Rijkswaterstaat
Ministry of Infrastructure and Water Management

Interreg
North-West Europe

Co-funded by the European Union

BEPROACT

Building an Ecosystem to PROACTively develop data-driven asset management

- Built environment
- Highway pavement
- Bridge infrastructure
- Intelligent transport system
- Water system
- Waste water treatment

11 partners from BE, DE, FR, IE, LU and NL
Cooperating from 2023 - 2027

EU funding
€6,1 million

Total project budget
€10,2 million

Objectives

BEPROACT aims to revolutionize critical infrastructure by transforming it into 'talking assets'. This innovative approach will equip organizations with the means to assess the health status of infrastructural assets more accurately. This improves maturity and decision making in Asset Management. And prolong these assets' lifespan, preventing failure, upgrade the profession of maintenance engineers and ultimately reducing maintenance costs.

beproact.nweurope.eu

Leadpartner: Rijkswaterstaat
Project management
Raymond Feron & Natalie Oonk

Rijkswaterstaat
Ministry of Infrastructure and Watermanagement

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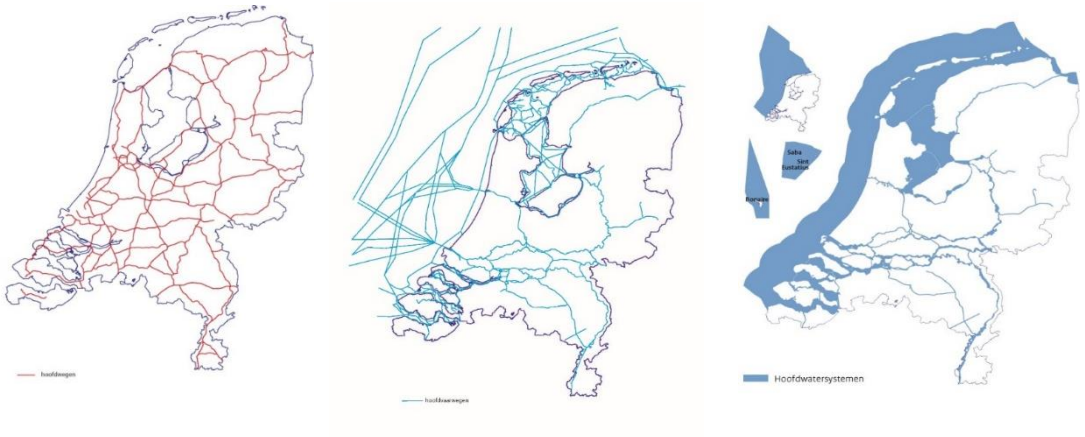
Towards future-proof Asset Management

Rijkswaterstaat manages three national infrastructure networks



Huge challenge

- 40.000 locks, fly-overs, tunnels, bridges in the Netherlands.
- Many are built in the 1950s and 1960s
- On national, regional and local levels

BEPROACT Partners

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Rijkswaterstaat
Ministry of Infrastructure and Water Management

Région Bourgogne Franche Comté

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

Die Autobahn

FLANDERS ENVIRONMENT AGENCY

bast
Bundesanstalt für Straßenwesen

Luxembourg Institute of Science and Technology
LIST

RTC Water
Real Time Control of Water Infrastructure

Université de Lille 1 Sciences et Technologies

TNO innovation for life

GEOSPARC

Associated Partners

Glasgow City Council

US Army Corps of Engineers

Doubs le Département

TU/e Technische Universiteit Eindhoven University of Technology
Where innovation starts

ARNiA

SIDEN
Syndicat Intercommunal de Dépollution des Eaux résiduaires du Nord

Goals en main outputs

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BEPROACT aims to boost performance and health of public (critical) infrastructure in NWE by providing innovative transnational solutions to address the urgent common challenges faced of “Aging critical Infrastructure”.

SMART Strategy

- how to transform to more pro-active and Data driven Asset Management

SMART Assets

- a “suite” of solutions to support organisations to improve asset management of their individual asset types.

SMART People

- open and re-usable knowledge products and training material to increase human capital

BEPROACT has a full coverage of regional as well as national/cross-border infrastructure with the ambition to reduce territorial disparities and strengthen sustainable developments.

