



LiveQuay:

Live Insight in Bridges and Quay Walls

KIVI middag

7 maart 2023

Dr. Ir. Mandy Korff

NWA programma UrbiQuay – Bruggen en kades hebben dringend meer kennis nodig om de grote opgave behapbaar te maken en efficiënt tot resultaten te komen.

Drie fase 1 projecten:

LiveQuay:
Live Insight in Bridges
and Quay Walls
Mandy Korff

Stability:
verstevigen
Andreas Hartmann

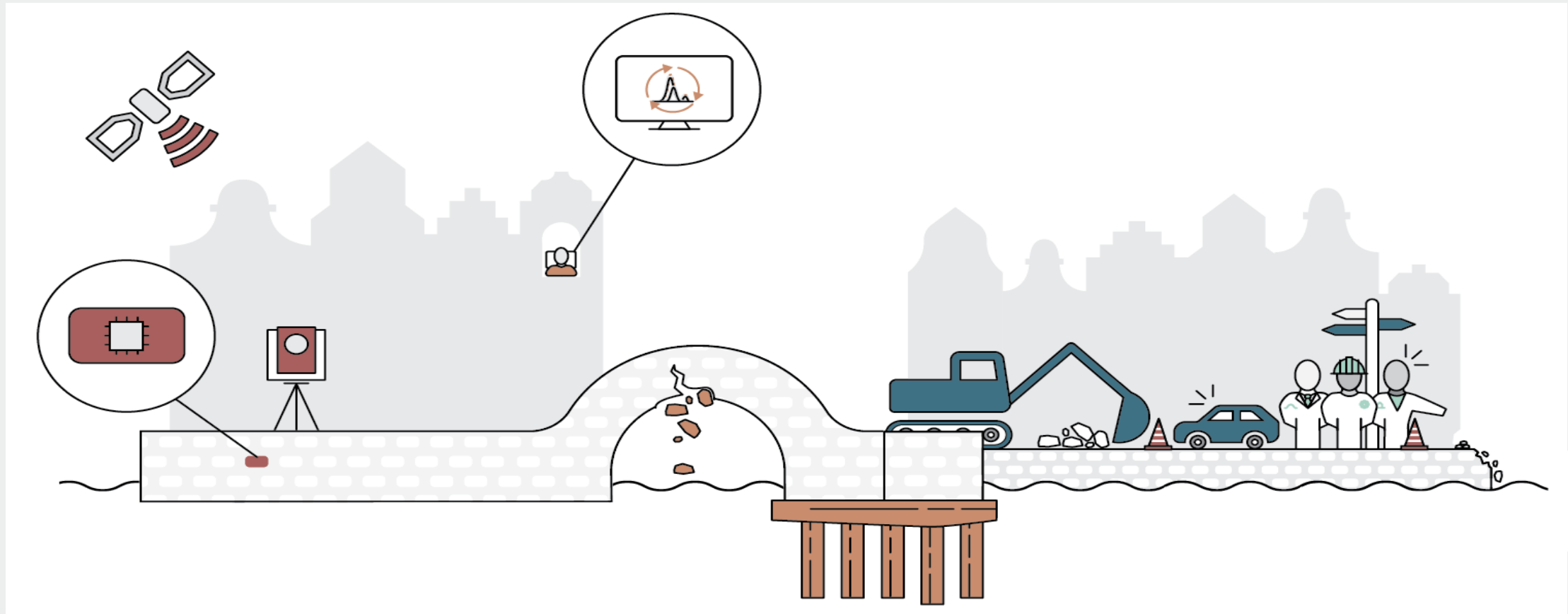
LogiQuay:
Logistiek bij
vernieuwing
Ruben Vrijhoef

Fase 2 project in ontwikkeling

Funding: gemeente Amsterdam, min I&W, NWO + partners



LiveQuay ondersteunt besluitvorming door:



MONITORING

MODELLING

INTEGRATED
ASSESSMENT

PRIORITISATION

Het LiveQuay consortium

Applicants:



UNIVERSITY OF TWENTE.



