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Example

FLORIAN ALLWEIN

A FRAMEWORK FOR DIGITAL BUSINESS PROCESSES

Venice, Jul 8, 2025

AGENDA

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WHERE I COME FROM

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- Professor in Digital Transformation at IU
- Background: arts/ social sciences
- PhD in **Information Systems** at LSE
- Department of Management
- qualitative data, interpretivist, critical,

  …

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INTRODUCTION: THE PROBLEM

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What is data, what is information?

WHY DOES IT MATTER?

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- As society and businesses are changing due to digital transformation, traditional, analogue business processes need to be rethought and re-built.
- Information Systems research aims to support decision-makers in organizations in practice
- Lack of conceptual clarity making it harder to apply its recommendations.
- E.g. terminology: no agreed-on definitions for central terms like "information" and "data" – would be helpful for organizations aiming to digitalize analogue processes.
- **What do we digitalize? How?**

RESEARCH QUESTIONS

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1. How can data and information be conceptualized?
2. What happens to them in the process of digitalization?

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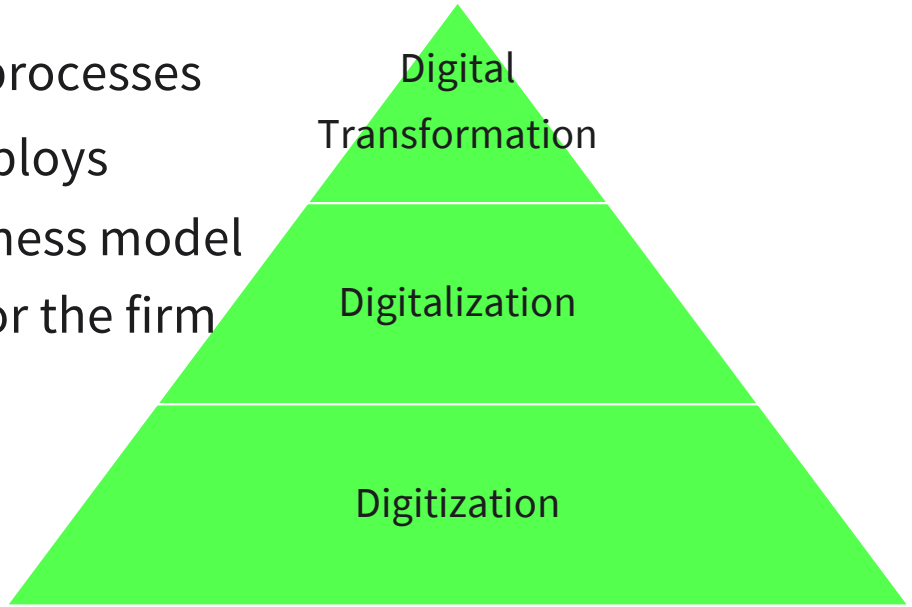
THEORETICAL BACKGROUND

DIGITALIZATION, DIGITAL TRANSFORMATION

Verhoef et al. 2021:

- **Digitization**: encoding of analog information into a digital format
- **Digitalization**: using IT to alter existing business processes
- **Digital transformation**: change in how a firm employs digital technologies, to develop a new digital business model that helps to create and appropriate more value for the firm



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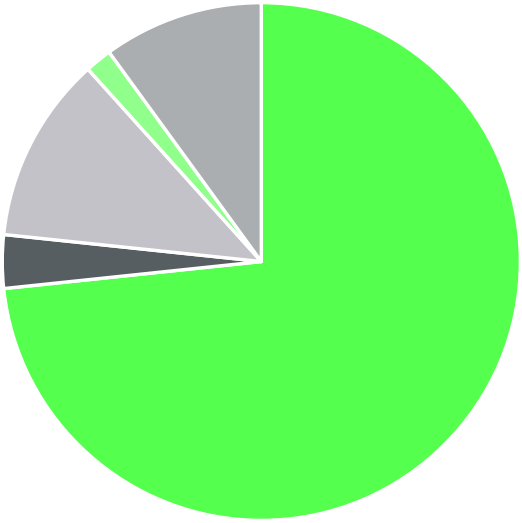
“Digital transformation affects the whole company and its ways of doing business (…) and goes beyond digitalization – the changing of simple organizational processes and tasks ” (Verhoef et al.)

→ having digital data available is necessary to reconsider business processes and business models!

DATA, INFORMATION

- Shannon 1948: establishes the field of **information theory**
- But: concerned with efficient transmission of information, not with its **meaning**
- McKinney & Yoos (2010): 4 views of **information**
  - **Token**: information and data are both tokens manipulated by processes. Most common (**73%**)
  - **Syntax**: information is the measureable relationship among tokens that reduces entropy
  - **Representation**: information is meaning
  - **Adaptation**: information is created when a system perceives differences in its environment which alter that system

Lack of conceptual clarity?