BEPROACT Roadmap

Action plan for pilot case development

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- Built environment
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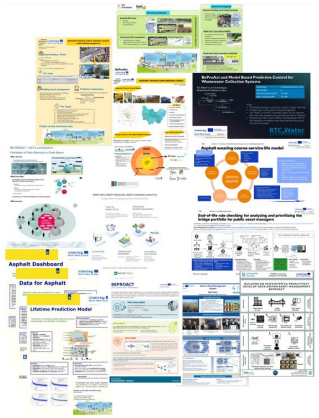

Definition of new data driven services

- Pilot case project plans
- Co-creation workshops
- Requirements & scope
- Pilot case posters & pitches
- Partner & ecosystem MAP

Proof of Concept Minimal Viable Product

- Transnational cooperation
- Co-creation workshops
- Business case
- Demonstration & round table events
- Diary of successfull demo's

Test & Validate In real life conditions

- Implementation strategy
- Cross domain and transnational potential
- Business model for uptake
- Training material for upskilling
- Apply stakeholder readiness tool
- Roadshow & pilot trainings

OUTPUT

A "suite" of 15 new innovative digital solutions to secure and align Data Driven Assetmanagement in the data enrichment cycle

For individual asset types and creating an ecosystem with common ground to support the transition to more Data Driven Assetmanagement in NWE

Communication and ecosystem development

2023 2024 2025 2026 2027

BEPROACT Amsterdam Launch Event – Photo impression
16 May 2023 World Cafe

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Pilot case portfolio POSTERS

Posters | BEPROACT (nweurope.eu)

Pilot case example: VMM & Geosparc Water management

https://www.youtube.com/watch?v=d1FTGZKzP94

BEPROACT business goals

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- Residual life time prediction
- Life time extension
- Predictive Maintenance
- Smart buildings
- Just in time maintenance
- Dynamic fault assessment
- Dynamic control models
- Alert and intervention models
- Just in time maintenance

Circularity goals ?

Less Materials

Energy saving

10-20% cost saving

Preventing waste and incidents

WP 1: SMART STRATEGY

CURRENT STATE Assetmanagement

Joint Strategy development

- Transnational, regional & cross sector requirements
- Benefits & value calculation
- Business Transformation Framework
- Asset management MODELS
- Implementation STRATEGY (organisation & assets types)

FUTURE STATE

More Data driven Assetmanagement

WP 3: SMART PEOPLE

Training schemes

Digital Transformation & digital expertise built up

- Knowledge products & user manuals
- TRAINING „see what can be done SMART“
- Boost Stakeholder Readiness Level
- Human capital built up

