



ASSET DATA MUST BE **FAIR**

Assetmanagement met LD: een praktijkcasus bij Schiphol

Jan Voskuil | Taxonic

PLDN, 22 januari 2020
Beeld en Geluid, Hilversum

WIE ZIJN WE



Jan Voskuil (PhD)
Semantic Web and FAIR Evangelist



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

Asset Management – Schiphol

Knowledge Graph technology – TopQuadrant Partner

AGENDA



WAAROM?

Schiphols situatie oud > nieuw
Onze visie; **FAIR** data is een must
Strategische overwegingen van Schiphol



DE CASUS VAN SCHIPHOL

Architectuur op hoofdlijnen
Uitdagingen
Doorontwikkeling



TOEKOMSTBEELD

Data-driven planning
Een herhaalbare oplossing



WAAROM

SITUATIE

ONZE VISIE

SCHIPHOL: STRATEGIE EN AMBITIE



MC 2019

Asset management geoutsourced
Aan 6 MCs

NIEUWE BUSINESSPROCESSEN

MC verantwoordelijk voor configuratie en informatie

PROBLEMATIEK: DATA OP ORDE

DIGITALE AMBITIES

Visie op data
Aansluiten op de markt

Definition

Asset management is:

- > A systematic approach to the **realization of value** from assets,
- > 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
PER DEFINITIE:

