



*Trondheim, Norway, 30 June – 3 July 2025*

### *Invited Session*

## ***Industry 5.0 – Human-centric analysis and design for competitive manufacturing processes in Europe***

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Whereas the Industry 4.0 concept has aimed to improve business performance through digital transformation – translating into an operations (manufacturing and logistics) environment improved by digital technologies like robots, automation, IoT, drones or artificial intelligence. Yet, pursuing business performance improvement in operations with a solely technological-driven approach led to many challenges such as effective adoption in human decision-making processes, preventing the full exploitation of I40-related technologies. The roles of human workers are changing significantly as technology and digital systems are becoming more and more independent – seeing for example drones, autonomous trucks, or software bots. Therefore, in the future, the human factor relies on supervision, oversight capacity, and system-level decision-making.

This paves the way for basic reflections regarding the role of humans and human workload in such newly conceived technology-centric factories and transportation processes, leading researchers and practitioners to reshape the industrial landscape with a human-centric perspective according to **the Industry 5.0 concept** by the European Commission, especially on the shop floor for production and assembly operations or in warehousing, logistics and transportation tasks. The rise of neuroscience with mobile and unobtrusive biosensor equipment facilitates the empirical measurement of human worker cognitive ergonomics states during task settings in operations. This includes an array of neuroscientific measurements like electroencephalogram (EEG), electrocardiography (ECG), galvanic skin response (EDA), EMG or Eye Tracking. Yet, large-scale avenues for empirical research in this domain are still missing, constituting a research gap to be explored by research projects and papers within the invited session.

Together, we aim to measure possible baseline values in typical operations tasks with biosensor equipment. Connected to this, an issue of individual variability and context variability for such values arises. Compared to physical ergonomics, such experience values exist from many years of research – whereas for cognitive ergonomics measurements in operations this is a completely new field of research.

The proposal focuses on the issue of relevant and required analyses regarding the human factor in manufacturing and operations (including warehousing and logistics) in order to detail the I50 concept for practical implementation. This can be seen as a sort of basic research, informing further research as well as management application regarding available *methods and concepts*. The method and concept objective specifically includes first prototype studies and proof of concept papers, highlighting the value and need for early case study and application insights in this domain.

Topics may include, but are not limited to:

- Human-centric analysis in operations and manufacturing
- Resilience and human-centricity in operations management
- Human-centric workplace design and sustainability
- Use of biosensors (EEG, ECG, EMG, EDA etc.) for human-centric analysis
- Role of AI and explainable AI in human-centric manufacturing
- Impact of AR, VR, XR systems in human-centric operations
- Task allocation, human-centric task sharing and takeover design
- Social sustainability, diversity and fairness concepts in I50 manufacturing

**INVITATION CODE: [8bn2g](#)**

Draft papers reporting original research (limited to 6 pages in IFAC format) and extended abstracts are welcome. When you submit your paper to the IFAC system, you will be required the **invitation code [8bn2g](#)** to associate your paper to the invited track: <https://ifac.papercept.net>

**IMPORTANT DATES:**

- Draft papers/ extended abstract submission deadline: **30.11.2024**
- Final papers submission deadline: **28.02.2025**
- Early registration opens: **28.02.2025**

**Conference website:** <https://conferences.ifac-control.org/mim2025>