Design for change

Erik Perjons

DSV, Stockholm University

(https://people.dsv.su.se/~perjons/designforchange/)

Understanding change – Structural coupling

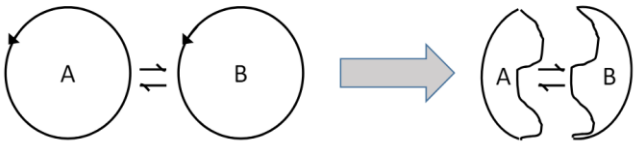
Structural coupling

- The **idea of structural coupling** is relatively simple; it suggests that a **complex system adjusts its structure to the structure of the environment** in which it operates
- The **adjustment** comes from the **constant interaction** between the system and its environment.
- Moreover, **during the system evolution** in the given environment, **some elements of the environment - and the interaction with them - become more important than others** for the system at hand

(Maturana, H. (2002). Autopoiesis, structural coupling and cognition: a history of these and other notions in the biology of cognition. *Cybernetics & human knowing*, *9*(3-4), 5-34.)

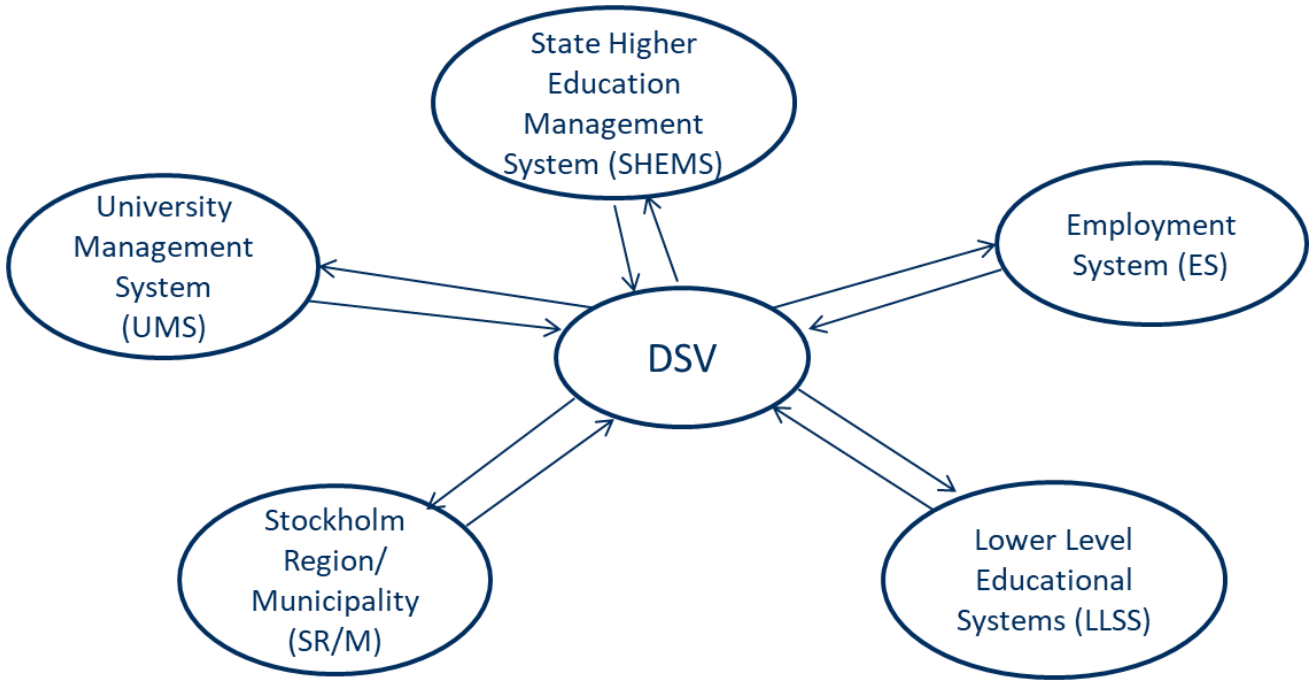
Structural coupling

- **An elements of the environment can also be seen as a system**, meaning, **it also adjust its structures** when interacting with other systems
- This creates an **interdependency between the two structurally coupled systems**
- **The coupling might not be symmetrical, i.e., one system may dominate the other**, making it more likely that the latter would change as a reaction on changes in the former



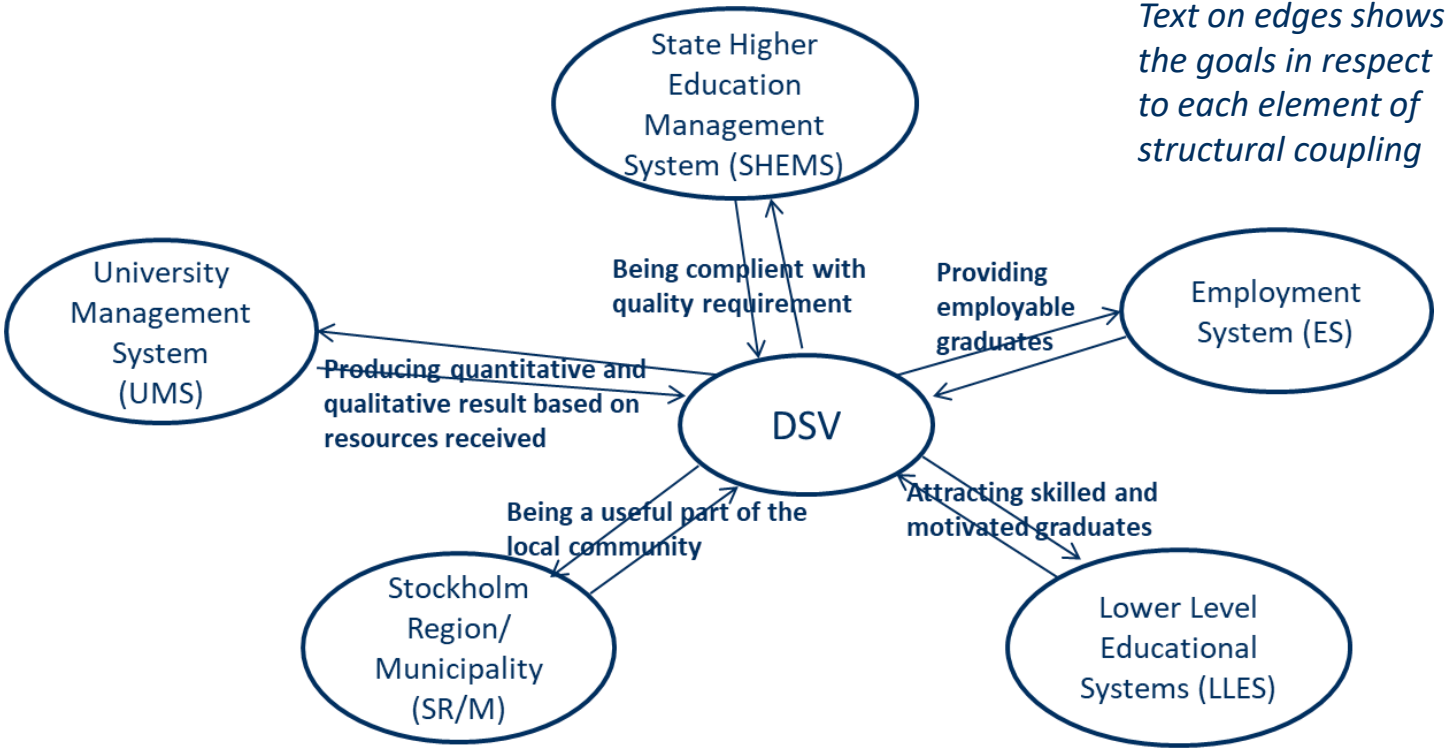
(Maturana, H. (2002). Autopoiesis, structural coupling and cognition: a history of these and other notions in the biology of cognition. *Cybernetics & human knowing*, *9*(3-4), 5-34.)