Usage of the views (McKinney&Yoos 2010)

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What happens in digitalization?

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THE FRAMEWORK

HOW?

- Allwein, F. (2025). Wie kann die Digitale Transformation voraussagende Instandhaltung unterstützen? Veränderungen, Konsequenzen, Modelle (in press). In M. Eifler, M. Nawito, & M. Venschott (Eds.), *Predictive Maintenance: Innovationen, Anwendungen und Herausforderungen in der industriellen Praxis*. Springer Gabler.
- Digital Transformation similar to Predictive Maintenance:
  - Observing facts of the world
  - Digitizing
  - Making decisions
  - Affecting facts

FRAMEWORK: DIGITALIZATION OF (BUSINESS) PROCESSES

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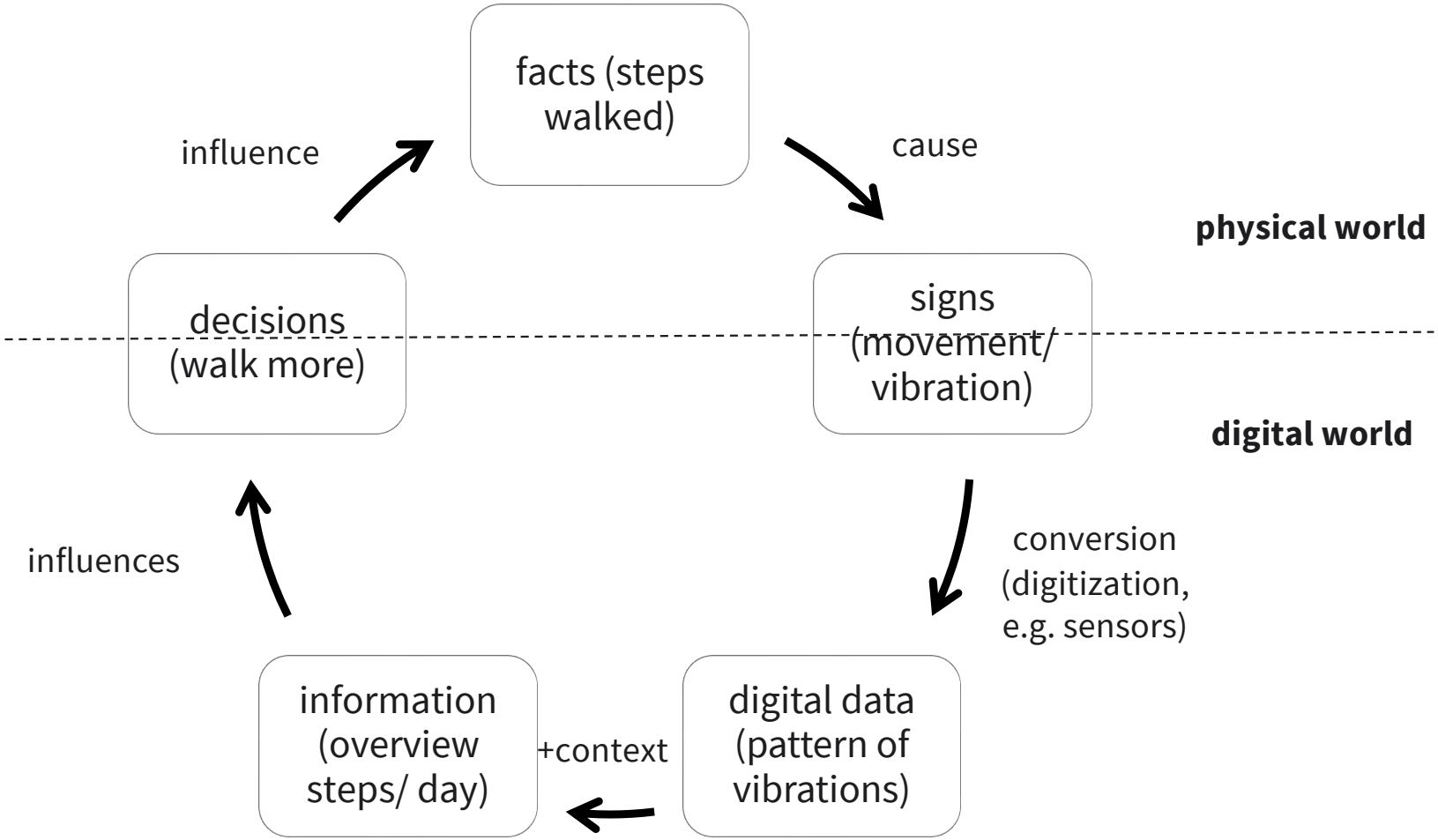

e.g. step counter in smart watch

DUE TO DIGITAL TRANSFORMATION, WE HAVE…

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- Much more data available (new sensors, data sources…)
- Virtually unlimited storage capacity
- Ability to analyze data in real time

