DIGITAL TWINS FOR SMART SYSTEMS

prof. dr. sc. Ivana Semanjski / Ghent University, Belgium / October 5th, 2021

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FLANDERS MAKE

AURORA

IARIA

The Tenth International Conference on Data Analytics
DATA ANALYTICS 2021
October 03, 2021 to October 07, 2021 - Barcelona, Spain

IVANA SEMANJSKI

Faculty of Engineering and Architecture, ISyE, Ghent University, Belgium

Research interests: Smart systems, Smart mobility, Digital twins & Big data analytics

Some of recent publications:

I. Semanjski: " **Smart Urban Mobility Transport Planning in the Age of Big Data and Digital Twins**", Elsevier Science Book, ISBN: 9780128207178

D.e Gillis, M. Petri, A. Pratelli, I. Semanjski and S. Semanjski

Urban Air Mobility: A State of Art Analysis,

(2021) Computational Science and Its Applications – ICCSA 2021. In Lecture Notes in Computer Science

J. Rodriguez Echeverría, I. Semanjski) , C. Van Gheluwe, D. Ochoa, H. IJben and S. Gautama

Density-based spatial clustering and ordering points approach for characterizations of tourist behaviour

(2020) ISPRS INTERNATIONAL JOURNAL OF GEO-INFORMATION. 9(11).

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MEET OUR DEPARTMENT

DEPARTMENT OF INDUSTRIAL SYSTEMS ENGINEERING AND PRODUCT DESIGN

8 professors, 50 + researchers

EDUCATION
- Master of Science in Industrial Engineering & Operations Research
- Master of Science in Industrial Design Engineering Technology
- Master of Science in Electrical Engineering Technology
- Postgraduaat Bedrijfskundig Ingenieur - BIR

RESEARCH
- Supply Networks & Logistics Research Center
- Integrated Production and Maintenance Planning & Scheduling
- Cyclic Inventory Routing Problem (CIRP)
- Lean Enterprise Research Center
- Center of eXcellence in industrial automation Kortrijk (XiaK)
- Industrial Design Center (IDC)

CONTENTS

INTELLIGENT VS SMART

Intelligent system - a system with an embedded, Internet-connected processor that has the capacity to gather data and communicate with other systems