Structural coupling



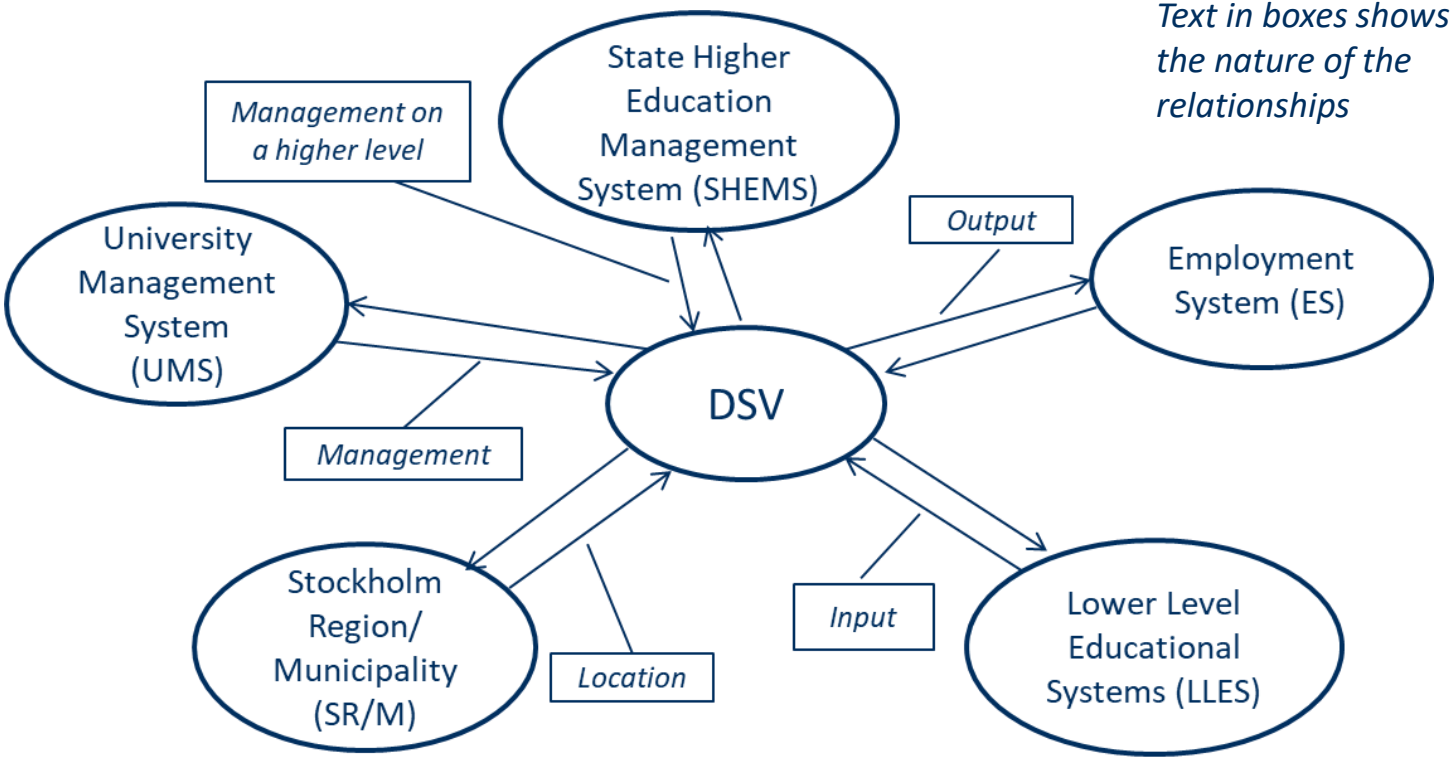
(Bider, I., & Perjons, E. (2018). Using structural coupling approach for defining and maintaining identity of an educational institution. Experience report. In *4th Workshop on Socio-Technical Perspective in IS development (STPIS'18), Tallinn, Estonia, June 12, 2018* (pp. 24-39). CEUR-WS. org)

Structural coupling



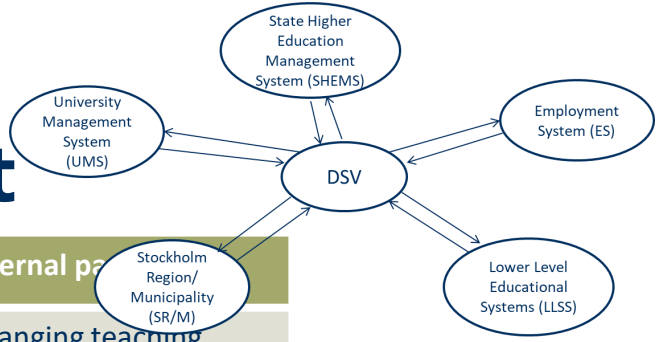
Text on edges shows the goals in respect to each element of structural coupling

Structural coupling



Text in boxes shows the nature of the relationships

Changes in the enviroment



Changes in structural couplings	Internal actions	Affected internal pa
Less students due to demographic dip at the end of 1990 + IT related boom (LLES)	Introducing international MS programs to enroll more students	Method: Changing teaching language to English
SHEMS inspection (2011) showed low quality of MS theses – this caused an existential threat to DSV	Introduction of a new process for BS amd MS theses courses	Method and Technical: A new process, new responsibilities and a new IT systems
Gradual decline (last 20 years) of the academic preparedness of students from LLES	Dealing with decreasing level of student's academic preparedness	Method and Technical: New teaching methods and (in some courses) new IT systems
Introducing Bolonga process recommendation (UMS, ES)	Bachelor program went from 4 to 3 year, while master program from 1 to 2 years	Management: Reducing number of BSc courses, while remaining relevant to ES
Distance education: Uncouple from SM/R + outreach to LLES students that cannot temporary change location	Introducing distance MS programs	Method and Technical: New teaching methods and new IT systems

Question

- What is the goal of the change?
- Which are the important elements/system in the environment impacted by the change?
- How will the change impacts the elements/systems in the environment – that is, the structural couplings?