HUMAN CAPITAL

Ready for Data driven Asset management

The data-enrichment cycle

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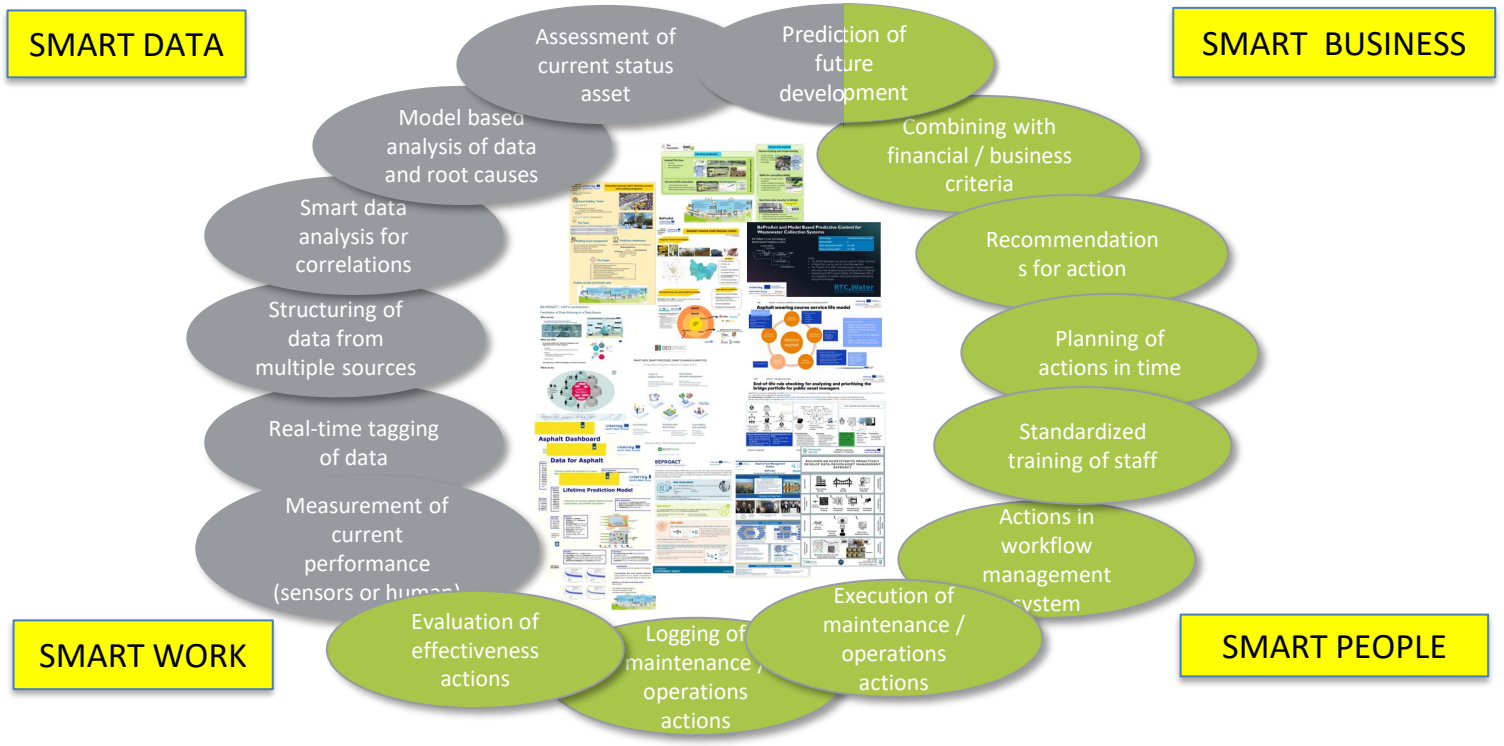

Collaboration structure:

Pilot case development &
Cross Domain working groups

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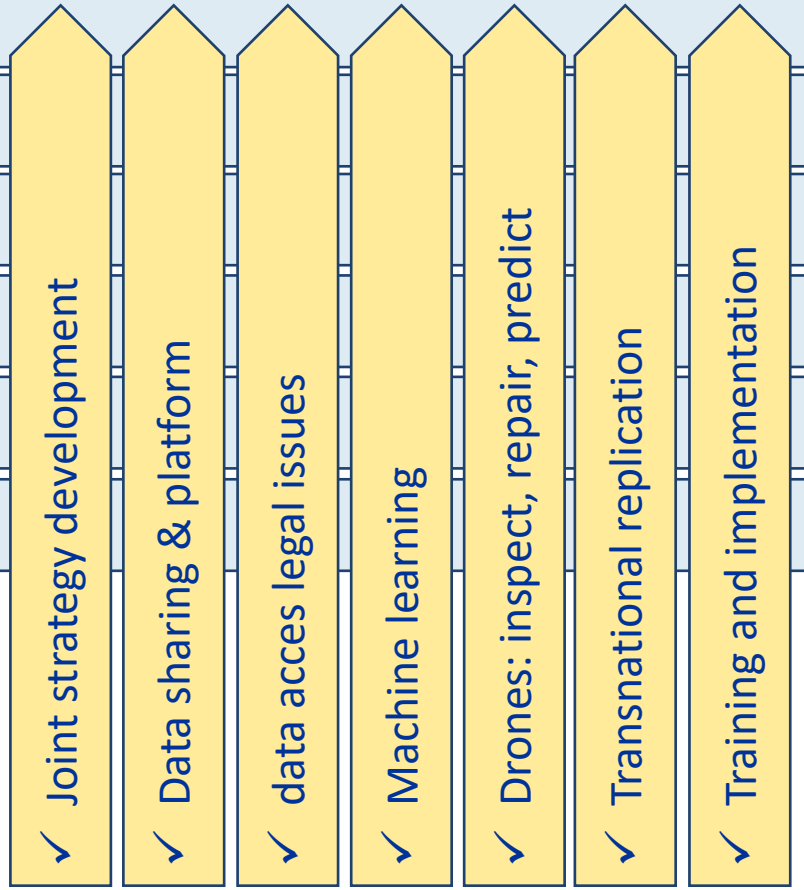
- Pilot case (s) Asset type Built environment
- Pilot case (s) Asset type Highway pavement
- Pilot case (s) Asset type Bridge infrastructure
- Pilot case (s) Asset type Intelligent Transport system
- Pilot case (s) Asset type Water system
- Pilot case (s) Asset type Waste water treatment



