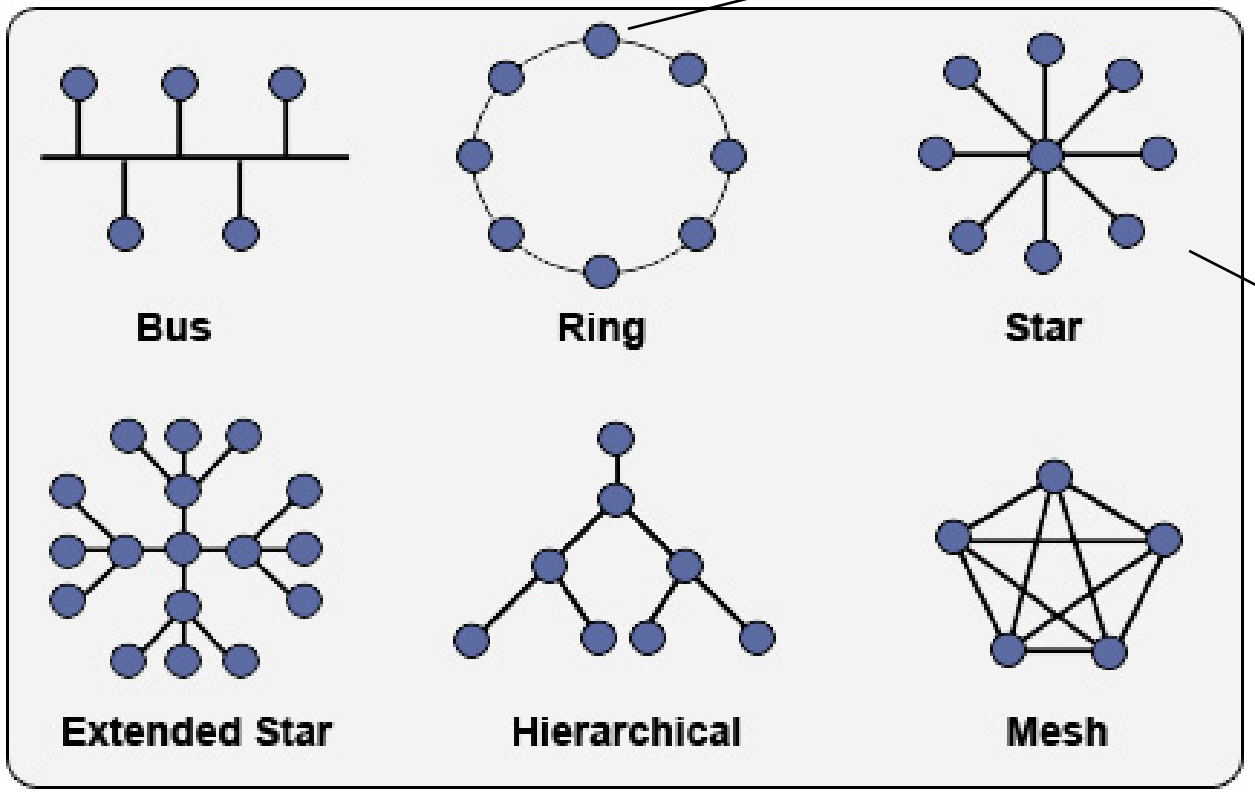
Digital transformation - og platforme

Peter Steen Mikkelsen, Professor
Danmarks Tekniske Universitet, DTU Miljø
Head of Outreach, Head of Water DTU

Netværks arkitektur

(fortid som IT-ansvarlig i 1990'erne)