Deltares

Supporting partners:



Den Haag



Cooperating partners:



Iv-Infra

Vereniging
Vrienden van
de Amsterdamse
Binnenstad



Universiteit
Leiden



DEPARTEMENT
MOBILITEIT &
OPENBARE
WERKEN



Societal

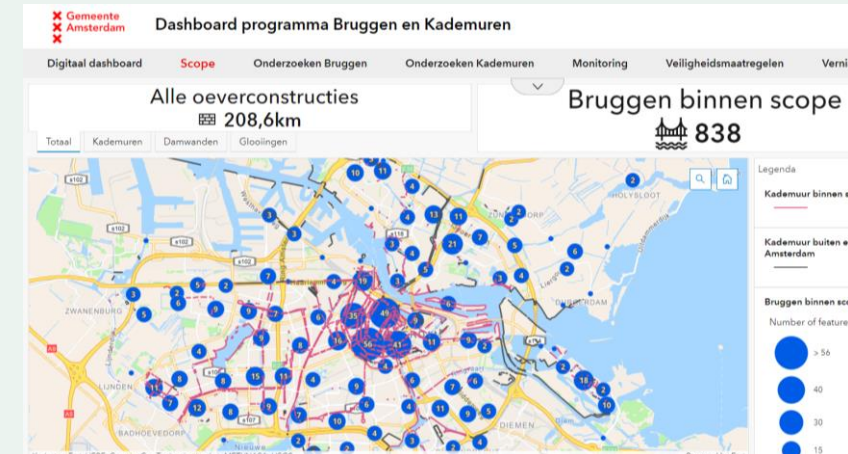
Technical

Organisational

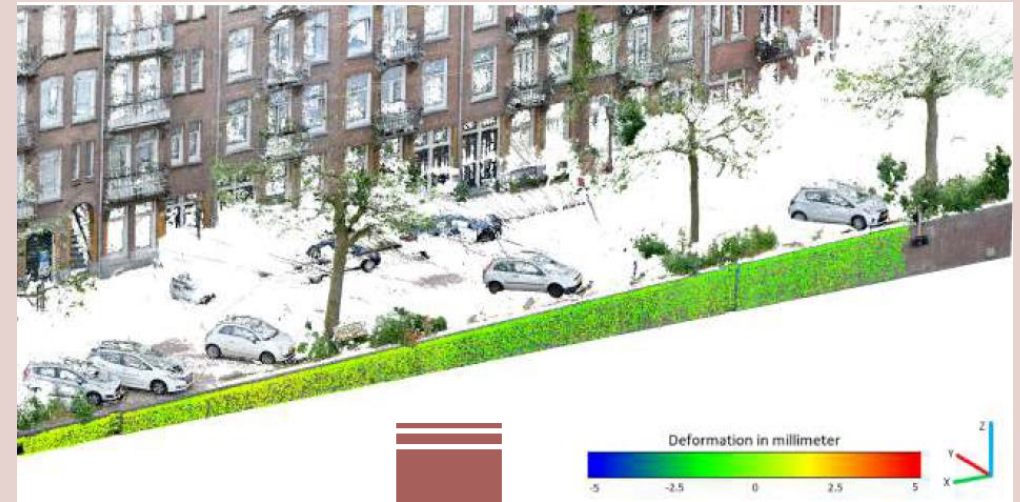
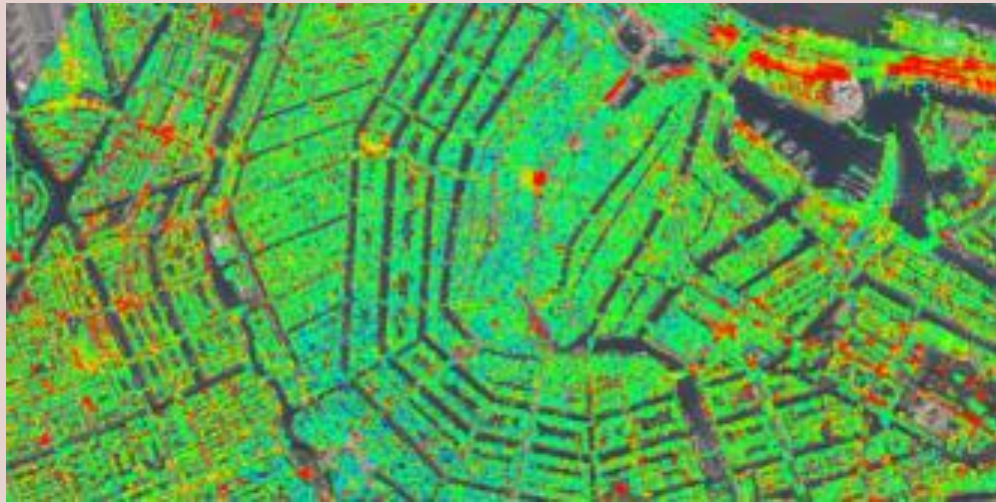
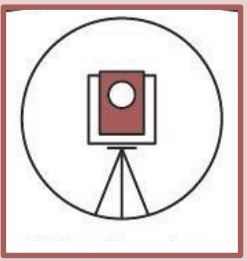
Urgent **CHALLENGE** of
defining **PRIORITIES**

