch	Restaurant Atmosphere
14:00 - 15:20	Parallel session 11	
15:20 - 16:20	Closing Ceremony	Cosmos 1&2

Thursday 21 September

Industrial Tours: Company allocation with departure and arrival times announced separately

DETAILED PRESENTATION SCHEDULE

• Monday 18 September, schedule *before* lunch

Time	Room	Cosmos 1&2			Cosmos 3A			Cosmos 3B		
Session name			**Advances in Dynamic Scheduling Technologies for Smart Manufacturing (1)**			**Circular Manufacturing and Industrial Eco-efficiency (1)**			**Next Generation Human-centered Manufacturing and Logistics Systems for the Operator 5.0 (1)**	
Session chair			*Magnus Wiktorsson*	*Sang Do Noh*		*Federica Acerbi*	*Mélanie Despeisse*		*David Romero*	*Johan Stahre*
10:20	*Parallel session 1*	SS-21	Scheduling Algorithm using Path Relinking in Different Search Paths for Production Process with Crane Interference	Takashi Tanizaki, Shonosuke Fujiwara, Hideki Katagiri, and Takayuki Katoka	SS-10	Developing Data Models for Smart Environmental Performance Management in Production	Mélanie Despeisse, Qi Fang, Ebru Turanoglu Bekar, Nils Ólafur Egilsson, Karolina Kazmierczak, Lena Moestam, Helena Söderberg, Dennis Andersson, Jenny Hörnlund, and Björn Molin	SS-8	The Role of Human Factors in Zero Defect Manufacturing: A Study of Training and Workplace Culture	Foivos Psarommatis, Gökan May, and Victor Azamfirei
10:40	*Parallel session 1*	SS-21	Buffer Sizing and Route Scheduling for Reliable Autonomous Vehicle Operations in a Dynamic Environment	Inkyung Sung, and Peter Nielsen	SS-10	Analyzing Emerging Circular Economy Business Models in the E-waste Sector through the Business Model Canvas	Tirufat Dejene Woldeyes, Muffatto Moreno, and Francesco Ferrati	SS-8	Modeling Human Problem-Solving Behavior in Complex Production Systems	Susanne Franke, and Ralph Riedel
11:00	*Parallel session 1*	SS-21	Beyond the Lab: Exploring the Socio-Technical Implications of Machine Learning in Biopharmaceutical Manufacturing	Erik Flores-García, So Hyun Nam, Yongkuk Jeong, Magnus Wiktorsson, and Yong Hun Woo	SS-10	How can Digitalisation Support the Circular Economy? An Empirical Analysis from the Manufacturing Industry	Beatrice Colombo, Albachiara Boffelli, Jacopo Colombo, Alice Madonna, and Simone Villa	SS-8	Human-centric Industrial Augmented Reality: Requirements and Design Guidelines for Usability	Tiberiu Florescu, Sabine Waschull, and Christos Emmanouilidis
11:20	*Parallel session 1*	SS-21	A Constraint Programming Model for a Reconfigurable Job Shop Scheduling Problem with Machine Availability	Zahra Mehdizadeh-Somarin, Reza Tavakkoli-Moghaddam, Mohammad Rohani Nezhad, Zdenek Hanzalek, and Behdin Vahedi-Nouri	SS-10	Stakeholder Management in Circular Economy Product Development in the Mining Industry – A Case Study	Juhoantti Viktor Köpman, Vesa-Matti Leiviskä, Harri Haapasalo, Petteri Annunen, and Jukka Majava			
Session name			**Advances in Dynamic Scheduling Technologies for Smart Manufacturing (2)**			**Circular Manufacturing and Industrial Eco-efficiency (2)**			**Next Generation Human-centered Manufacturing and Logistics Systems for the Operator 5.0 (2)**	
Session chair			*Sang Do Noh*	*Magnus Wiktorsson*		*Beatrice Colombo*	*David Romero*		*Fabio Sgarbossa*	*Thorsten Wuest*
12:00	*Parallel session 2*	SS-21	Prediction of Residual Dye using Machine Learning Algorithms for an Eco-friendly Dyeing Process	Whan Lee, Hye Kyung Choi, seyed mohammad mehdi Sajadieh, Sang Do Noh, and Hyun Sik Son	SS-10	Optimization of Distribution Center and Supply Chain Management with Mixable Products: A Case Study of Recycling Mixable Metal Waste in South Korea	Sewon Oh, Kim Junseok, Kim Juyoun , Alex Yoosuk, and Ilkyeong Moon	SS-8	Towards Industry 5.0: Empowering SMEs with Blockchain-based Supplier Collaboration Network	Prince Waqas Kan, Imene Bareche, and Thorsten Wuest
12:20	*Parallel session 2*	SS-21	Applying Multi-agent Reinforcement Learning and Graph Neural Networks to Flexible Job Shop Scheduling Problem	Seung Heon Oh, Young In Cho, and Jong Hun Woo	SS-10	A Stochastic Frontier Analysis (SFA)-based Method for Detecting Changes in Manufacturing Energy Efficiency by Sector and Time	Ga Hyun Lee, and Hyun Woo Jeon	SS-8	Toward a Framework for Human-Technology Cooperation in Manufacturing	Jannick Fiedler, Omid Maghazei, Arne Seelinger, and Torbjørn Netland
12:40	*Parallel session 2*	SS-21	Enhancing Operations Planning and Scheduling in Dynamic Production Systems by Using CLIP	Julia Markert, Matthias Kerzel, Michael Variola, Dominik Saubke, Stephanie von Riegen, Lothar Hotz, and Pascal Krenz	SS-10	Gap Analysis for CO2 Accounting Tool by Integrating Enterprise Resource Planning System Information	Martin Perau, Dogukan Seker, Tobias Schroer, and Guenther Schuh	SS-8	Investigating Human Factors Integration into DT-based Joint Production and Maintenance Scheduling	Chiara Franciosi, Salvatore Miranda, Ciele Resende Veneroso, and Stefano Riemma

Time	Room	Cosmos 3C			Cosmos 3D	Sirius		
Session name			**Workforce Evolutionary Pathways in Smart Manufacturing Systems**		**Meet the Editors (1); Production Research & Management**		**Experiential Learning in Engineering Education (1)**	
Session chair			*Chiara Cimini*	*Tamás Ruppert*	*Gregor von Cieminski*	*Jannicke Baalsrud Hauge*	*Giovanni Romagnoli*	
10:20	*Parallel session 1*	SS-7	A Reflective Framework for Understanding Workforce Evolutionary Pathways in Industry 5.0	Alexandra Lagorio, Chiara Cimini, and David Romero	Participating editors: Bjørn Andersen, Production Planning and Control: The Management of Operations Alexandre Dolgui, International Journal of Production Research Dmitry Ivanov, IISE Transactions, Omega and International Journal of Integrated Supply Management	SS-4	Industrial Engineering Education for Industry 4.0	Giovanni Mummolo, Jim Browne, and Asbjørn Rolstadås
10:40	*Parallel session 1*	SS-7	Managing Change towards the Future of Work - Clustering Key Perspectives	Katrin Singer-Coudoux, Greta Braun, and Johan Stahre		SS-4	Towards Novel Ways to Improve and Extend the Classic MIT Beer Game	Rudi Niemeijer, Paul Buijs, and Nick B. Szirbik
11:00	*Parallel session 1*	SS-7	Development of a Task Model for Artificial Intelligence-based Applications for Small and Medium-sized Enterprises	Florian Clemens, Fabian Willemsen, Susanne Mütze-Niewöhner, and Günther Schuh		SS-4	Challenges for Smart Manufacturing and Industry 4.0 Research in Academia: A Case Study	Matthew McCormick, and Thorsten Wuest
11:20	*Parallel session 1*	SS-7	Indoor Positioning-based Occupational Exposures Mapping and Operator Well-being Assessment in Manufacturing Environment	Gergely Halász, Tibor Medvegy, János Abonyi, and Tamás Ruppert		SS-4	Innovation & Entrepreneurship in Engineering Curricula: Evidences from an International Summer School	Jovista Qosaj, Donatella Corti, and Sergio Terzi
Session name			**Battery Production Development and Management**		**Food and Bio-manufacturing**		**Experiential Learning in Engineering Education (2)**	
Session chair			*Mélanie Despeisse*	*Carla Susana Agudelo Assuad*	*Hans Henrik Hvolby*	*Boonserm Kulvatunyou*	*Matthias Kalverkamp*	*Jannicke Baalsrud Hauge*
SS-11	*Parallel session 2*	SS-11	Battery Production Systems: State of the Art and Future Developments	Mélanie Despeisse, Björn Johansson, Jon Bokrantz, Greta Braun, Arpita Chari, Xiaoxia Chen, Qi Fang, Clarissa A. González Chávez, Anders Skoogh, Johan Stahre, Ninan Theradapuzha Mathew, Ebru Turanoglu Bekar, Hao Wang, and Roland Örtengren	RS-6 Towards More Sustainable Food Processing: A Structured Tool for the Integration and Analysis of Sustainability Aspects of Processing Equipment	Sara Esmaeilian, Anita Romsdal, Eirin Skjøndal Bar, Bjørn Tore Rotabakk, Jørgen Lerfall, and Anna Olsen	SS-4 Milky Chain Game: A Pedagogical Game for Food Supply Chain Management	Mizuho Sato, Tomoya Manago, and Hajime Mizuyama
SS-11	*Parallel session 2*	SS-11	Assessment of the Main Criticalities in the Automotive Battery Supply Chain: A Professionals' Perspective	Valérie Botta-Genoulaz, and Giulio Mangano	RS-6 Transforming Food Production: Smart Containers for Sustainable and Transparent Food Supply Chains	Peter Burggräf, Tobias Adlon, Fabian Steinberg, Jan Salzwedel, Philipp Nettesheim, and Tschauder Henning	SS-4 Introducing Active Learning and Serious Game in Engineering Education: "Experience from Lean Manufacturing Course"	Gianpiero Mattei, Paolo Pedrazzoli, Giuseppe Landolfi, Fabio Daniele, and Elias Montini
SS-11	*Parallel session 2*	SS-11	Integration of Hydropower and Battery Energy Storage Systems into Manufacturing Systems - A Discrete-Event Simulation	Carla Susana Agudelo Assuad, Lennart Deike, Zhicheng Liao, and Ali Akram	RS-6 Produce it Sustainably: Life Cycle Assessment of a Biomanufacturing Process through the Ontology Lens	Ana Nikolov, Milos Drobnjakovic, and Boonserm Kulvatunyou	SS-4 Crafting a Memorable Learning Experience: Reflections on the Aalto Manufacturing Game	Mikael Öhman, Müge Tetik, Risto Rajala, and Jan Holmström

