



ASSET DATA MUST BE FAIR

Trends in asset management

Jan Voskuil | Taxonic

SEMANTiCS, 10-11 September 2019
Karlsruhe

WHO WE



Jan Voskuil (PhD)
*Semantic Web and FAIR
Evangelist*



Founded: in 2012 with a strong commitment to model driven architectures

Asset Management – Schiphol

Knowledge Graph technology – TopQuadrant Partner

THE PROBLEM

Definition

Asset management is:

- A systematic approach to the realization of value from assets,
- With the objective of providing the best value level of service for the costs involved
- Over their whole life cycle
 - including design, construction, commissioning, operating, maintaining, repairing, modifying, replacing and decommissioning or disposal—of physical and infrastructure assets

ASSET MANAGEMENT
DONE RIGHT:
EVIDENCE
BASED

- >Data
- >Analytics



	STATIC DATA	DYNAMIC DATA	DERIVED DATA
	CONFIGURATION	CURRENT STATUS	PREDICTIVE
FUNCTIONAL	Function Traffic Throughput	Performance Degradation	Capacity Remaining Useful Life
PHYSICAL	Asset Type Road segment	Inspection Sensors Load, wear and tear	Asset Usage Predictive maintenance





ASSET PORTFOLIOS CHANGE CONSTANTLY

- Asset Life Cycle
 - Structural maintenance
 - Defect rectification
 - Damage repair
 - Lifetime extension
 - Asset replacement

ASSETS ARE PART OF COMPLEX SYSTEMS

- A lock is interconnected
- Impact:
 - Shipping lines
 - Water management
 - Agriculture
 - Building owners (basements)



MANY PARTIES HAVE RELEVANT DATA

Relevant, but impossible to use



Municipality



Province



National Roads
and
Waterways
Authority



Regional
Water Board



Harbour
Authority



Province



Regional
Water Board



Harbour
Authority



Municipality



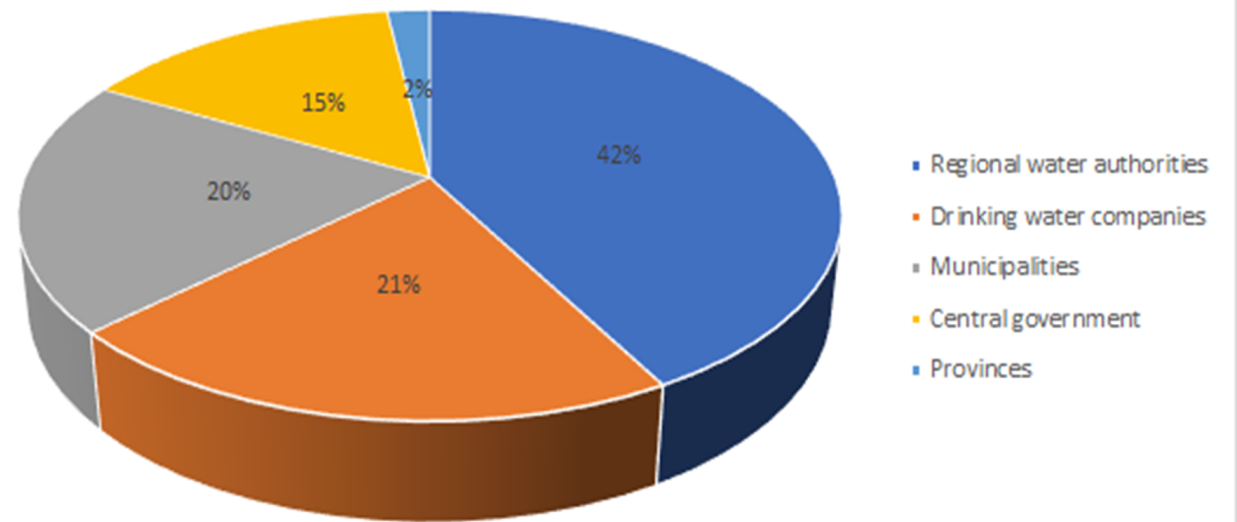
Safety Region

Total expenditures for water asset management in 2012

EUR 6.67 billion

- The aggregate cost of water resources management is estimated at **EUR 7.6 billion per year**, or about 1.26% of the GDP of the Netherlands
- **Flood Risk Management:** EUR 940 mln (14 percent of total expenditure)
- An indicative projection of total public water resources management costs for the year 2025 shows:
 - costs may increase to **EUR 9 093 million** or to EUR 8 343 million, if planned savings from increased efficiency can be achieved.

Distribution of total public expenses for water resource management





TWO FUNDAMENTAL PROBLEMS

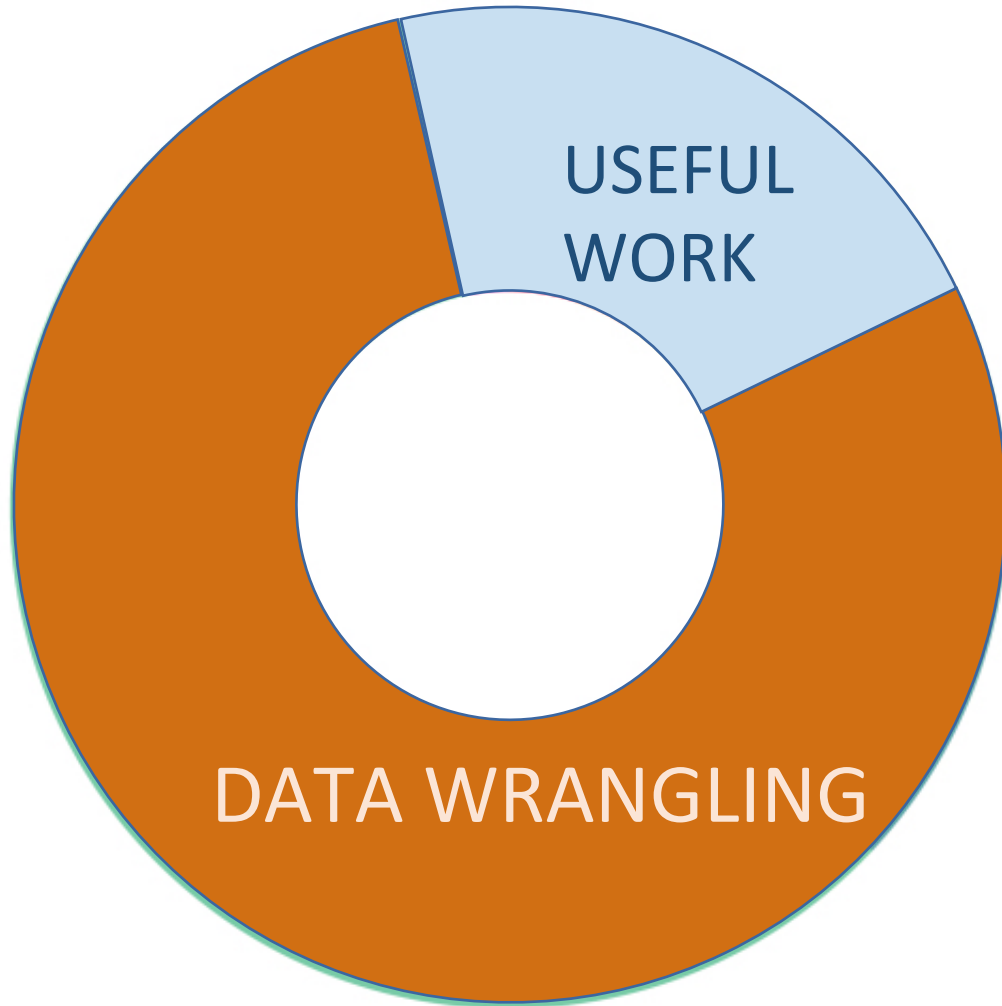
- Do you have the **data**?
- Can you **compute** the solution?