How **STRONG** are our
STRUCTURES?

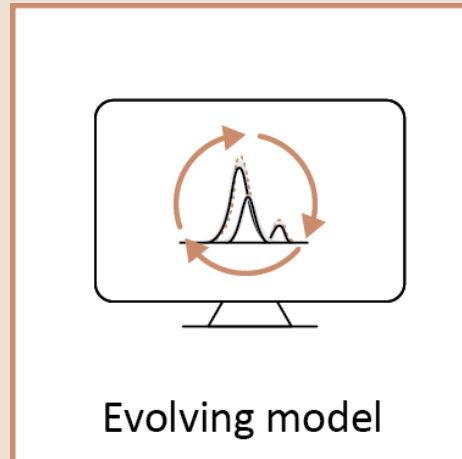
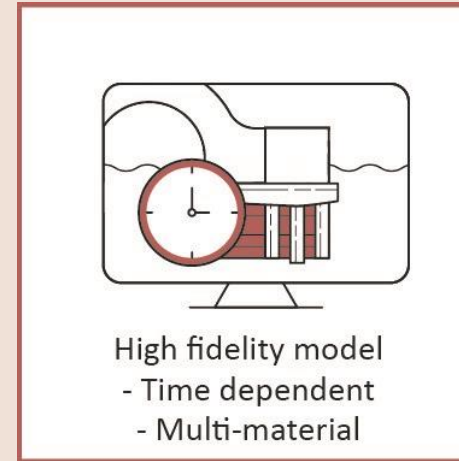
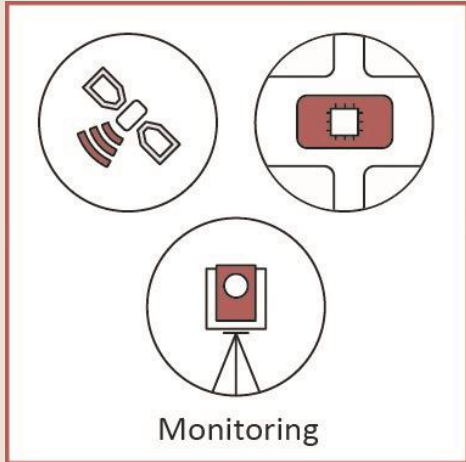
How **FAST** can asset owners
PROCEED?