• Monday 18 September, schedule *after* lunch

Time	Room	Cosmos 1&2			Cosmos 3A			Cosmos 3B		
Session name			**Advances in Dynamic Scheduling Technologies for Smart Manufacturing (3)**			**Circular Manufacturing and Industrial Eco-efficiency (3)**			**Next Generation Human-centered Manufacturing and Logistics Systems for the Operator 5.0 (3)**	
Session chair			*Yongkuk Jeong*	*Erik Flores-García*		*Clarissa A. González Chávez*	*Thorsten Wuest*		*David Romero*	*Fabio Sgarbossa*
15:00	*Parallel session 3*	SS-21	An Improved Method of Job Shop Scheduling Considering Reworking and Reprocessing based on Proactive Approach	Eiji Morinaga, Kenta Teramoto, and Hidefumi Wakamatsu	SS-10	Circular Production Equipment - Futuristic Thoughts or the Necessity of Tomorrow?	Malvin Elvin, Jessica Bruch, and Ionna Aslanidou	SS-8	Fostering Human-AI Collaboration with Digital Intelligent Assistance in Manufacturing SMEs	Stefan Wellsandt, Mina Foosherian, Alexandros Bousdekis, Bernhard Lutzer, Fotis Paraskevopoulos, Yiannis Verginadis, and Gregoris Mentzas
15:20	*Parallel session 3*	SS-21	Optimized Task Planning of Transfer Robots using Reinforcement Learning	Jiwhan Park, and Sang Do Noh	SS-10	Systematic Green Design in Production Equipment Investments: Conceptual Development and Outlook	Seyoum Eshetu Birkie, Zuhara Zemke Chavez, Emma Lindahl, Martin Kurdve, Jessica Bruch, Monica Bellgran, Lotta Bohlin, Mikael Bohman, and Malin Evlin	SS-8	Metaverse-based Softbot Tutors for Inclusive Industrial Workplaces: Supporting Impaired Operators 5.0	Lara Popov Zambiasi, Ricardo José Rabelo, Saulo Popov Zambiasi, and David Romero
15:40	*Parallel session 3*	SS-21	Adaptive Traffic Signal Control for a Mixed Autonomous and Traditional Vehicles by Agent-based Digital Twin Simulation	Harry Lim, Minseop Go, Taekyu Lim, and Duck Young Kim	SS-10	Selective Complexity Determination at Cost based Alternatives to Re-Manufacture	Fabio Fruggiero, Sotirios Panagou, Francesco Mancusi, and Giuseppe La Cava	SS-8	Optimizing Performance-Allocation Trade-Off: The Role of Human-Machine Interface Technology in Empowering Multi-Skilled Workers in Industry 4.0 Factories	Federica Costa, Alireza Ahmadi, and Alberto Portioli Staudacher
16:00	*Parallel session 3*	SS-21	Data Preparation for AI-Assisted Video Analysis in Manual Assembly Task: A Step Towards Industry 5.0	Yongkuk Jeong, Magnus Wiktorrson, Donggyun Park, Jesper Gans, and Linda Svensson	SS-10	Towards a Green Transition: Preliminary Steps of a Quantitative Model	Federica Costa, and Alberto Portioli Staudacher	SS-8	A Stochastic-based Model to Assess the Variability of Task Completion Times of Differently Aged and Experienced Workers Subject to Fatigue	Andrea Lucchese, Salvatore Digiesi, and Giovanni Mummolo
Session name			**Advances in Dynamic Scheduling Technologies for Smart Manufacturing (4)**			**Circular Manufacturing and Industrial Eco-efficiency (4)**			**Next Generation Human-centered Manufacturing and Logistics Systems for the Operator 5.0 (4)**	
Session chair			*Erik Flores-García*	*Yongkuk Jeong*		*Stephen Childe*	*Federica Acerbi*		*Johan Stahre*	*Thorsten Wuest*
16:40	*Parallel session 4*	SS-21	Data-driven Analysis and Assignment of Manual Assembly Production Lines	Changha Lee, Jongpil Yun, Goo-Young Kim, Junwoo Lim, Sang Do Noh, and Yongjin Kim	SS-10	Understanding the Implications of Circular Business Models for Businesses and Supply Chains	Melissa Marques-McEwan,and Umit Bititci	SS-8	Bridging the Hype Cycle of Collaborative Robot Applications	Omkar Salunkhe, David Romero, Johan Stahre, Johan; Björn Johansson, and Anna Syberfeldt
17:00	*Parallel session 4*	SS-21	NSGA-II for Solving a Multi-objective, Sustainable and Flexible Job Shop Scheduling Problem	Candice Destouet, Houda Tlahig, Belgacem Bettayeb, and Bélahcène Mazari	SS-10	Exploiting Information Systems for Circular Manufacturing Transition: A Guiding Tool	Federica Acerbi, Claudio Sassanelli, Mélanie Despeisse, and Marco Taisch	SS-8	Considering Gripper Allocations in Balancing of Human-Robot Collaborative Assembly Lines	Yüksel Değirmencioğlu Demiralay, and Yakup Kara
17:20	*Parallel session 4*	SS-21	AI Vision Use Case for Digital Twin WIP Tracking in Heavy Industry	Jang Won Choi, Sunglae Cho, Binglu Li, and Jong-Hoon Park	SS-10	Circularity Impact on Automotive Assembly – What Do We Know?	Kerstin Johansen, Marie Jonsson, and Sandra Mattsson	SS-8	A Smart Work Cell to Reduce Adoption Barriers of Collaborative Robotics	Elias Montini, Lorenzo Agbomemewa, Fabio Daniele, Vincenzo Cutrona, Matteo Confalonieri, Andrea Ferrario, Paolo Rocco, and Andrea Bettoni
17:40	*Parallel session 4*	SS-21	Reactive Flexible Job Shop Problem with Stress Level Consideration	Ehsan Yadegari, Damien Lamy, and Xavier Delorme	SS-10	Rapid Sorting of Post-Consumer Scrap Aluminium Alloys Based on Laser-Induced Breakdown Spectroscopy (LIBS)	Md Ali Akram, Ragnar Holthe, and Geir Ringen	SS-8	A Proposal for Production Scheduling Optimization Method with Worker Assignment Considering Operation Time Uncertainty	Daiki Nagata, Toshiya Kaihara, Daisuke Kokuryo, Toyohiro Umeda, and Houei Mizuhara
18:00	*Parallel session 4*	SS-21	Mixed Integer Programming for Integrated Flexible Job-Shop and Operator Scheduling in Flexible Manufacturing Systems	Reza Ghorbani Saber, Pieter Leyman, and El-Houssaine Aghezzaf	SS-10	Forecast-Based Dimensioning of Spare Parts Inventory Levels in the MRO Industry	Tabea Marie Demke, Tim Kämpfer, Torben Lucht, Jens Wachsmann, and Peter Nyhuis	SS-8	The Impact of the Design Decisions of an Order Picking System on Human Factors Aspects of the Order Pickers	Vivek Vijayakumar, and Fabio Sgarbossa
18:20										

