

20

Digital design of intralogistics systems: Flexible and agile solutions to short-cyclic fluctuations

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INNOVATIONSLABOR
Hybride Dienstleistungen
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In times of fast-paced, fluctuating and individual markets, intralogistics systems, such as warehouses, have to adapt to the resulting volatile performance demands dynamically. Hybrid systems, in which humans and machines work together efficiently and communicate in socio-technical networks, can be the answer to manage these high-frequency markets. Hybrid systems of the future need to adapt frequently and permanent change becomes the "new normal". A one-time planning of warehousing systems upon first installation becomes obsolete. This results in the question of how to design and implement processes for future logistics systems in an agile way in order to exploit the flexibility potential of hybrid services, which represent an interface between man, machine and organization. As part of the Innovation Lab Hybrid Services in Logistics in Dortmund, Germany, a research project funded by the German Federal Ministry of Education and Research, this research proposes a new concept for digital design of intralogistics systems that is meeting the requirements of a continuous, short-cycle adjustment following the Industry 4.0 development path.

INTRODUCTION

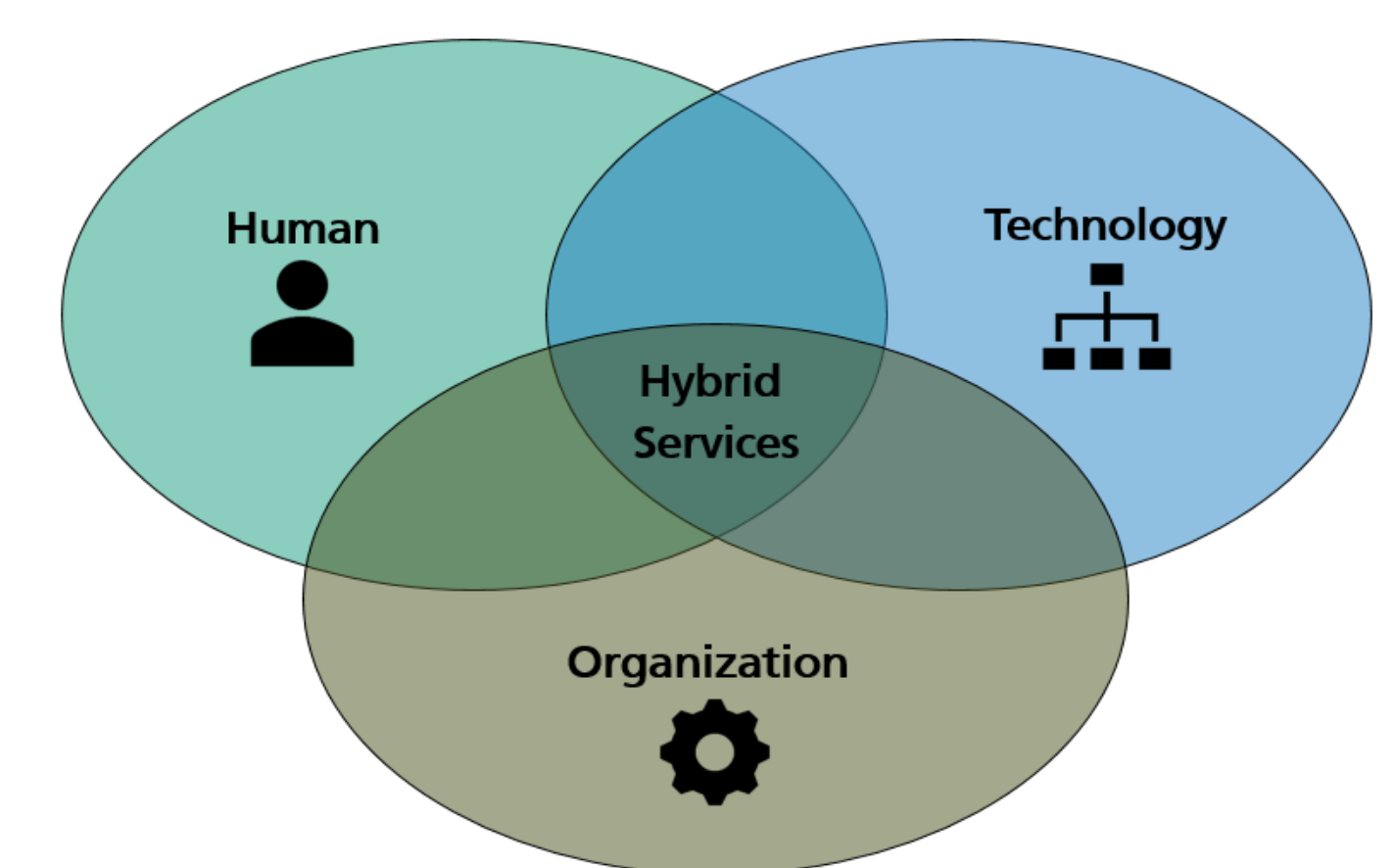
State of the Art

- Currently there is no universal solution for digital warehouse design
- Mainly level-based approaches to warehouse design can be found in the German research community
- The English-speaking literature shows a focus on mathematical optimization models for isolated problems
- Seldom the interaction between humans and machines or the operators experience and knowledge are (formally) involved in the design process