Maintaining identity

- **The goal of our research on structural coupling** was to develop a model that could help an institution to **make informed decision to maintain or change its organizational identity**
- The approach was **based on the idea** that **maintaing or changing identity** are equal to **maintaing/changing structural couplings** to key elements in the environment
- Two ways of **investigating organizational identity** – **starting from inside** (e.g., mission/vision/policy statements) or **starting from outside** – how **external observers see the organisations**

(Hoverstadt, P.: Defining Identity by Structural Coupling in VSM Practice. In : UK Systems Society, Oxford (2010)

Viable System Model

System id	Naming
System 1	Operations – producing and delivery of products and services
System 2	Coordination – coordinating work of operation units
System 3	Control – managing operational units and establishing coordination mechanism
System 4	Intelligence, Future, Development – forward looking, identifying trends in the environment, preparing for change/development
System 5	Identity/Policy – solving conflicts between system 4 and 5, handling change/stability

(Beer, S. (1995). Brain of the Firm (Vol. 10). John Wiley & Sons)
(Hoverstadt, P. (2020). The viable system model. Systems approaches to making change: a practical guide, 89-138)
(Hoverstadt, P. (2009) *The fractal organization: Creating sustainable organizations with the viable system model*. John Wiley & Sons)

Stockholms universitet

Designing change – Design Thinking, Design Science, Practice Research

Stockholms universitet

Design thinking

Defining Design Thinking

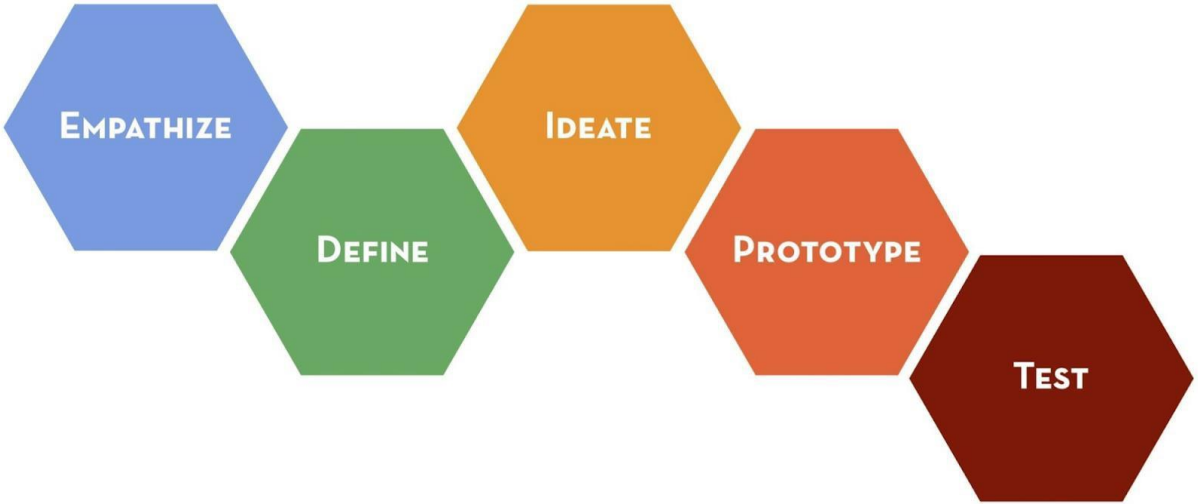
- “What is design thinking? It means stepping back from the immediate issue and taking a broader look. It requires systems thinking: realizing that any problem is part of a larger whole, and that the solution is likely to require understanding the entire system.” (Don Norman)

(Don Norman, founder of Design Lab, University of California, https://jnd.org/design_thinking_a_useful_myth/)

Three design thinking methods

- Stanford Design School (d.school)
- IDEO
- Double Diamond

Method from d.school



[https://dschool.stanford.edu]

Method from d.school

- **Empathize - examine users' needs.**
  - This activity aims to create an **empathic understanding** of the **needs of the users**
  - The designer should here try to put aside their own assumptions and opinions and instead **familiarize themselves with the users' practice, needs and experiences**
- **Define - formulate users 'needs and problems**
  - This activity aims to **define and formulate users' needs as clearly as possible**, based on the information collected during the empathy activity.
  - The **needs and problems must be expressed** from the **users' perspective**.

[https://dschool.stanford.edu]

Method from d.school

Stockholms universitet

- **Ideate (idea generation) - challenge assumptions and create ideas**
  - This activity aims to **generate ideas that can form the basis for a solution to the needs and problems identified**
  - The designer must be prepared to **"think outside the box",** look for alternative ways of looking at the problems, and identify innovative solutions.
- **Prototype - start creating solutions**
  - This is an experimental activity and the purpose is **to identify the best possible solutions** to the problems identified.
  - The designer **produces a number of cheap, scaled-down versions in the form of prototypes to concretize** and then investigate the solutions that have emerged during the idea generation.

[https://dschool.stanford.edu]

Method from d.school

- **Test (test) - test the solutions.**
  - This activity aims to carefully **test the best solutions (prototypes)** identified in the prototype activity. This is the last activity in the process, but **in an iterative process such as design thinking, the generated results are often used to redefine or identify additional problems.**
  - The designer can then choose to return to previous activities in the process to **make further iterations, changes and refinements.**

[https://dschool.stanford.edu]

Stockholms universitet

Design science

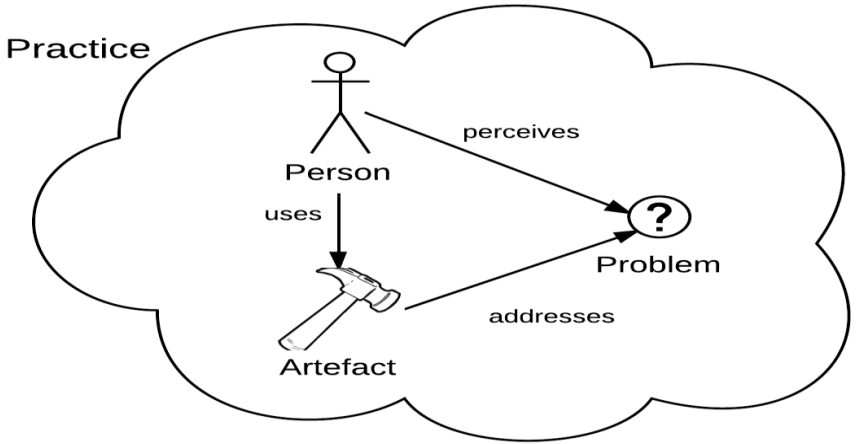
Positioning design science

Empirical science - aims at **describing and explaining the actual world**

Design science - aims at **improve and change the world** by developing and introducing **artefacts** in **practices**