Time	Room	Cosmos 3C			Cosmos 3D			Sirius		
Session name			**Managing Digitalization of Production Systems (1)**			**Everything-as-a-Service (XaaS) Business Models in the Manufacturing Industry**			**Experiential Learning in Engineering Education (3)**	
Session chair			*Kenn Steger-Jensen*	*Hans-Hermann Wiendal*		*Mohamed Naim*	*Margherita Pero*		*Mikael Öhman*	*Giovanni Mummolo*
15:00	*Parallel session 3*	RS-2	Leveraging Advanced Digital Technology Practices to Enhance Information Quality in Low-volume Product Introduction and Manufacturing	Siavash Javadi, and Koteshwar Chirumalla	SS-13	Moving towards Everything-as-a-Service: A Multiple Case Study in Manufacturing	Laura Scalvini, Federico Adrodegari, and Nicola Saccani	SS-4	Development and Stress Test of a New Serious Game for Food Operations and Supply Chain Management: Exploring Students' Responses to Difficult Game Settings	Davide Mezzogori, Giovanni Romagnoli, and Francesco Zammori
15:20	*Parallel session 3*	RS-2	Evaluating Augmented Reality, Deep Learning and Paper-based Assistance Systems in Industrial Manual Assembly	Alexander Riedel, Johanna Gerlach, Maximilian Dietsch, Frank Engelmann, Nico Brehm, and Tobias Pfeifroth	SS-13	Creation of Subscription-related Service Modules	Günther Schuh, Christian Holper, Lennard Holst, and Wolfgang Boos	SS-4	Report on the Integration a COTS Game in Teaching Production and Logistics	Jannicke Baalsrud Hauge, and Matthias Kalverkamp
15:40	*Parallel session 3*	RS-2	Reinforcing the Closing of the Circular Economy Loop through Artificial Intelligence and Robotics	Waleska Siguenza, Naiara Uriarte-Gallastegi, Beñat Landeta Manzano, and Germán Arana Landín	SS-13	Suitability Criteria for Customers for Subscription Business Models in Machinery and Plant Engineering	Günther Schuh, Daniela Greven, Lennard Holst, and Mariele Kreitz	SS-4	A Classification Framework for Analysing Industry 4.0 Learning Factories	Simone Vailati, Matteo Zanchi, Chiara Cimini, and Alexandra Lagorio
16:00	*Parallel session 3*	RS-2	Application of Digital Tools, Data Analytics and Machine Learning in Internal Audit	Jelena Popara, Milena Savkovic, Ciric Lalic Danijela, and Bojan Lalic	SS-13	How to Acquire Customers for Subscription Business Models in Machinery and Plant Engineering: Challenges and Coping Strategies	Günther Schuh, Calvin Rix, and Lennard Holst			
Session name			**Product and Asset Life Cycle Management for Sustainable and Resilient Manufacturing Systems**			**Workshop; APMS Talks**			**Lean Management in the Industry 4.0 Era (1)**	
Session chair			*Roberto Sala*	*Oliver Stoll*		*Hermann Lödding*	*Gregor von Cieminski, Erlend Alfnes*		*Eivind Reke*	*Paolo Gaiardelli*
16:40	*Parallel session 4*	SS-3	Green Design: Introducing a New Methodology to Increase Environmental Sustainability in Capital Investments at AstraZeneca	Filip Magnusson, Mikale Bohman, and Monica Bellgran		Presenter I: Chiara Cimini , «Operator 5.0 and Human Factors in smart manufacturing and logistics» Discussant I: David Romero Presenter II: Melanie Despeisse «How can smart lead to green production?» Discussant II: Bella Nujen Presenter III: Magnus Wiktorsson, "Smart production logistics – from plan-based to dynamic scheduling" Discussant III: Sang Do Noh		SS-2	A Design Science – Informed Process for Lean Warehousing Implementation	Anna Corinna Cagliano, Giovanni Zenezini, Carlo Rafele, Sabrina Grimaldi, and Giulio Mangano
17:00	*Parallel session 4*	SS-3	Capturing Value by Extending the End of Life of a Machining Department through Data Analytics: An Industrial Use Case	Federica Acerbi, Davide Pasanisi, Valerio Pesenti, Luca Verpelli, and Marco Taisch					SS-2	Digitally Enhancing Kanban Lean Practice to Support Just-in-Time Reconfigurable Supply: A Case Study	Christina Papadimitropoulou, Anne Zouggar, Daryl Powell, Helena Macedo, and David Romero
17:20	*Parallel session 4*	SS-3	The Role of Asset Ownership in PSS Theory: An Insight from Expert Interviews	Oliver Stoll, Shaun West, Fabiana Pirola, and Roberto Sala					SS-2	Sociotechnical Approach to Self-reporting in PMM Systems for HSE and Digital Security	Sverre Sorbye Larsen, and Jarle Nyberg
17:40	*Parallel session 4*	SS-3	Identifying Customer Returns in PCB Production using the Mahalanobis Distance	Endre Sølvsberg, Simone Arena, Fabio Sgarbossa, and Per Schjølberg					SS-2	Integrating Smart Manufacturing to Lean: A Multiple-Case Study of the Impact on Shop-floor Employees' Autonomy and Empowerment	Thomas Bortolotti, Stefania Boscari, Etta Morton, and Daryl Powell
18:00	*Parallel session 4*	SS-3	A Systematic Literature Review on the Developments in the Field of Flexible and Fully Automated Assembly Stations within the Automotive Sector	Bennet Schulz, Katja Klingebiel, and Daniel Reh					SS-2	Applying the Value Stream Map to Streamline Energy Consumption: Analysis of an Italian Company	Matteo Ferrazzi, and Alberto Portioli-Staudacher

• Tuesday 19 September, schedule *before* lunch

Time	Room	Cosmos 1&2			Cosmos 3A			Cosmos 3B		
Session name			**Modelling Supply Chain and Production Systems (1)**			**Transforming Engineer-to-Order Projects, Supply Chains, and Ecosystems (1)**			**Exploring Digital Servitization in Manufacturing (1)**	
Session chair			*Hermann Lödding*	*Fabio Sgarbossa*		*Jonathan Gosling*	*Joakim Wikner*		*Giuditta Pezzotta*	*Clarissa A. González Chávez*
08:40	*Parallel session 5*	RS-1	Cost Evaluation of a (Q, r, K) Inventory Model with Two Demand Classes of Lost Sales and Backorders	Zengxu Guo, and Haoxun Chen	SS-1	Challenges and Opportunities of Software-based Production Planning and Control for Engineer-to-Order Manufacturing	Patrick Bründl, Micha Stoidner, Huong Giang Nguyen, Andreas Baechler, and Jörg Franke	SS-5	Servitization and Industry 5.0: The Future Trends of Manufacturing Transformation	Dragana Slavic, Ugljesa Marjanovic, Giuditta Pezzotta, Ioan Turcin, and Slavko Rakic
09:00	*Parallel session 5*	RS-1	Optimal Class-based Storage System with Diagonal Movements	Kasuni Vimasha Weerasinghe, Fabio Sgarbossa, and Giulia Fede	SS-1	Has the Pendulum Swinged Too Much from JIT o JIC in the Aftermaths of Covid-19?	Jenny Bäckstrand, and Andréas Malmstedt	SS-5	Measuring Acceptance and Benefits of AI-based Resilience Services	Wolfgang Boos, Max-Ferdinand Stroh, Rajath Honagodu Phalachandra, Suat Selvi, Sijmen Boersma, and Justus Benning
09:20	*Parallel session 5*	RS-1	Algorithms and Models for Automated Replenishment of Store Shelves – Exploratory Research	Abhinav Majumder, Shiyu Sun, and Vittaldas Prabhu	SS-1	Underlying Mechanisms for Planning Engineering Capacity and Load in an Engineer-to-Order Context	Nils-Erik Ohlson	SS-5	Maximizing Customer Satisfaction in Sheet Metal Processing: A Strategic Application of the Customer Health Score	Greta Tjaden, Annika Baier, Maureen Strache, Cornelia Regelmann, and Anne Meyer
09:40	*Parallel session 5*				SS-1	Performance Management Collaboration between Companies Involved in the Industrialised Housebuilding Order Fulfilment Process	Wolfgang Grenzfurtner, and Martin Rudberg	SS-5	An Investigation into Technological Potentials of Library Intralogistics Operations	Niloofar Jafari, Fabio Sgarbossa, Bjørn Tore Nyland, and Arild Sorheim
Session name			**Modelling Supply Chain and Production Systems (2)**			**Transforming Engineer-to-Order Projects, Supply Chains, and Ecosystems (2)**			**Exploring Digital Servitization in Manufacturing (2)**	
Session chair			*Ralph Riedel*	*Vittal Prabhu*		*Martin Rudberg*	*Margherita Pero*		*Giuditta Pezzotta*	*Ugljesa Marjanovic*
10:20	*Parallel session 6*	RS-1	A Location-Routing Problem: Last-Mile Delivery with Drop-off Facilities for Return	Sungbae Jo, and Ilkyeong Moon	SS-1	Capability Building Blocks for Digital Twin Development	Sonika Gogineni, Cansu Tanrikulu, Jörg Brünnhäußer, Kai Lindow, and Heiko Witte	SS-5	Coalescing Circular and Digital Servitization Transitions of Manufacturing Companies: The Circular Economy Digital Innovation Hub	Claudio Sassanelli, Saman Sarbatzvatan, Giorgos Demetriou, Lucie Greyl, Giorgio Mossa, and Sergio Terzi
10:40	*Parallel session 6*	RS-1	Business Models for Electric Vehicle Fixed Charging Station Infrastructure with Commercial & Non-Commercial Uses	Hakan Erdeş, and Saadettin Erhan Kesen	SS-1	Towards the Digital Factory Twin in Engineer-to-Order Industries: A Focus on Control Cabinet Manufacturing	Micha Stoidner, Patrick Bründl, Huong Giang Nguyen, Andreas Baechler, and Jörg Franke	SS-5	The Digital Servitization of Manufacturing Sector: Evidence from a Worldwide Digital Servitization Survey	Giuditta Pezzotta, Veronic Arioli, Federico Adrodegari, Mario Rapaccini, Nicola Saccani, Slavko Rakic, Ugljesa Marjanovic, Shaun West, Oliver Stoll, Stefan A. Wiesner, Marco Bertoni, David Romero, Fabiana Pirola, Roberto Sala, and Paolo Gaiardelli
11:00	*Parallel session 6*	RS-1	Investigating the Sustainable Development of Charging Stations for Plug-in electric vehicles: A System Dynamics Approach	Mohammad Pourmatin, Amir Fayaz-Heidari, Moein Moeini-Aghtaie, Erfan Hassannayebi, and Mohadese Basirati	SS-1	Industry 4.0 Application in ETO Companies: An Empirical Comparison	Felix Schulze, and Patrick Dallasega	SS-5	Sustainability-as-a-Service: Requirements based on Lessons Learned from Empirical Studies	Clarissa A. González Chávez, Mèlanie Despeisse, Björn Johansson, David Romero, and Johan Stahre

