

Regulation for Artificial Intelligence and Robotics in Transportation, Supply Chain Management, and Logistics

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Previous production-oriented developments in technical infrastructure and IT form the basis for recent trends of automatization and digitalization in the transportation, supply chain, and logistics sector. Along with economic aspects, areas such as human perception, motivation, and safety are gaining in significance against the background of artificial intelligence and robotics. Long seen as contradiction, these factors are now understood as a crucial enabler for overall economic impact and success. In particular, for the people-oriented logistics business, but also for many other industry branches, the question of regulation becomes increasingly important in order to secure human trust and motivation in artificial intelligence and robotics without raising the burden to economic development.

Introduction

Through terms such as the *Internet of Things*, *Industry 4.0*, and *Physical Internet*, many automatization and digitalization trends are developing for the transportation, supply chain, and logistics sector. Both trends result largely from production-based developments over the last years that have changed the role of data comprehensively (Figure 1). Starting with the implementation and operation of LVS systems in the 1970s, data became rapidly enabler for processes in the 1990s and also for products until the 2000s, and are today products themselves. The different data development stages should not be

of connected devices will double to 50 billion due to further development of the *Internet of Things* (Figure 2).

In summary, past and present trends of the *Internet of Things*, *Industry 4.0*, and *Physical Internet* are results of the development and understanding of data and its importance. Therefore, the topical framework of automatization and robotics, enabled and driven by these developments, became one of the most important action points for a wide range of industries in the future. The application of automatization and robotics, combined with artificial intelligence will be a major innovation in transportation and supply chain management, but also growth and efficiency

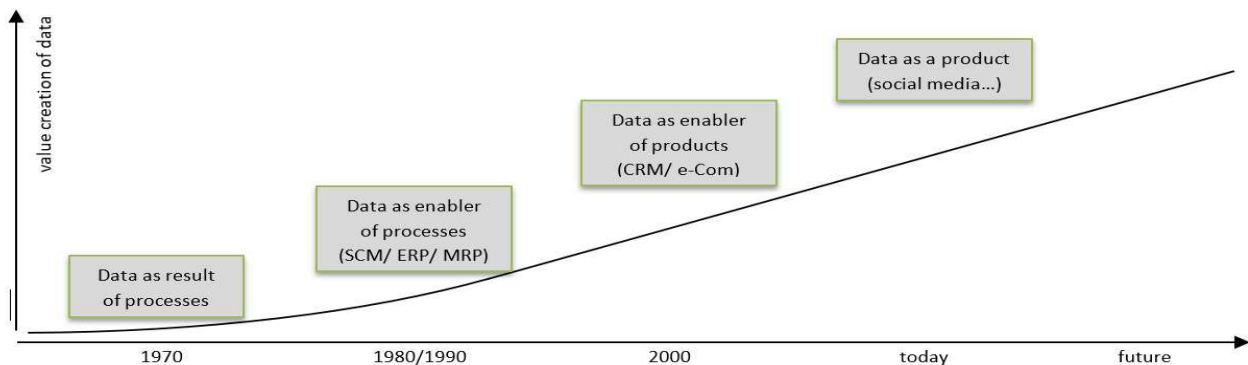


Figure 1. Role of data in the course of digitalization and automatization

Source: Otto, B. (2016)

understood as disjunct, rather as parallel developments in companies. For one thing, data are the result of digitalization and automatization, but also a resource for service creation or even products, which leads to the 'data paradox'.

Considering that the number of connected devices has increased by a factor of almost 35,000 since the first connected devices were launched in 1992, the development of the *Internet of Things* has increased the number of connected devices almost exponentially. By 2020 the total amount

driver in the next 15 years. Focusing on challenges and opportunities for the logistics sector, the recent trends can even be described as a 'game-changer' for many different areas.

Risks and opportunities

The main exogenous drivers for the recent developments in digitalization and automatization are cost pressure (46 percent), staff shortage (64 percent), complexity (39 percent) and dynamically changing buying behavior (57

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percent), combined with endogenous factors stated as the need for transparency in supply chains (55 percent), business analytics (62 percent) and collaboration (55 percent).

Next to the challenges, logistics companies consider opportunities in terms of additional revenues (34 percent) and cost reduction (34 percent), (Kersten et al. 2017, p. 19). Many developments are driving these aspects with en-

safeguards and regulations (see the European Parliament Resolution on Civil Law Rules on Robotics, 2015/2103 (INL)). Therefore, questions of human perception, motivation, and safety are increasingly entering the discussion (Ruiner & Klumpp, 2018a).