Defining design science

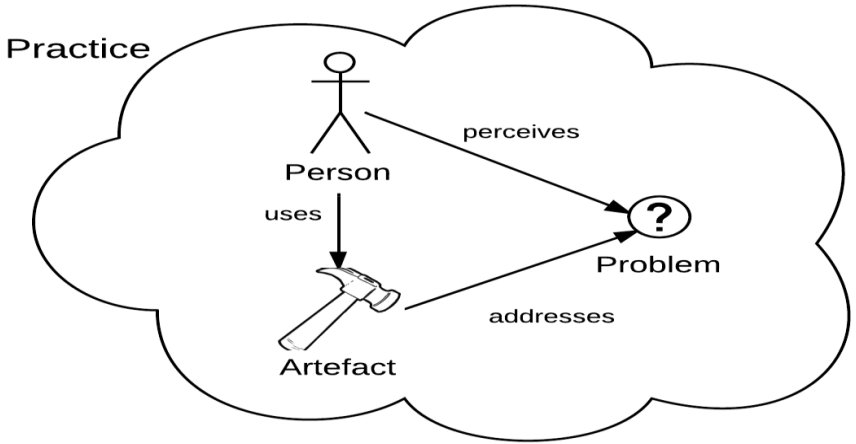
- ***Design science*** is the **scientific study and creation of artefacts** as they are **developed and used by people** with the goal of **solving practical problems** of **general interest**



(Johannesson, P., & Perjons, E. (2014, 2021). *An introduction to design science,* Cham: Springer)

Defining design science

- ***Design science*** is the **scientific study and creation of artefacts** as they are **developed and used by people** with the goal of **solving practical problems** of **general interest**

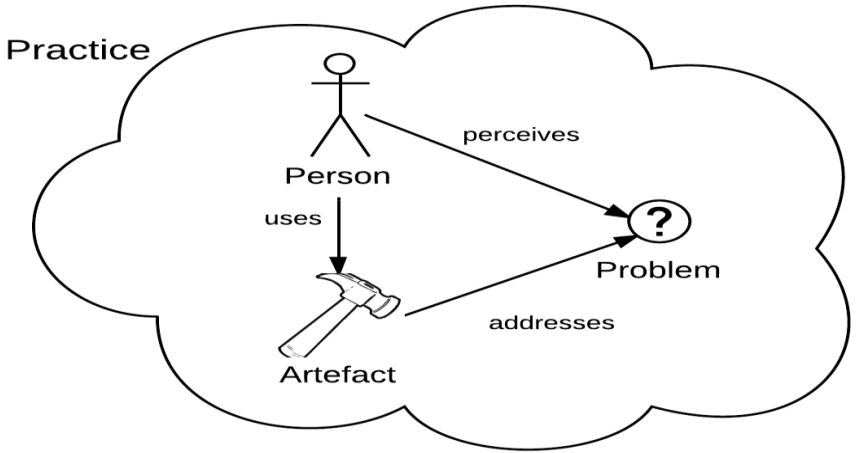


(Johannesson, P., & Perjons, E. (2014, 2021). *An introduction to design science,* Cham: Springer)

What is an artefact?

Defining artefact

- An ***artefact*** is an **object made by humans** with the intention to be **used to address a practical problem** in a **practice**



(Johannesson, P., & Perjons, E. (2014, 2021). *An introduction to design science,* Cham: Springer)

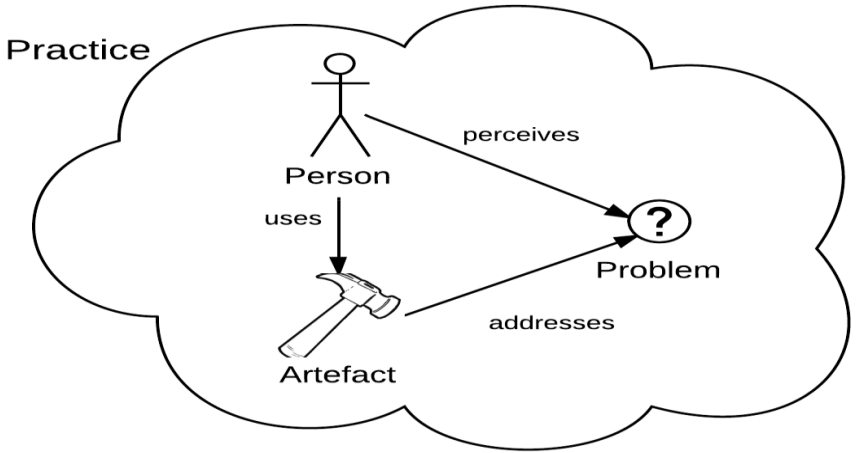
What is an artefact – more precisely?

Artefact types in information systems

- IT system
- Prototype of an IT system
- Algorithm
- Model
- Requirements
- Method
- Guidelines
- Notation (written symbols)
- Metrics (quantify measures)
- Patterns
- Socio-Technical system
- …

Defining artefact for a practice

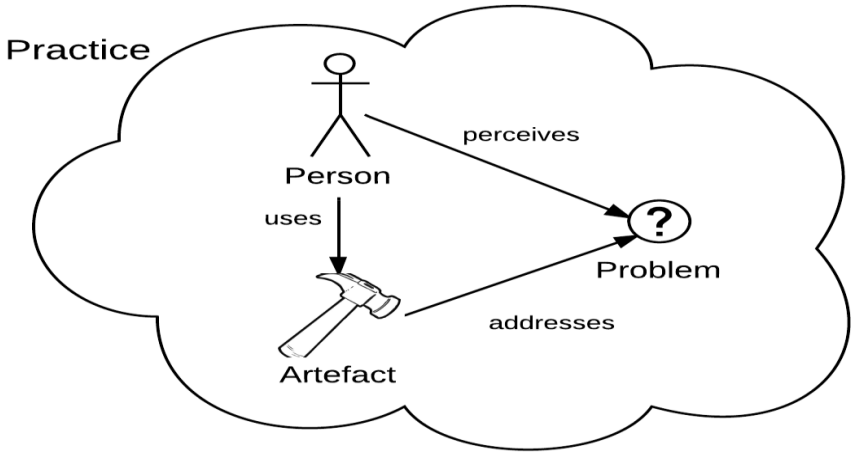
- An ***artefact*** is an object made by humans with the intention to be used to address a practical problem in a **practice**



What is a practice?

Defining practice

- A ***practice*** is a set of **human activities performed regularly** and seen as **meaningfully** related to each other by the people participating in them.