AND:

- A lot of money is at stake

OUR VISION

THE DATA PROBLEM IS UNIVERSAL



What data scientists spend the most time doing

● Building training sets: 3%

● Cleaning and organizing data: 60%

● Collecting data sets; 19%

● Mining data for patterns: 9%

● Refining algorithms: 4%

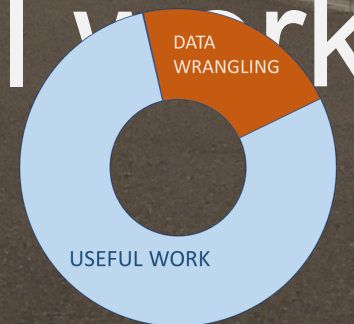
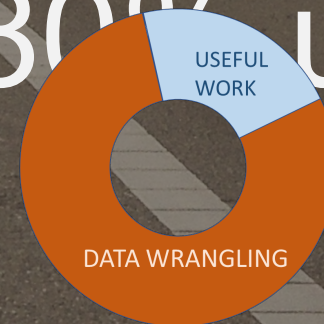
● Other: 5%

80%

FAIR

Let's aim for:
20% data
wrangling

80% useful work

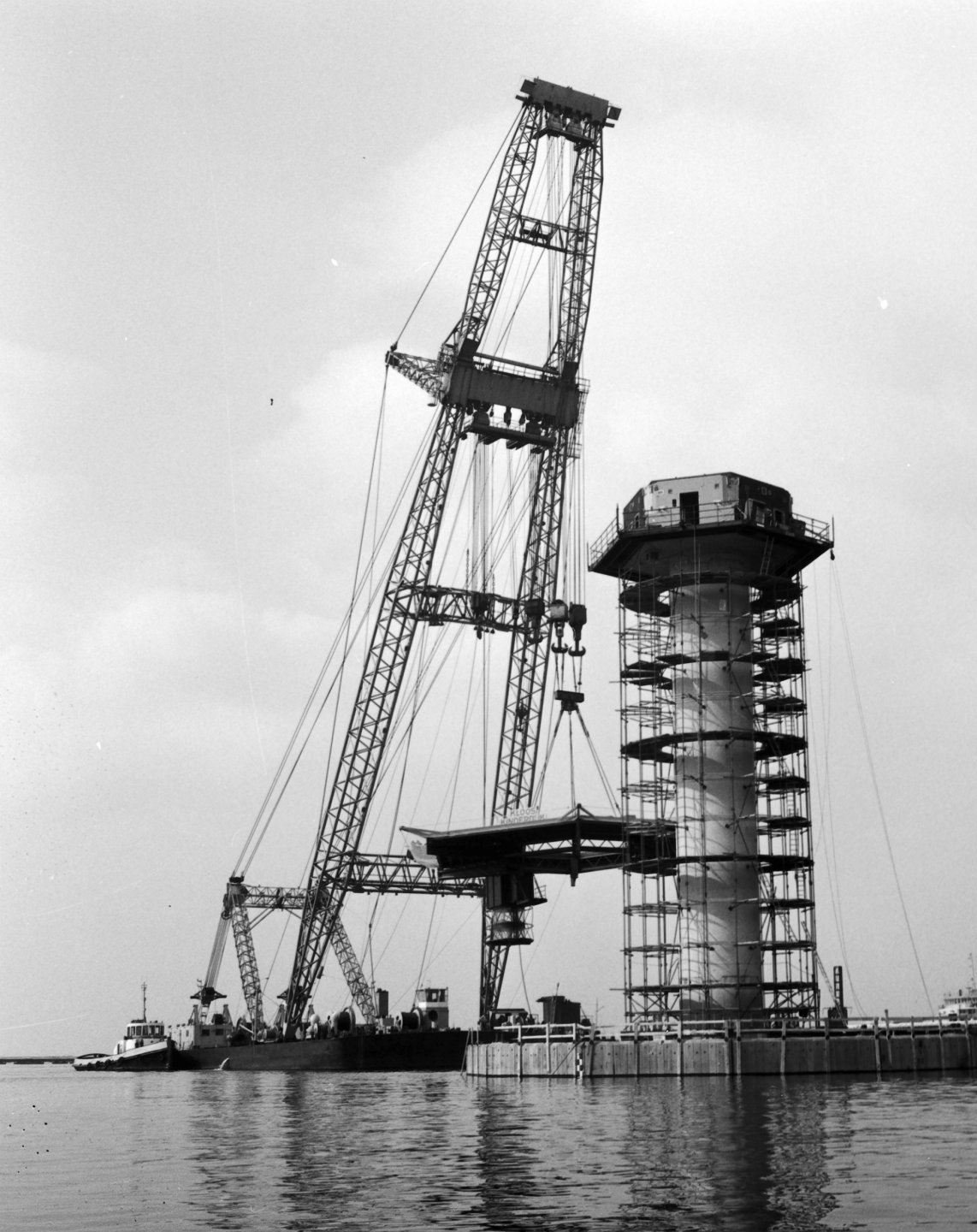