Smart systems – a responsive system that incorporates functions of sensing, actuation, and control to describe and analyse a situation, preform predictive analytics, supports decision making and act in an adaptive manner by the use of the most efficient means, often involving the use of innovative technology
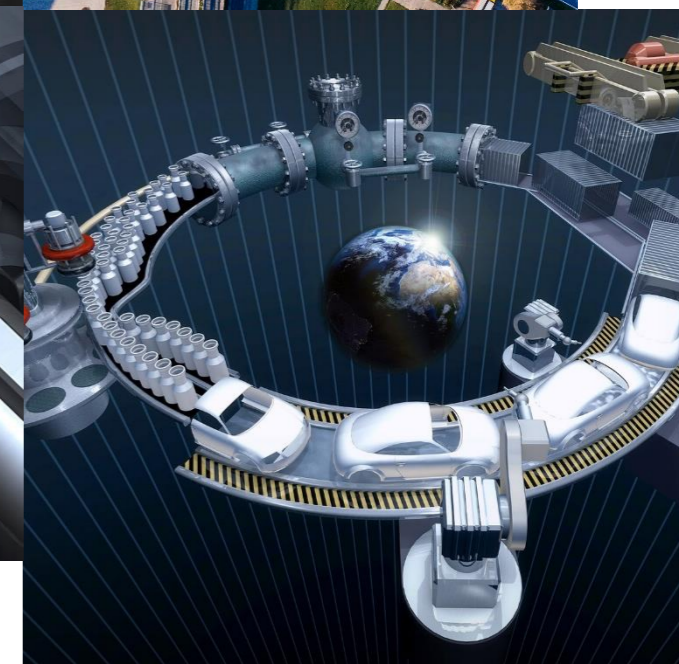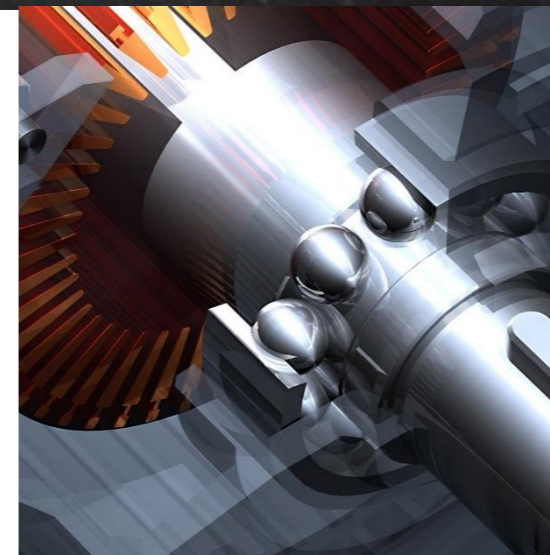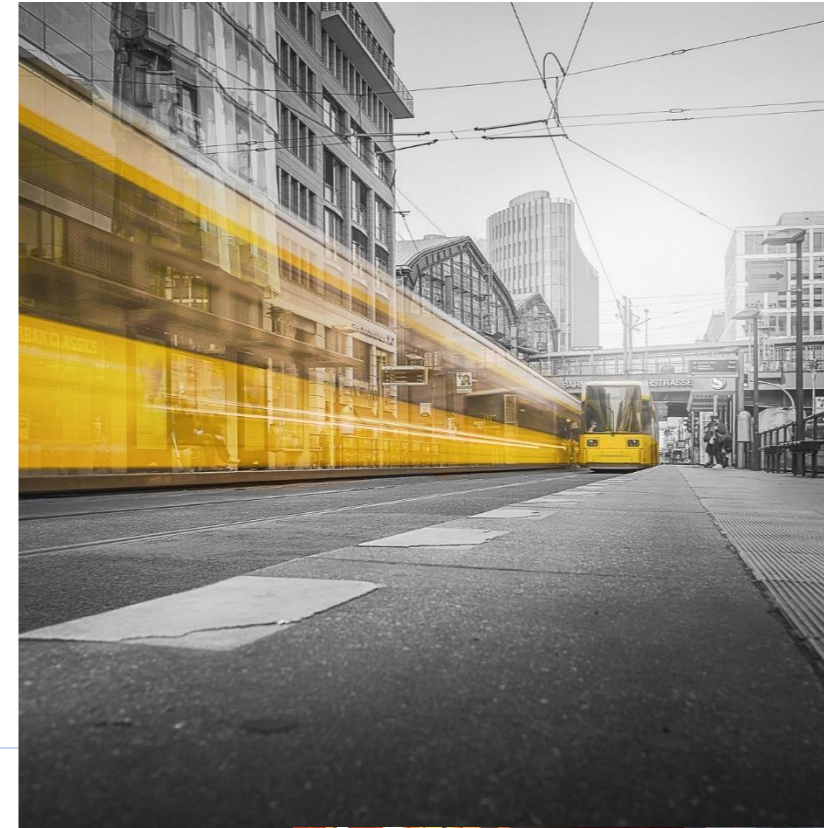
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SMART URBAN MOBILITY