Cross domain working groups

WP1 Joint Strategy Development
Maturity levels

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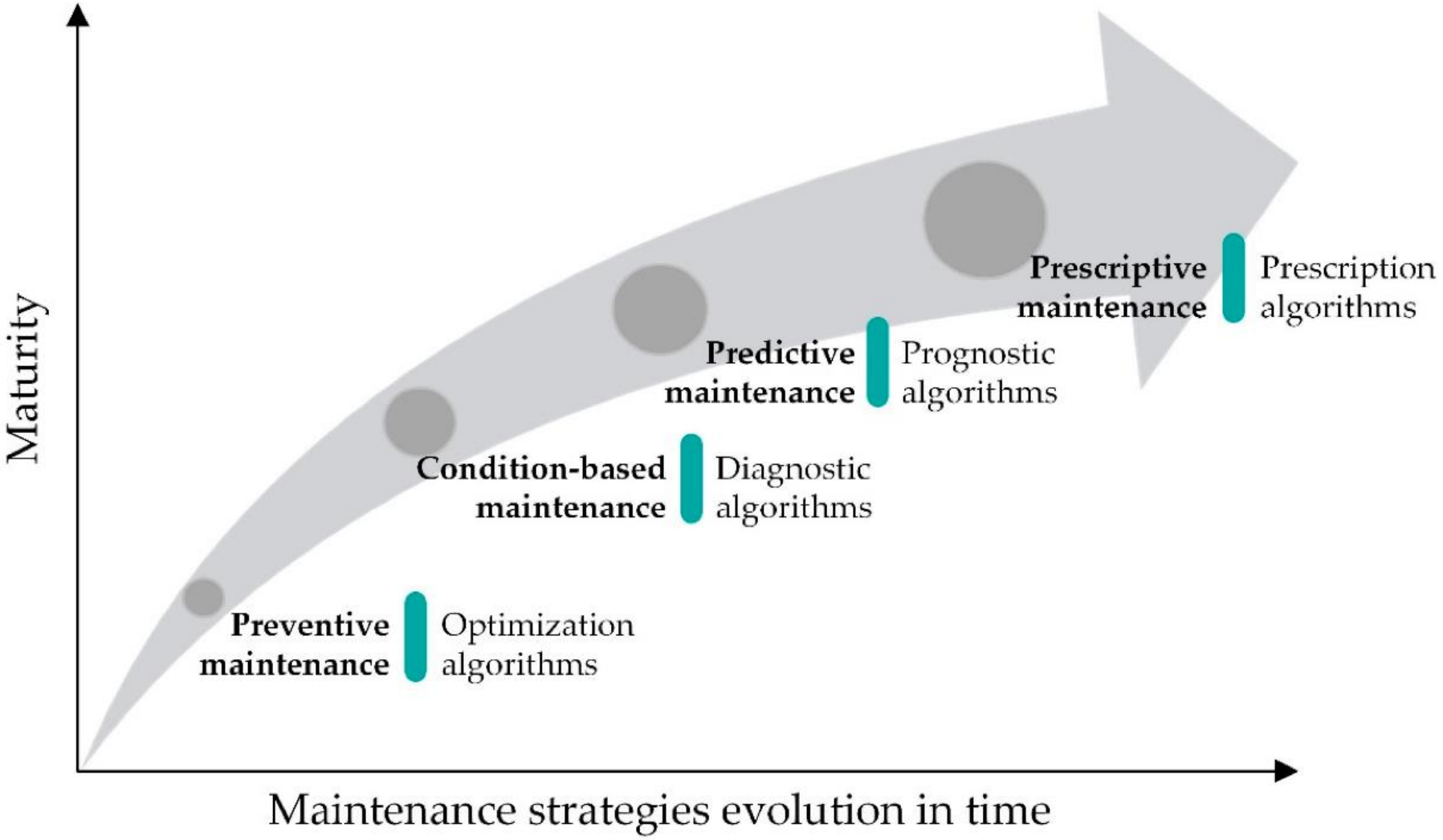