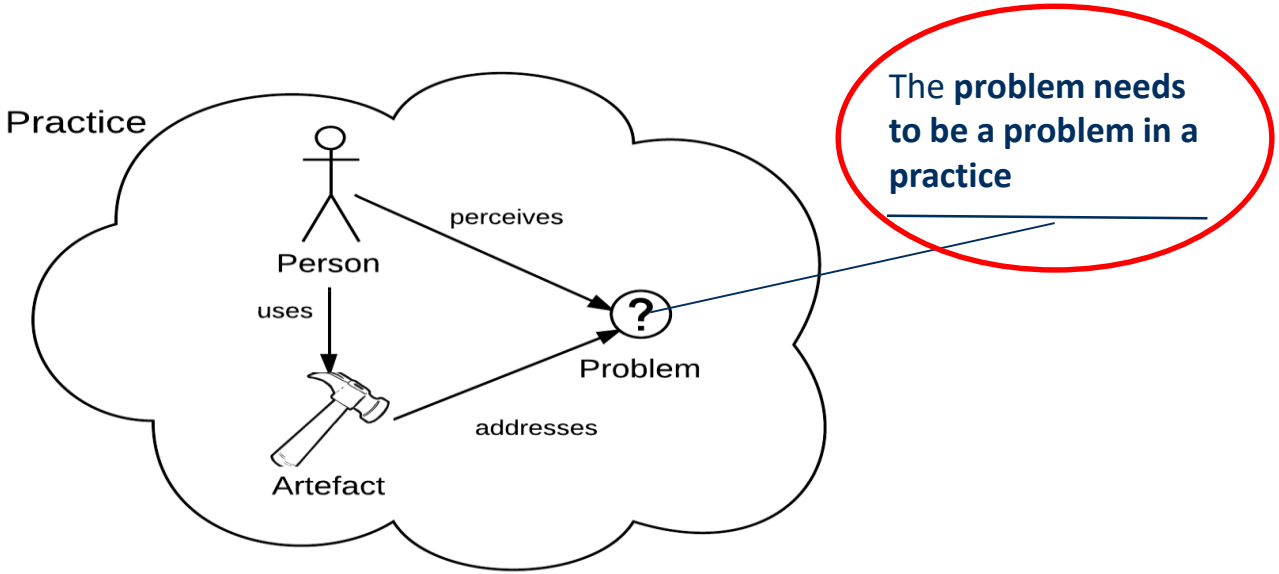
An example of a practice

- The **practice of dentists** is an example a practice
- **Dentist perform activities** such as cleaning teeth, drilling teeth, taking X-rays
- To carry out the practice, **dentists make use of artefacts**, such as pliers, drills, X-ray machines, and other tools

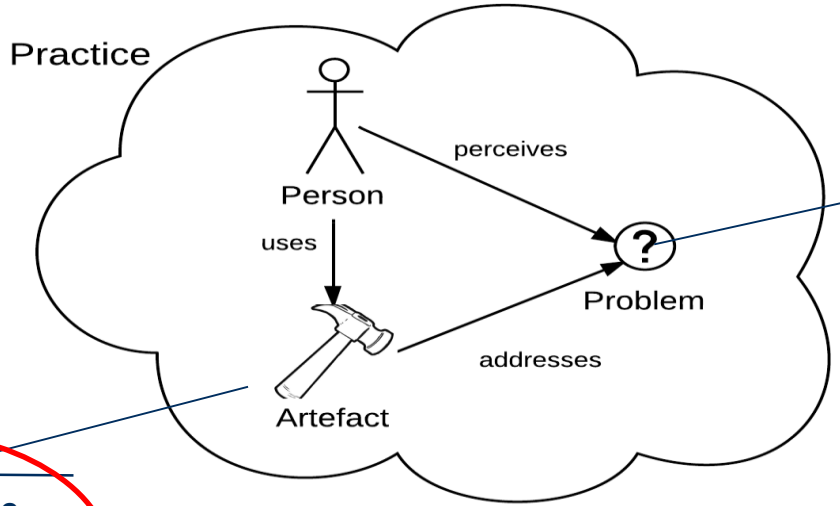
Stockholms universitet

What characterize design science?

What characterize design science?



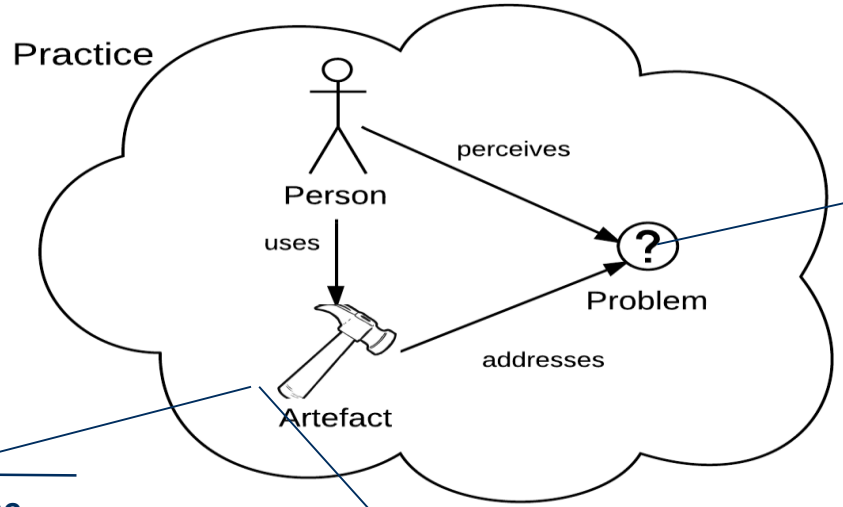
What characterize design science?



The **problem needs to be a problem in a practice**

The **artefact is the solution that needs to be developed** to address the problem

What characterize design science?

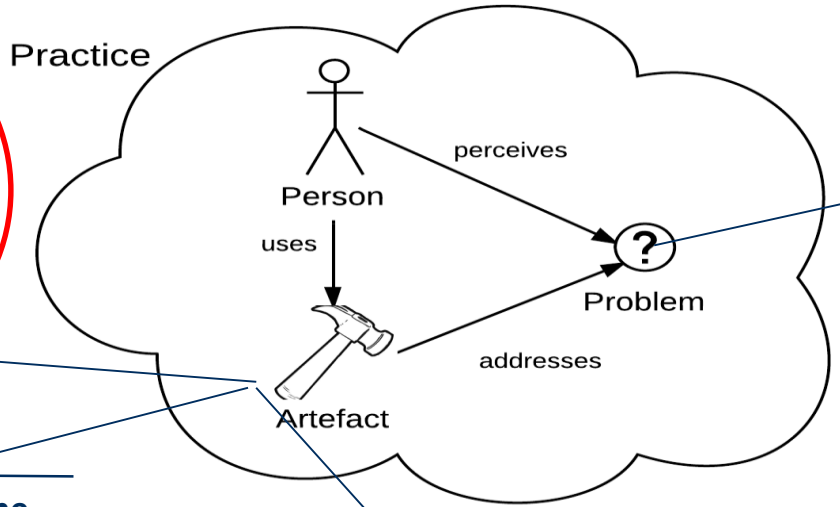


The **problem needs to be a problem in a practice**

The **artefact is the solution that needs to be developed** to address the problem

The **artefact needs to be used in a practice**

What characterize design science?