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

CONTRIBUTION TOWARDS ASSET MANAGEMENT OBJECTIVES

VEEL PARTIJEN HEBBEN RELEVANTE DATA

Relevant, maar onmogelijk te gebruiken

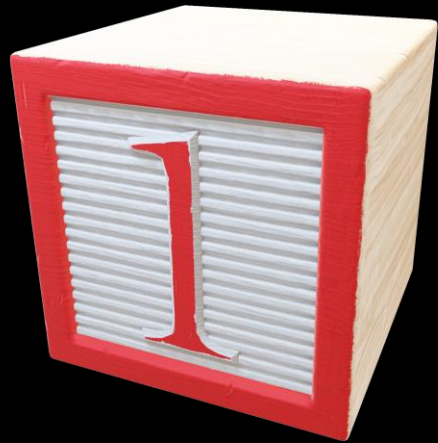
Leveranciers

Brandweer

Partijen binnen Schiphol

Aannemers

Kennisinstituten



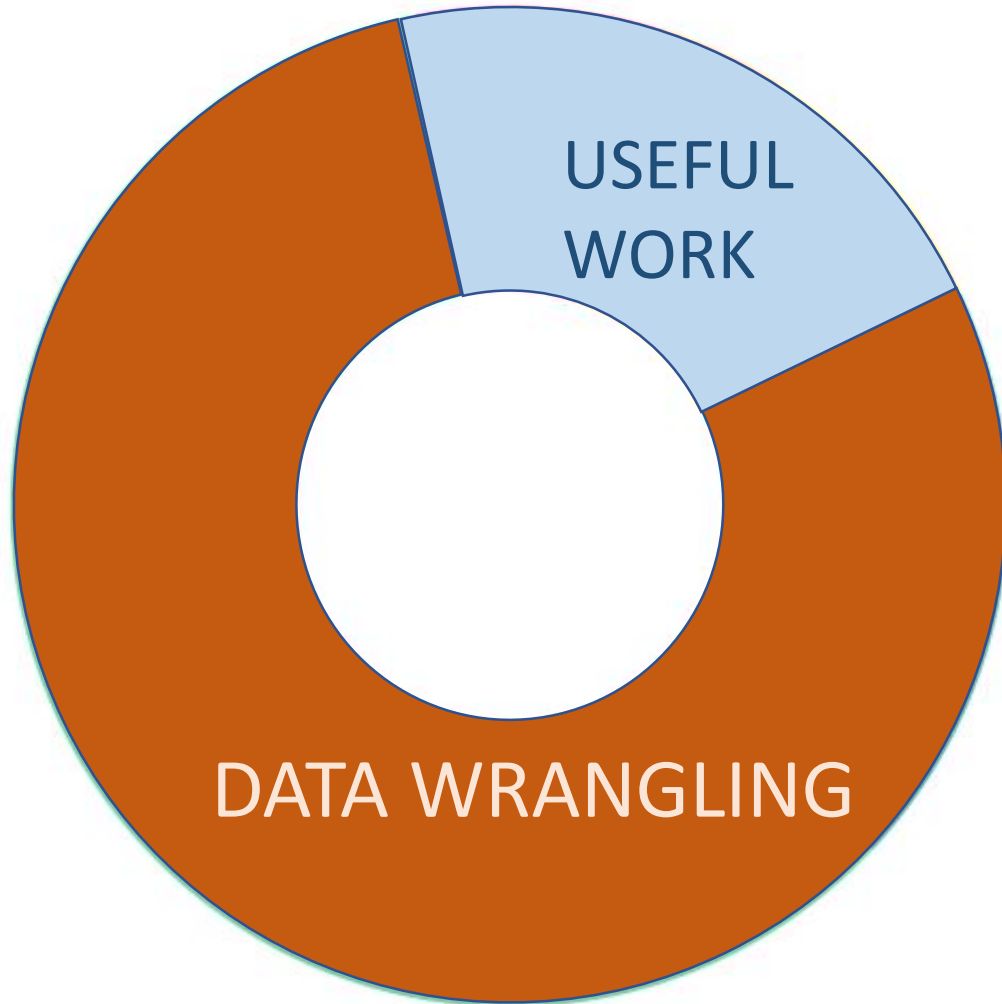
WAAROM

SITUATIE

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SCHIPHOL: STRATEGIE EN AMBITIE

THE DATA PROBLEM IS UNIVERSAL



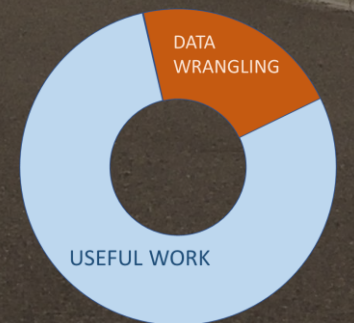
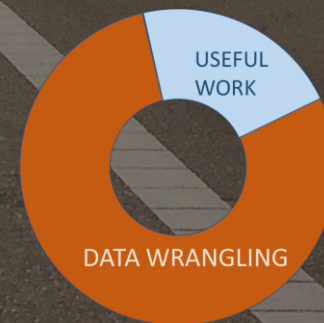
What data scientists spend the most time doing

- 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



A wide-angle photograph of an airfield at sunset. The sky is a mix of orange, pink, and light blue. In the foreground, a large commercial jet is parked on the tarmac. In the background, several other aircraft are visible, along with airport buildings and tall light poles. The overall scene is calm and well-lit by the low sun.

FAIR Principles

> **F**indable

> **A**ccessible

> **I**nteroperable

> **R**eusable



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



INTERLINK



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]

OTLs published by:

RWS, ProRail, ... (many will follow, soon)

