# The potential of digital twins in road maintenance



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#### Outline

- Background and needs why is a digital twin needed ?
- A digital twin solution and how it will support Nye Veier
- Outlook what will come
- How do we look at the potential of digital twins







## Why is a digital twin needed ?







#### Vision

- Nye Veier will be a fully digital innovative force in the industry
- More efficient, predictable implementation of projects
- 99.95% availability for road users







#### Needs

- Common digital environment for data and information
- User friendly and robust solutions
- Backbone through lifetime perspective







### A digital twin solution and how it will support Nye Veier's business







#### Data Refinement Chain" according to EU project EuroRoadS\* \* <a href="https://inspire.ec.europa.eu/glossary/EuroRoadS">https://inspire.ec.europa.eu/glossary/EuroRoadS</a>

### **WHY** ?









Our challenge - support business infrastructure objects along its life cycle and operation ...



#### Different perspectives / purposes

Physical unit (As-Built, As-Is) Galvanized steel Article no 1111111

**Technical solution** (As-Designed) Culvert Diameter X, Length Y

Functional unit (As-Required)) Drainage

Inspection Picture, date, protocol -> State



**TRIONA** 

Maintenance activity Change of culvert Maintained design and function

State Blocked











## Common digital environment supporting the lifetime perspective

- Accurate geographical location
- Model that supports the overall intended future needs/use
- Dynamic Feature Type Catalog (library of object definitions)
- Data validated against quality requirements
- Data has a time dimension (past, present, and future)
- Data stored according to well documented/known formats and structure
- Classification system that support life cycle

#### CoClass







#### User friendly and robust solutions



- Data is easy accessible through
  - APIs and open international exchange standards
  - Customized dataset (by segmentation adjusted to information needed by a specific service or application and its purpose and intended use)
  - o M2M
  - Webb interface
- Usage of well proven standardized software that are development continuously
- Operated in an environment with high availability and performance







#### Standardization islands – how to think?









## Outlook

#### What will come?







#### AIM – Webportal: Camera overview









#### AIM – Webportal: Work order









#### Case 1: Disfunction on emergency telephone SOS23 Væretunnelen



Alert to Operation Contractor by phone (popup, generated by SCADA WinCCOA or AIM)

Link from alarm automatically creates a work order which in turn opens the web portal and correct object(SOS23). The user get a link to related data sheet and line drawings identifying phone connections. Based upon this, a replacement phone can be ordered from the supplier or local stock, and programmed acc. to correct IP no. and phone number.

TRIONA

SOS

SOS

Upon receive of the replacement phone, the user can replace the defect phone. ( acc. to the current roadwork permit plan, also linked to the object or the tunnel)



The work order is not closed until the alarm is reset and necessary documentation in AssetDB is updated.





#### AIM – Webportal: Camera overview









#### Vision for other O&M systems into AIM









## Example of future usage in operation RoadCloud WAY AHEAD

- Enables continuous, Real-time monitoring of road status (friction, surface, etc.)
- What will be the benefits of connecting road status data to the AIM solution?









#### Enable new ways...

 To access the specific data (road condition could for example be available in the AIM web portal or by the contractors working for Nye Veier)



- Increase collaboration with other parties (contractors etc.) in the "operation value-chain" (dynamic routing etc.)
- To do cross analyzes when combined with other data (accident data, traffic flows, etc.)
- To produce better basis for decisions, now and in the future, about when to start operation tasks





## People

#### Organisational hurdles we need to overcome







#### Hurdle # 1: Fragmentation within our Industry - Domain

The people who plan

are not the people who design

are not the people who build

are not the people who maintain & operate







#### Hurdle # 2: Fragmentation within our Industry - Software

The people who make planning systems

are not the people who make design systems

are not the people who make systems for construction

are not the people who make systems for maintenance &

operations...







#### THE SINGLE BIGGEST PROBLEM IN COMMUNICATION IS THE ILLUSION THAT IT HAS TAKEN PLACE.

PLAYWRIGHT GEORGE BERNARD SHAW,

BORN IN DUBLIN, COUNTY DUBLIN

## How do we look at the potential of digital twins







#### The potential of digital twins

"Substantial reduction of cost for data capture and supply of data"







#### The potential of digital twins

"Fast and efficient information exchange in order to provide a *reliable* basis for decisions"







#### The potential of digital twins

"The suppliers for operation and maintenance can optimize the use of resources in order to provide a high service level while minimizing response time."







#### The potential of digital twins - the X factor

"The ultimate achievement would be total predictability to enable a safe journey for everybody that is using a Norwegian road"







#### Thank you - Questions?