Steps to increase maturity

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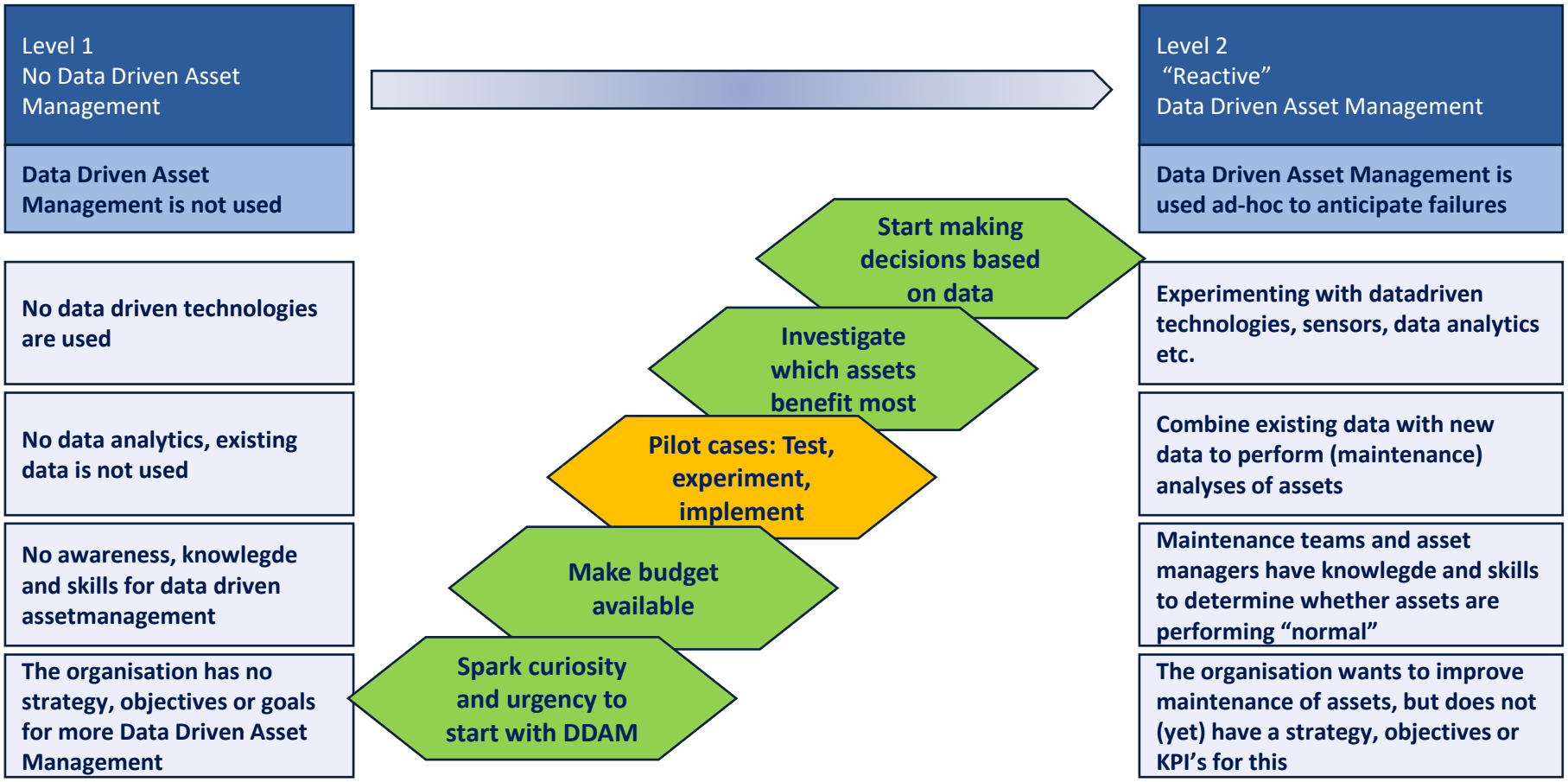

