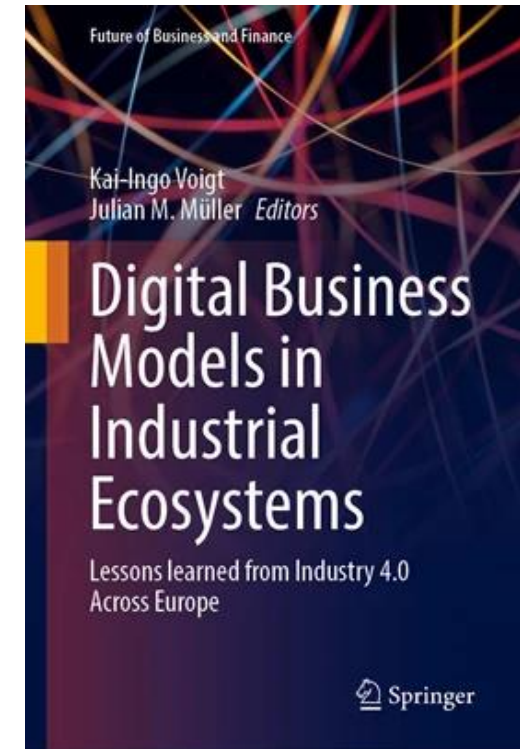
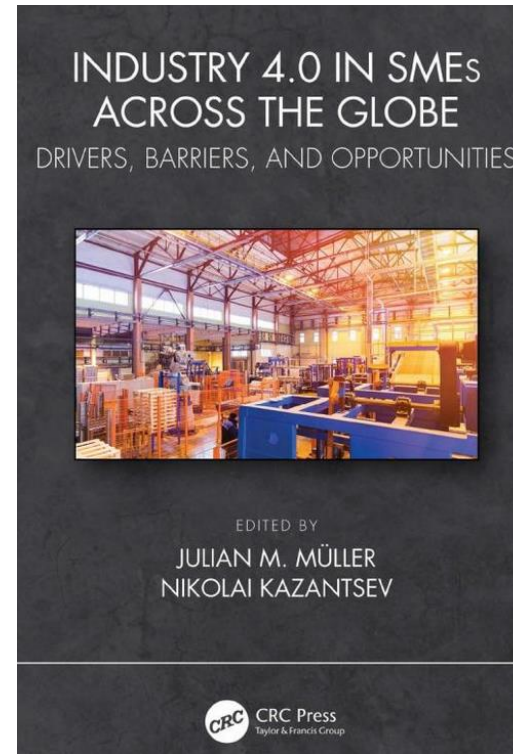


Barriers for SMEs towards Digital Transformation

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A short introduction of myself



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Overview

1. Lack of capabilities and resources (internal)
2. Lack of feasibility for technologies
3. Lack of (end) customer access
4. Lack of standards and economies of scale
5. No access to overall data of supply chain