		Cosmos 3C			Cosmos 3D			Online		
Session name			**Additive Manufacturing in Operations and Supply Chain Management (1)**			**Meet the Editors (2); Production Systems and their Methods, Tools, and Technologies**			**Digital Track (1)**	
Session chair			*Trond Halvorsen*	*Marco Semini*		*David Romero*			*Federica Acerbi*	*Bella Nujen*
08:40	*Parallel session 5*	SS-16	What to Share? A Preliminary Investigation into the Impact of Information Sharing on Distributed Decentralised Agent-Based Additive Manufacturing networks	Owen Rahmat Peckham, James Gopsill, Chris Snider, and Mark Goudswaard		Participating editors: Uglješa Marjanović, International Journal of Industrial Engineering and Management Thorsten Wuest, Smart and Sustainable Manufacturing Systems and Robotics and Computer-Integrated Manufacturing Nick Szirbik, Computers in Industry		DT-1	Comparative Analysis of Sustainability and Resilience in Operations and Supply Chain Management: Exploring Similarities and Differences	Piotr Warmbier
09:00	*Parallel session 5*	SS-16	The Potential of Additive Manufacturing Networks in Crisis Scenarios	Yen Mai Thi, Xiaoli Chen, and Ralph Riedel				DT-1	Understanding Sustainability: Cases from the Norwegian Maritime Industry	Olena Klymenko, and Lise Lillebrygfjeld Halse
09:20	*Parallel session 5*	SS-16	An Environmental Decision Support System for Determining On-site or Off-site Additive Manufacturing Production of Spare Parts	Enes Demiralay, Seyed Mohammad Javad Razavi, Ibrahim Kucukkoc, and Mirco Peron				DT-1	A Proposed Assessment Framework for Circular Supply Chains Management towards Net Zero Targets in The Netherlands	Verena Zielke, and Adriana Saraceni
09:40	*Parallel session 5*							DT-1	A Simulation Optimization Approach to Inventory Optimization in Supply Chain Networks	Farzaneh Mahmoudi, Alireza Eshghi, Mohadese Basirati, and Erfan Hassannayebi
Session name			**Additive Manufacturing in Operations and Supply Chain Management (2)**			**Lean in Healthcare**			**Digital Track (2)**	
Session chair			*Trond Halvorsen*	*Lise Lillebrygfjeld Halse*		*Christiane Lima Barbosa*	*Flávia de Souza*		*Gregor von Cieminski*	*Bella Nujen*
10:20	*Parallel session 6*	SS-16	Latest Technological Advances and Key Trends in Powder Bed Fusion: A Patent-based Analysis	Antonio Pedro DiasAlves de Campos, and Marco Leite	SS-14	Role Of Manufacturing Industry for Minimizing the Barriers to Circular Transition in the Health Sector: A Framework	Kartika Nur Alfina, and R.M. Chandima Ratnayake	DT-1	Pricing Strategy of Apparel Supply Chain Considering Traceability Awareness of Consumers Driven by Blockchain	Wenjie Wang, Jinxia Zheng, Yazhou Liu, and Lei Xie
10:40	*Parallel session 6*	SS-16	Integration of Additive Manufacturing in an Industrial Setting: The Impact on Operational Capabilities	Christopher Gustafsson, Anna Sannö, Koteshwar Chirumalla, and Jessica Bruch	SS-14	Managing Performance in Technology-enabled Elderly Care Services: The Role of Service Level Agreements in Modular Smart Service Ecosystems	Godfrey Mugurusi, Anne Grethe Syversen, Inge Hermanrud, Martina Ortova, Pankaj Khatiwada, and Stian Underbekken	DT-1	The Role of Organizational Culture in the Transformation to Industry 4.0	Rogerio Queiroz Camargo, Marcia Terra Silva, Ana Lucia Figueiredo Facin, and Rodrigo Franco Gonçalves
11:00	*Parallel session 6*	SS-16	Additive Manufacturing: A Case Study of Introducing Additive Manufacturing of Spare Parts	Bjørn Jæger, Fredrik Wiklund, and Lise Lillebrygfjeld Halse	SS-14	Effect of Machine Sharing in Medical Laboratories	Aili Biriita Bertnum, Roy Kenneth Berg, Stian Bergstøl, Jan Ola Strandhagen, and Marco Semini	DT-1	Requirements Planning in the New Normal: Comparison between Reorder Point Method and DDMRP	Beatrice Marchi, Ivan Ferretti, and Simone Zanoni

• Tuesday 19 September, schedule *after* lunch

Time	Room	Cosmos 1&2			Cosmos 3A			Cosmos 3B		
Session name			**Modelling Supply Chain and Production Systems (3)**			**Transforming Engineer-to-Order Projects, Supply Chains, and Ecosystems (3)**			**Digitally enabled and Sustainable Service and Operations Management in PSS Lifecycle (1)**	
Session chair			*Matthias Thurer*	*Fabio Sgarbossa*		*Mohamed Naim*	*Patrick Dallasega*		*Roberto Sala*	*Fabiana Pirola*
14:00	*Parallel session 7*	RS-1	Implementation of a Quality Cost Management Model: Case Study from the Textile Industry Sector	Bruno Barros, Cristina Rodrigues, Sérgio Sousa, and Eusébio Nunes	SS-1	Integrating Lean, Agile, Resilient and Green Supply Chain Management in Engineer-to-Order Contexts: Insights from Expert Interviews	Antonio Masi, and Margherita Pero	SS-6	Source-Target-Link-Matrix: A Conceptual Approach for the Systematic Design of Data-Driven Product Service Systems	Oliver Stoll, Simon Züst, Eugen Rodel, and Shaun West
14:20	*Parallel session 7*	RS-1	Optimal Production Planning of Ice-food Under Production, Backordering and Renewal Conditions	Syrine Guinoubi, Yasmina Hani, Marwa Hasni, and Abderrahmane Elmhamedi	SS-1	Investigating On-Site Production in Construction Using Decoupling Thinking	Petter Haglund, Joakim Wikner, and Martin Rudberg	SS-6	It is Not About Technology – Stupid! Lessons from a Start-up Developing a Digitally-enabled Product Service System to Grow Plants	Marco Kunz, Shaun West, Oliver Stoll, and Michael Blickenstorfer
14:40	*Parallel session 7*	RS-1	Automating Loading and Unloading for Autonomous Transport: Identifying Challenges and Requirements with a Systems Approach	Tarun Kumar Agrawal, Robin Hanson, Farook Abdullah Sultan, Mats I. Johansson, Dan Andersson, Gunnar Stefansson, Konstantina Katsela, and Michael Browne	SS-1	Clarifying the Interface between Construction Supply Chain and Site - A Key to Improved Delivery Efficiency	Farah Naz, and Anna Fredriksson	SS-6	Smart Product-Service System Definitions and Elements – Relationship to Sustainability	Stefan Wiesner, Jannicke Baalsrud Hauge, and Klaus-Dieter Thoben
15:00	*Parallel session 7*	RS-1	Design of Reconfigurable Cellular Manufacturing Systems with Alternative Routing	Mehmet Uzunosmanoglu, Veronique Limère, and Birger Raa	SS-1	Exploring Challenges in a Low-Volume Product Industrialization Process - A Railway Case Study	Vésteinn Sigurjónsson, Jessica Bruch, and Anna Granlund	SS-6	Service Lifecycle Management in Complex Product-Service Systems	Peter Dober, Shaun West, Stefan Wiesner, and Martin Ebel
15:20	*Parallel session 7*	RS-1	Development of Predictive Maintenance Models for a Packaging Robot Based on Machine Learning	Ayoub Chakroun, Yasmina Hani, Sadok Turki, Nidhal Rezg, and Abderrhmane Elmhamedi	SS-1	The Resilience of an ETO Archetype to Demand Shocks	Yuxuan Zhou, Jonathan Gosling, Mohamed Naim, and Xun Wang	SS-6	Lifecycle Management of Digitally-enabled Product- Service Systems Offerings: The Next Challenge for Manufactures	Oliver Stoll, Shaun West, Fabiana Pirola, and Roberto Sala
Session name						**Towards Next-Generation Production and SCM in Yard and Construction Industries**			**Operations and SCM in Energy-Intensive Production for a Sustainable Future (1)**	
Session chair						*Marco Semini*	*Jo Wessel Strandhagen*		*Giuseppe Fragapane*	*Fabio Sgarbossa*
17:00	*Parallel session 8*				SS-15	Towards a Concept for Digitalized Yard Logistics—Outlining the Next-Generation Features	Jo Wessel Strandhagen, Marco Semini, and Erlend Alfnes	SS-17	A Digital Twin–based Approach to Reinforce Supply Chain Resilience: Simulation of Semiconductor Shortages	Phu Nguyen, Dmitry Ivanov, and Fabio Sgarbossa
17:20	*Parallel session 8*				SS-15	Requirement Analysis and Concept Design of a Smart Mobile Factory for Infrastructure Projects	Patrick Dallasega, Andrea Revolti, Felix Schulze, Lorenzo Benedetti, and Doré de Morsier	SS-17	Integrating Closed-loop Supply Chain Design-Planning into Product Development: A Systematic Literature Review	Sobhan Mostafayi Darmian, Fabio Sgarbossa, and Torgeir Welo
17:40	*Parallel session 8*				SS-15	Management and Emerging Technology in Maritime Logistics: A Lewin Force Field Analysis	Atle Martin Christiansen, and Kenneth Vidskjold	SS-17	Life Cycle Assessment of Red Mud-based Geopolymer Production at Industrial Scale	Luca Adelfio, Fabio Sgarbossa, Rosanna Leone, and Giada La Scalia
18:00	*Parallel session 8*				SS-15	Streamlining the Execution of Maritime Commissioning with a Digital Assistance System	Tim Maximilian Jansen, Oliver Karl, Ahmed Elzalabany, and Hermann Lödding	SS-17	Product Recovery Options in Closed Loop Supply Chain Networks: A Literature Review	Hiran Harshana Prathapage, Dmitry Ivanov, and Fabio Sgarbossa