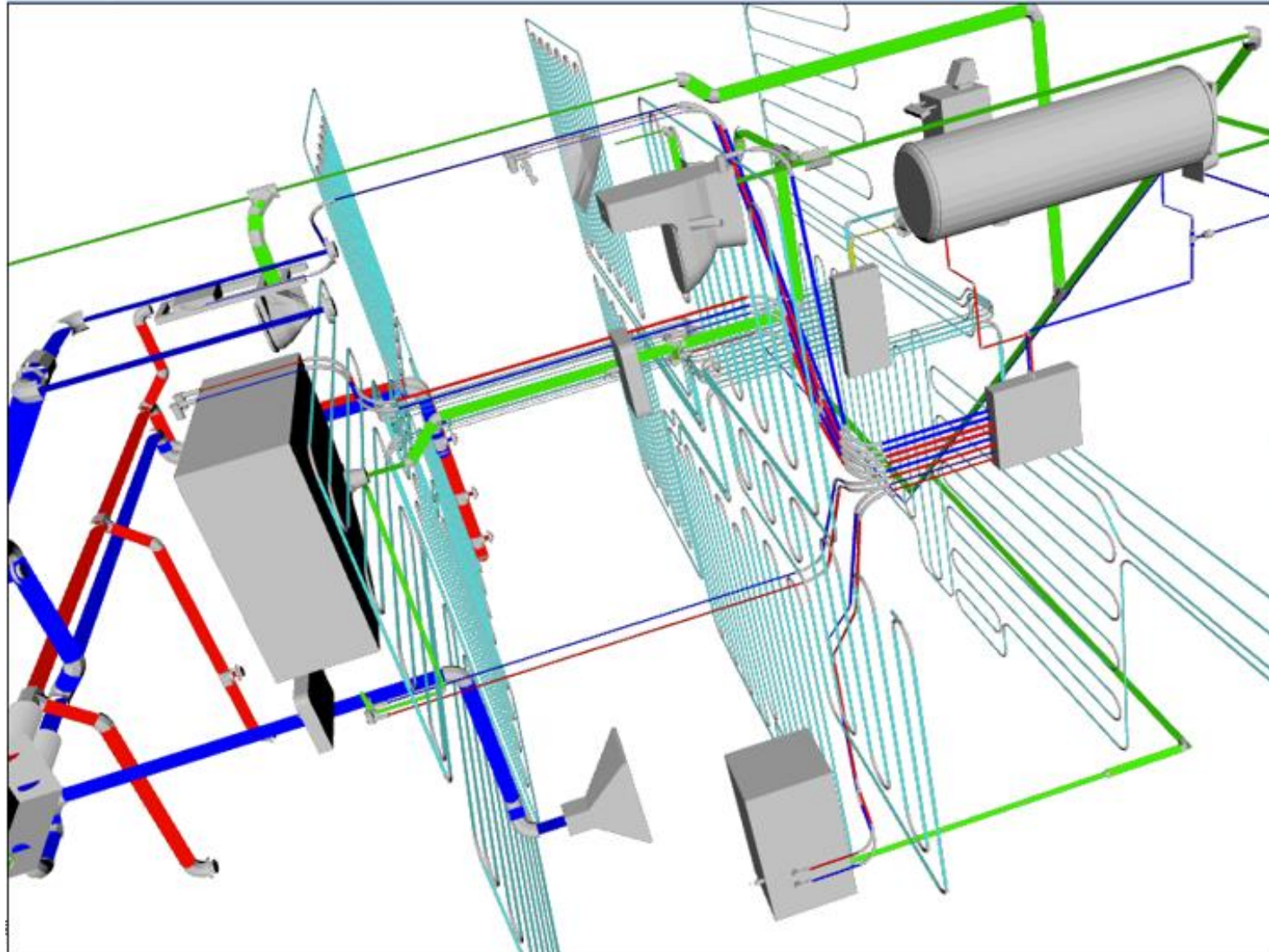
INTERNATIONALLY

Linked Building Data [W3C]

buildingSMART [IFC-OWL > ¿native RDF?]

CEN TC442

ISO 21597 ICDD



Instance details

urn:x-evt-master:vvs_med_gulvvarme/INSTANCE_711

Annotations

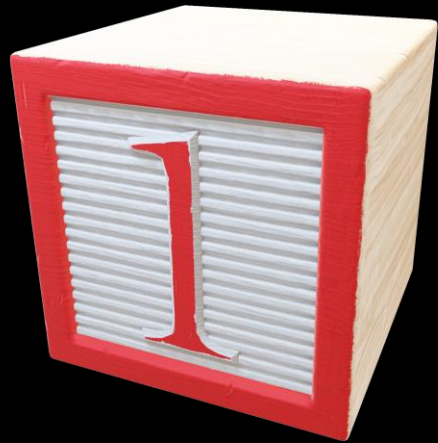
3D DEF: 711
label: EXPRESS instance with name #711 and type IFCENERGYCONVERSIONDEVICE.