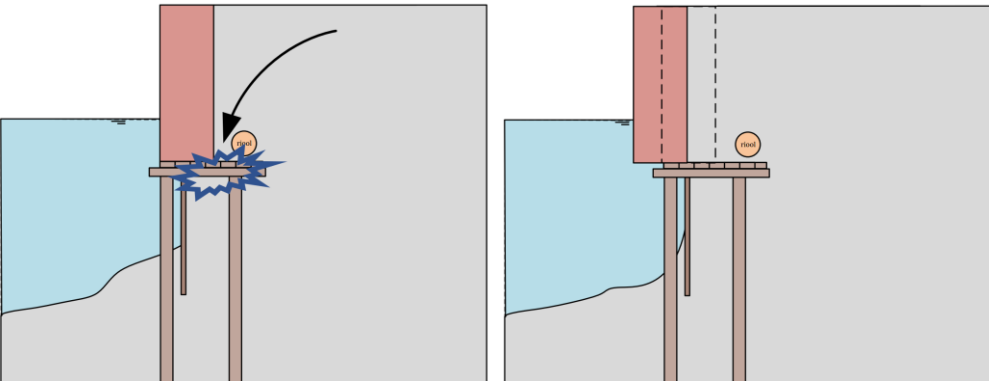
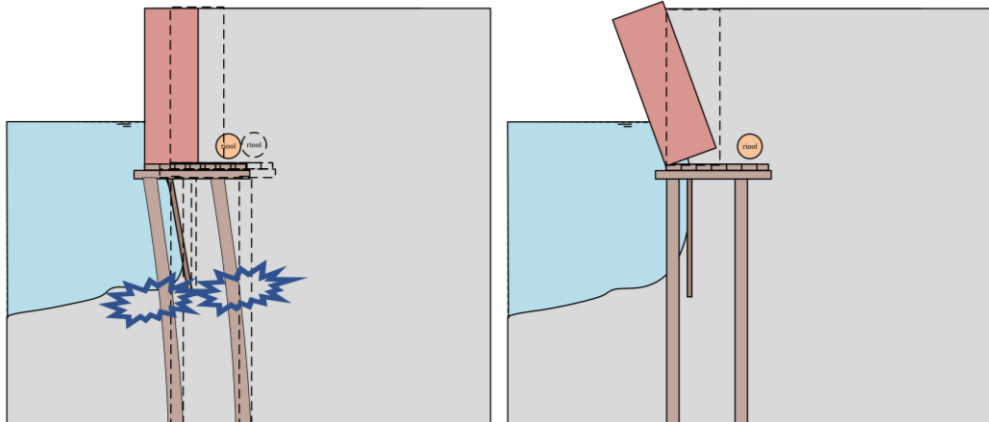


Monitoring, detectie en modellering



Integratie in zich steeds verbeterend model, gebaseerd op combinatie van probabilistiek en fysica





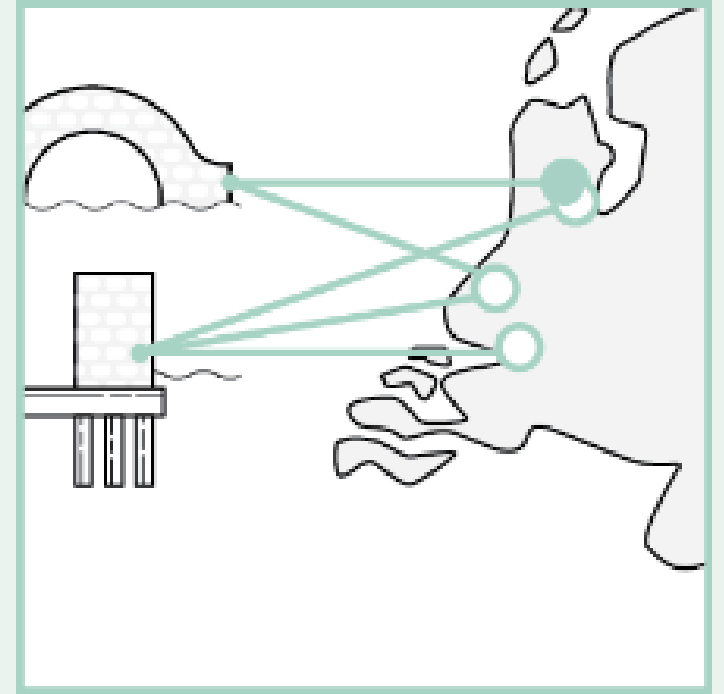
Faal mechanismen identificeren
& Bepalen restlevensduur

Vier field lab locaties

Amsterdam

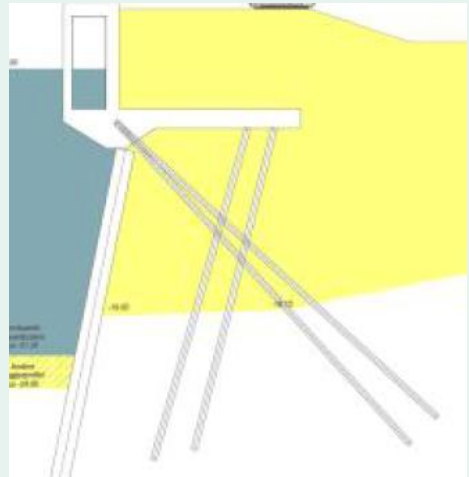
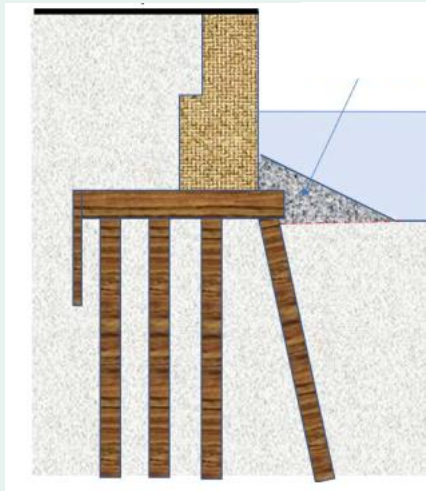
Den Haag