DDAM = Data Driven Asset Management

Steps to increase maturity

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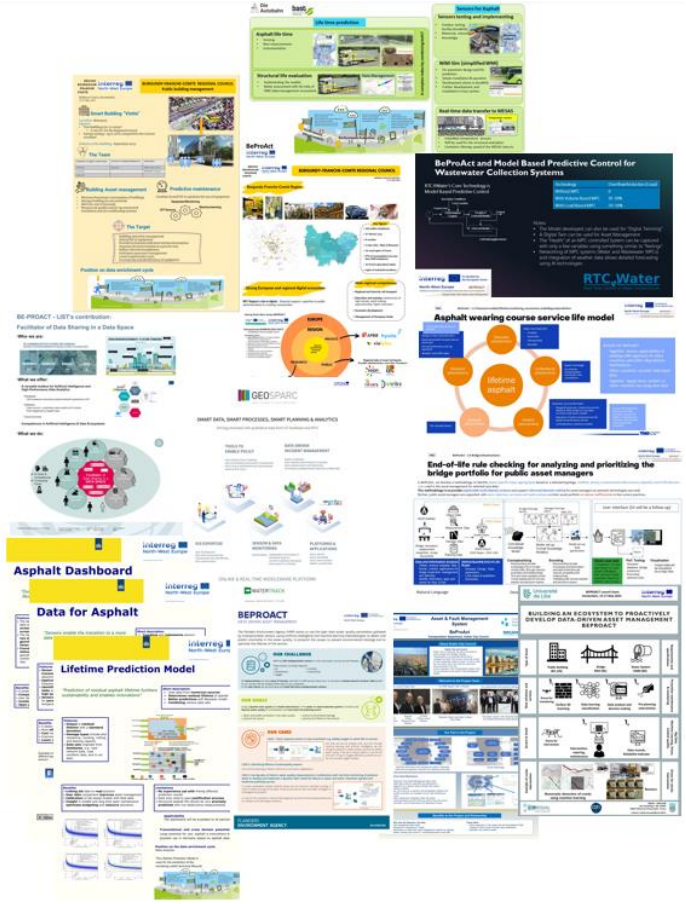
Level 1 No Data Driven Asset Management	Level 2 "Reactive" Data Driven Asset Management
Data Driven Asset Management is not used	**Data Driven Asset Management is used ad-hoc to anticipate failures**
No data driven technologies are used	**Experimenting with datadriven technologies, sensors, data analytics etc.**
No data analytics, existing data is not used	**Combine existing data with new data to perform (maintenance) analyses of assets**
No awareness, knowlegde and skills for data driven assetmanagement	**Maintenance teams and asset managers have knowlegde and skills to determine whether assets are performing "normal"**
The organisation has no strategy, objectives or goals for more Data Driven Asset Management	**The organisation wants to improve maintenance of assets, but does not (yet) have a strategy, objectives or KPI's for this**



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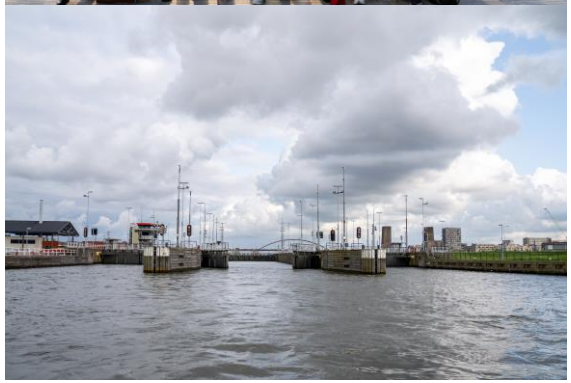
BEPROACT

?

Align smart maintenance goals with circularity?

Invite SURE Eurodelta partners to online strategy workshops and pilot case development sessions?



Thank you

Reserve slides

Pilot case example #1: Highway pavement.