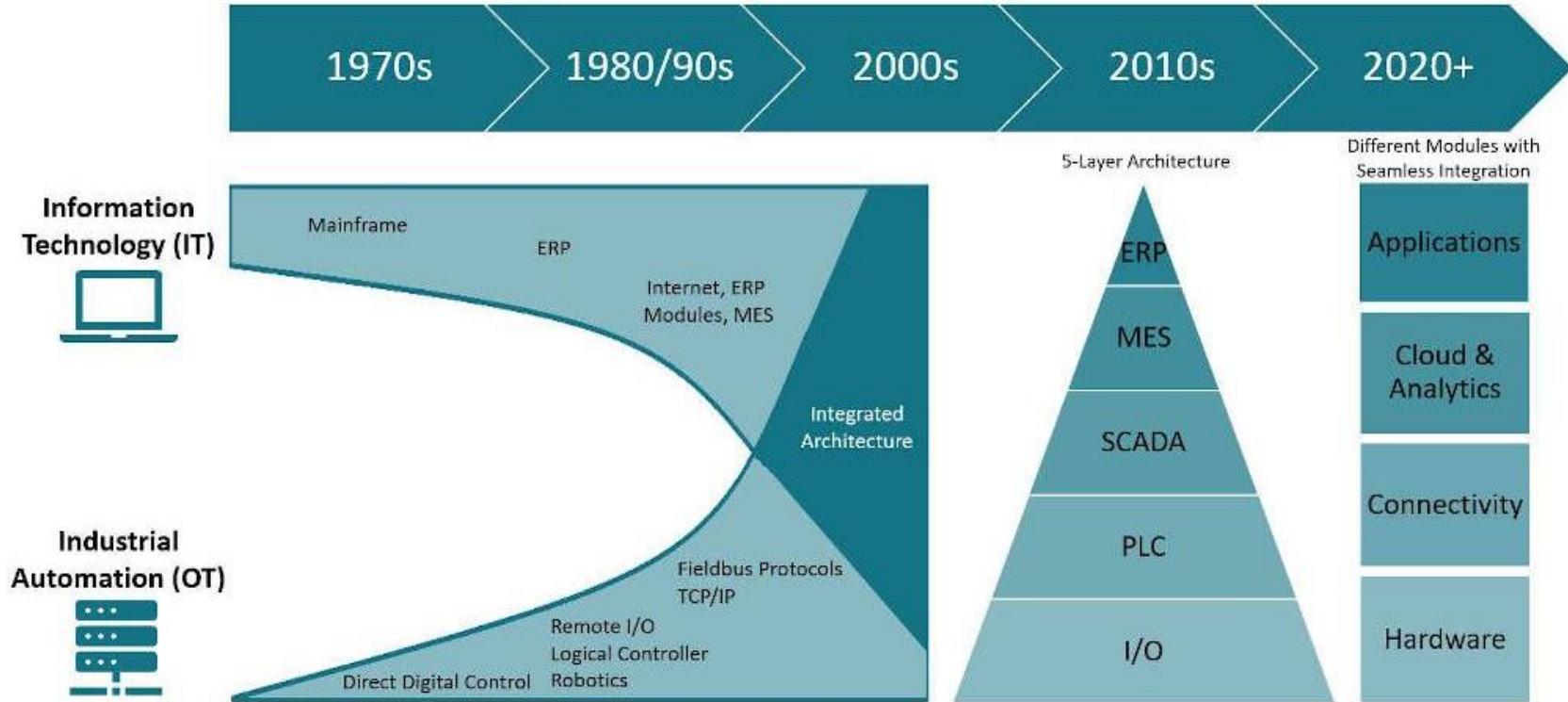
1. Lack of capabilities and resources (internal)

			<p>Formal Industry 4.0 strategy and service-based business models allow an active role in markets, alliances and ecosystems</p>
		<p>Conditions for Industry 4.0 fulfilled: Foremost market, strategy and efficiency</p>	<p>Full implementers (88) <i>Service-based business models and complex products</i></p>
	<p>Preconditions for Industry 4.0 fulfilled: Foremost innovation and strategy</p>	<p>Non-planner implementers (106) <i>Manufacturers of complex products</i></p> <p>- Strengths: Efficiency, strategy, availability of financing resources and infrastructures. Integrated management of Industry 4.0 transition.</p> <p>- Challenges: Servitization, analysis of competitors, market acceptance, development of alliances, change of organizational models and availability of qualified staff.</p>	<p>- Industry 4.0 technologies: Big Data Analytics, Robotics, Artificial Intelligence, Internet of Things or intelligent metrology.</p> <p>- Strengths: Collaboration culture, (mainly technological centers), technological advisors and experts, advanced services. Integrated management of Industry 4.0 transition.</p> <p>- Challenges: Availability of qualified staff and financial resources.</p>
<p>Non-implementers with no Industry 4.0 preconditions (88) <i>No own end-product and low-technology sectors</i></p> <p>- Challenges: Low degree of pre-conditions, mainly: leadership, alliances, innovation, skills and management</p>	<p>Non-implementers of Industry 4.0 with preconditions (68) <i>Usually low-technology industries and semi-finished components</i></p> <p>- Challenges: Low acceptance of Industry 4.0 by market, servitization, organizational model, alliances and qualified staff.</p>		