https://www.itprc.com/a-guide-to-network-topology/

Coax

Ethernet

Digital transformation ...
... for at gøre vandsektoren

- Mere effiktiv
- Mere innovativ
- Mindre fragmentet
- Mere bæredygtig

Præsenteret på Christiansborg

25. march, 2019

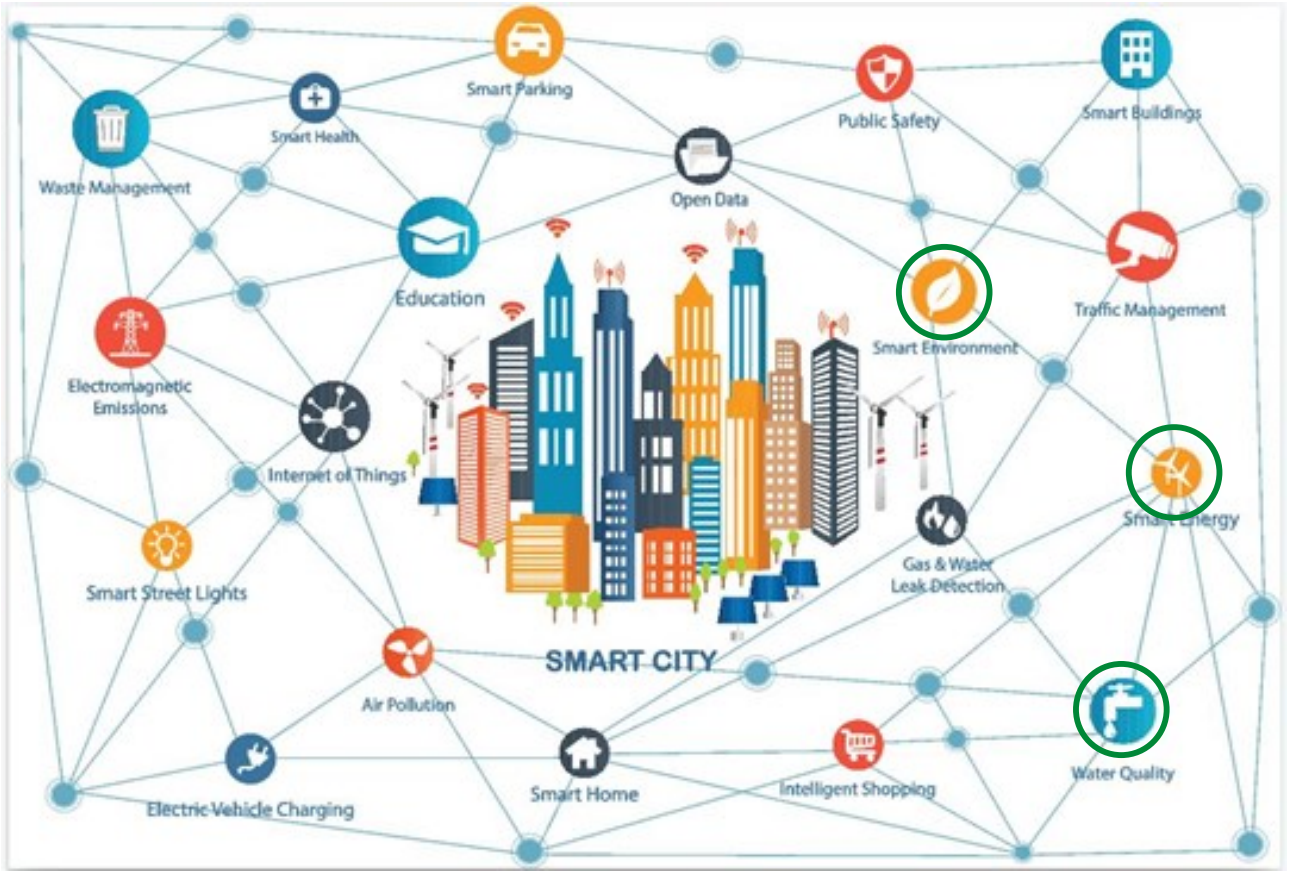
Megatrends currently shaping the water sector

- A call for **Sustainability**

- A strive for **Liveability**

- A push for **Digitalization**

Smart cities



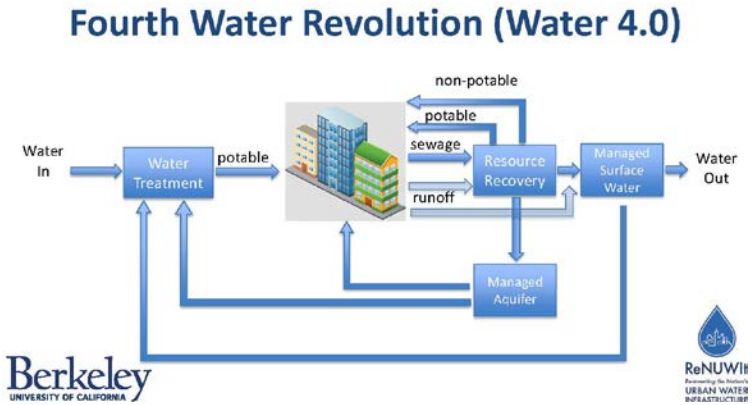
For 2½ år siden trevlede jeg nettet tyndt efter sådanne billeder, de handlede OVERHOVEDET ikke om vand…