FAIR

Principles

- > Findable
- > Accessible
- > Interoperable
- > Reusable



XAM | ASSET MANAGER

> Integrated **data** platform

- ★ FAIR principles

- ★ Relevant standards

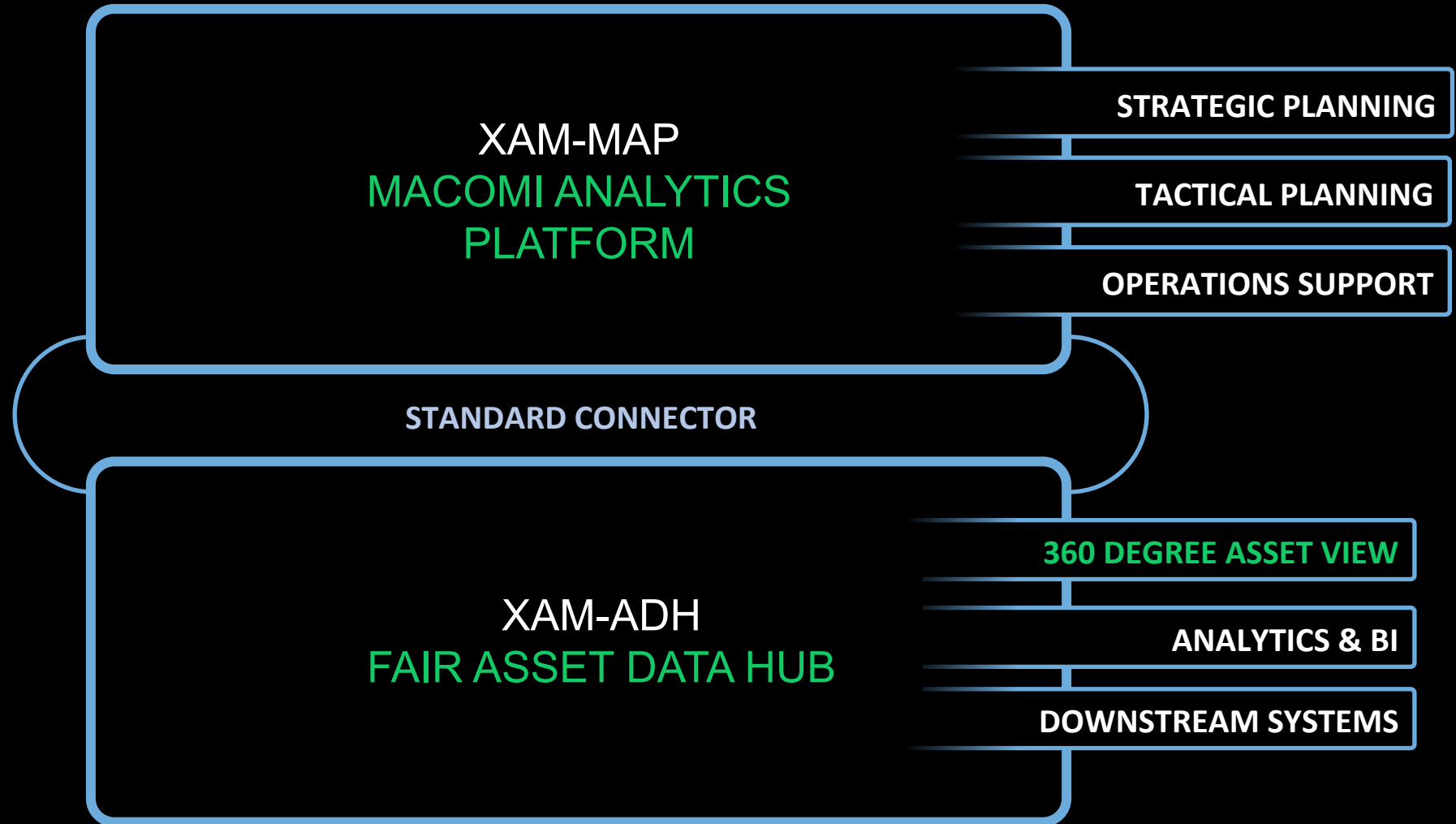
> State of the art

analytics

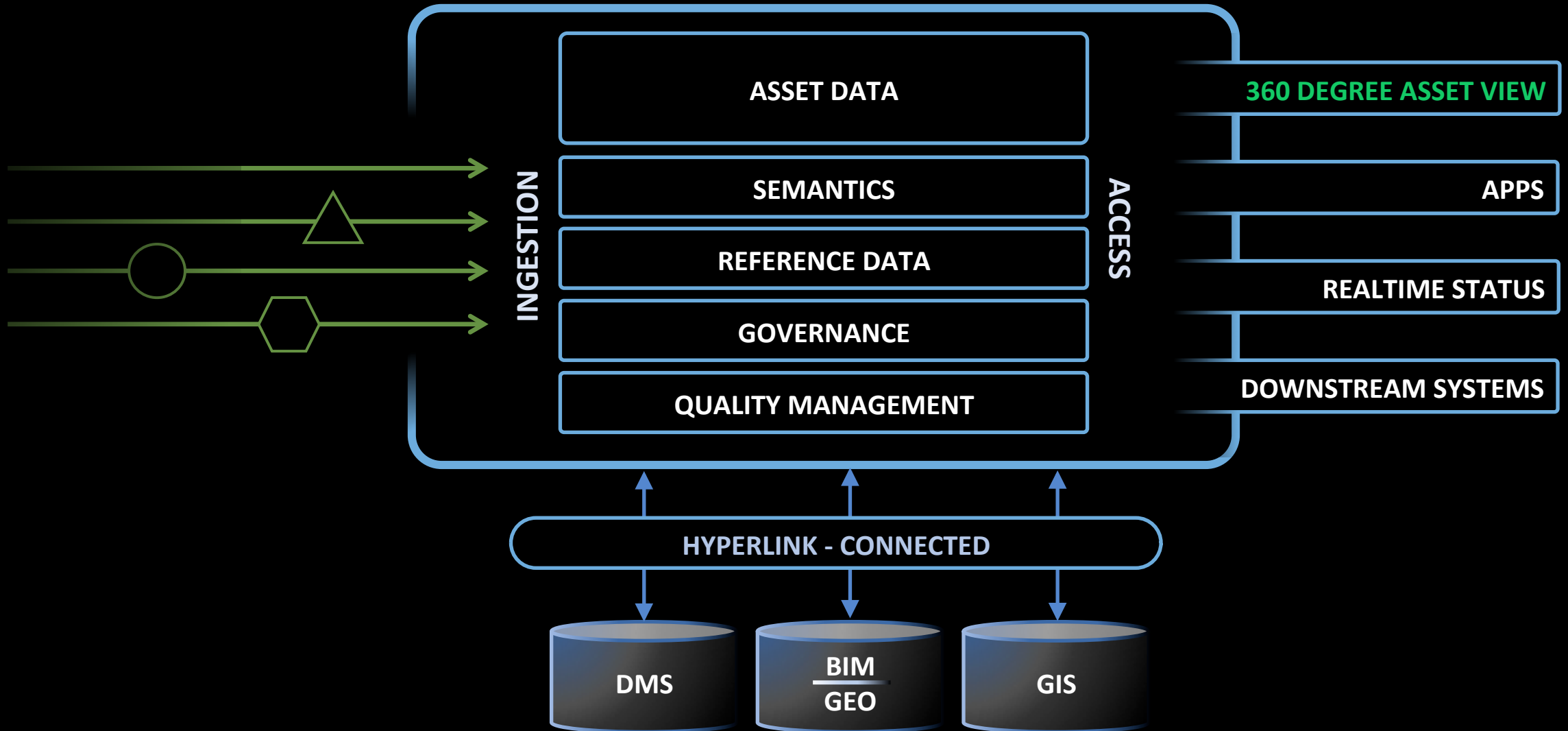
- ★ Specific algorithms

- ★ Operational, tactical, strategic

XAM | ASSET MANAGER



XAM-ADB | ASSET DATA HUB

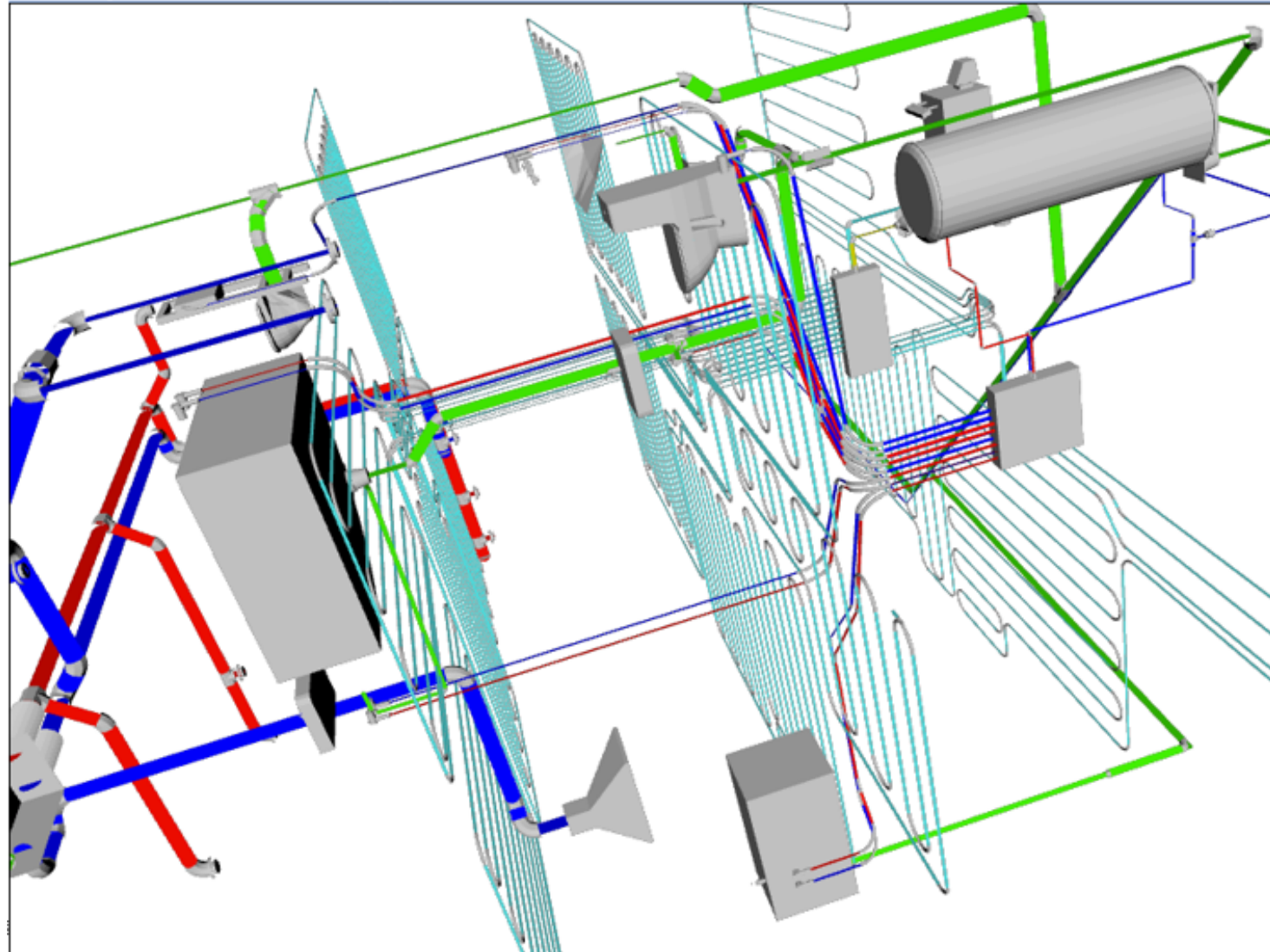


XAM-ADB

360° Degree Asset View

A single pane of glass that provides visual insight in all information available about an asset





Instance details

urn:x-evn-master:vvs_med_gulvvarme/INSTANCE_711

Annotations

3D DEF: 711

label: EXPRESS instance with name #711 and type IFCENERGYCONVERSIONDEVICE.

Properties

GlobalId: '2his41_kP8Ch2cl2v5FT6y'

ObjectPlacement: EXPRESS instance with name #4522 and type IFCLOCALPLACEMENT.

OwnerHistory: EXPRESS instance with name #75 and type IFCOWNERHISTORY.