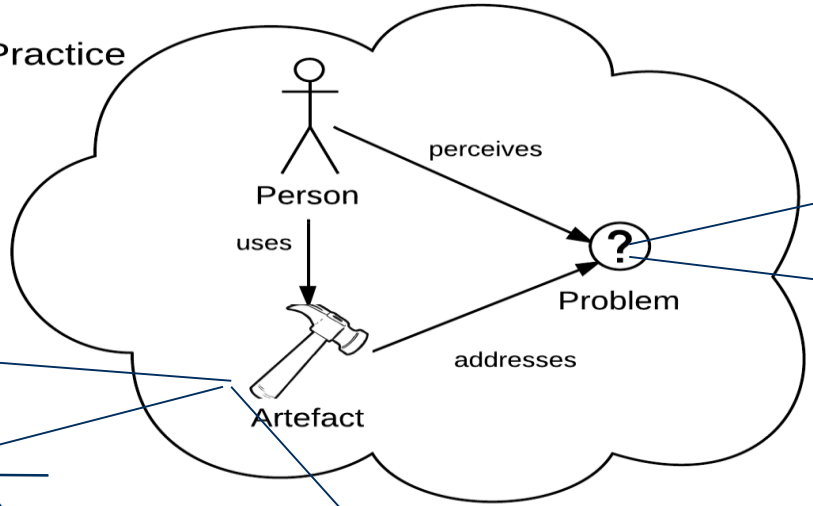
The **artefact developed** in a design science initiative **needs to be novel, something new and original**, not previously developed

The **problem needs to be a problem in a practice**

The **artefact is the solution that needs to be developed** to address the problem

The **artefact needs to be used in a practice**

What characterize design science?



The **artefact developed** in a design science initiative **needs to be novel, something new and original**, not previously developed

The **problem needs to be a problem in a practice**

The **problem needs to be generic**, that is, a solution not only for one organization

The **artefact is the solution that needs to be developed** to address the problem

The **artefact needs to be used in a practice**

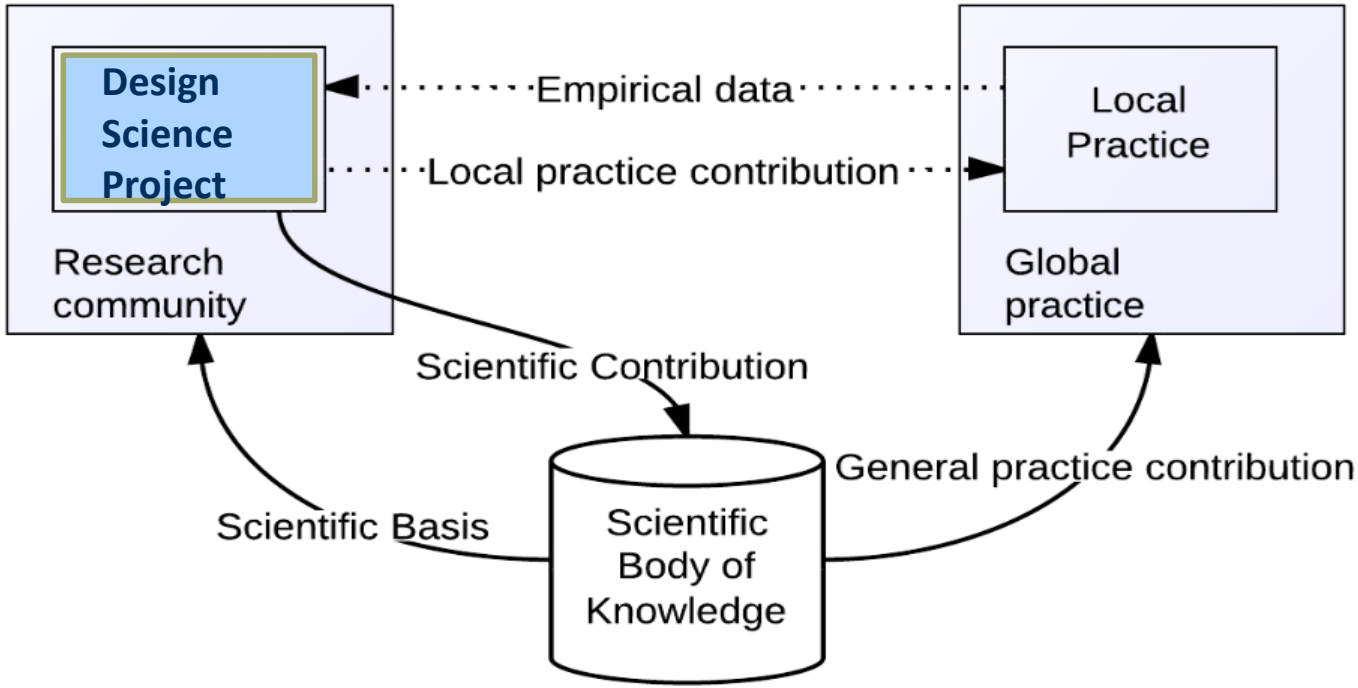
Stockholms universitet

Design science and practice research

Design science and Practice research

- ***Design science*** is often seen as part of what is called practical research
- ***Practice research*** is research that addresses problems in a specific practices (sometimes called workpractice)

Design science and Practice research



(Figure from Johannesson & Perjons, 2021, inspired by Goldkuhl, 2012)

Implement change - Fair Processes, Practice vs. Processes, Governing the Knowledge Worker

Stockholms universitet

Fair processes

What is fair process?

- A **fair process** is a **decision-making method characterized by transparency**, where **employees affected by decisions** have the **opportunity to give their input to management**
- This **input** offers the employees a **chance to influence the outcomes**
- A fair process **makes employees to trust management** even if they **disagree with the decisions**

(Kim, W., & Mauborgne, R. (1997/). Fair process. *Harvard business review*, *75*, 65-75.)

What is not a fair process?

- A fair process **is not decision-making method aiming at consensus**, that is, it is **not about to win people's support through compromises**

(Kim, W., & Mauborgne, R. (1997/). Fair process. *Harvard business review*, *75*, 65-75.)

Why is fair process important?

- Research has shown that **employees care not only about outcomes**, but **also about the process that produces these outcomes**
- This **contradict some assumptions made by economist** which claim that people focus only on outcomes

(Kim, W., & Mauborgne, R. (1997/). Fair process. *Harvard business review*, *75*, 65-75.)