Ivana Cavar Semanjski

Smart Urban Mobility

Transport Planning in the Age of
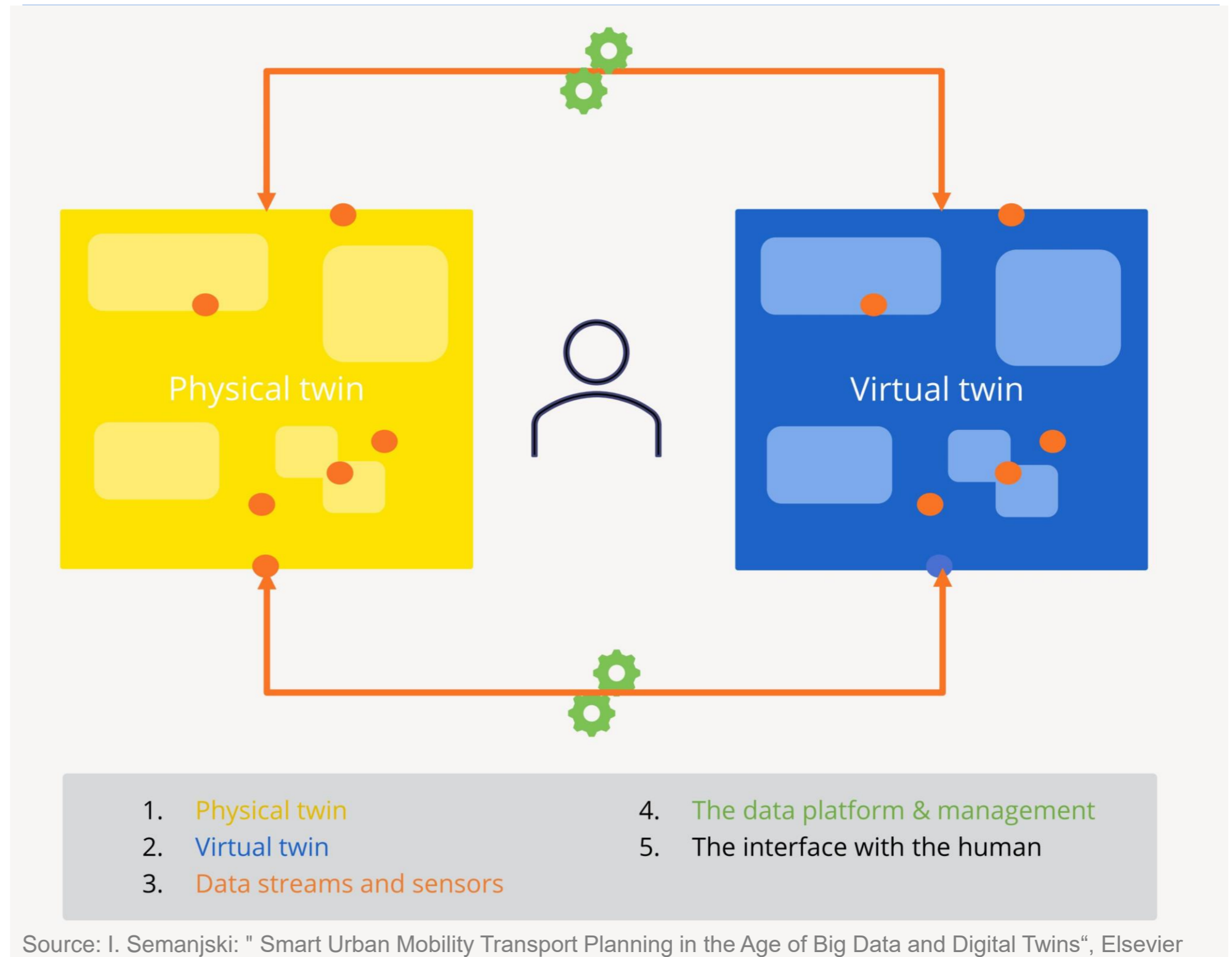Big Data and Digital Twins