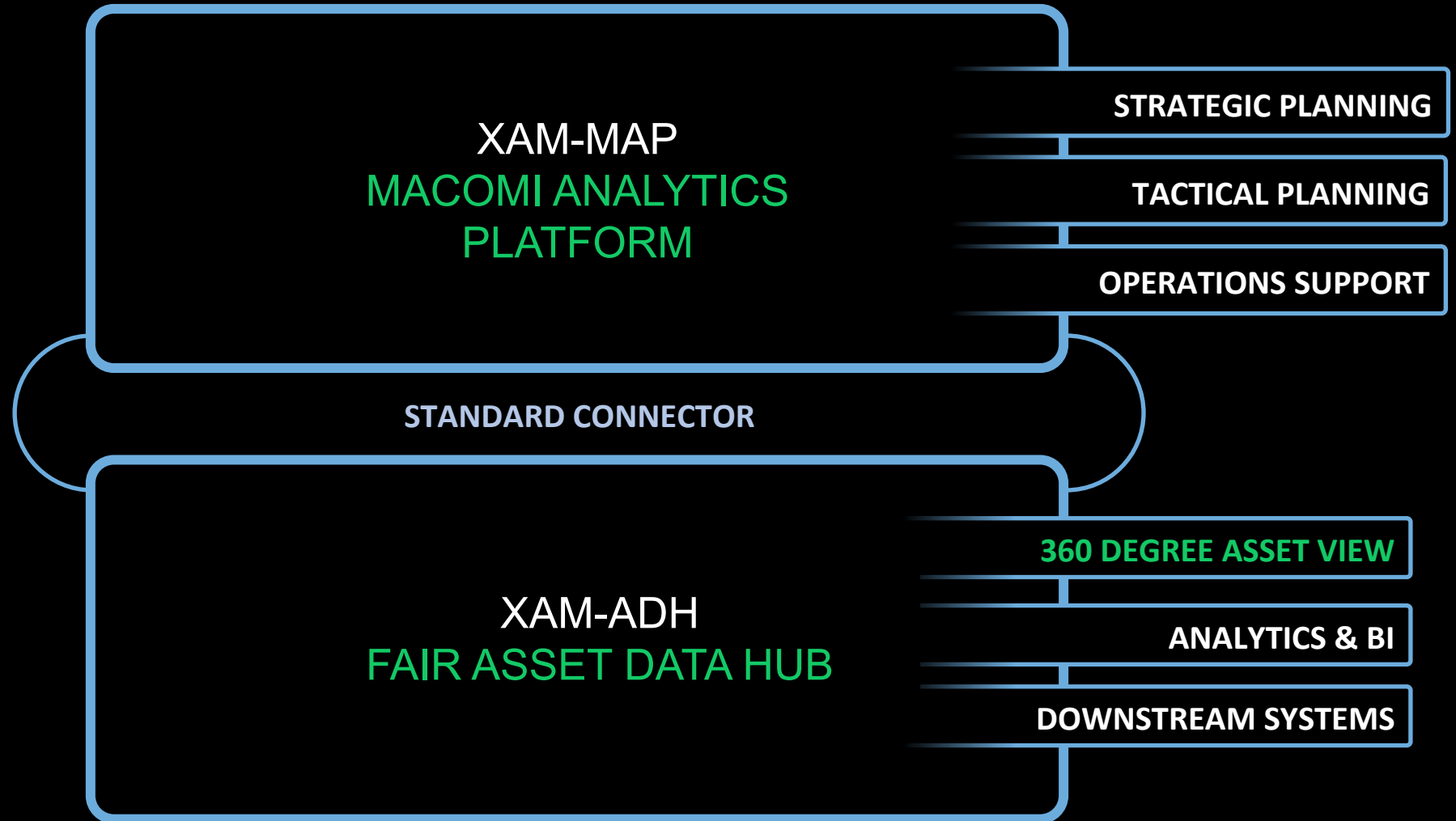
Representation: EXPRESS instance with name #4523 and type IFCPRODUCTDEFINITIONSHAPE.

type: IfcEnergyConversionDevice

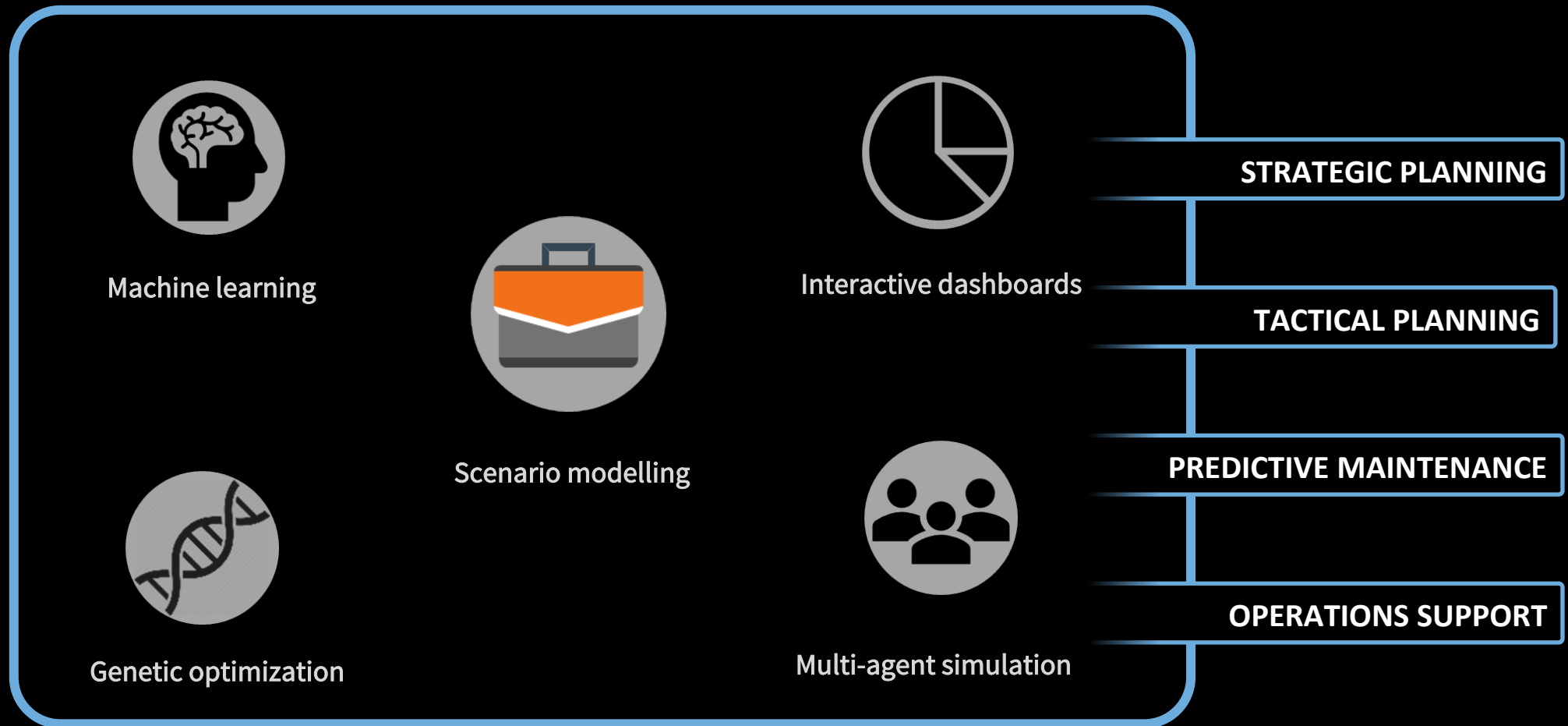
Incoming References

hasContents (inverse): c9c199-6ea6-47da-940a-4abece14ebc9
cbd7b04-a8d7-4244-9863-829e85066526
f57b961-cc81-4cd7-932b-ae566ced48a8
f7829a2-0250-4daf-91fe-220378a11010
fb8b07-b8a8-46bb-9e95-5b631416b67c