It has been found that human-AI collaboration decisively depends on its design requiring opportunities for auton-

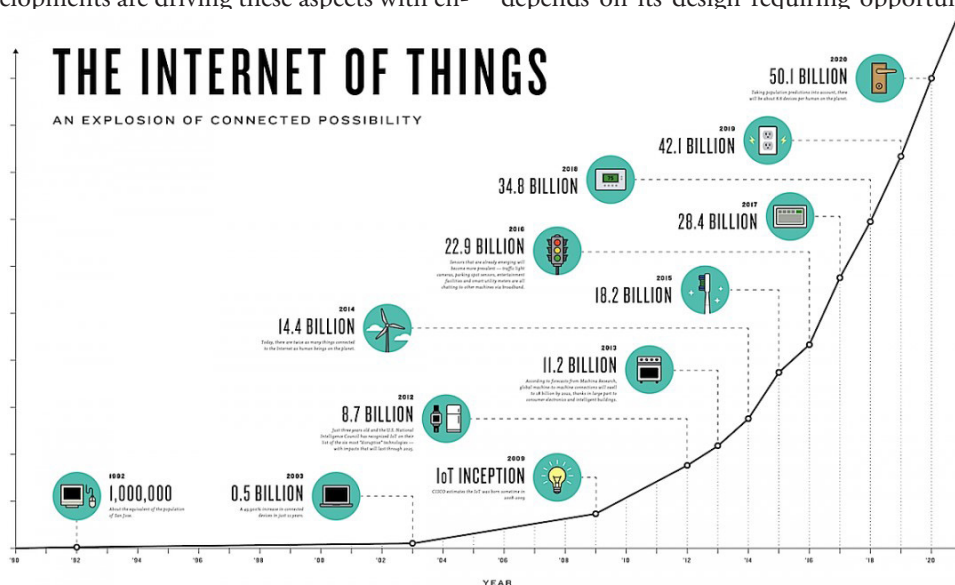


Figure 2. Development of connected devices

Source: Mesh-Net Limited (2017)

abling technologies, also in line with economic success. In direct comparison, the opportunities of digitalization and automatization outweigh the counteracting risks of digital transformation (Figure 3).

Against this background, it can be noted that the vast majority of companies in transportation, supply chain management, and logistics expect fewer risks than opportunities from digital transformation driven by digitalization and automatization. Nevertheless, the logistics sector attaches high importance (59 percent) to the burden resulting from regulation and compliance related to digital transformation, making this a crucial topical area for overall economic impact and success.

Regulation conclusions

Regulation for technology developments in artificial intelligence and robotics can be seen as an important yet structurally neglected field regarding the human perspective on increasing automatization. This point was underlined in 2017 by a European Parliament report and a public consultation for the European Union, which indicated that a majority of citizens in Europe regard those developments as positive innovation fields, but with the need for further

omous decisions, feedback, and participation, as well as individualized and respectful communication of support and care. For acceptance and human-AI team-building, as well as proactive use of AI, digital devices and automatized robots must be designed to support humans, not to control or direct them. Thus, the preparation and participation of the human workforce in combination with such applications as human-computer interaction (HCI) is an important issue for individuals regarding the acceptance and use of AI, for unions, politics, and regulation, as well as businesses, in order to retain competitiveness and design positive impacts. Furthermore, regulation issues require local, regional, national, and European actors to address standardization, safety, and trust issues for the public, as well as the European workforce in transportation and logistics. All societal groups and representatives are called on to help with this major task, as the world of work as well as general mobility will change significantly and will require structured guidance (Ruiner & Klumpp, 2018b).