Haven Rotterdam

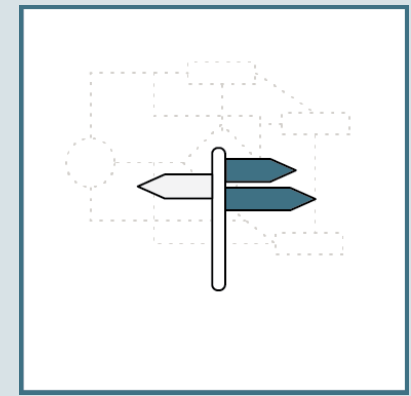




Field lab project types



Integratie waarden en risico's in besluitvorming



MONITORING strategieën

WAARDEN (erfgoed, veiligheid, overlast etc)

BETERE BESLUITVORMING
prioritering onderhoud,
noodzaak voor versterking
of vernieuwing



Wat ga ik hiervan zien?

- Onderzoek door PhD studenten (Jan Koune en Daan ter Meulen, TUD)
- Onderzoek door Postdocs (Hongyu Yang, HR en 2 ntb (Utwente, TUD)
- Workshops met partners
- Bijeenkomsten en presentaties met en bij derden (BiKa, Programma Bruggen en Kademuren, etc)
- Resultaten in publicaties en richtlijnen