Research Questions

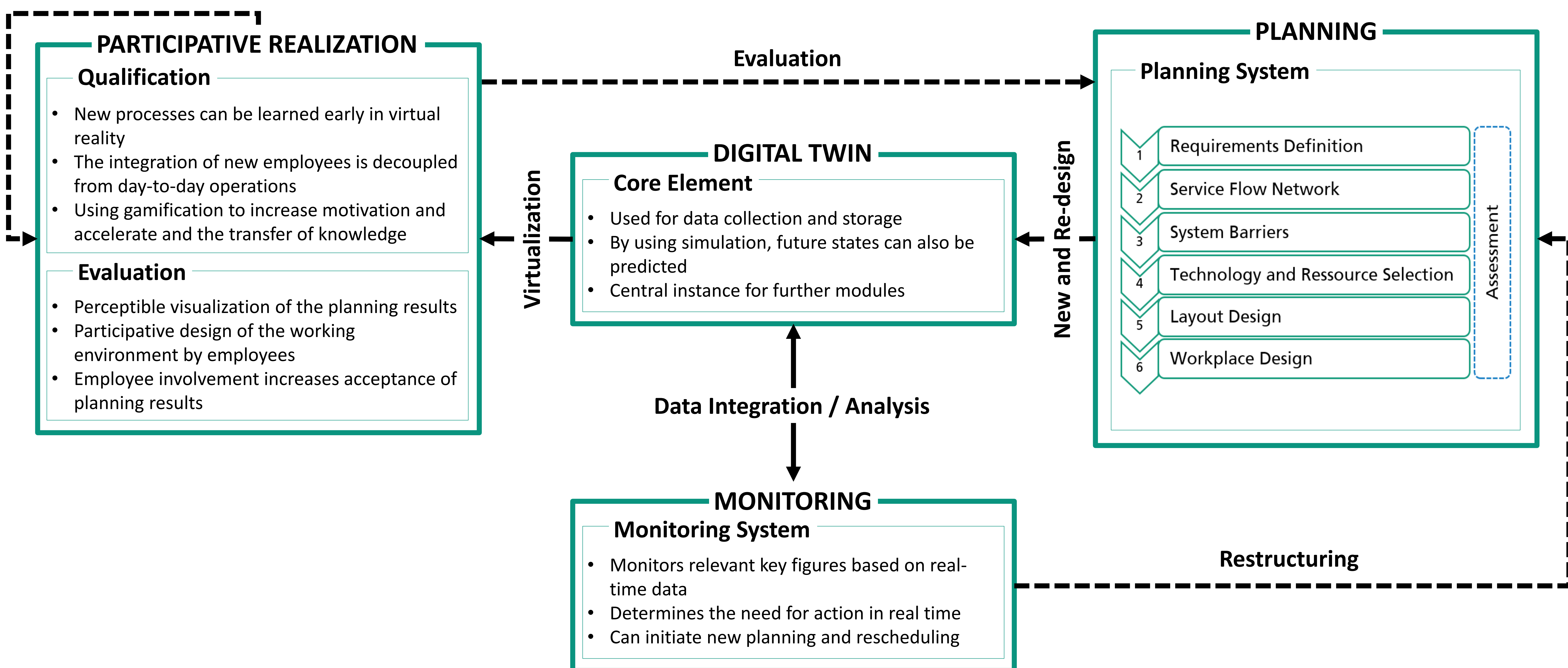
- RQ1: Which planning steps are necessary in digital design in order to be able to realize continuous and short-cycle adjustments in intralogistics systems?
- RQ2: What role do planner and operator play in hybrid systems and how can their knowledge be incorporated into intralogistics planning processes?

Parts of Hybrid Services



DIGITAL DESIGN

Training



SUMMARY & OUTLOOK

- The concept of digital design makes planning of scalable intralogistics systems possible and meets the requirements of fast-paced individual markets
- The concept aims at designing and re-designing constantly changing systems and enabling employees to adapt to new systems more easily
- New technologies, e. g. Virtual Reality, offer new opportunities for evaluating systems and learning new processes
- The concept accelerates the acceptance and introduction of new technical solutions in the era of industry 4.0

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