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
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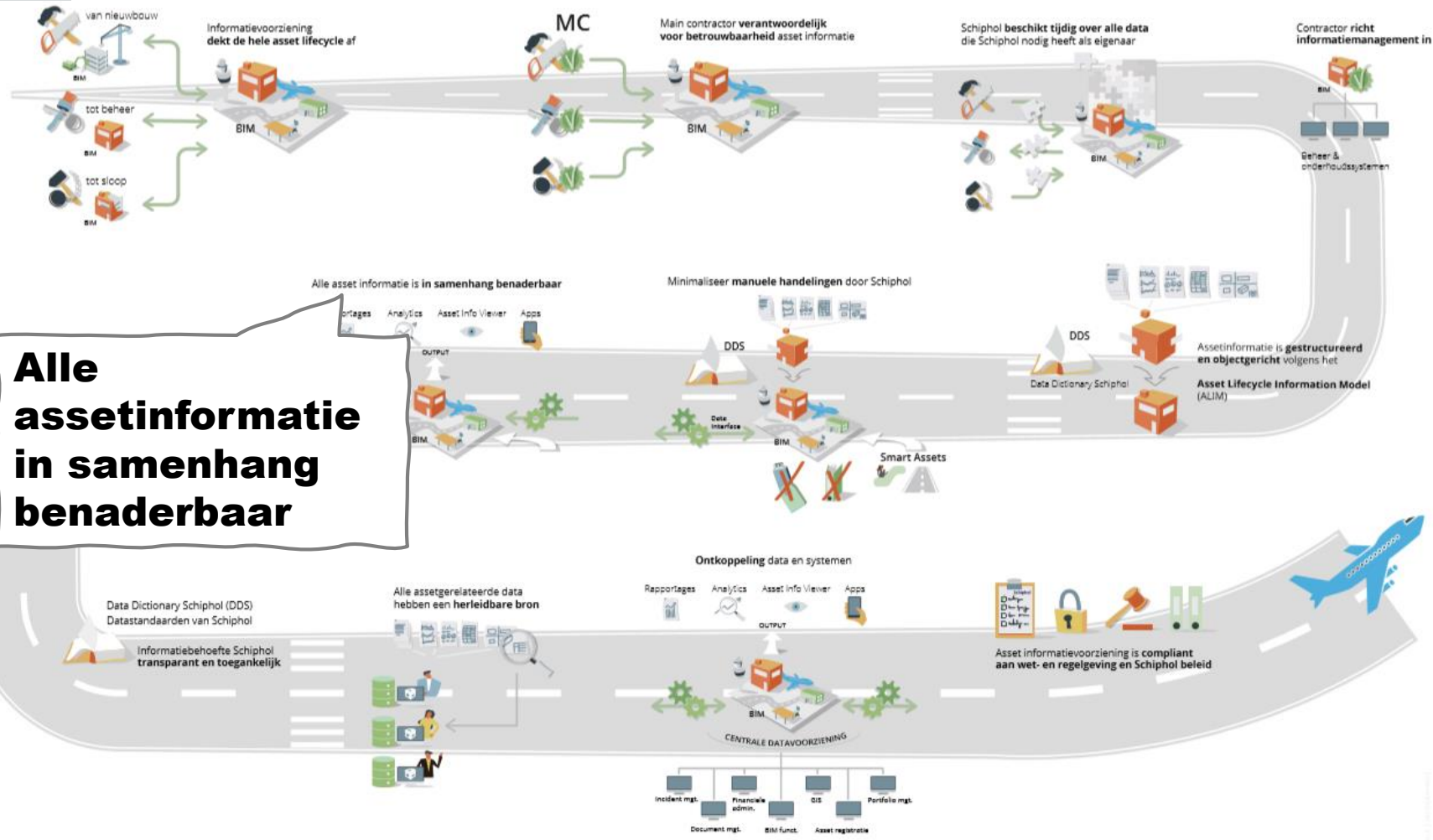
WAAROM