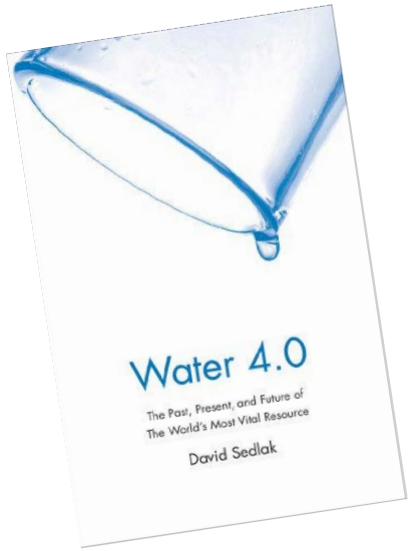
Men se nu (et par dage siden ifm. IDA-kursus)! ☺

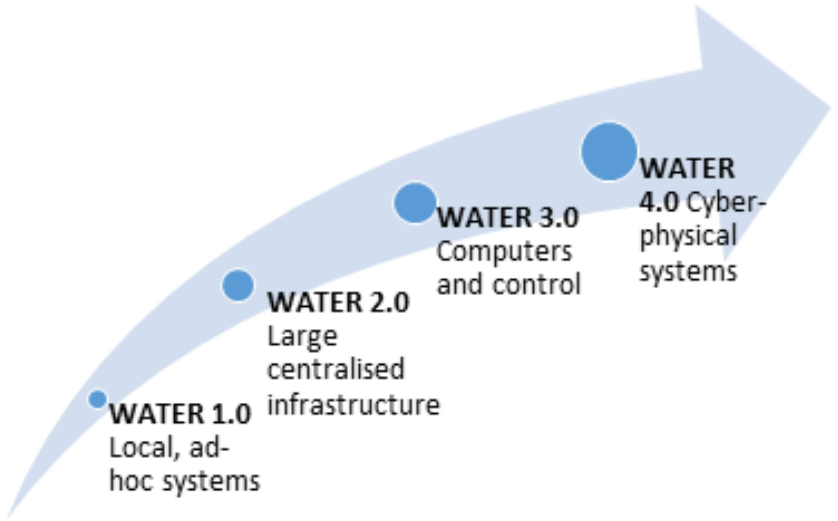
Det betyder, at vores vandsektorens systemer skal kunne snakke sammen med rigtig mange andre – i et **digitalt økosystem!**


whatfix
4.0
Service
A digital ecosystem is a network of inter-connected companies or products.