bast Bundesanstalt für Straßenwesen

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Die Autobahn

Life time prediction

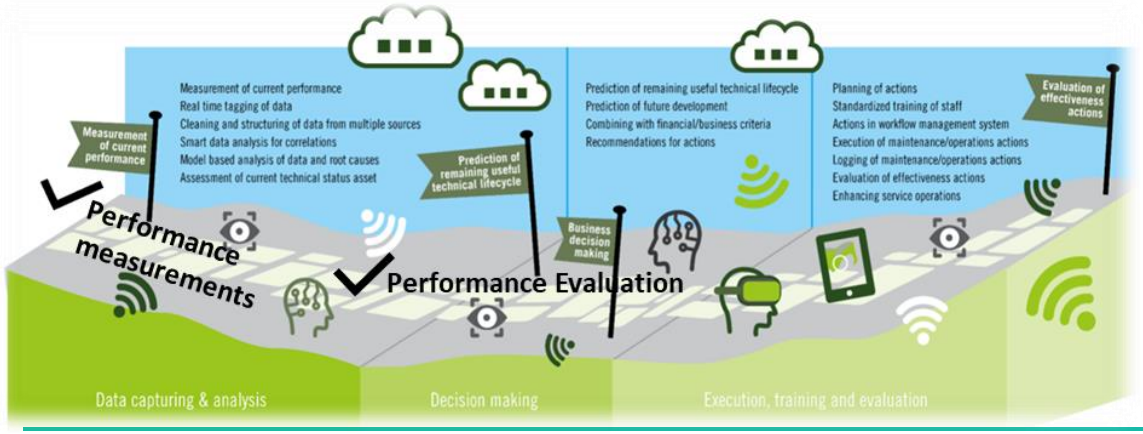
Asphalt life time

- Existing
- New measurements
- Instrumentation

Structural life evaluation

- Implementing the models
- Better assessment with the help of DME (data management ecosystem)

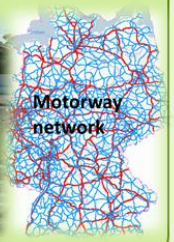
A complex index by combining both?



Sensors for Asphalt

Sensors testing and implementing

- Outdoor testing facility (duraBASt)
- Motorway network
- Knowledge



WIM-Sim (simplified WMI)

- For pavement design and life prediction
- Simple installation & operation
- Development phase in duraBASt
- Further development and Installation in test section

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Real-time data transfer to MESAS

- Imbedded temperature sensors
- Will be used for the structural evaluation
- Limitation: Moving speed of the MESAS (80km/h)

Pilot case example #2
Water management

FLANDERS ENVIRONMENT AGENCY

VLAIO

GEOSPARC

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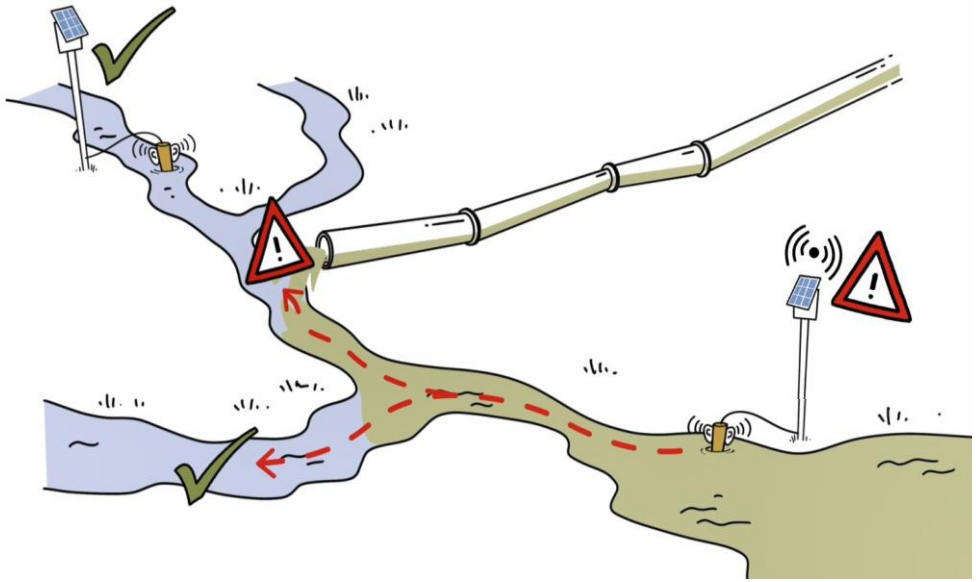
CASE 1: smart and dynamic alert system
- smart alarming (by pattern recognition)
- early-response actions in case of environmental incidents

CASE 2: real-time tracing in case of pollution incident
- upstream: source?
- downstream: impact?