SITUATIE

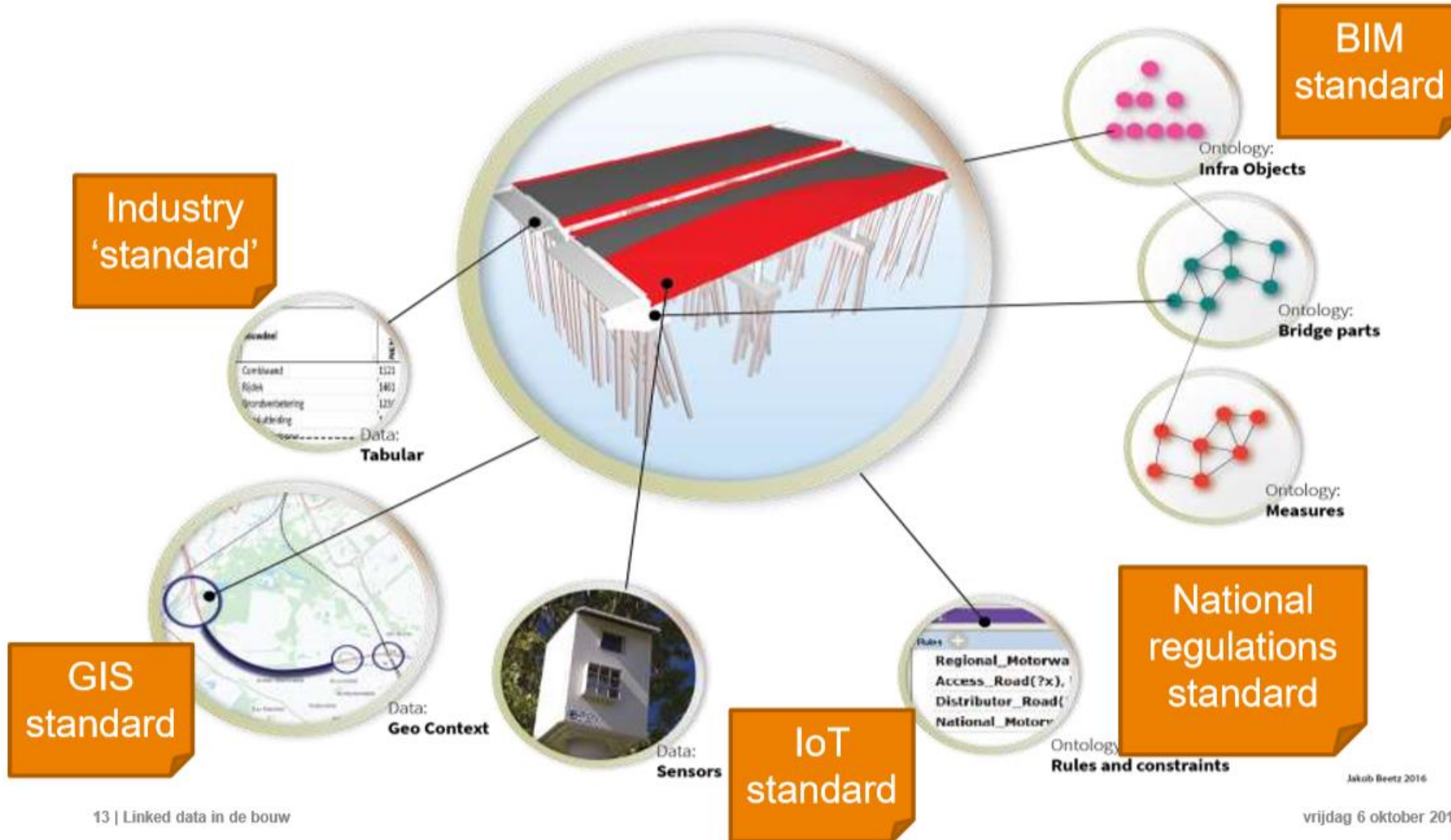
ONZE VISIE

SCHIPHOL: STRATEGIE EN AMBITIE

STRATEGIE INFORMATIEMANAGEMENT



DIGITAL TWIN MET LINKED DATA REALISEERBAAR



Jakob Beetz 2016



DE SCHIPHOL CASE

**ARCHITECTUUR | UITDAGINGEN |
DOORONTWIKKELING**



Asset Info
Viewer



Schiphol Data
Dictionary

OTL

MAIN
CONTR-
ACTOR

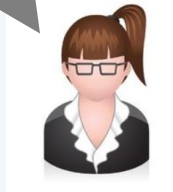
APPS

CDV

GIS

DMS

Data Quality



DATA ENGINEER

Integraal Assetbeeld



END USER



CDV



VIEWER | API



{ REST:API }




GraphQL



APP DEVELOPER

Real Time Sync & Persistence

Object Type Library



Data Quality



Integraal Assetbeeld



DATA ENGINEER

END USER


DATA SHAPES (SHACL)