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EXAMPLE: PREDICTIVE MAINTENANCE

PREDICTIVE MAINTENANCE

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Mobley 2002:

> "The common premise of predictive maintenance is that **regular monitoring** of the **actual mechanical condition**, operating efficiency, and other **indicators of the operating condition** of machine-trains and process systems will provide **the data required** to **ensure the maximum interval between repairs** and minimize the number and cost of unscheduled outages created by machine-train failures"

(p. 4, my emphases)

SMARTPHONES TO MONITOR RAILWAY TRACKS

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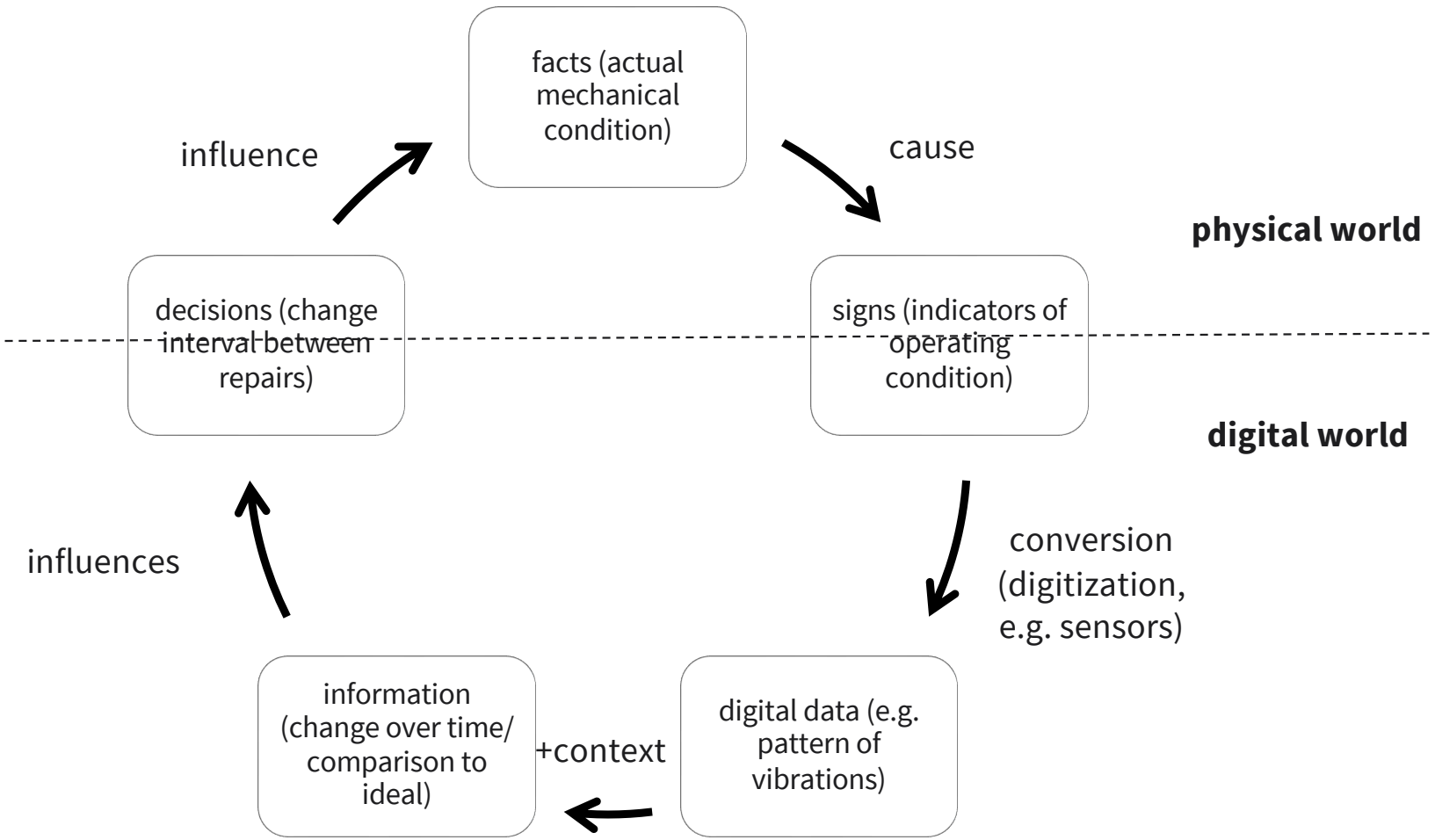

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CONSEQUENCES

SO WHAT?