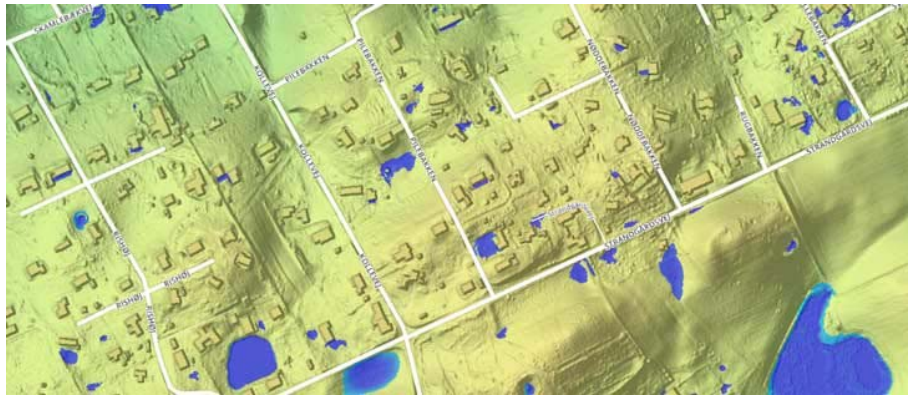
Ideas need to converge …





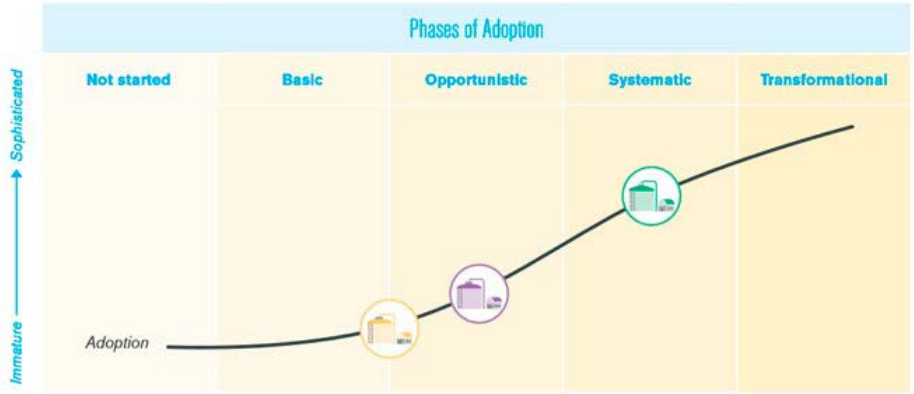


Digitization, Digitalization, and Digital transformation



Digitization

Digitalization



Digital transformation

Digital tvilling – jf. Autiosalo et al. og Agnethe!

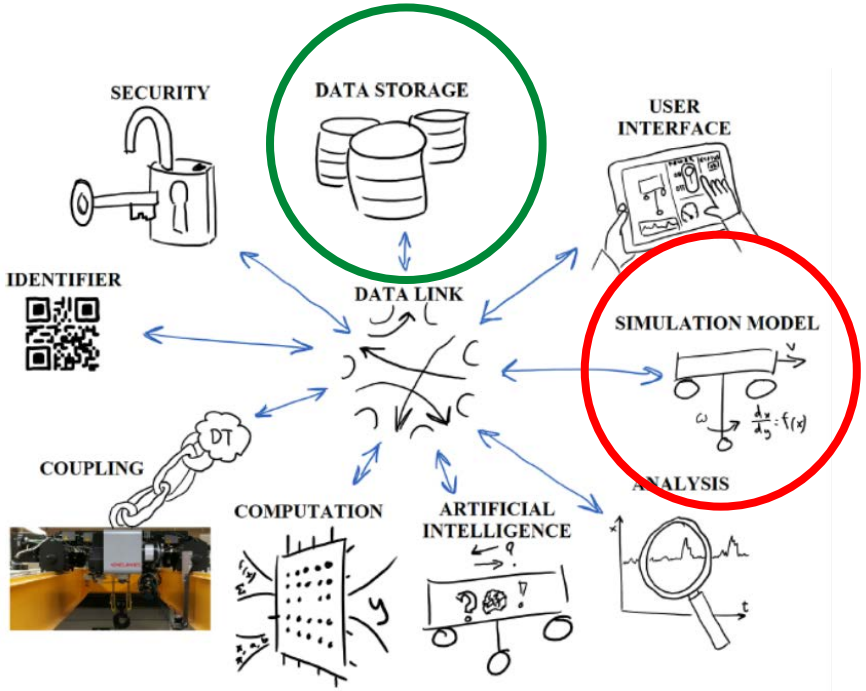


FIGURE 1. Conceptual ideal of feature-based digital twin framework.

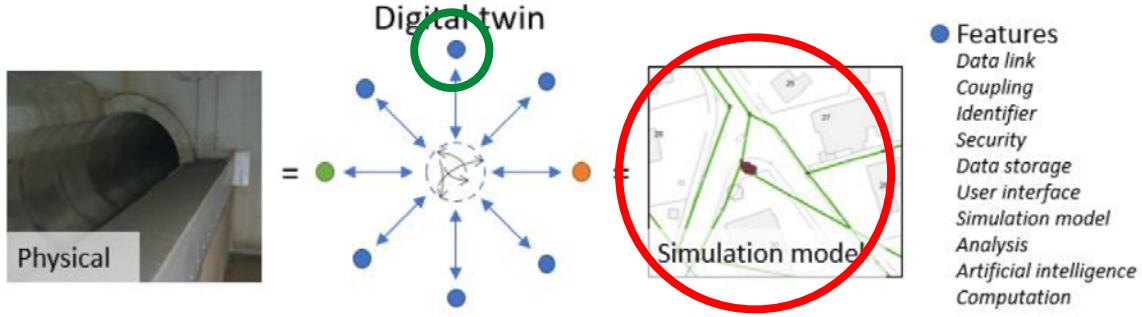


Figure 3. Illustration of the concept of digital twin (DT) for urban water systems. The DT consists of a virtual part linked to a list of features and a physical counterpart. The continuous coupling to the physical twin is important to make it a "living" DT, and simulation models play an important role in urban water systems (here exemplified by a distributed urban drainage system model). • refers to the feature data link, which is the center of a star structure surrounded by other features. • refers to the feature coupling, and • refers to the feature simulation model. Inspired by [24].

