

THESIS FOR THE DEGREE OF LICENTIATE OF ENGINEERING

# Towards interoperable information and communication systems for manufacturing operations

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Gothenburg, Sweden 2016

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ISSN 1652-9243

Report No. 106

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Cover: The research approach for this thesis.

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Gothenburg, Sweden 2016

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## ABSTRACT

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Mass customization and the demand for flexible manufacturing systems have increase focus on the human workers. Diversity and complexity of the products that manufacturing operators have to handle is constantly on the rise. It is believed that the recent advances in information and communication technology can assist the manufacturing organisations to manage these challenges. As a matter of fact, if organisations manage to implement the systems correctly, the productivity is thought to increase to such an extent that it will give rise to a new paradigm in production, the fourth industrial revolution. However, as it stands now, there is a large gap between the exiting technology and what is actually used in the manufacturing industry. If organisations are to close this gap they need to manage several challenges. The problem addressed in this thesis is how to design and structure the information and communication systems that need to handle the new technologies, and particularly those designed for manufacturing operators and the automation systems. This thesis aims to aid the manufacturing operations organisations to configure their information and communication systems and this has been done regarding interoperability. Interoperability is the ability for systems to communicate and exchange data which is crucial to enable many different systems to co-exist and work together. The information and communication technologies that manufacturing operators use have been connected with several areas of interoperability research, which enable a useful discussion about the implementation and design choices of the technology.

**Keywords:** Interoperability, Industry 4.0, Information Systems, ICT, Manufacturing operators.

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## ACKNOWLEDGEMENT

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This thesis would not have been possible without support from others. I would like to start by thanking my co-supervisor and dear friend Åsa Fast-Berglund who is always supportive and motivating, it is a privilege to be able to work with her. I would also like to express my gratitude to my supervisor Johan Stahre for giving me the opportunity to be part of an interesting and learning environment and for providing valuable input and challenging questions at crucial moments.

Special thanks are due to all members in our “little” research group: Human and Automation Optimisation. With such a diverse group it can sometimes be difficult to agree but that is also how we can achieve anything.

I am also very grateful for all the friends and colleagues at the department Product and Production Development. There have been countless moments of interesting insights and aha moments during “fika time”, or on after work. No one mentioned, no one forgotten.

I would also like to acknowledge the contribution of the Swedish Governmental Innovation Agency (VONNOVA) for financial support to my research through several research projects.

Gothenburg, Sweden, May, 2016

*Magnus Åkerman*

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## PUBLICATIONS

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- Paper I** Fast-Berglund, Å., **Åkerman, M.**, Karlsson, M., Hernández, V. G., & Stahre, J. (2014). Cognitive Automation Strategies – Improving Use-efficiency of Carrier and Content of Information. *Procedia CIRP*, 17, 67-70. doi:10.1016/j.procir.2014.02.042
- Paper II** **M. Åkerman**, M. Karlsson, and L.-o. Bligård, "Refining the needs: An exploratory study through usability testing," in *The 6th International Swedish Production Symposium*, 2014.
- Paper III** **Åkerman, Magnus**, Fast-Berglund, Åsa, Karlsson, Malin, & Stahre, Johan. (2016). Introducing Customized ICT for Operators in Manufacturing. *Procedia CIRP*, 41, 490-495. doi: 10.1016/j.procir.2015.12.074
- Paper IV** **Åkerman, M.**, Fast-Berglund, Å., & Ekered, S. (2016). Interoperability for a Dynamic Assembly System. *Procedia CIRP*, 44, 407-411. doi:10.1016/j.procir.2016.02.026

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