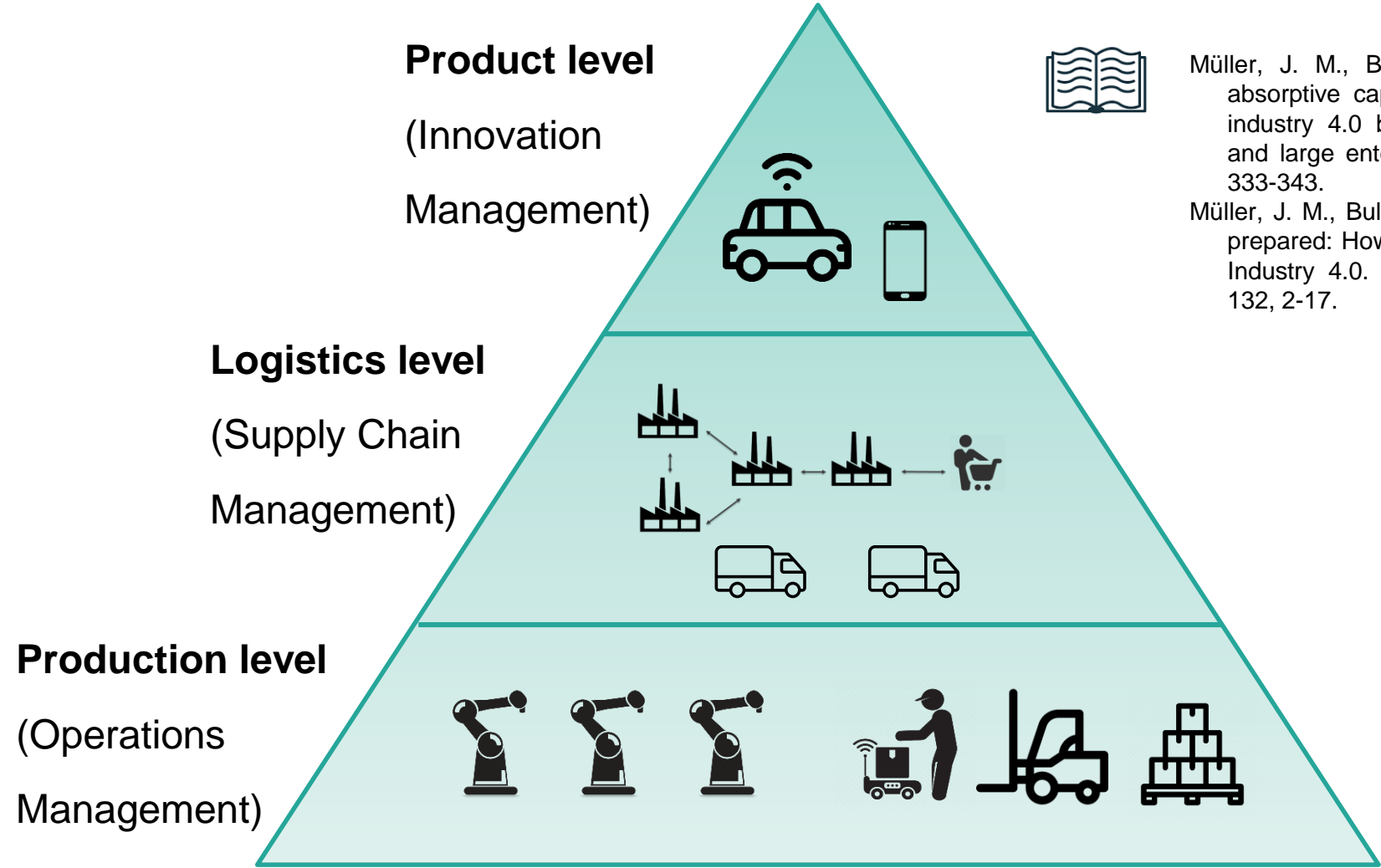


Estensoro, M., Larrea, M., Müller, J. M., & Sisti, E. (2021). A resource-based view on SMEs regarding the transition to more sophisticated stages of Industry 4.0. *European Management Journal* (in press).