Autiosalo, J.; Vepsalainen, J.; Viitala, R.; Tammi, K. A Feature-Based Framework for Structuring Industrial Digital Twins. *IEEE Access* **2020**, *8*, 1193–1208, doi:10.1109/ACCESS.2019.2950507.

Pedersen, A.N., Borup, M., Brink-Kjær, A., Christiansen, L.E., Mikkelsen, P.S. (2021): Living Digital Twins of Urban Water Systems: Towards multi-purpose value creation using models and sensors. *Water*, 13(5), 592. https://doi.org/10.3390/w13050592

Digital tvilling vs. Data lake

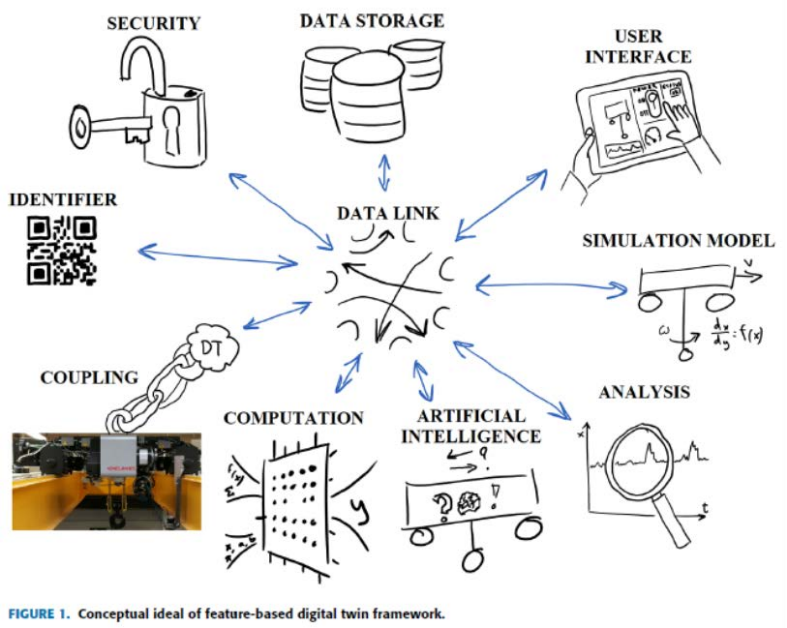


FIGURE 1. Conceptual ideal of feature-based digital twin framework.

Autiosalo, J.; Vepsalainen, J.; Viitala, R.; Tammi, K. A Feature-Based Framework for Structuring Industrial Digital Twins. *IEEE Access* **2020**, *8*, 1193–1208, doi:10.1109/ACCESS.2019.2950507.

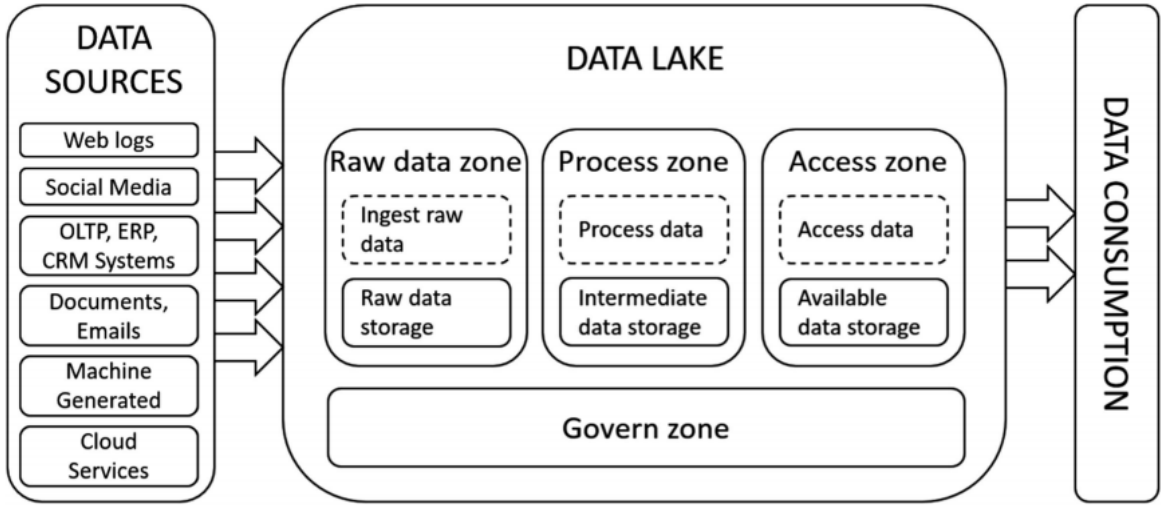


Fig. 1. Data lake functional architecture.