XAM | ASSET MANAGER



XAM-MAP | MACOMI ANALYTICS PLATFORM



A CASE





MAIN
CONT
R-
ACTOR

Schiphol
Data
Dictionary
OTL

Asset
Info
Viewer

APPS

CDV

Data Quality

360° Asset View



DATA ENGINEER

END USER



CDV

TopBraid
Enterprise
Data Governance™

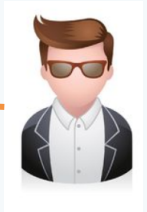
VIEWER | API

TopBraid
Enterprise
Data Governance™

{ REST:API }

GraphQL

SPARQL



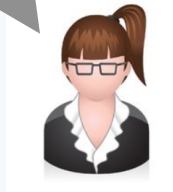
APP DEVELOPER

Real Time Sync & Persistence

Object Type Library



Data Quality



360° Asset View



DATA ENGINEER

END USER

CDV



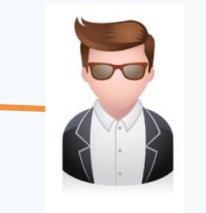
VIEWER | API



{ REST:API }

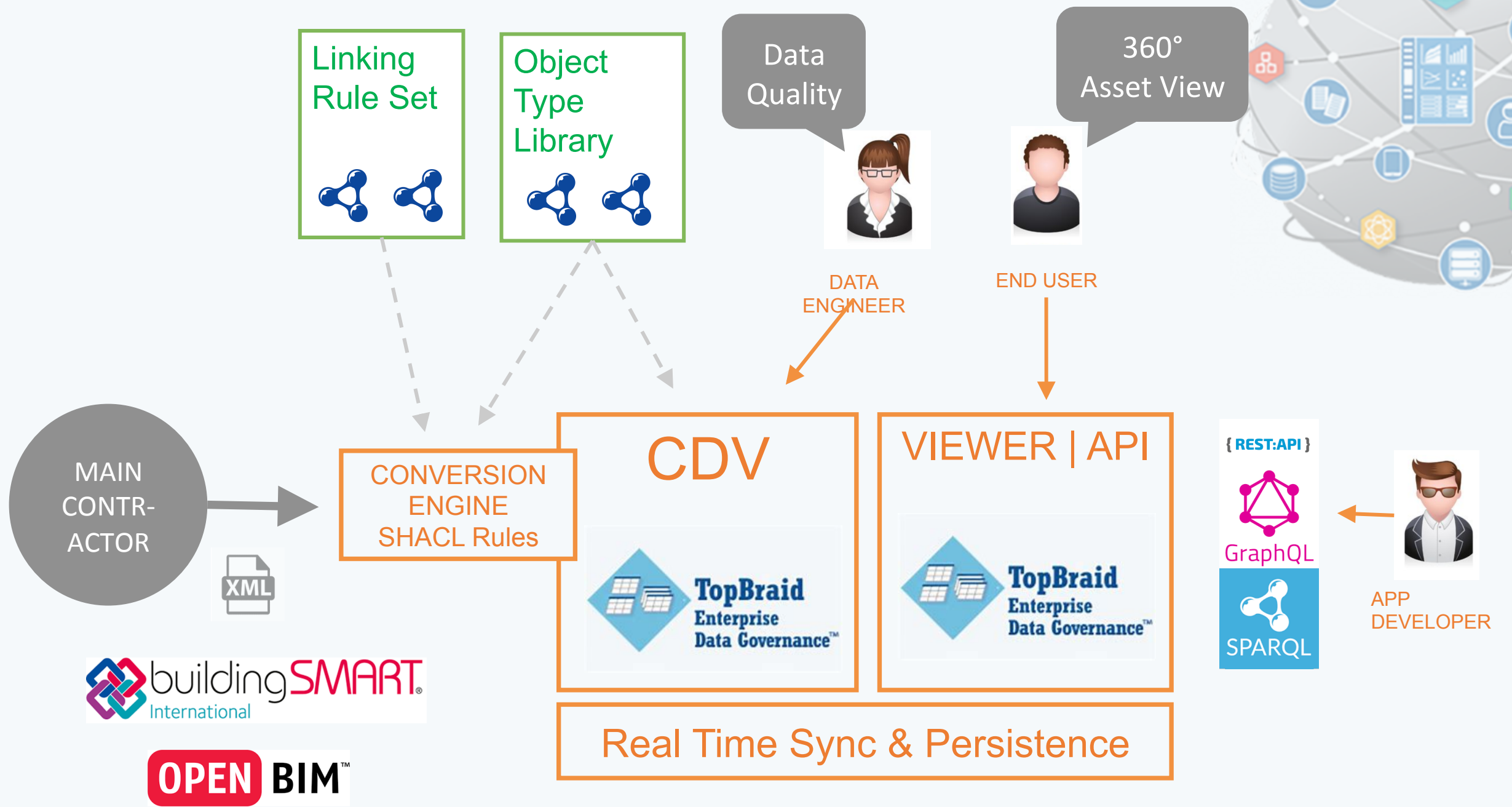


GraphQL



APP DEVELOPER

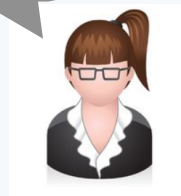
Real Time Sync & Persistence



Linking Rule Set

Object Type Library

Data Quality



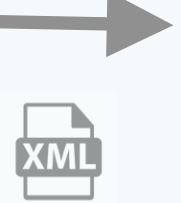
DATA ENGINEER

360° Asset View



END USER