CASE 3: maintenance optimization
- detecting defects
- optimizing route of field workers

Upstream tracing of pollution incidents



Pilot case example #3
Bridge infrastructure

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TNO BeProAct - 2.4 Bridge infrastructures

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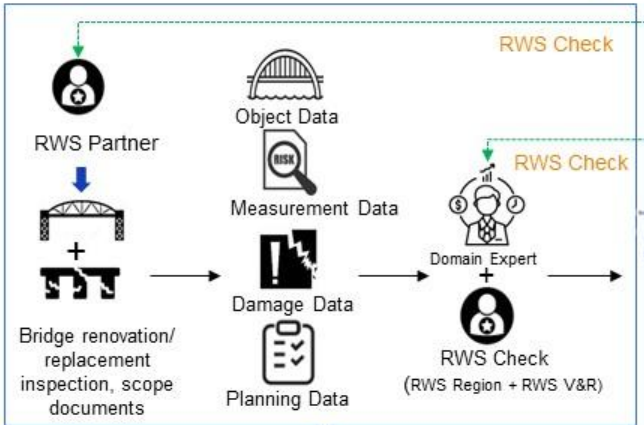
North-West Europe BEPROACT
Towards More Data Driven Asset Management

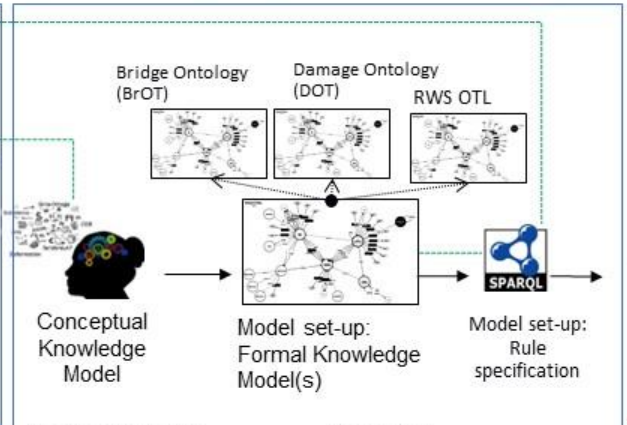
End-of-life rule checking for analyzing and prioritizing the bridge portfolio for public asset managers

In BeProAct, we develop a methodology to identify object-specific major ageing types based on a selected typology, combine various (un)structured data sources, objectify end-of-life decision rules used in the asset management for selected case data.
This methodology is to provide explainable multi-domain analysis and support **informed-decision making** for asset managers as semantic technologies are used.
By that, public asset managers are supported with more objective, accurate and rapid analyses on their asset portfolio to reduce inefficiencies in the current practices.



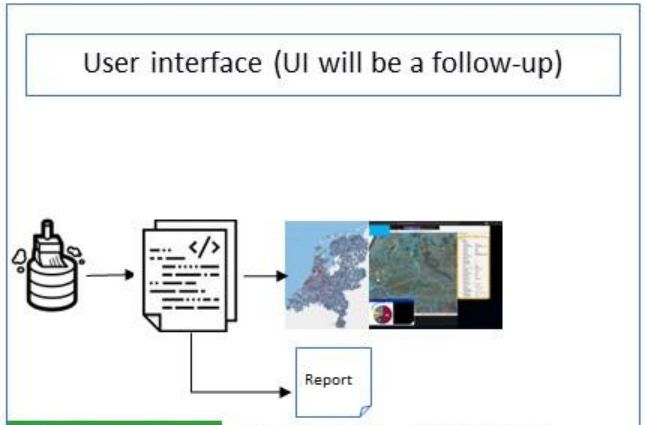
Data and Information Analysis
- Obtain, analyze available data format, content, applications for bridge inspection, management and planning
- Identify information gaps and needs for Rep. & Ren.

Define/Quantify End of Life Rules
- Demand, Design, State parameters,
- Limit states & qualitative thresholds.



Conceptualizing
- Representing domain knowledge in form of data model (UML) through classes, properties and relationships.
- This will make validation of the model explainable for domain experts and decision makers.

Encoding
- Representing domain knowledge and information and data needs through classes, properties and relationships.
- Validating with domain experts and decision makers.



Obtain case data
- Preparation of input data based on case studies (#bridges) with selected model properties based on defined sets of rules

PoC Tooling
- Semantic database (bridge instances)
- Executing selected rules

Visualisation
- Output data will be visualized on a map view.

Natural Language | Development | Application

TNO innovation for life