CDV



TopBraid Enterprise Data Governance™

VIEWER | API



TopBraid Enterprise Data Governance™

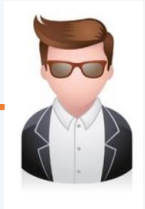
{ REST:API }



GraphQL

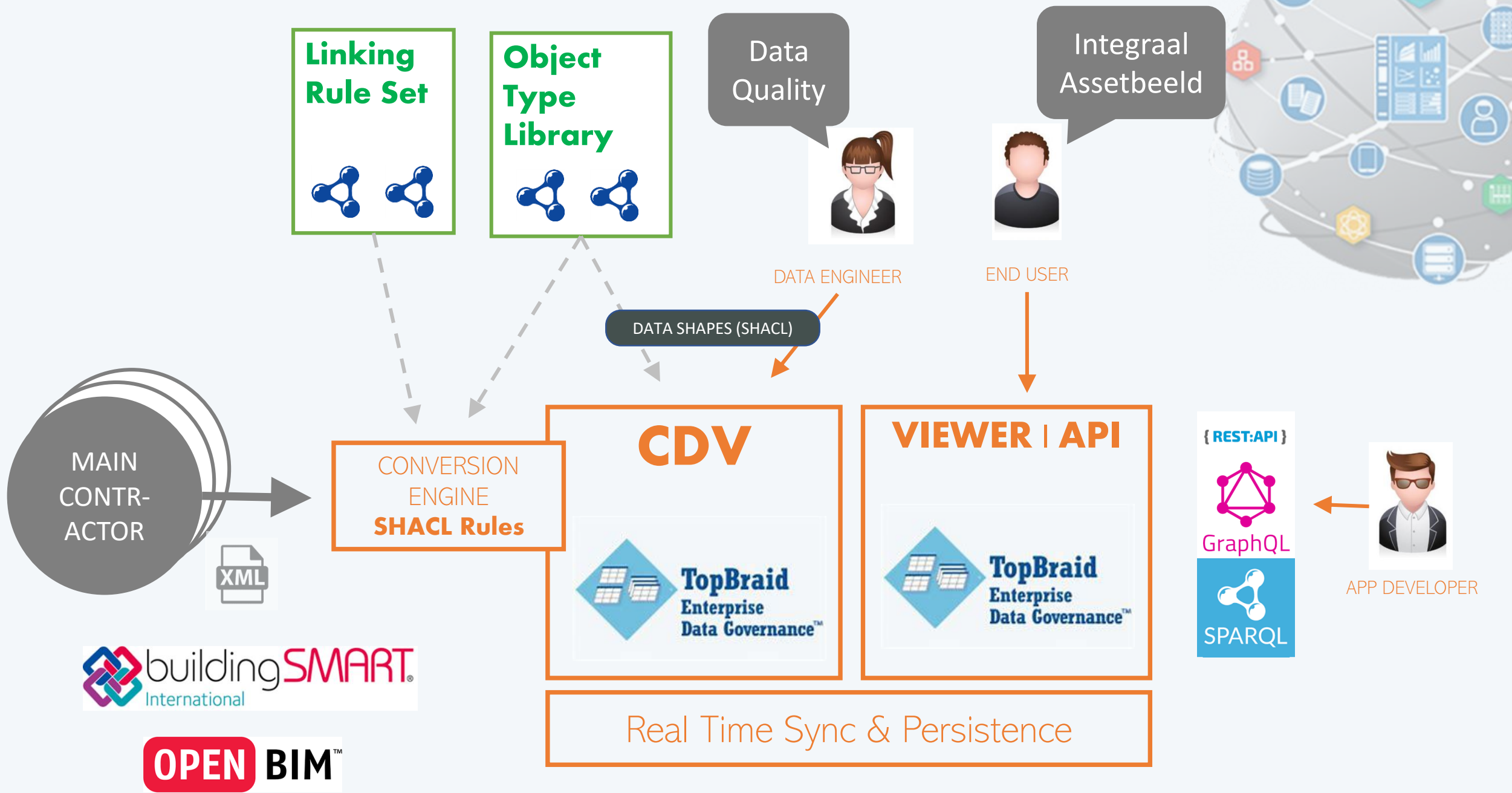


SPARQL



APP DEVELOPER

Real Time Sync & Persistence



Linking Rule Set

Object Type Library

Data Quality

Integraal Assetbeeld



MAIN CONTRACTOR

CONVERSION ENGINE
SHACL Rules

CDV

VIEWER | API

{ REST:API }

APP DEVELOPER

Real Time Sync & Persistence

buildingSMART International

OPEN BIM™

Doorontwikkeling

- > Projectdata (data drops, planning)
- > Financiële data (cost management)
- > Meerjarige conditiedata
- > Eventdata (sensoren, IoT)
- > Incidenten
- > Locatiehiërarchie
- > Functieinformatie