Franck Ravat, Yan Zhao. Data Lakes: Trends and Perspectives. International Conference on Database and Expert Systems Applications (DEXA 2019), Aug 2019, Linz, Austria. pp.304-313. hal-02397457

Hierarki af DT'er, der skal kunne samarbejde

Table 1. Hierarchical organization of DT application areas, from the component to societal scale, indicating typical references.

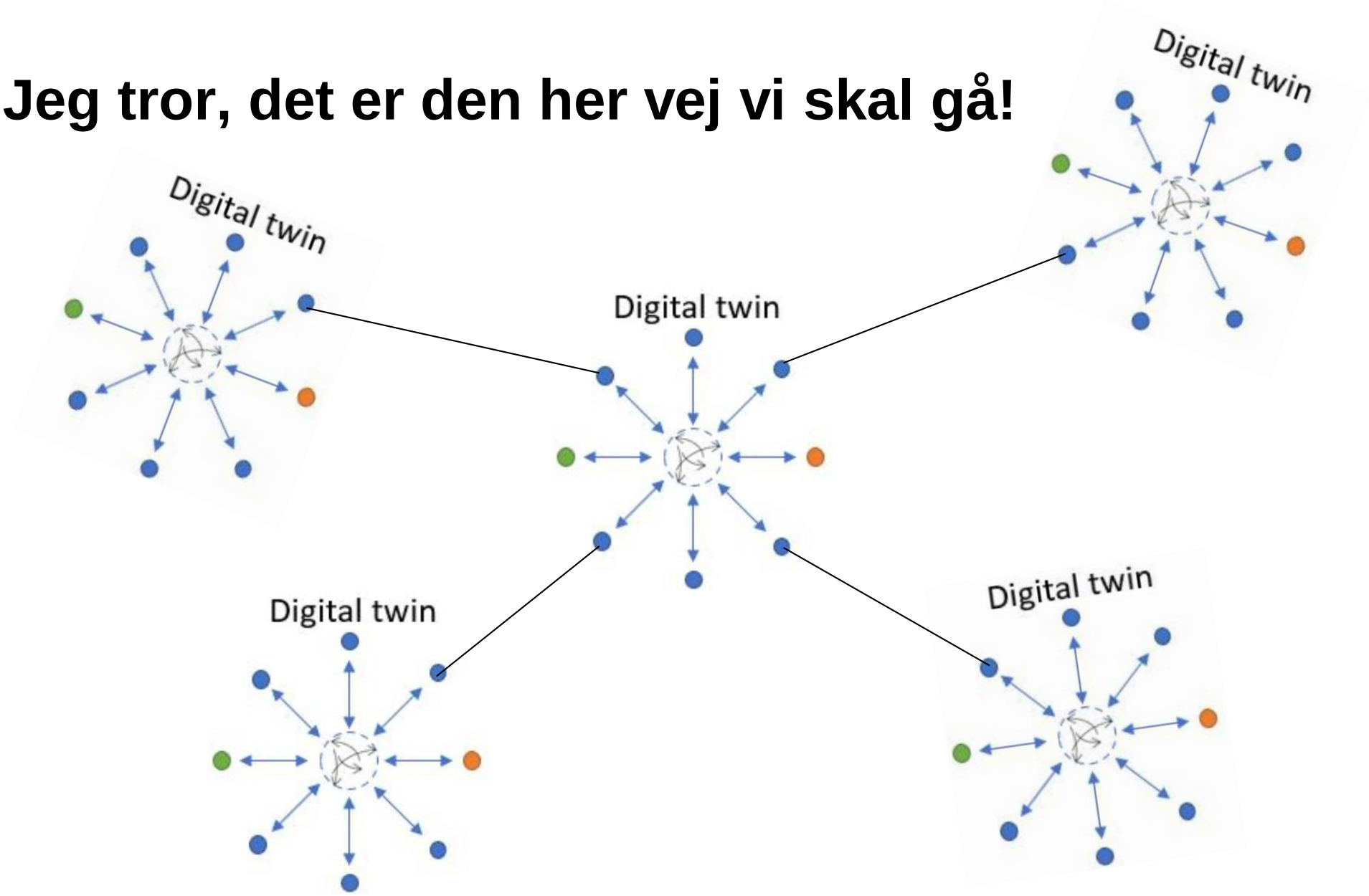
Application area	Examples in Literature
Society	National DT system with many different DTs in different sectors where value can be created [36]
City	Connection of several DTs, where relevant, to give value to citizens in a connected city across sectors [33–35]
System	Autonomous cars [37], water distribution systems [4], oil and gas industry [38], or urban drainage systems (as discussed in this paper).
Plant	WRRF [5] or drinking water facilities [12]
Unit Process/Operation, Hydraulic Structure	DTs of overflow structures, other complicated hydraulic constructions, or biochemical processes in the WRRF treatment step [39]
Component	e.g., pumping devices [40] guided by the DT for maintenance of the product.