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1) RQ1: How can data and information be conceptualized?

- Data, or specifically **digital data**, can be defined as **digital representations of signs in the physical world**, which in turn represent facts of the physical world.
  - Facts: variables of interest in the physical word – monitored/ modified
  - some measurable signs representing these facts need to be identified. If these signs are not digital, a way to digitize them has to be found.
- **Information**, on the other hand, is defined as **views of specific digital data, enriched by relevant context**, that serve to support specific decisions either by humans or automated systems.

SO WHAT?

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RQ2: What happens to data and information in the process of digitalization?

- In the process of digitalization, relevant facts of the world are identified.
- Next, measurable signs relating to these facts are identified.
- These signs are then digitalized, i.e., converted into digital data if needed.
- The digital data is then enhanced with context and presented in a way that is useful for supporting decisions, i.e., it is turned into information.
- This information is then presented in a way that can support decisions, either by humans or automated systems.

So what?

RECOMMENDATIONS

Identify relevant signs

- E.g. supermarkets analyzing customer numbers by installing cameras to count customers' feet as they enter the store
- Stores analyzing customers' buying history (e.g. detecting if a customer is pregnant)

Consider UX and interaction design

- Present only the right information, in an easily actionable way
- Consider which (external) data sources to use (weather, maps, …)

Evaluate automatization options

- processes should be automated as far as possible
- e.g. apps automatically recognize typical exercise.
- Decisions should be automated as well: RPA/ tools like Microsoft Copilot also for smaller organizations

Researchers: Apply this framework to analyze other (business) processes

REFERENCES

- F. Allwein, “Wie kann die Digitale Transformation voraussagende Instandhaltung unterstützen?” [How can Digital Transformation support Predictive Maintenance?] in Predictive Maintenance: Innovationen, Anwendungen und Herausforderungen in der industriellen Praxis [Predictive Maintenance: Innovations, Applications and Challenges in Industrial Practice], M. Eifler, M. Nawito, and M. Venschott, Eds., Springer Gabler, 2025, in press.
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- C. E. Shannon, “A Mathematical Theory of Communication,” Bell System Technical Journal, vol. 27, no. 3, pp. 379–423, Jul. 1948, doi: 10.1002/j.1538-7305.1948.tb01338.x.
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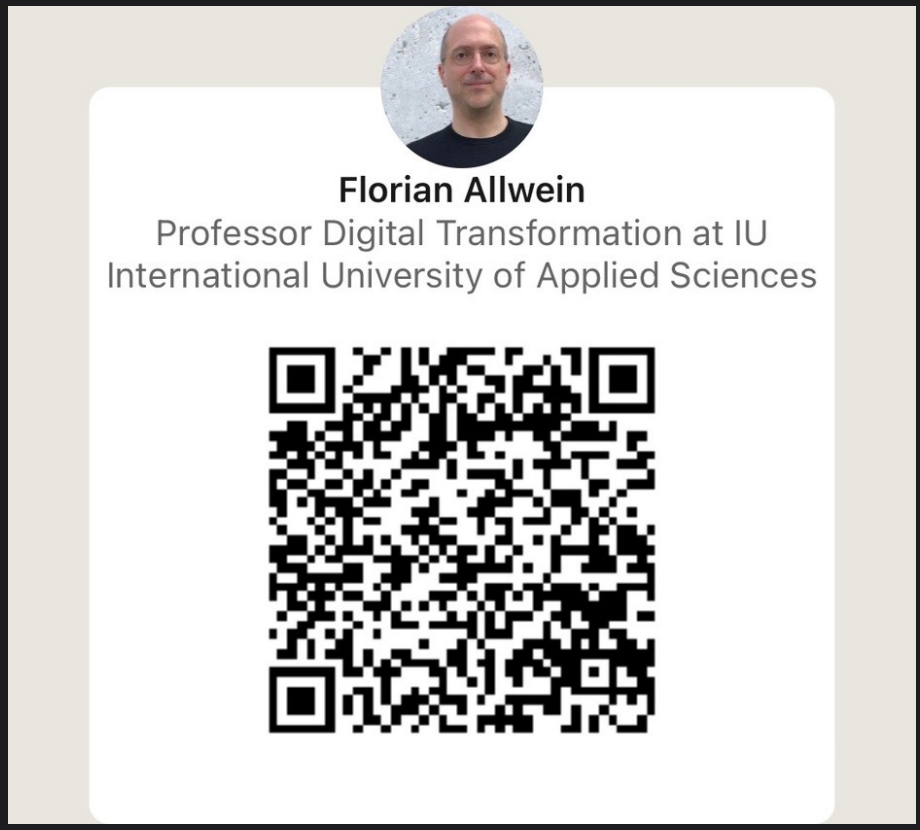
THANK YOU



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Q & A