TOEKOMST- BEELD

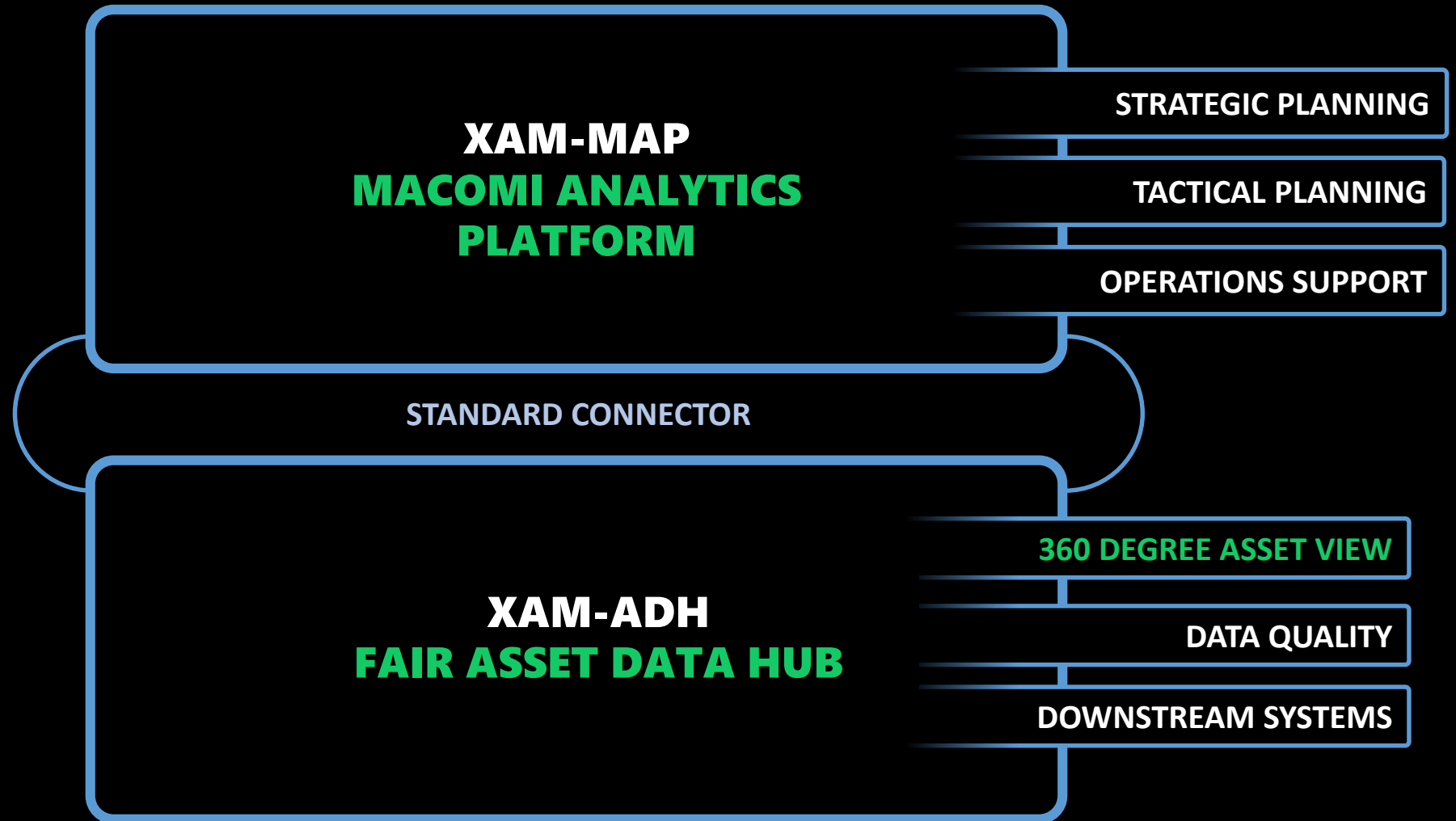
**DATA-DRIVEN PLANNING
HERHAALBARE OPLOSSING**