Data source

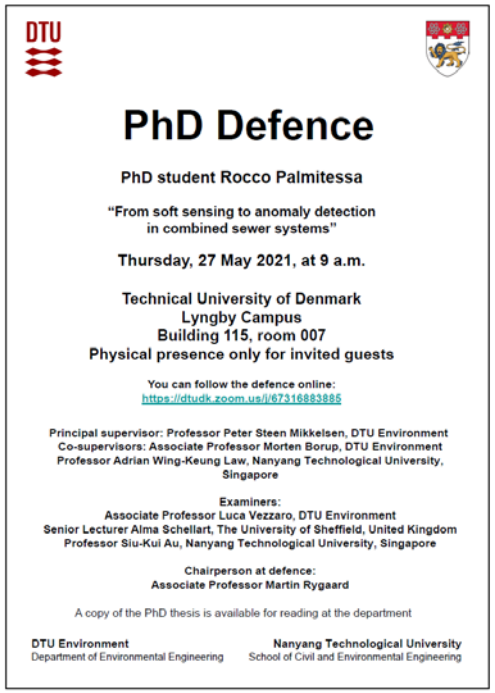
Fokus for dagens oplægsholdere?

Living	Prototyping
Peter	
Agnethe, Trine?	
Peter, Trine	Ástridur
Michael	Michael
Lasse	
Michael, Jonas, Rocco	

Jeg tror, det er den her vej vi skal gå!



Relaterede events i den nærmeste fremtid



PhD Defence

PhD student Rocco Palmitessa

"From soft sensing to anomaly detection in combined sewer systems"

Thursday, 27 May 2021, at 9 a.m.

Technical University of Denmark
Lyngby Campus
Building 115, room 007
Physical presence only for invited guests

You can follow the defence online:
https://dtudk.zoom.us/j/67316883885

Principal supervisor: Professor Peter Steen Mikkelsen, DTU Environment
Co-supervisors: Associate Professor Morten Borup, DTU Environment
Professor Adrian Wing-Keung Law, Nanyang Technological University, Singapore

Examiners:
Associate Professor Luca Vezzaro, DTU Environment
Senior Lecturer Alma Schellart, The University of Sheffield, United Kingdom
Professor Siu-Kui Au, Nanyang Technological University, Singapore

Chairperson at defence:
Associate Professor Martin Rygaard

A copy of the PhD thesis is available for reading at the department

DTU Environment
Department of Environmental Engineering

Nanyang Technological University
School of Civil and Environmental Engineering

09 JUN

ARRANGEMENT

CLEAN Talk – Data, datadeling og digitale tvillinger

På denne CLEAN talk stiller vi bl.a. skarpt på digitale tvillinger for afløbssystemer, machine learning og tilløbsprognoser, samt sensormåling af svovlbrinte i kloaksystemer.

Se invitation og program her

18 JUN

ARRANGEMENT

CLEAN Talk – Brug af vejrdata til dynamisk klimasikring og nye varslingsteknologiprodukter

Fra fremragende vandteknologi til verdensklasse vandteknologi? - Brug af vejrdata til dynamisk klimasikring og nye varslingsteknologiprodukter

Se invitation og program her

Tak for ordet! ☺