- Programma loopt 5 jaar vanaf nov 2022

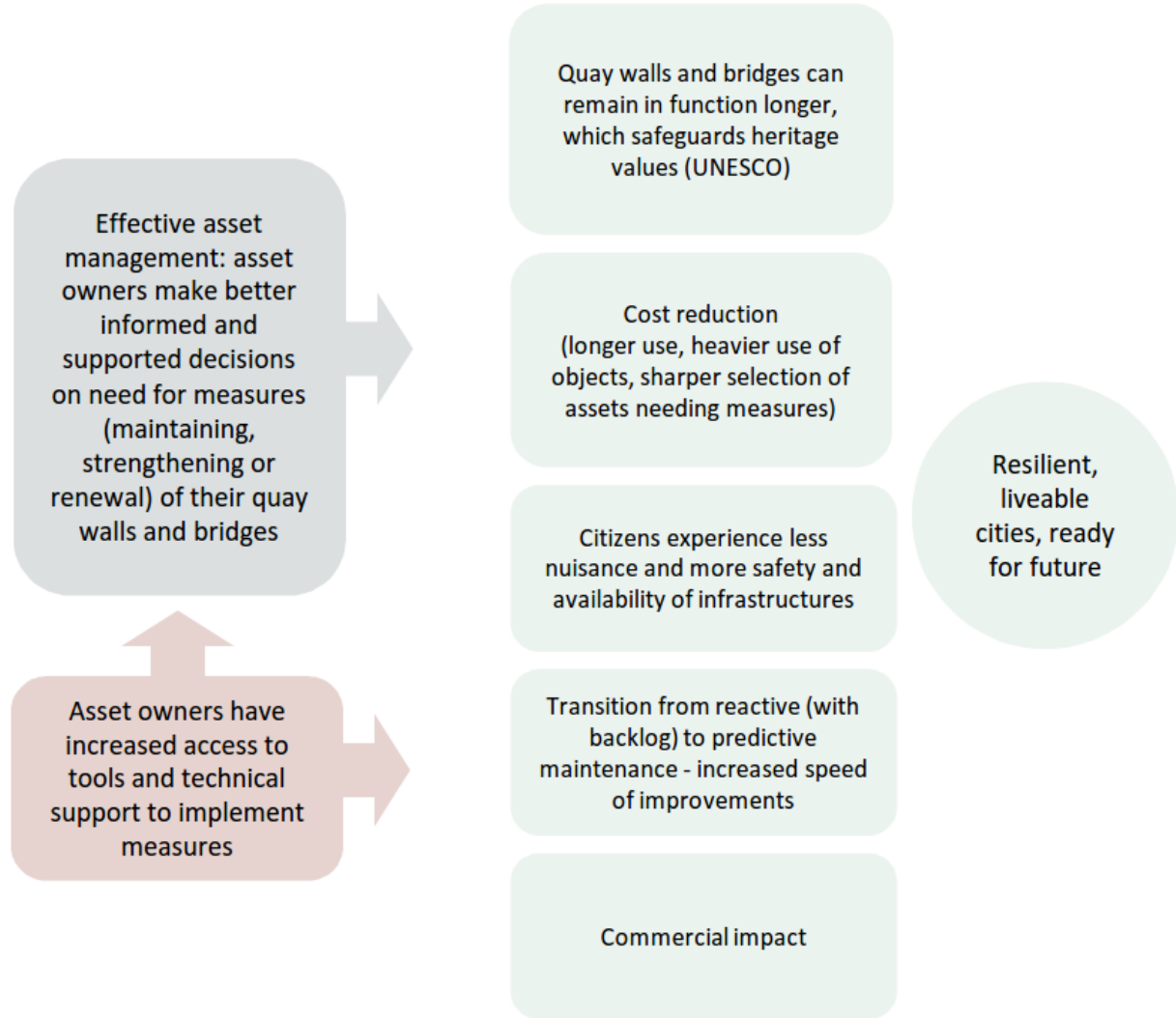
Output

- Historic overview of quay wall and bridges asset management
- Value-based decision making platform
- Uncertainties and risk visualization
- Overview of consequence scenarios
- Monitoring strategies
- Monitoring post processing methods
- Fundamental understanding of long-term structural behavior based on structural models
- A modal field test protocol (shake test) and database of related model data
- Evolving, physics informed machine learning model
- Assessment methods for most relevant failure mechanisms and remaining life span
- Integrated assessment of at least 4 field lab projects