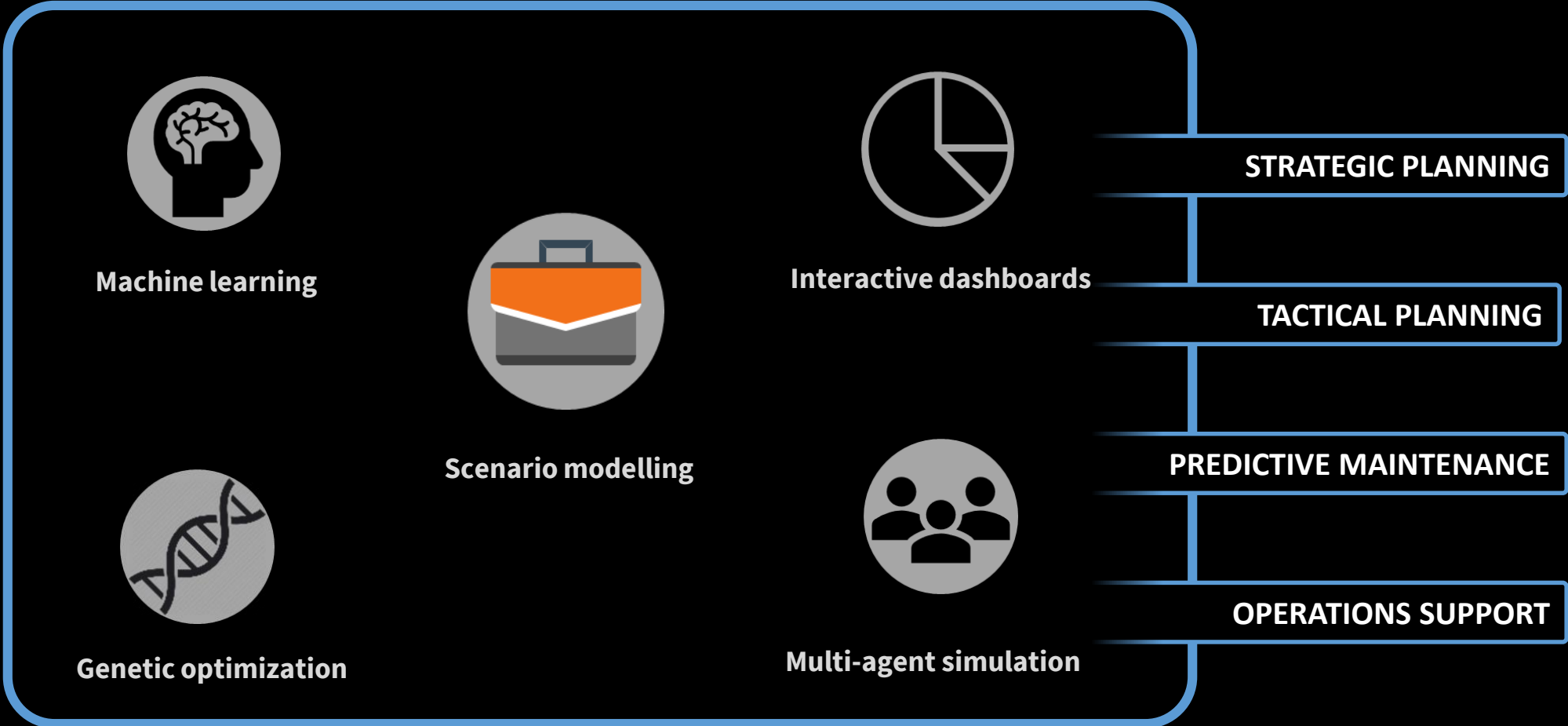
XAM | ASSET MANAGER

- > Integrated **data** platform
 - ★ FAIR principles
 - ★ Relevant standards
- > State of the art **analytics**
 - ★ Specific algorithms
 - ★ Operational, tactical, strategic

XAM | ASSET MANAGER



XAM-MAP | MACOMI ANALYTICS PLATFORM



DANK!



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