MAIN CONTRACTOR



CONVERSION ENGINE
SHACL Rules

CDV

VIEWER | API

{ REST:API }

GraphQL

SPARQL



APP DEVELOPER

buildingSMART International

OPEN BIM

Real Time Sync & Persistence



TRENDS

RDF IS TRENDING





Conference of European Directors of Roads

OTL
Object Type Library

*Ontology in OWL (and SHACL)
specialized for asset management
purposes*



INTERLINK



INTERLINK – A EUROPEAN ROAD OTL

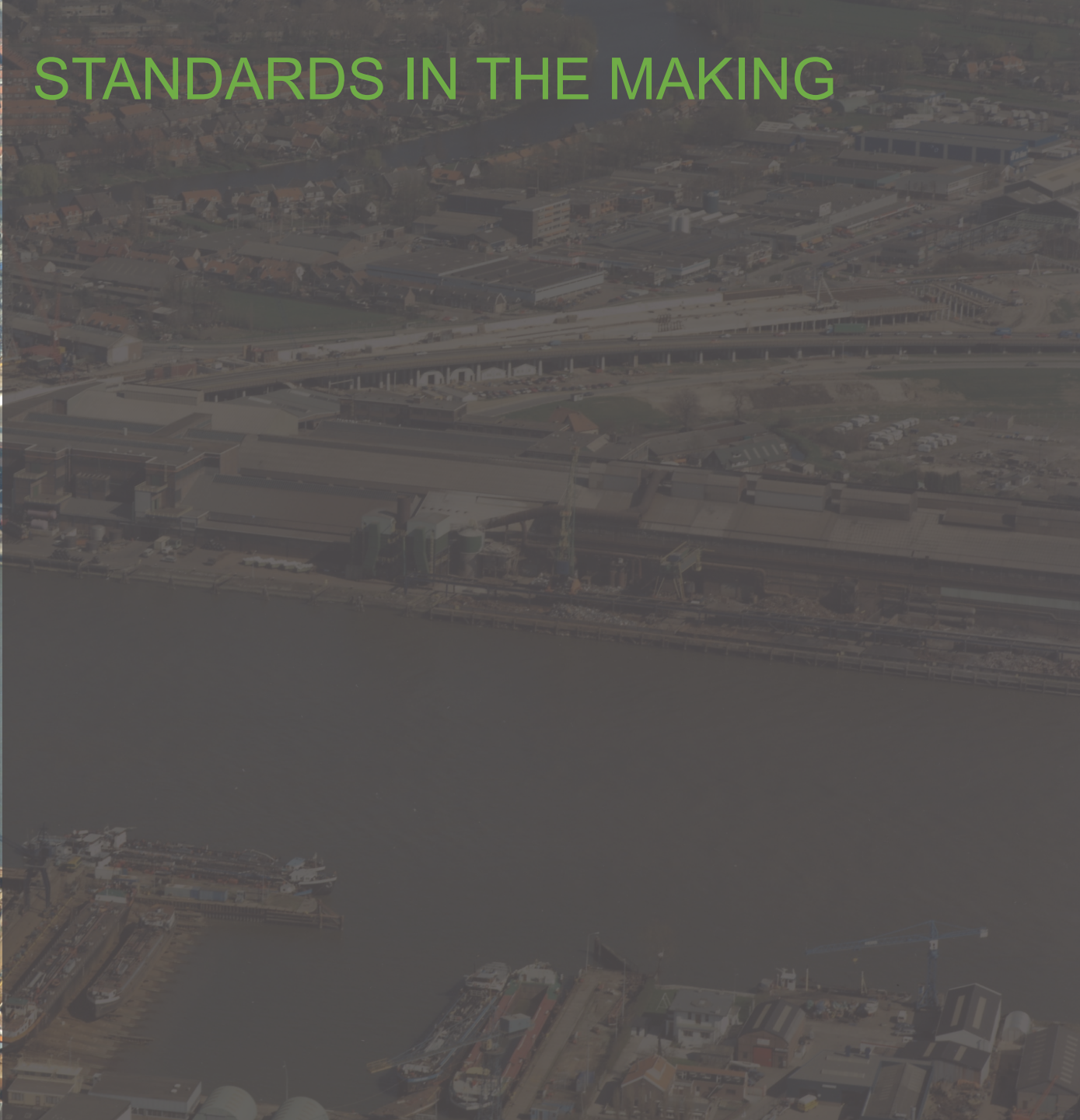
LDAC – 5th Linked Data in Architecture and Construction Workshop 13-15 November 2017
Dijon, France







STANDARDS IN THE MAKING





STANDARDS IN THE MAKING NETHERLANDS

- COINS [OWL + proprietary interpretation]
- NEN NTA 8035 [OWL, SHACL]
- GWSW [OTL for urban water management]
- BGT [LOD and GIS combined (Kadaster)]
- IMBOR [Management of Public Space]



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OTLs published by:
RWS, ProRail, ... (many will follow, soon)