Time	Room	Cosmos 3C			Cosmos 3D			Online		
Session name			**Lean Management in the Industry 4.0 Era (2)**			**Digital Twin Concepts in Production and Services**			**Digital Track (3)**	
Session chair			*Daryl Powell*	*Matteo Ferrazzi*		*Boonserm Kulvatunyou*	*Hans-Henrik Hvolby*		*Gregor von Cieminski*	*Bella Nujen*
14:00	*Parallel session 7*	SS-2	Enablers Identification to Support the Combined Implementation of Lean and Industry 4.0	Ilse Urquia, Anne Zouggar, and Bruno Vallespir	RS-3	The Digital Thread Concept for Integrating the Development Disciplines for Mechatronic Products	Sylwester Oleszek, and Erik Rieger	DT-1	Systems Thinking Approach for Production Process Optimization based on KPI Interdependencies	Heiner Winkler, Susanne Franke, Felix Franke, Iren Jabs, Daniel Fischer, and Matthias Thürer
14:20	*Parallel session 7*	SS-2	Lean and Digitalization Status in Norwegian Manufacturing Companies	Natalia Iakymenko, Daryl Powell, Eivind Reke, Marte Daae-Qvale Holmemo, Eirik Bådsvik Hamre Korsen, Signe Sagli, Sigrid Sand and Sunniva Økland	RS-3	A Digital Reverse Logistics Twin for Improving Sustainability in Industry 5.0	Xu Sun, Hao Yu, and Wei Deng Solvang	DT-1	Human in Command in Manufacturing	Doris Aschenbrenner, and Cecilia Colloseus
14:40	*Parallel session 7*	SS-2	Effects of Lean and Industry 4.0 Technologies on Job Satisfaction: A Case-based Analysis	Matteo Zanchi, Andrea Lorenzi, Matteo Prezioso, Daryl Powell, and Paolo Gaiardelli	RS-3	Model Simplification: Addressing Digital Twin Challenges and Requirements in Manufacturing	Adria Sánchez de Ocaña, Jessica Bruch, and Ioanna Aslanidou			
15:00	*Parallel session 7*	SS-2	Lean Supply Chain and Industry 4.0: A Study of the Interaction between Practices and Technologies	Matteo Rossini, Stefano Frecassetti, and Alberto Portioli-Staudacher	RS-3	Digital Service Twin - Design Criteria, Requirements and Scope for Service Management	Alicia Schultheiss, Edgar Polovoj, Stefan Dolanovic, and Katja Gutsche			
15:20	*Parallel session 7*	SS-2	The Productivity Leap: Effects of an Industry Program in Norway	Eivind Reke, Natalia Iakymenko, and Mette Holmriis Brøgger	RS-3	Towards Ontologizing a Digital Twin Framework for Manufacturing	Milos Drobnjakovic, Guodong Shao, Ana Nikolov, Boonserm Kulvatunyou, Simon Frechette, and Vijay Srinivasan			
Session name			**Applications of Artificial Intelligence in Manufacturing**			**SME 5.0: Exploring Pathways to the Next Level of Intelligent, Sustainable, and Human-Centred SMEs**				
Session chair			*Klaus-Dieter Thoben*	*Ricardo Rabelo*		*Seyoum Eshetu Birkie*	*Jannicke Baalsrud Hauge*			
17:00	*Parallel session 8*	RS-4	Examining Heterogeneous Patterns of AI Capabilities in Manufacturing Value Chain	Djerdj Horvat, Marco Baumgarten, Steffen Kinkel, and Patrick Mikalef	SS-20	From Surviving to Thriving: Industry 5.0 at SMEs Enhancing Production Flexibility	Zuhara Zemke Chavez, Ala Arvidsson, Jannicke Baalsrud Hauge, Monica Bellgran, Seyoum Eshetu Birkie, Patrik Johnson, and Martin Kurdve			
17:20	*Parallel session 8*	RS-4	Enabling an AI-based Defect Detection Approach to Facilitate Zero Defect Manufacturing	Nicolas Leberruyer, Jessica Bruch, Mats Ahlskog, and Sara Afshar	SS-20	Challenges in Designing and Implementing Augmented Reality-based Decision Support Systems for Intralogistics: A Multiple Case Study	Moritz Quandt, Hendrik Stern, Markus Kreutz, and Michael Freitag			
17:40	*Parallel session 8*	RS-4	A Conceptual Framework for applying Artificial Intelligence to Manufacturing Projects	Aymane Sahli, Eujin Pei, and Richard Evans	SS-20	Data at the Heart of the Industry of the Future: New Information Issues from an Information and Communication Sciences Perspective	Nathalie Pinède,and Bruno Vallespir			
18:00	*Parallel session 8*	RS-4	Influence of Artificial Intelligence on Natural Resource Consumption	Naiara Uriarte-Gallastegi, Beñat Landeta Manzano, Germán Arana-Landín, and Iker Laskurain-Iturbe						

• Wednesday 20 September, schedule *before* lunch

Time	Room	Cosmos 1&2			Cosmos 3A			Cosmos 3B			Cosmos 3C		
Session name			**Smart Production Planning and Control (1)**			**Crossroads and Paradoxes in the Digital Lean Manufacturing World (1)**			**Digital Transformation Approaches in Production Management (1)**			**Smart Manufacturing to Support Circular Economy**	
Session chair			*Jan Ola Strandhagen*	*Anita Romsdal*		*David Romero*	*Paolo Gaiardelli*		*Selver Softic*	*Ugljesa Marjanovic*		*Rossella Pozzi*	*Nicolò Saporiti*
08:40	*Parallel session 9*	SS-19	Modeling of a Matrix Production System for Simulation to Predict Material Demand	Daniel Ranke	SS-9	Tying Digitalization to the Lean Mindset: A Strategic Digitalization Perspective	Victor Eriksson, Sourav Sengupta, Ann-Charlott Pedersen, Elsebeth Holmen, Heidi Carin Dreyer, Marte Daae-Qvale Holmemo, Signe Sagli, Sigrid Sand, Sunniva Økland, Daryl Powell, Natalia Iakymenko, Serkan Eren, and Eirin Lodgaard	SS-12	Digital Transformation towards Industry 5.0: A Systematic Literature Review	Jelena Crnobrnja, Darko Stefanovic, David Romero, Selver Softic, and Ugljesa Marjanovic	SS-18	Assessing the Interplay between Circular Economy, Industry 4.0 and Lean Production: A Bibliometric Review	Violetta Giada Cannas, Riccardo Fabris, Rossella Pozzi, Matteo Ridella, Nicolò Saporiti, and Andrea Urbinati
09:00	*Parallel session 9*	SS-19	Data-driven Production Logistics: Future Scenario in Two Swedish Companies based on Discrete Event Simulation	Masoud Zafarzadeh, Magnus Wiktorsson, and Jannicke Baalsrud Hauge	SS-9	Synergies between Industry 4.0 and Lean on Triple Bottom Line Performance	Thomas Bortolotti, Stefania Boscari, Willem Grob, and Daryl Powell	SS-12	Industry 5.0 and Manufacturing Paradigms: Craft manufacturing - A Case from Boat Manufacturing	Bjørnar Henriksen, and Maria Kollberg Thomassen	SS-18	Adopting Circular Economy Paradigm to Waste Prevention: Investigating Waste Drivers in Vegetable Supply Chains	Madushan Madhava Jayalath, R.M. Chandima Ratnayake, H. Niles Perera, and Amila Thibbotuwawa
09:20	*Parallel session 9*	SS-19	Artificial Intelligence of Things (AIoT) Strategies for a Smart Sustainable-Resilient Supply Chain	Hamed Nozari, Reza Tavakkoli-Moghaddam, Mohammad Rohani Nezhad, and Zdenek Hanzalek	SS-9	Design and Application of a Development Map for Aligning Strategy and Automation Decisions in Manufacturing SMEs	Malin Löfving, Peter Almström, Caroline Jarebrant, and Magnus Widfeldt	SS-12	Industry 4.0 Readiness Assessment of Enterprises in Kazakhstan	Dinara Dikhanbayeva, Malika Aitzhanova, Yevgeniy Lukhmanov, Ali Turkyilmaz, Essam Shehab, and Idriss El-Thalji	SS-18	Towards a Circular Manufacturing Competency Model: Analysis of the State of the Art and Development of a Model	Marta Pinzone, and Marco Taisch
09:40	*Parallel session 9*	SS-19	PPC-Layout and Order Net – Visualization for a rapid PPC Analysis and Design	Hans-Hermann Wiendahl	SS-9	Using the Lean Approach for Improving Eco-efficiency Performance: A Case Study for Plastic Reduction	Matteo Ferrazzi, and Alberto Portioli-Staudacher	SS-12	Critical Factors for Selecting and Integrating Digital Technologies to enable Smart Production: A Data Value Chain Perspective	Natalie Agerskans, Mohammad Ashjaei, Jessica Bruch, and Koteshwar Chirumalla	SS-18	Implications of Improving Resource Efficiency when Utilizing Residual Raw Material on Trawlers Producing Head and Gutted Fish	Per Solibakke
10:00	*Parallel session 9*	SS-19	Does Regulating Work-In-Process Increase Throughput and Reduce Cycle Times? An Assessment by Lab Scale System Models	Matthias Thürer, Shan Shan Li, Can Yang, Ting Qu, and George Q. Huang	SS-9	Work Pattern Analysis with and without Site-specific Information in a Manufacturing Line	Takeshi Kurata, Rei Watanabe, Satoki Ogiso, Ikue Mori, Takahiro Miura, Karimu Kato, Yasunori Haga, Shintaro Hatakeyama, Atsushi Kimura,and Katsuko Nakahira	SS-12	Business Process Reengineering in Agile Manufacturing – A Mixed Method Research	Khadija Lahlou, Khaled Medini, Thorsten Wuest, and Qussay Jarrar	SS-18	Driving Sustainability through a VSM-Indicator-based Framework: A Case in Pharma SME	Zuhara Zemke Chavez, Mayari Perez Tay, Mohammad Hasibul Islam, and Monica Bellgran
Session name			**Smart Production Planning and Control (2)**			**Crossroads and Paradoxes in the Digital Lean Manufacturing World (2)**			**Digital Transformation Approaches in Production Management (2)**			**Operations and SCM in Energy-Intensive Production for a Sustainable Future (2)**	
Session chair			*Julia Pahl*	*Jo Wessel Strandhagen*		*Daryl Powell*	*David Romero*		*Selver Softic*	*Ugljesa Marjanovic*		*Giuseppe Fragapane*	*Fabio Sgarbossa*
11:40	*Parallel session 10*	SS-19	Setup Time Prediction using Machine Learning Algorithms: A Real-world Case Study	Alberto Locatelli, Manuel Iori, Marco Lippi, and Marco Locatelli	SS-9	A Systematic Literature Review on Combinations of Industry 4.0 and Lean Production	Kristian Johan Ingvar Ericsson, and Antonio Maffei	SS-12	Service-Oriented Architecture for Driving Digital Transformation: Insights from a Case Study	Omid Maghazei, Marco Messerli, Thomas Gittler, and Torbjørn Netland	SS-17	Digital Twin enabling Manufacturing and Energy Flexibility and Optimizing Industrial Demand Response Services	Paul Kengfai Wan, Matteo Ranaboldo, Alessandro Burgio, Chiara Caccamo, and Giuseppe Fragapane
12:00	*Parallel session 10*	SS-19	Simple Analysis of Planning Quality in Production Logistics	Tobias Hiller, Lena Osterkamp, Lea Vinke, Patrick Holtsch, Alexander Mütze, and Peter Nyhuis	SS-9	Lean and Digital Strategy Role in Achieving a Successful Digital Transformation	Stefano Frecassetti, Anna Presciuttini, Matteo Rossini, and Alberto Portioli-Staudacher	SS-12	Consumer Engagement in the Design of PLM Systems: A Review of Best Practices	Uchechukwu Nwogu, and Richard Evans	SS-17	Discrete Event Simulation for Improving the Performance of Manufacturing Systems: A Case Study for Renewable Energy Sources Production	Panagiotis Mavrothalassitis, Nikolaos Nikolakis, and Kosmas Alexopoulos
12:20	*Parallel session 10*	SS-19	Planning and Control of Maritime Commissioning - Planning Concept	Nina Maria Köster, Christopher Mundt, and Hermann Lödding	SS-9	Characterization of Digitally-Advanced Methods in Lean Production Systems 4.0	Simon Schumacher, Roland Hall, Michael Hautzinger, Jan Schöllmann, and Thomas Bauernhansl	SS-12	A Distributed Ledger Technology Solution For Connecting E-Mobility Partners	Radu Ungureanu, Selver Softic, Emil Stefan Chifu, and Ioan Turcin	SS-17	Analysing Barriers to Achieving SDG 7. Managing Green Product Development in the Wind Energy Sector	Rakel Garcia, Beñat Landeta, German Arana, and Ruben Jimenez
12:40	*Parallel session 10*	SS-19	Production Scheduling using Production Feedback Data; An Illustrative Case Study	Mina Rahmani, Anita Romsdal, Øyvind A.M. Syversen, Fabio Sgarbossa, and Jan Ola Strandhagen							SS-17	Challenges and Opportunities for Adopting Green Technologies in Maritime Transportation Planning	Mohamed Ben Ahmed, Even Molland, and Tore Tomasgard