As the aim of this article was to describe past, recent and future trends in digitalization and automatization against the background of regulation focusing on risks and opportunities of the digital transformation, it should be noted

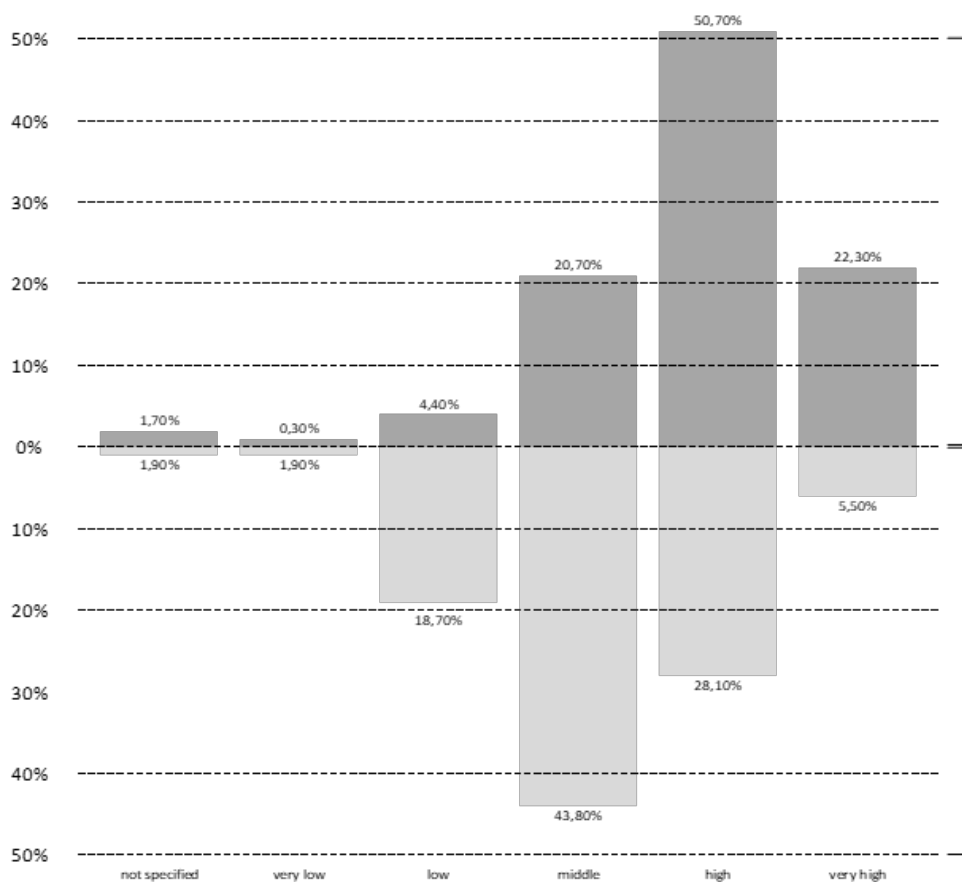


Figure 3. Comparison of risks and opportunities of digitalization
Source: Kersten, W.; Seiter, M.; von See, B.; Hackius, N.; Maurer, T. (2017)

that all related topics warrant further investigation. Moreover, sufficient attention and support must be given to exploring a detailed and sensible framework as well as operational solutions to process, collaboration, and regulation questions. Only if all factors, perspectives and dependencies have been thought through, planned, and taken into account by all relevant stakeholders will digitalization and automatization be able to help the transportation, supply chain management and logistics sector achieve higher efficiency built on trustful, secure, and motivated human perception.

References

- Bauernhansl, T., ten Hompel, M., Vogel-Heuser, B. (2014). Industrie 4.0 in Produktion, Automatisierung und Logistik: Anwendung · Technologien · Migration.
- Ruiner, C.; Klumpp, M. (2018a). 2018 Workshop at Florence School of Regulation (EUI), <http://clubofflorence.org/?p=20>, accessed 1 May 2018.
- Ruiner, C.; Klumpp, M. (2018b). Results, <http://clubofflorence.org/?p=61>, accessed 1 May 2018.
- Heistermann, F., Mollé, T., ten Hompel, M., Bundesvereinigung Logistik (BVL) e. V. (Ed.) (2017). Digitalisierung in der Logistik, BVL Positionspapier. p. 9–15.
- Kersten, W.; Seiter, M.; von See, B.; Hackius, N.; Maurer, T., Bundesvereinigung Logistik (BVL) e. V. (Ed.) (2017). Trends und Strategien in Logistik und Supply Chain Management – Chancen der digitalen Transformation. p. 9–24.
- Mesh-Net Limited (2017). What is the Internet of Things (IoT)?, <https://www.mesh-net.co.uk/what-is-the-internet-of-things-iot/>, accessed 26 April 2018.
- Otto, B. et al., Fraunhofer-Gesellschaft e. V. (Ed.): Digitale Souveränität. Beitrag des Industrial Data Space. p. 8–11.