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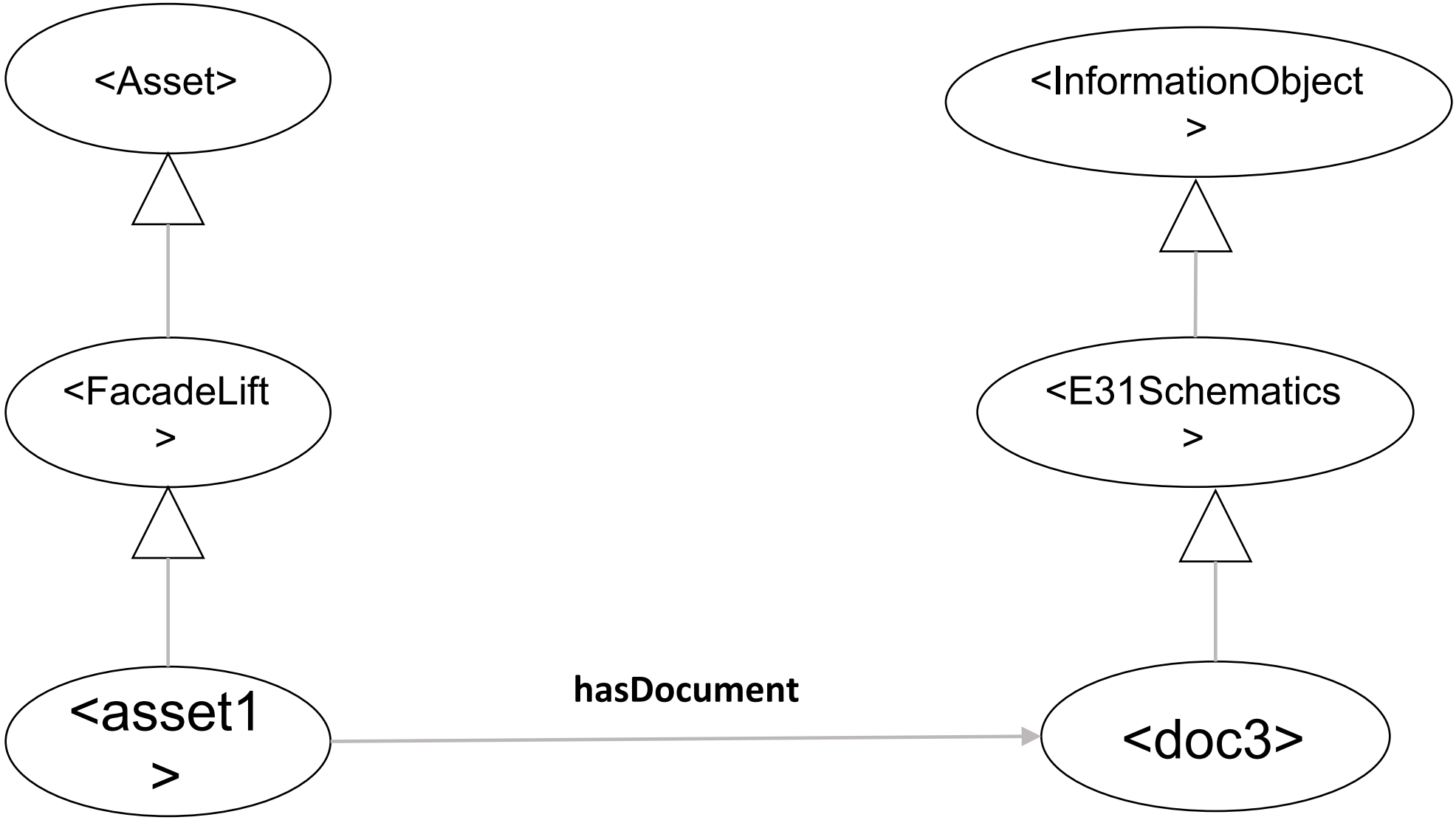
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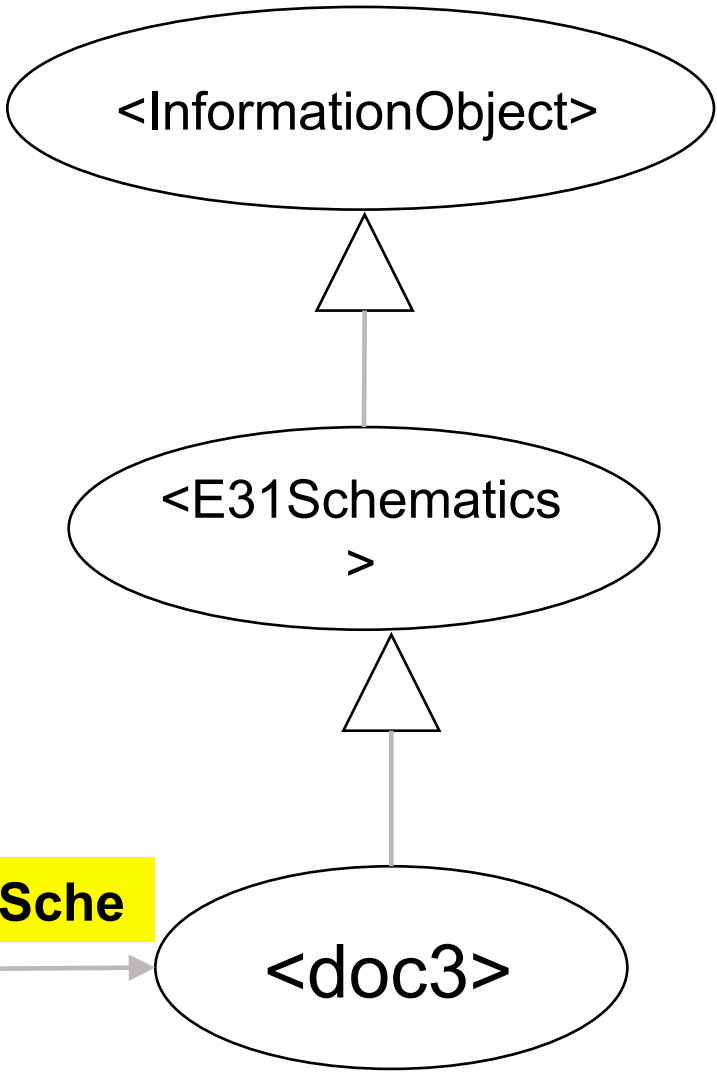
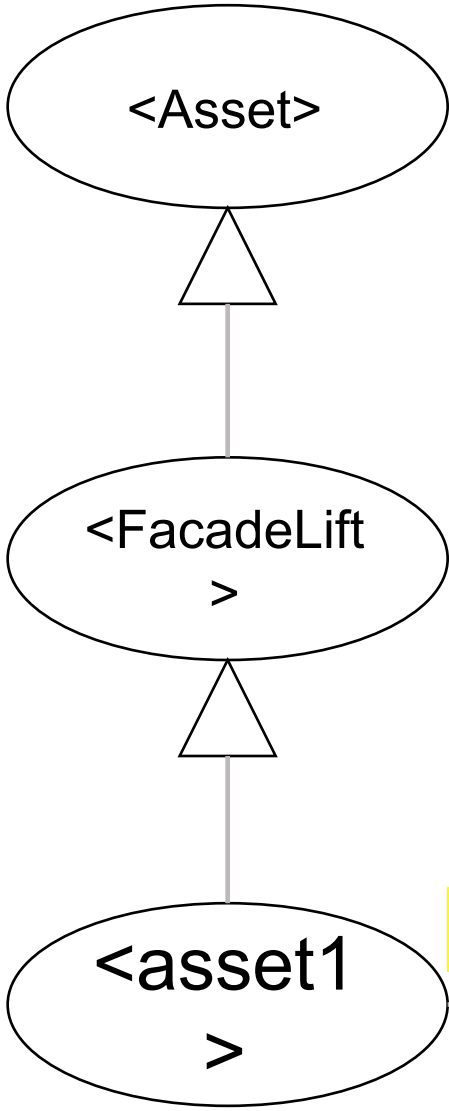
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INTERNATIONALLY

Linked Building Data [W3C]
buildingSMART [IFC-OWL > ¿native RDF?]
CEN TC442
ISO 21597 ICDD

CHALLENGES





FacadeLift_hasDocument_E31Sche
matics



QUERY:

“The average number of documents per asset instance in the database”

OLD SITUATION:

70,000 instances of asset x
1

Solution space: 70,000

**QUERY TIME: 0.1
seconds**

NEW SITUATION:

70,000 instances of asset x
4498 solutions for “subproperty
of hasDocument”

Solution space: 314,860,000

QUERY TIME: 7.5 minutes

HOW DO WE MAKE SURE OTL'S WORK IN PRACTICE?

Your help is needed!



THANK YOU!



Jan Voskuil

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