Photo: Colourbox, Niels Melander

• Wednesday 20 September, schedule *after* lunch

Time	Room	Cosmos 1&2			Cosmos 3A			Cosmos 3B		
Session name			**Smart Production Planning and Control (3)**			**Product Information Management and Extended Producer Responsibility**			**Managing Digitalization of Production Systems (2)**	
Session chair			*Jannicke Baalsrud Hauge*	*Sven-Vegard Buer*		*Lise Lillebrygfjeld Halse*	*Bjørn Jæger*		*Umit Bititci*	*Heidi Dreyer*
14:00	*Parallel session 11*	SS-19	Towards Smart Maintenance and Integrated Production Planning	Julia Pahl, Harald Rødseth, and Jan Ola Strandhagen	SS-23	Opportunities and Challenges of Applying Internet of Things for Improving Supply Chain Visibility of Incoming Goods: Results from a Pilot Study	Ravi Kalaiarasan, Malin Ducloux, Tarun Kumar Agrawal, Jannicke Baalsrud Huage, and Magnus Wiktorsson	RS-2	A New Generation? A Discussion on Deep Generative Models in Supply Chains	Eduardo e Oliveira, and Mª Teresa Pereira
14:20	*Parallel session 11*	SS-19	Smart Production Planning and Control; Concept for Improving Planning Quality with Production Feedback Data	Mina Rahmani, Øyvind A.M. Syversen, Anita Romsdal, Fabio Sgarbossa, and Jan Ola Strandhagen	SS-23	A Review on Design for Repair Practices and Product Information Management	Nataliia Roskladka, Gianmarco Bressanelli, Giovanni Miragliotta, and Nicola Saccani	RS-2	Business Context-based Approach for Managing the Digitalization of Biopharmaceutical Supply Chain Operational Requirements	Elena Jelisic, Milos Drobnjakovic, Boonserm Kulvatunyou, Nenad Ivezic, and Hakju Oh
14:40	*Parallel session 11*	SS-19	Spare Parts Demand Prediction by using a Random Forest approach	Joakim Andersson, and Evangelos Siminos	SS-23	Approach on How to Handle Digital Thread Information in Manufacturing with a Human-Centric Perspective Taking into Account a Didactic Factory	Kay Burow, Patrick Klein, Karl Hribernik, and Klaus-Dieter Thoben	RS-2	Volunteering Service Engineering in Non-Profit Organizations	Mike Freitag, and Oliver Hämmerle
15:00	*Parallel session 11*	SS-19	Interfaces between the Factory Planning Process and the Quality Management for an Optimized Planning Outcome	Tanya Jahangirkhani, Ninja vom Stein, Peter Nyhuis, and Manuel Löwer	SS-23	Textile Industry Circular Supply Chains and Digital Product Passports. Two Case Studies	Bjørn Jæger, and Sivert Myrold			

Time	Room	Cosmos 3C		
Session name		**Resilience Management in Supply Chains**		
Session chair			*Dmitry Ivanov*	*Boonserm Kulvatunyou*
14:00	RS-5	Derivation of the Data Attributes for Identification of Incorrect Events in Supply Chain Event Management	Jokim Janßen, Tobias Schröer, and Günther Schuh	
14:20	RS-5	Resilience Configurator for Procurement	Maria Spiß, Tobias Schröer, and Günther Schuh	
14:40	RS-5	A Proposal of Resilient Supply Chain Network Planning Method with Supplier Selection and Inventory Levels Determination using Two-stage Stochastic Programming	Hibiki Kobayashi, Toshiya Kaihara, Daisuke Kokuryo, Rina Tanaka, Masashi Hara, Yuto Miyachi, and Puchit Sariddichainunta	
15:00	RS-5	Function-based Approach for Disaster Relief Logistics	Theresa-Franziska Hinrichsen, Eduardo Colangelo, Merlit Kirchhoefer, and Tobias Spanke	

Digital Track

A digital track is offered for participants who are unable to join physically in Trondheim to present and discuss their accepted papers. Other participants are also welcome to join the discussions online.

The link to join the digital track can be found in the conference app.

Photo: Unsplash, Robin Mikalsen

INDUSTRIAL TOURS

Three manufacturing companies in Trondheim and the surrounding region have invited APMS participants to visit their facilities Thursday 21 September.

Practical information has been communicated to the participants who have registered for the industrial tour.

Siemens Energy

Although Siemens established its activities in Norway in 1898, Siemens Energy is a young company that was listed on the Frankfurt Stock Exchange in 2020. Siemens Energy is today a global leader in the energy business, and one sixth of global electricity generation is based on Siemen's technology.

The Trondheim site employs around 400 staff in a Maritime and Offshore Center that focuses on industrial decarbonization through electrification and process optimization. The facility assembles and delivers complex electric power solutions for the global maritime industry and is home to an advanced robotized and digitized battery module factory.

Orkel AS

Orkel develops, manufactures, and sells Orkel compactors for agriculture and industry. The company was founded over 70 years ago and is one of the largest producers of agricultural and industrial machinery in Norway. Orkel focuses on high quality products, innovation, and solid craftmanship. The company's compactors are now sold in over 60 countries worldwide – and their products contribute to a more sustainable world by ensuring optimal preservation and handling of everything from corn feed to household waste.

Aker Solutions Verdal

Aker Solutions delivers integrated solutions, products, and services to the global energy industry. Deliveries range from large platforms and subsea systems for oil and gas production, to offshore wind installations and facilities for carbon capture, utilization, and storage.

The yard in Verdal was established in 1969 and has with its 1 020 employees become one of the largest industrial employers in the region. The yard specializes in fabricating fit-for-purpose steel substructures and jackets for offshore developments.

Photo: Aker Solutions, Verdal

CONFERENCE VENUE: CLARION HOTEL

Address

Brattørkaia 1, Trondheim
Phone number: +47 73 92 55 00

Refreshments and lunch

Refreshments are served throughout the day in Space mingling area outside the conference rooms.

A buffet lunch is offered between 13:00 – 14:00
in the Atmosphere Restaurant on the ground floor.

Internet access

You can connect to the hotel network Clarion-Connect.
No password is needed.