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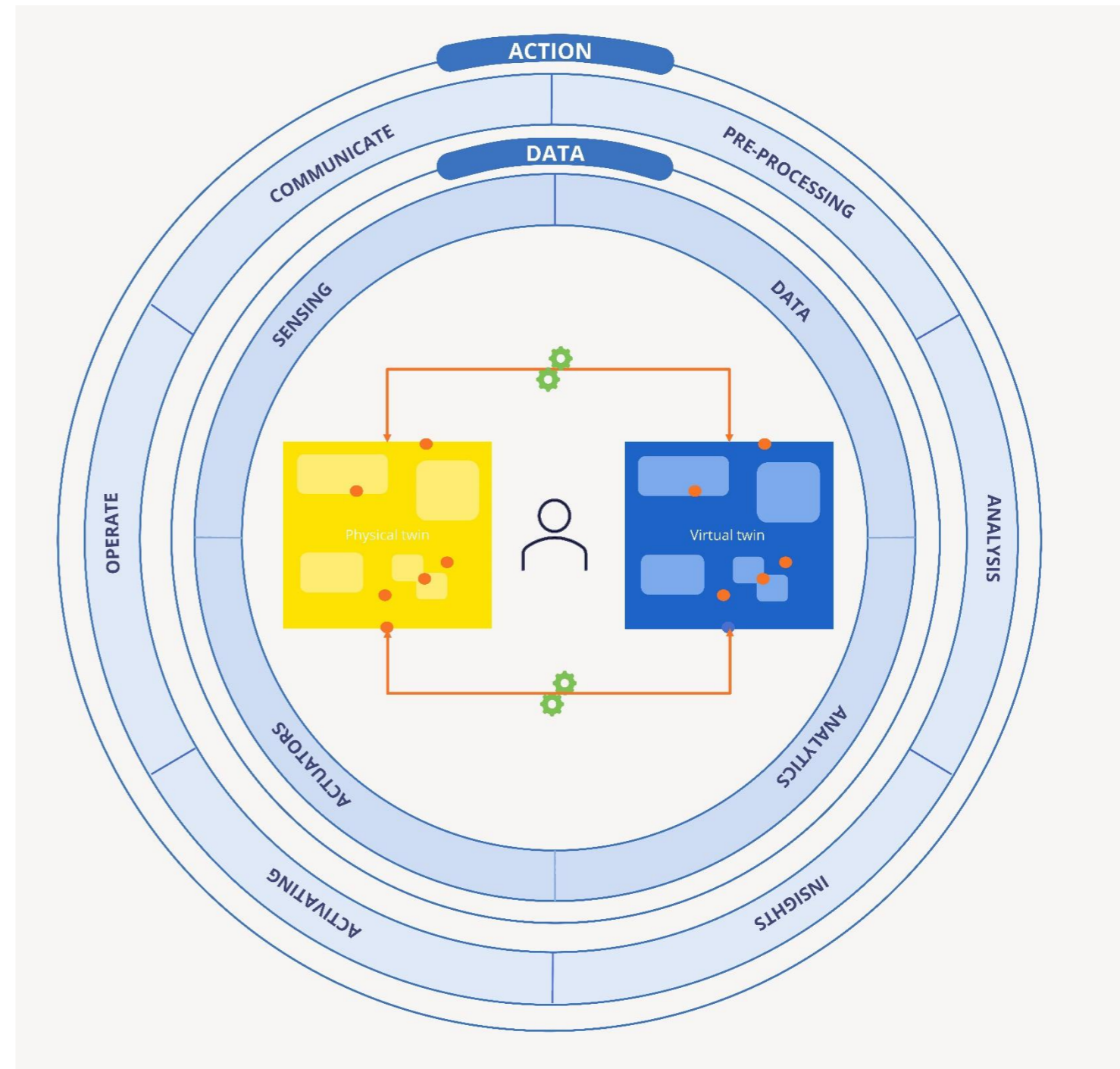UNIVERSITY

DIGITAL TWIN CONCEPTS
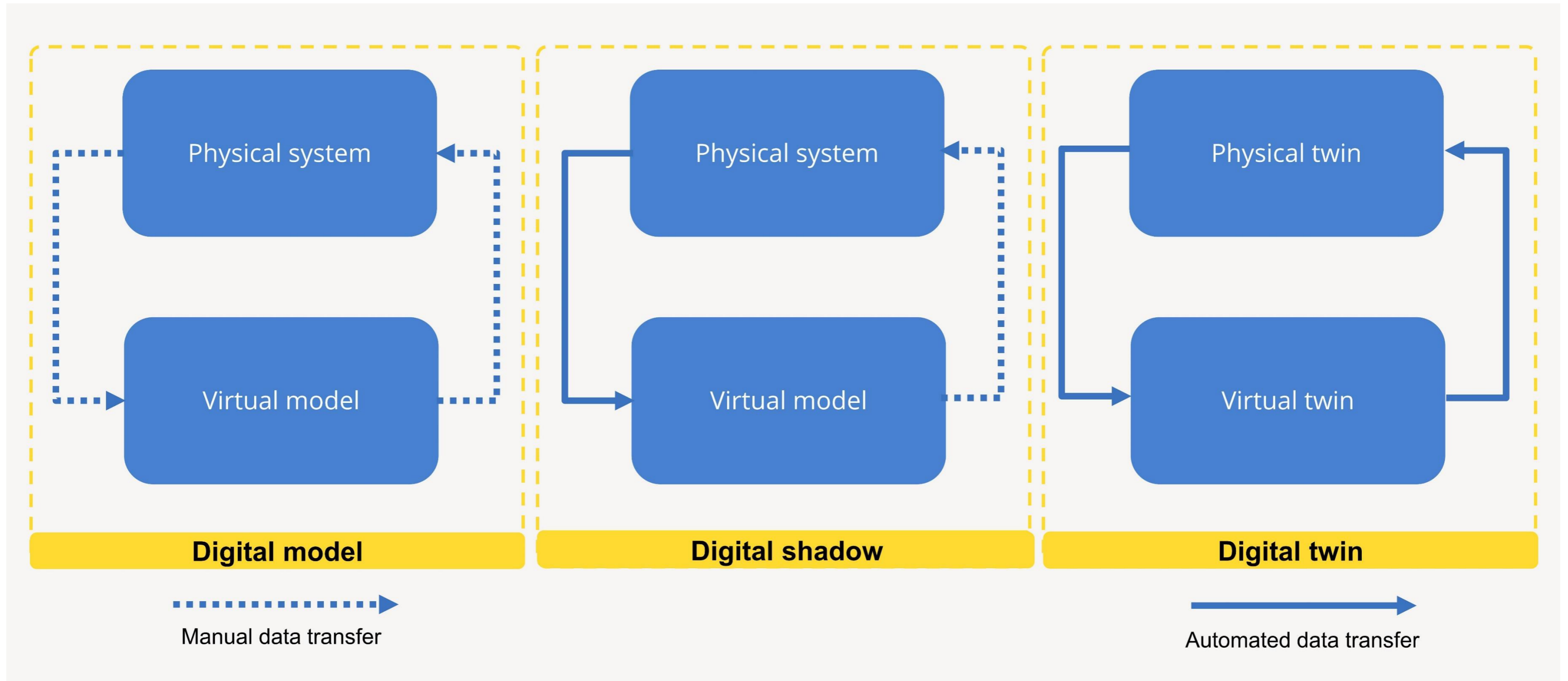
Based on: W. Kritzinger, M. Karner, G. Traar, J. Henjes, W. Sihn, Digital Twin in manufacturing: A categorical literature review and classification, IFAC-PapersOnLine, Volume 51, Issue 11, 2018.