2. Lack of feasibility of technologies



3. Lack of end customer access



Müller, J. M., Buliga, O., & Voigt, K. I. (2021). The role of absorptive capacity and innovation strategy in the design of industry 4.0 business Models-A comparison between SMEs and large enterprises. *European Management Journal*, 39(3), 333-343.

Müller, J. M., Buliga, O., & Voigt, K.-I. (2018). Fortune favors the prepared: How SMEs approach business model innovations in Industry 4.0. *Technological Forecasting and Social Change*, 132, 2-17.

Digital interconnection on product, production and logistics level



4. Lack of standards and economies of scale

Usage of ERP Systems in SMEs

In 2021, the percentage of EU enterprises using Enterprise resource planning (ERP) ranged from **33% for small enterprises** to **81% for large enterprises** (Eurostat, 2021)



Usage of robots in SMEs

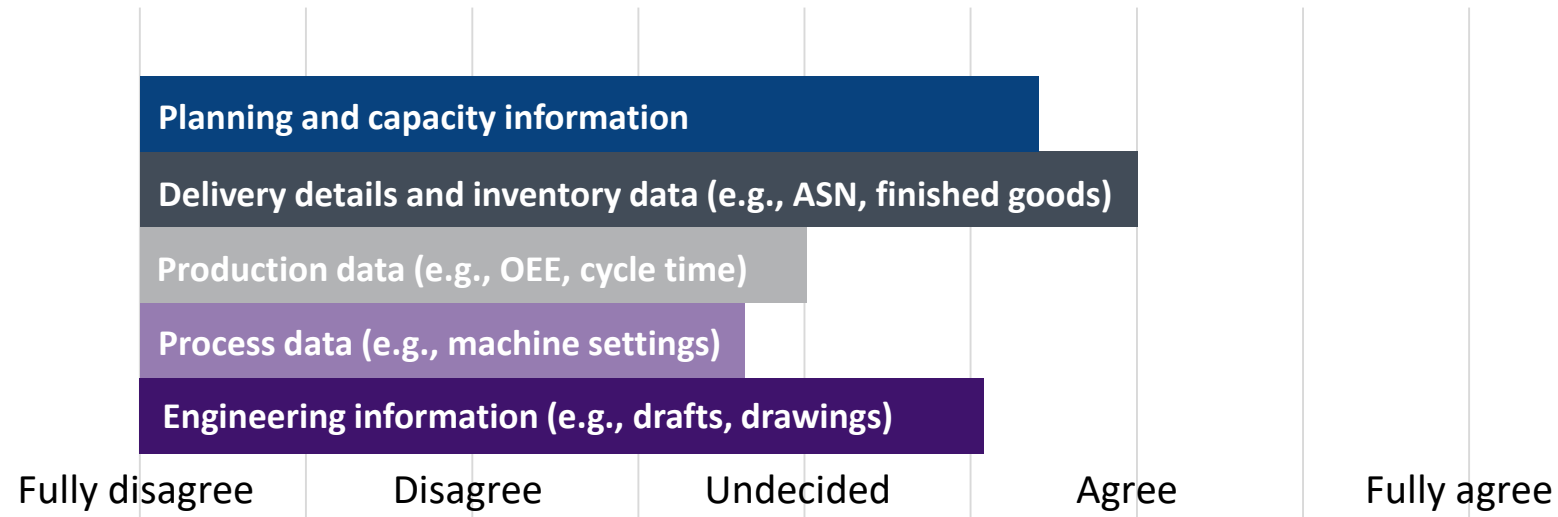
SME robot usage: 19%
Large enterprise robot usage: 31%

(German Robotics Association, 2021)



5. No Access to Overall Data of supply chain

Willingness to share data by suppliers (sample of 957 global suppliers)



Müller, J. M., Veile, J. W., & Voigt, K. I. (2020). Prerequisites and incentives for digital information sharing in Industry 4.0 – an international comparison across data types. *Computers & Industrial Engineering*, 148, 106733.