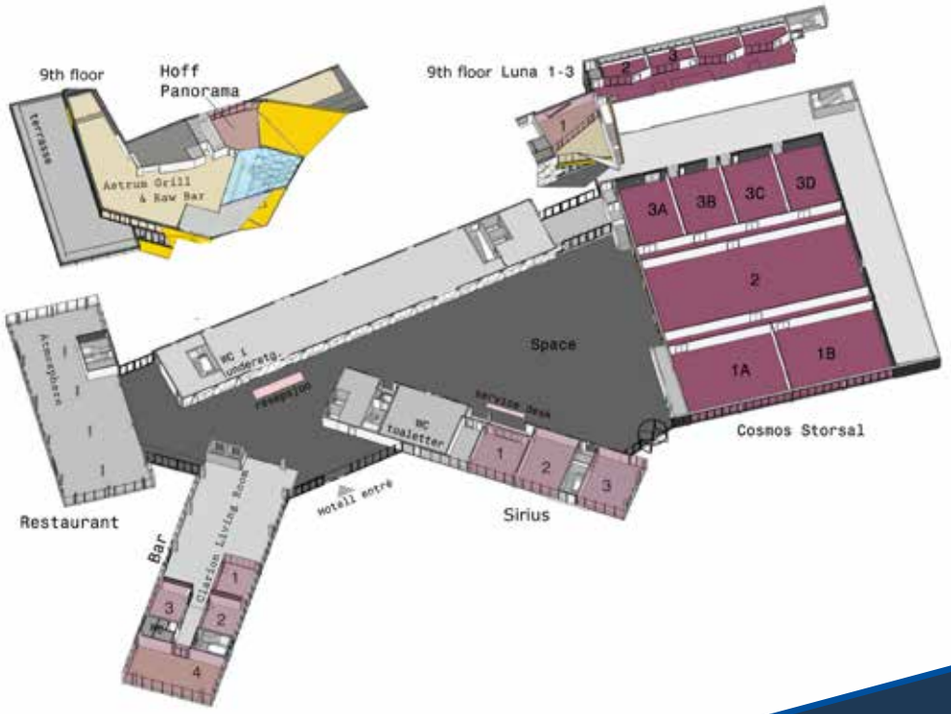


Photo: Clarion Hotel

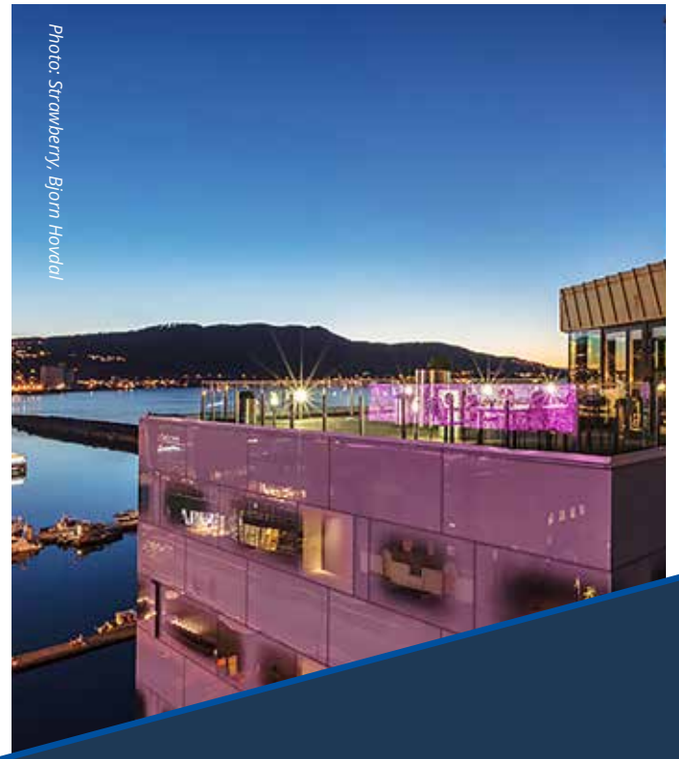
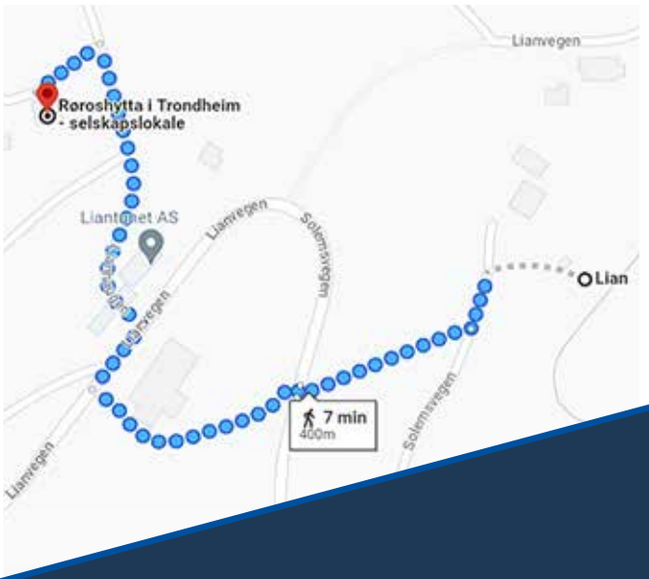


Photo: Strawberry, Bjorn Hovdal

Photo: Clarion Hotel

SOCIAL PROGRAM



Informal Mingling in the Forest

When: Saturday 16 September, 14:00 – 17:00
Location: “Røroshytta”, Rørosstien 1, Trondheim

Welcoming people to Norway and Trondheim gives us an opportunity to introduce our Norwegian traditions and habits. One such tradition is “gå på tur” (going on a hike) where we pack some good snacks, put on outdoor clothing, and head off to the forest or mountains – all year around.

We invite you to sample this tradition by joining us at the “Røroshytta”, a wooden cabin in the nearby forest of “Bymarka” above Trondheim city center. Here, you can explore the surrounding area and enjoy beautiful views of Trondheim – and then find shelter and some APMS friends around the “hytte”.

We will be there from 14:00 and at 17:00 we will start shuffling those who are still left back to town. If the weather allows some equipment for outdoor games and activities will be available.

Simple refreshments are provided, including the traditional “grilla pølse med lompe” (grilled hotdog in a potato cake), soft drinks and snacks, with alternatives for those with dietary requirements.

The event takes place outdoors so casual and weather-appropriate clothing and shoes are recommended.

Getting there and away
The event takes place around “Røroshytta”, 11 kms from the city center.

By tram
The recommended way to get there is by tram. From the final tram stop Lian there is a 400 m walk along a non-paved track up to the cabin. See map for directions.

- Saturday 16 September tram number 9 departs from St. Olavs gate to Lian every 15 minutes. Lian is the final stop, and the trip takes around 20 minutes.
- A ticket costs NOK 43 one way and must be bought before boarding, either through the AtB app, via SMS, online, or at the convenience store Narvesen in the city center (more information about tickets: https://atb.no/en/ticket/).

By car or taxi
Search for “Røroshytta i Trondheim” on Google Maps. The cabin is a 20-minute drive from the city center. Cars can be left in the carpark of the closed down restaurant “Liantunet” (see map).

Scan the code for location on Google Maps:

SOCIAL PROGRAM

Welcome Reception

When: Sunday 17 September, 19:00 – 20:30
Location: Rockheim, Brattørkaia 14 (2-minute walk from the conference venue)

The welcome reception will take place at Rockheim – Norway's National Museum of Popular Music. The reception hall offers fantastic views of the city and the Trondheim fjord.

Simple refreshments will be available.

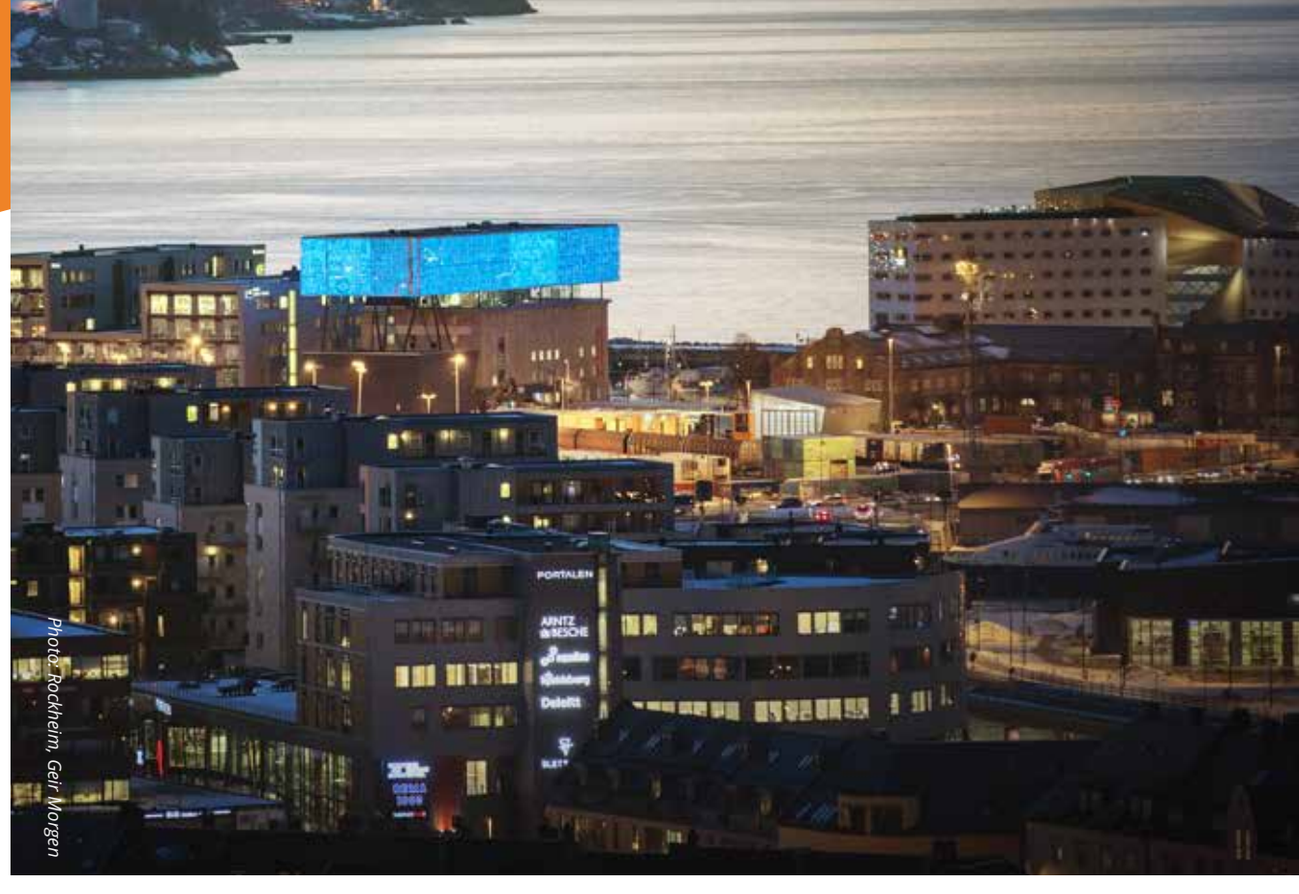


Photo: Rockheim, Geir Morgen

Organ Recital in Nidaros Cathedral

When: Monday 18 September, Doors open 19:15, concert starts 19:30
Location: Nidaros Cathedral, Kongsgårdsgata 2, Trondheim city center

The mayor and municipality of Trondheim invites all APMS conference participants to an organ recital in the 700-year-old Nidaros Cathedral. The recital is a unique opportunity to visit the cathedral and hear the 10.000 pipes of the Steinmeyer organ - one of Europe's largest and most magnificent cathedral organs.

The cathedral is a 25-minute walk from the conference venue through Trondheim city center. Or you can stroll along the river and the signature wooden wharfs of Bakklandet between Bakke Bridge (Bakke bro) and the Old Town Bridge (Gamle Bybro) that takes you across the river to the cathedral.

The concert starts at 19:30 so please arrive by 19:15 to find a seat and take in the impressive stonework, the beautiful glass rose window, and the stunning architecture.

