

# Human Work and Skills Advances Related to Smart Manufacturing

## Open invited track proposal 30 (CODE: 5gsv3) 22nd IFAC World Congress

This proposal is endorsed by TC 5.1 Manufacturing Plant Control

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**Keywords:** *Human work; Human factors; Skills; Digitization; Smart manufacturing; Human Centered Systems; Artificial Intelligence; Human-AI work.*

### Abstract:

The work environment is changing. Some smart manufacturing work environments involve digitization, automation, machines and robotics, artificial intelligence, which replace human work (Autor, 2014). These changes influence smart manufacturing environments by reducing the demand for labor and wages (Acemoglu & Restrepo, 2018). We enter a new and dynamic industrial age in which machines and computers can substitute, complement and expand human work, requiring new and shifting human skills and competencies. Furthermore, two parallel trends continue to dominate the smart work setting. First, technology continues to govern how workers communicate and socialize (Ray & Thomas, 2019; Sela et al, 2022). Second, new work arrangements (e.g., freelance, gig-work, task, project-based work) are increasingly prevalent and are expected to reach a record high by 2030 (Barlage, van den Born, & van Witteloostuijn, 2019).

This rapid change has major implications on the human operator. Human operators in smart work environments, are incorporating information, data and implementing artificial intelligence more than ever before. We observe AI-based applications assisting workers in daily tasks, project management, decision-making and collaboration, thus enabling smarter time-critical tasks in industrial and managerial settings. As a result, emerges the need for new collaboration mechanisms, tasks and skills to support social interactions with peers, robots and artificial intelligent systems. Thus, the need to examine and evaluate the ever-changing human-centered perspective and required skills in order to make necessary adjustments. The shifting Smart

Manufacturing setting, requires adjustments in skills and competencies in order to adjust to these rapid changes. New tools, frameworks and methods will be required support the human work in managing technology and digitized work streams. With these new developments, studies in the human-related factors should be carried out, on both the theoretical and practical levels, highlighting the interdependences between digital technologies and human skills, and providing high-tech and industrial firms with state-of-the-art tools to drive their workforce towards agile human-centred smart manufacturing environments. This special session calls for high-quality contributions investigating the main research challenges, reviews, case studies and applications related to the following topics (but not limited to):

- Human centered systems to assist workers in their increasingly complex tasks.
- Innovative tools and technologies to enhance the human work.
- Original industrial and real-world case studies to test the adoption execution of human skills in smart manufacturing settings.
- Implementing new technologies to meet the demand vs. supply of new skills in smart manufacturing settings.
- The role of Artificial Intelligence in controlling and excelling human work in smart manufacturing environments.
- Multidisciplinary approaches to human work in smart tech-based and unique work settings.
- Human factors and associated new skills affecting the performance of smart manufacturing environments.
- New Skills/Competencies for the digitized smart work environment.
- Industrial Smart Work Theory and Practice.
- Human-AI Work adoption framework.
- Human-AI Work skills/ competencies assessment.
- Digitalization impact on shopfloor.

### **Time schedule**

November 11, 2022	Deadline for paper submission
February 01, 2023	Notification of acceptance/rejection
March 31, 2023	Final paper submission
09-14 July, 2023	22nd IFAC World Congress: Yokohama, Japan

## Manuscript Preparation

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