Why is fair process important?

- Research has also shown that a **fair process enhances both employee motivation and performance**
- **Employees want to understand the rationale behind decisions** and **want their ideas to be considered and taken seriously**

(Kim, W., & Mauborgne, R. (1997/). Fair process. *Harvard business review*, *75*, 65-75.)

The Elco Case

- In the Elco case, the **top management initiated a business transformation** towards cellular manufacturing with self-directed teams.
- Top management employed a **consultant firm to plan for the transformation**, but **did not first inform the employees**. Later **information to the employees lacked clarity**, causing further anxiety among employees.
- **Trust and commitment** towards management quickly **deteriorated** among the employees, **despite the potential benefits of the transformation for the employees**

(Kim, W., & Mauborgne, R. (1997/). Fair process. *Harvard business review*, *75*, 65-75.)

How to achieve fair process?

Three principles for achieving a fair process, according to Kim&Mauborgne, 2003:

- Engagement
- Explanation
- Expectation clarity

(Kim, W., & Mauborgne, R. (1997/). Fair process. *Harvard business review*, *75*, 65-75.)

Principle 1: Engagement

- **Engagement** – means **involving employees in the decision-making process** and, thereby, listen to and taking the employees' opinions into account. This will **build collective wisdom**. And this will result in **better decisions and greater commitments**

(Kim, W., & Mauborgne, R. (1997/). Fair process. *Harvard business review*, *75*, 65-75.)

Priciple 2: Explanation

- **Explanation** – means **explaining the reasoning behind a decision to employees** who have been involved or who are affected by it. Thereby, employees will trust the intentions by managers even if the employees' ideas have been rejected

(Kim, W., & Mauborgne, R. (1997/). Fair process. *Harvard business review*, *75*, 65-75.)

Principle 3: Expectation clarity

- **Expectation clarity** – means that management should make everyone understand the new rules and policies guiding their work, that is, **make it clear what is expected of the employees in the future**

(Kim, W., & Mauborgne, R. (1997/). Fair process. *Harvard business review*, *75*, 65-75.)

Research background

- Two social scientist, John Thibaut and Laurance Walker, invited the concept of fair process. They were interested **in psychology of justice**, in mid 1970s, and **they investigated why people trust the legal system, and thereby, comply with laws**
- Chan Kim and Renee Mauborgne **applied the same concept in their management studies**. They carried out studies in 19 companies and found links between processes, attitudes and behavior

Implement change - Processes vs Practices

Processes vs Work Practices

- **Business processes** - are often designed and introduced top-down by management and imposed on employees with or without their consent
- **Work practices** - emerge bottom-up from the way employees are carried out tasks. These practices reflect the knowledge and experience of the employees as these have developed over time

(Brown, J. S., & Duguid, P. (1999). Balancing act: How to capture knowledge without killing it. *Harvard business review*, *78*(3), 73-80)

Business processes - benefits

- Business processes - organize and structure the daily work in an organization
- Business processes - enable management to establish an efficient work organization that ensures reliable and consistent results

(Brown, J. S., & Duguid, P. (1999). Balancing act: How to capture knowledge without killing it. *Harvard business review*, *78*(3), 73-80)

Business processes - drawbacks

- Business processes - may hamper creativity and flexibility – a limited number of ideas of how to perform work are created
- Business processes – introducing business processes can break down existing work practices, thereby disrupting the working of an organization

(Brown, J. S., & Duguid, P. (1999). Balancing act: How to capture knowledge without killing it. *Harvard business review*, *78*(3), 73-80)

Work practices - benefits

- Work practices - provide fertile ground for invention and adaptability

(Brown, J. S., & Duguid, P. (1999). Balancing act: How to capture knowledge without killing it. *Harvard business review*, *78*(3), 73-80)

Work practices - drawback

- Work practices - are challenging to manage and can easily become inefficient
- Work practices - if an organization lean too much towards work practices, new ideas is bubbling up all the time, and there is often a lack of structure for harnessing them

(Brown, J. S., & Duguid, P. (1999). Balancing act: How to capture knowledge without killing it. *Harvard business review*, *78*(3), 73-80)

Balance processes and practices

- Managers need to balance between processes and practices to **provide structure and efficiency and at the same time foster innovation and creativity**

(Brown, J. S., & Duguid, P. (1999). Balancing act: How to capture knowledge without killing it. *Harvard business review*, *78*(3), 73-80)

How to balance practices and processes?

- **In order to balance practice and processes that, practices need to be identified, understood and disseminated** – since processes are often already documented in process diagrams or in text form
- **Challenge to identify work practices** – there is often a gap between the way work is described in work descriptions and the way employees actually work within a practice.
- **How to identify practices:** Observe the practices in reality otherwise the tacit knowledge is missed

(Brown, J. S., & Duguid, P. (1999). Balancing act: How to capture knowledge without killing it. *Harvard business review*, *78*(3), 73-80)

Xerox case

- The Xerox technicians met every day and created a **community of practice** - which develop a collective pool of practical knowledge about different machines, ways of workings, issues, methods used
- The technicians did something that they were not expected to do. They address problems in a way not specified in process decriptions

(Brown, J. S., & Duguid, P. (1999). Balancing act: How to capture knowledge without killing it. *Harvard business review*, *78*(3), 73-80)

Implement change - Governing the knowledge worker

Manual vs. Knowledge work

- **Manual work -** consists of repetitive and/or programmed tasks, often emphasizing speed, accuracy and uniformity. Moreover, for manual work it is obvious what the task to be done is
- **Knowledge work –** consists of tasks using specialized knowledge. Moreover, for knowledge work it is often not clear what the task to be done is

(Drucker, Peter F. "Knowledge-worker productivity: The biggest challenge." California management review 41, no. 2 (1999): 79-94.)

Manual worker and productivity

- The **productivity for manual workers in manufacturing has increased** around 3 % per year during the 20th century – in total a 50-fold increase in productivity
- This increase in productivity is **the base for all economic and social gains of the 20th century**, according to Peter Drucker.
- This increase in productivity for manual worker all started with Frederick Winslow Taylor. **Frederick Winslow Taylor (FTW)** (1856-1915) was the first one to study and re-structure manual work, according to Peter Drucker

(Drucker, Peter F. "Knowledge-worker productivity: The biggest challenge." California management review 41, no. 2 (1999): 79-94.)

Knowledge work and productivity

- According to Peter Druker, the knowledge worker will be most valuable assets for organizations during the 21st centrury.
- Therefore, the **major challenge for organizations** - and countries - is to **increase the knowledge workers' productivity**

(Drucker, Peter F. "Knowledge-worker productivity: The biggest challenge." California management review 41, no. 2 (1999): 79-94.)