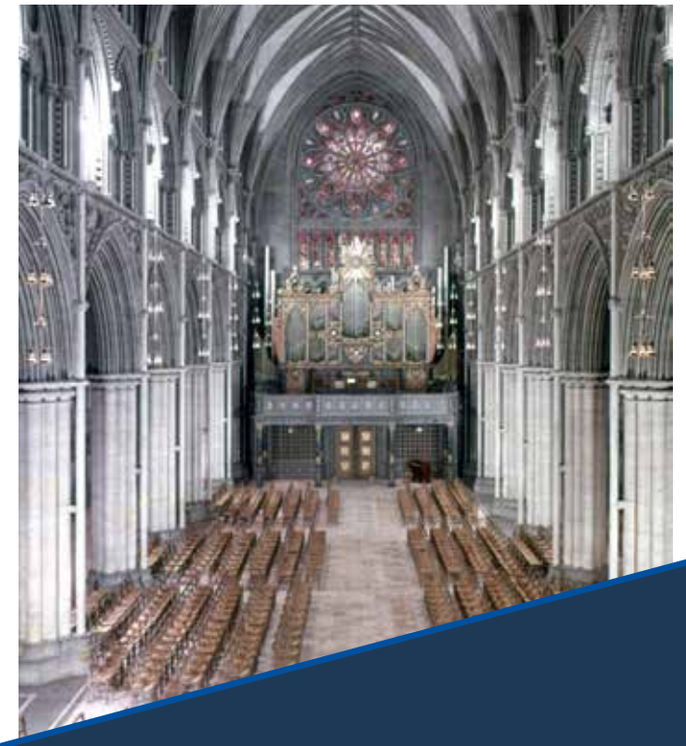


Photo: Colourbox, Ruzanna Aruyunova

SOCIAL PROGRAM

Gala Dinner

When: Tuesday 19 September, 19:30
Location: Clarion Hotel, conference hall Cosmos 1&2

Trondheim and the surrounding Trøndelag County has become a world-renowned food region in recent years and was the European Region of Gastronomy in 2022. For the gala dinner, we will be served a 3-course meal that showcases fresh local products and culinary talents.

After the dinner, you are welcome to mingle and enjoy great views from the hotel's Rooftop Restaurant & Bar on the 9th floor.

Photo: Strawberry

Photo: Clarion Hotel & Congress

Photo: Clarion Hotel & Congress

NTNU CONFERENCE ATTENDEE APP

The NTNU Conferences Attendee App is your all-in-one single point of access for all information at APMS 2023. All registered participants have received information via email about how to download the app and log in to the event.

With the app, you can:

- Network with other attendees with the EventStream Private Social Network, including posting of photos, videos, likes and tags.
- View a list of attendees and speakers, and connect with them with direct in-app messaging.
- View a complete agenda of the event program and build your own personal agenda. You can also take notes at sessions and export them for future reference.
- Participate in live polls, session surveys, and even invite other attendees to sit at your table at evening events.
- Stay up to date with real time messaging, alerts and news updates.
- Connect with other attendees with the easy-to-use contact exchange feature.

How to download

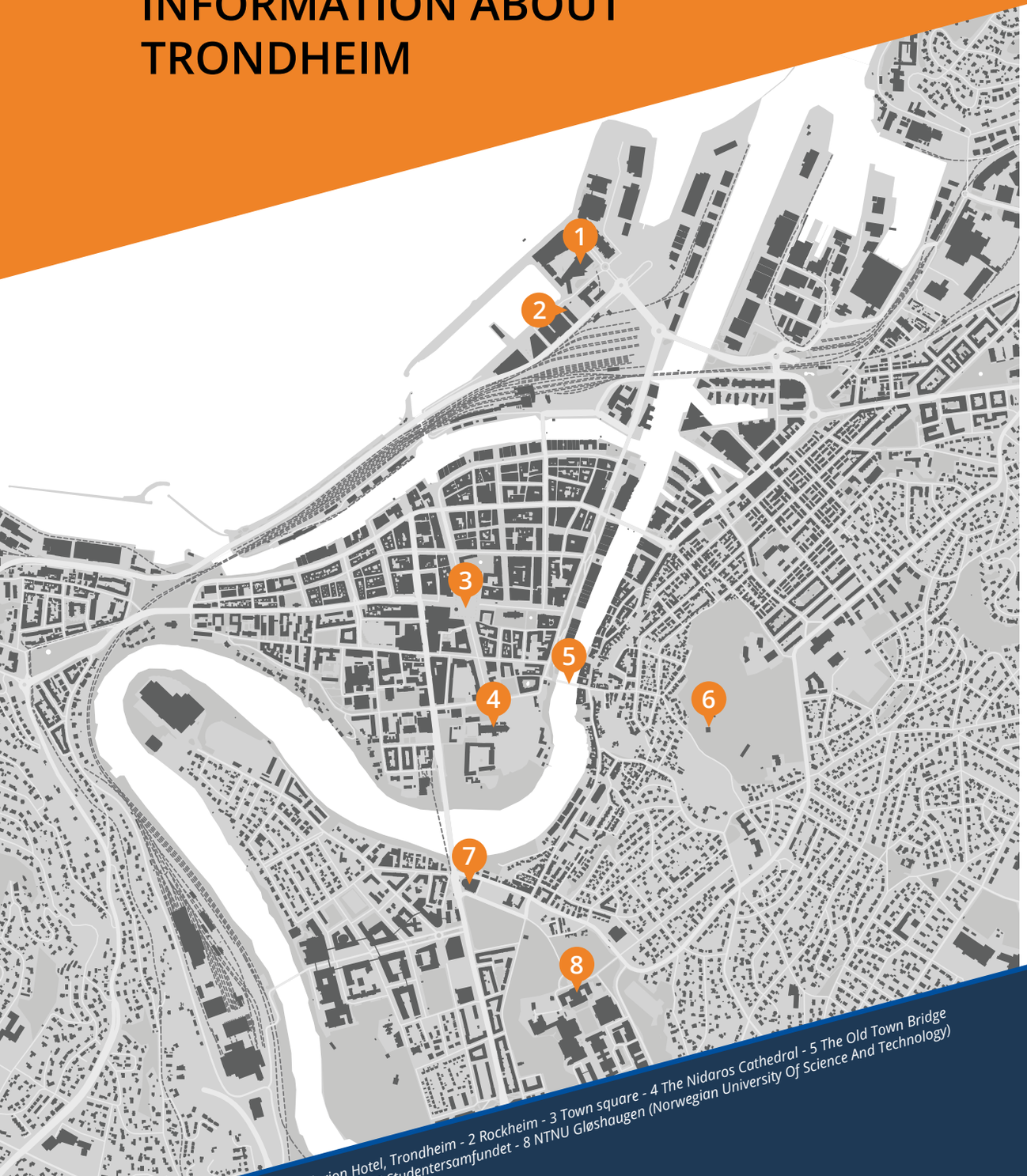
Download and access APMS 2023 with the event code **apms2023**

GET IT ON Google Play

Download on the App Store

Photo: Colourbox, Morten Normann Almeland

INFORMATION ABOUT TRONDHEIM



1 Clarion Hotel, Trondheim - 2 Rockheim - 3 Town square - 4 The Nidaros Cathedral - 5 The Old Town Bridge - 6 The Kristiansten Fortress - 7 Studentersamfundet - 8 NTNU Gløshaugen (Norwegian University Of Science And Technology)

Trondheim is where the fusion of history, arts, technology, and green initiatives ignite a culture of innovation and rich tradition. Trondheim stands out with its progressive nature and vibrant city life, while still embodying its small-town heart. It's Norway's third largest city, with just over 200 000 inhabitants.

Did you know Trondheim was once the Viking capital of Norway?

But even before the Pilgrims and the Viking Age, people were drawn to the region because of the seafood-rich fjords and vast mountains filled with wildlife and some of the most fertile soil in the country.

Today, Trondheim is well-known as a top location for students and academics. It has several times been ranked as Norway's best student city. The city has long traditions in education. The Trondheim Cathedral School has been in existence since 1152. The roots of today's university go all the way back to 1760, with the establishment of the Royal Norwegian Society of Sciences and Letters (DKNVS).

The Norwegian Institute of Technology (NTH) was founded in 1910. NTNU came into being in 1996, when NTH merged with the College of Arts and Sciences (AVH), the Museum of Natural History and Archaeology, the Faculty of Medicine, the Trondheim Academy of Fine Art, and the Trondheim Conservatory of Music to become one university. In 1994, Sør-Trøndelag University College was established, offering study programs in health and social work, ICT, teaching and interpretation, technology, economics, and management.

Trondheim has around 33 000 students who make their mark on the city. Studentersamfundet, the students' association, is the base for many of them. Every two years, volunteers from here organize UKA, Norway's largest cultural festival. Students in Trondheim are also behind the International Student Festival in Trondheim, ISFIT – the largest of its kind in the world.

Photo: Per Henning

GETTING AROUND TRONDHEIM

Trondheim is a compact city, and it's easy to find means of transport and get around the local area. If you don't feel like hiking, you can always rent a bike or electric scooter, or travel by bus or tram.

It is easy to travel around Trondheim using the public transport network of AtB busses and trams. We recommend downloading the AtB app to find departure times, bus lines and stops, as well as pay for your ticket. Tickets can also be purchased via SMS, ticket machines at selected stops, at selected shops and kiosks and the AtB service center. It is not possible to purchase tickets on board the bus in the city center.

A single adult ticket costs NOK 43 and is valid for 3 hours of unlimited travel in zone A.

Photo: Colourbox, Eugene Sergeev

Photo: Unsplash, Jonas Jacobsson

Photo: AtB

More information about Trondheim

For more information and inspiration for your visit to Trondheim, check out the wonderful website Visit Trondheim: visittrondheim.no/en/about/trondheim.

This is your inspiration portal for:

- Planning your stay
- Things to do – activities & attractions, fun & leisure
- Places to eat & drink
- Practical information – tourist info, emergency, currency, public transport, climate and weather, FAQ
- How to get to and from Trondheim – by air, train, boat, car, bus, and pilgrimage

Photo: Colourbox, Ruzanna Arutyunyan

LEARN MORE

See our website www.apms-conference.org, or scan the code to read more, see the full program and download papers from the Springer proceedings.