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DIGITAL TWIN COMPONENTS

1. Physical twin
2. Virtual twin
3. Data streams and sensors
4. The data platform & management
5. The interface with the human

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DIGITAL TWIN ECOSYSTEM

Source: I. Semanjski: " Smart Urban Mobility Transport Planning in the Age of Big Data and Digital Twins", Elsevier Science Book, ISBN: 9780128207178

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DIGITAL TWIN APPLICATIONS

MOST FREQUENT DIGITAL TWIN APPLICATIONS

Most frequent digital twin applications
throughout design, build (development),
and operations stages:

- ▶ Personalized production
- ▶ Assembly assistance
- ▶ Decision support (smart cities, operators, etc.)
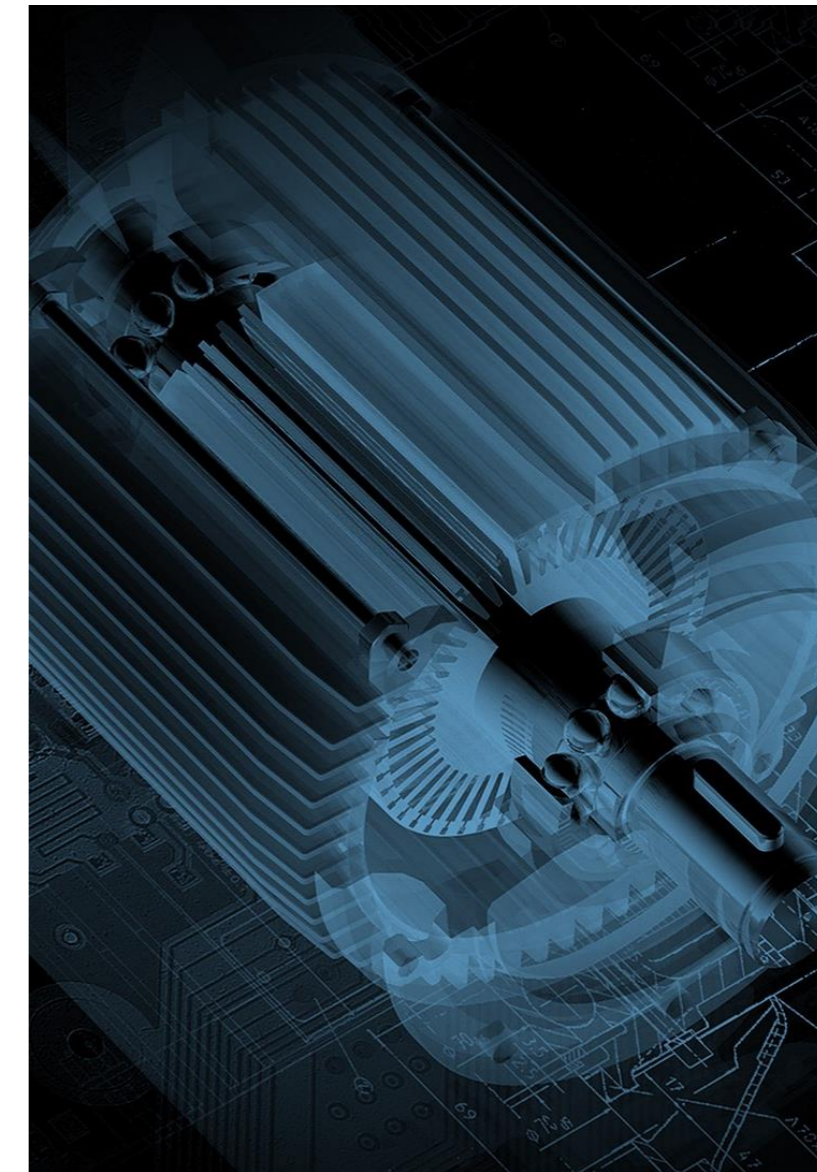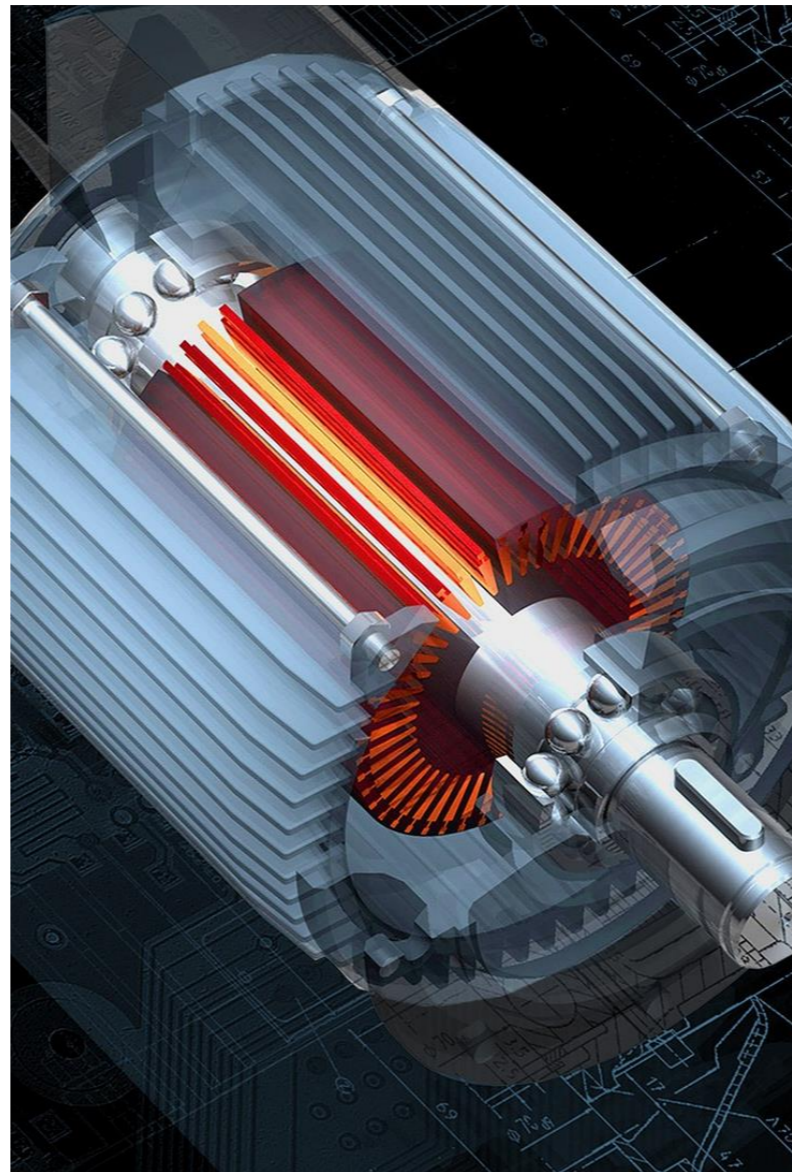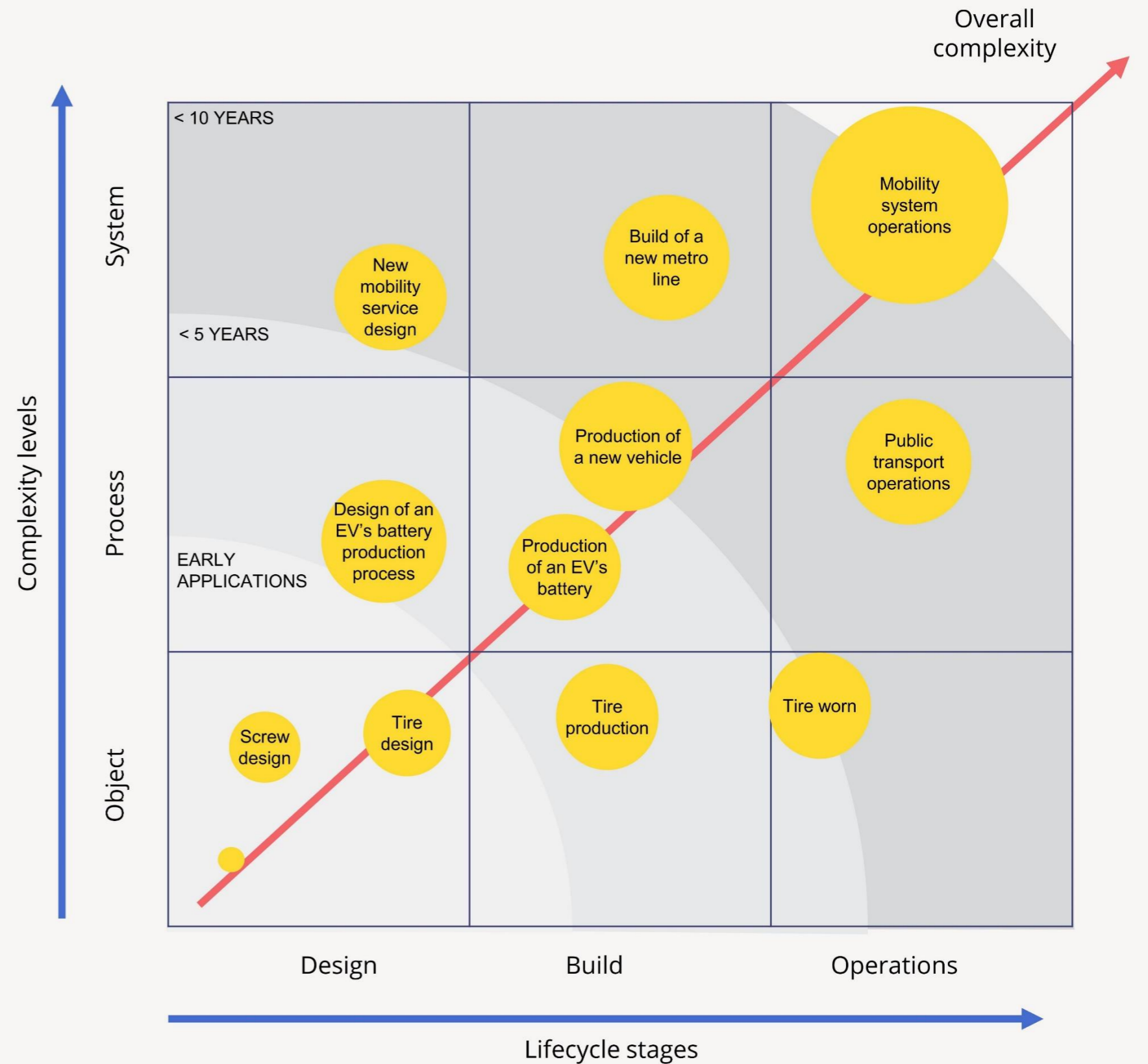- ▶ Predictive maintenance

Photo credits: Pixabay

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DIGITAL TWIN COMPLEXITIES AND TIME HORIZON

Source: I. Semanjski: " Smart Urban Mobility Transport Planning in the Age of Big Data and Digital Twins", Elsevier Science Book, ISBN: 9780128207178

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KEY CHALLENGES

- Analitics and responsivness in due time
- System level digital twins
- System of systems twining

Ivana Semanjski

DEPARTMENT OF INDUSTRIAL SYSTEMS
ENGINEERING AND PRODUCT DESIGN

E   ivana.Semanjski@ugent.be
T   +32 9 264 55 02

www.ugent.be

Universiteit Gent

@ugent

@ugent

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