Factors determine the productivity

- Factors that determine the productivity of the knowledge workers – and what the knowledge worker needs to do:
  - **define the tasks** - the hardest and the most important thing to do
  - **define the output of the work** - in form of both quantity and quality
  - **impose responsibility**
  - **enforce continuous learning and innovation**

(Drucker, Peter F. "Knowledge-worker productivity: The biggest challenge." California management review 41, no. 2 (1999): 79-94.)

Define the task and output

- Questions to answer about the task:
  - What is your task?
  - What should it be?
  - What should you expected to contribute?
  - What hampers you in doing your task and should be eliminated?
- Question to answer about the output. For example:
  - How many students in a class vs. How many students have learn anything
  - How many test can be performed in a certain timeframe vs. How many test are valid and reliable
- Answer these questions - and taking actions in form of re-structure the task based on the answers - will improve productivity, according to Druker

(Drucker, Peter F. "Knowledge-worker productivity: The biggest challenge." California management review 41, no. 2 (1999): 79-94.)

Stockholms universitet

Using Data and Technology for change – Data driven decisions making

Towards data-driven decision making

- Investigations show that few organizations use available data – for example in their IT-system - in order to support their decisions and govern their organizations
- Why do so many organizations not applíng data/evidence based decision making?

(Beath, C. M., Quadgrass, A., & Ross, J. (2013). You may not need big data after all. *Harvard Business Review online*.)

Towards data-driven decision making

- The answer, according to Beath et al (2013) is to apply the following four practices:
  - Agree on a Single Source of Truth
  - Provide Real-Time (or close to) Feedback to Decisions made by Decision Makers (“Use Scorecard”)
  - Explicitly Manage Your Business Rules
  - Use Coaching to Improve Performance

(Beath, C. M., Quadgrass, A., & Ross, J. (2013). You may not need big data after all. *Harvard Business Review online*.)

Using Data and Technology for change – Defensive and offensive data strategies

What is a data strategy?

- A **data strategy - is a plan to organize, manage and govern the data assets in an organization**

(DalleMule, L., & Davenport, T. H. (2017). What's your data strategy. *Harvard Business Review*, *95*(3), 112-121.)

What is the core of the data strategy?

- DalleMule & Davenport (2017) claim that **an organization's data strategy** should have a **proper balance** between **offensive** and **defensive activities**

(DalleMule, L., & Davenport, T. H. (2017). What's your data strategy. *Harvard Business Review*, *95*(3), 112-121.)

Defensive part of the data strategy

Goals for the defensive part of the data strategy:

- Ensure data security, privacy, integrity, quality, regulatory compliance, and governance

Data management defensive activities:

- Ensuring that data is in compliance with regulations
- Introduce data access control
- Detect and limit fraud and theft
- Ensure data integrity of data flows
- Provide a single source of truth

(DalleMule, L., & Davenport, T. H. (2017). What's your data strategy. *Harvard Business Review*, *95*(3), 112-121.)

Offensive part of the data strategy

Goals for the offensive part of the data strategy:

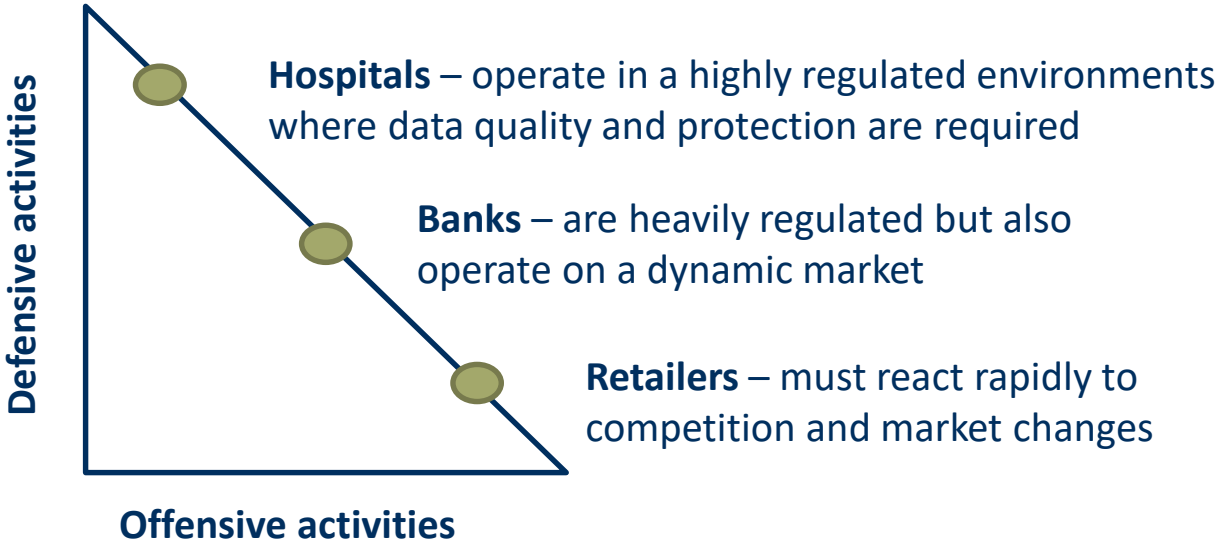
- Improve innovation, the competitive position and increase profitability, revenue, and customer satisfaction

Data management offensive activities:

- Generate customer insights by using data analysis, advanced data modelling and data science (including AI) work
- Integrate customer and market data for supporting decision making
- Include real time analysis

(DalleMule, L., & Davenport, T. H. (2017). What's your data strategy. *Harvard Business Review*, *95*(3), 112-121.)

External factors



Hospitals – operate in a highly regulated environments where data quality and protection are required

Banks – are heavily regulated but also operate on a dynamic market

Retailers – must react rapidly to competition and market changes

(DalleMule, L., & Davenport, T. H. (2017). What's your data strategy. *Harvard Business Review*, *95*(3), 112-121.)

The proper balance depends on a number of factors

- Market competition and dynamic
- Regulatory environment
- The overall strategy of the organisation
- Maturity of data management
- Centralized or decentralized data management
- Size of data budget

External factors

Internal factors

(DalleMule, L., & Davenport, T. H. (2017). What's your data strategy. *Harvard Business Review*, *95*(3), 112-121.)

Focusing on just defensive activities can inhibit flexibility

- There is a risk that organisation focus too much on defensive activities – and data is not transformed into info that can be used by organizations strategically

(DalleMule, L., & Davenport, T. H. (2017). What's your data strategy. *Harvard Business Review*, *95*(3), 112-121.)

SSOT and MVOT

- **The data strategy can include both defensive and offensive activities by introducing:**
    - **a single source of truth (SSOT) and**
    - **a multiple version of the truth (MVOT)**

- Therefore, the framework could be seen as a **SSOT-MVOT model**

(DalleMule, L., & Davenport, T. H. (2017). What's your data strategy. *Harvard Business Review*, *95*(3), 112-121.)