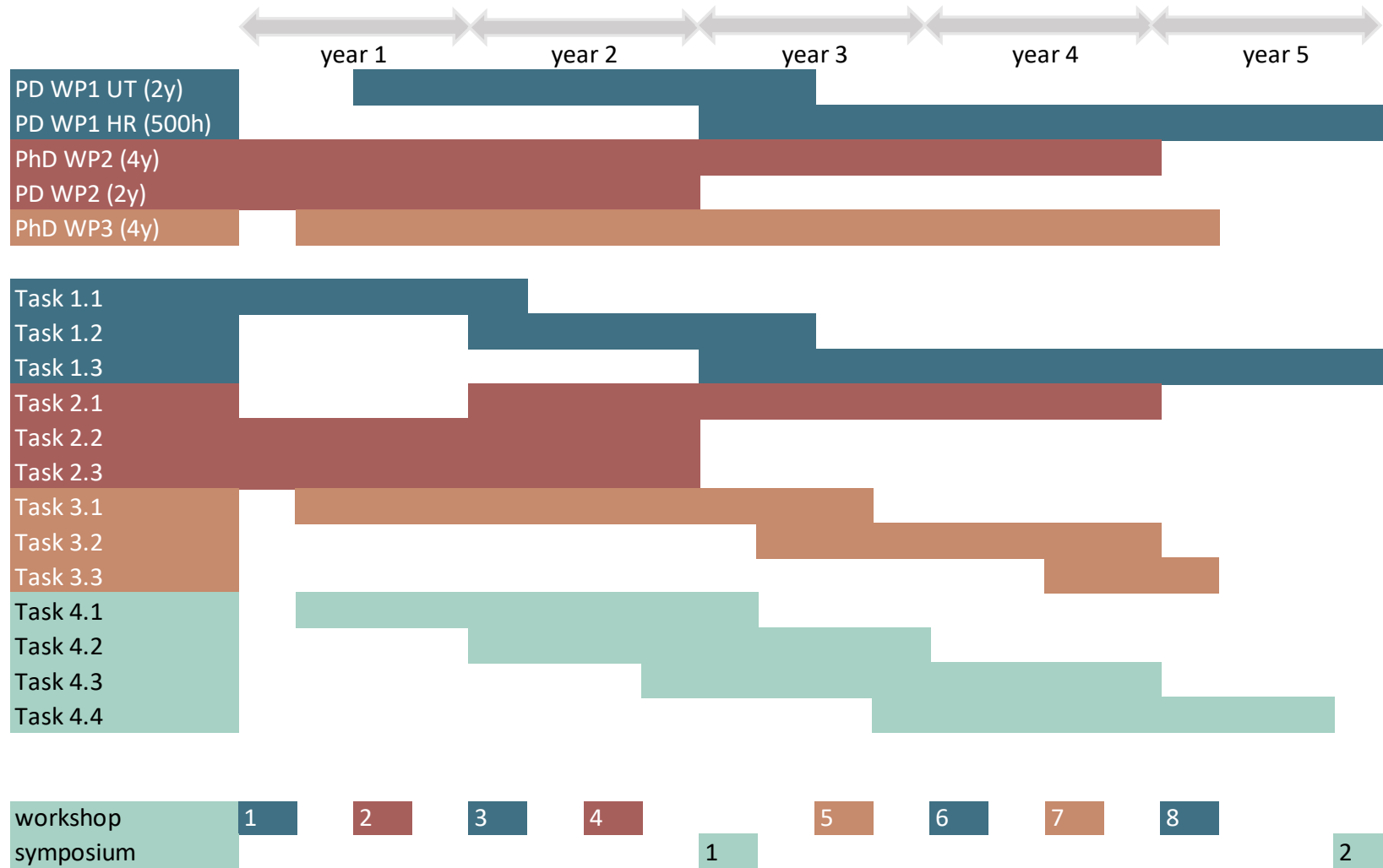
Outcome

- Asset owner and citizens understand each others values; citizens support need for measures
- Citizens understand failure risk and consequences
- Asset owners implement guidelines for effective monitoring planning
- Companies offer service packages for asset owners combining monitoring and modelling
- Validated trigger and alarm values implemented in NEN8700 series and local procedures
- Asset owners have detailed insight into asset conditions
- Asset owners, engineering and monitoring firms have improved staff capacities

Impact



planning



Workshops

Workshop 1 year 1 Q1: Perceptions of failure risks by the different stakeholders

Workshop 3 year 2 Q1: Monitoring strategies evaluated

Workshop 6 year 4 Q1: Decision making platform user specifications

Workshop 8 year 5 Q1: Decision making platform design evaluation.

Workshop 2 year 1 Q3: Advanced Modelling for bridges and Quay walls workshop

Workshop 4 year 2 Q3: Monitoring strategies evaluated

Workshop 5 year 3 Q3: Failure mechanism identification for bridges and quay walls WP2-WP3;

Workshop 7 year 4 Q3: Remaining life span workshop WP2 – WP3.

workshop
symposium

1

2

3

4

1

5

6

7

8

2

AIM To support decision making to maintain current safe operational conditions of existing bridges and quay walls

OBJ 1.1 To develop a framework to select appropriate and effective monitoring strategies and their added value to enhance the decision making process.

OBJ 1.2 To evaluate different quantifiable values from citizens/users and asset owners such as safety and impact on liveability and including them in the input and output of the platform.

OBJ 1.3 To design a platform for decision-making that visualizes the information on the condition and remaining life and risks based on stakeholder values on object and portfolio level.



RQ 1.1 How is an effective monitoring strategy designed taking into account asset condition, risks and stakeholder values?

RQ 1.2 How can we translate technical output of monitoring and models into meaningful decision making information on maintenance and replacements?

OBJ 2.1 To develop a modal field test protocol to provide input for the modelling

OBJ 2.2 To develop new algorithms to post-process and interpret monitoring data from different sources

OBJ 2.3 To develop robust models including simulation of structural response in time that describes all relevant failure mechanisms and consequences



RQ 1 Which measurements and models contribute to the insight into critical mechanisms of quay walls and bridges?

OBJ 3.1 To develop an evolving hybrid physics-data model that can support decision making under uncertainties

OBJ 3.2 To create an assessment method to determine the most relevant failure mechanisms occurring in different situations/structures

OBJ 3.3 To create an assessment method to determine the remaining life span of the structures



RQ 2 How can we make a (faster) integral assessment of the technical condition of bridges and quay walls based on all available information?

OBJ 4 To test components developed in WP1, 2 and 3 in real-life field lab projects