

THTH workshop 2020 for planning long-term activities

The long-term targets of TIE and SIMANTICS
divisions

Agenda

9:00 – 10:20: Theme: the **future of the TIE division after the project** including the impacts of Nordic Interoperability Collaboration and wider European industry community

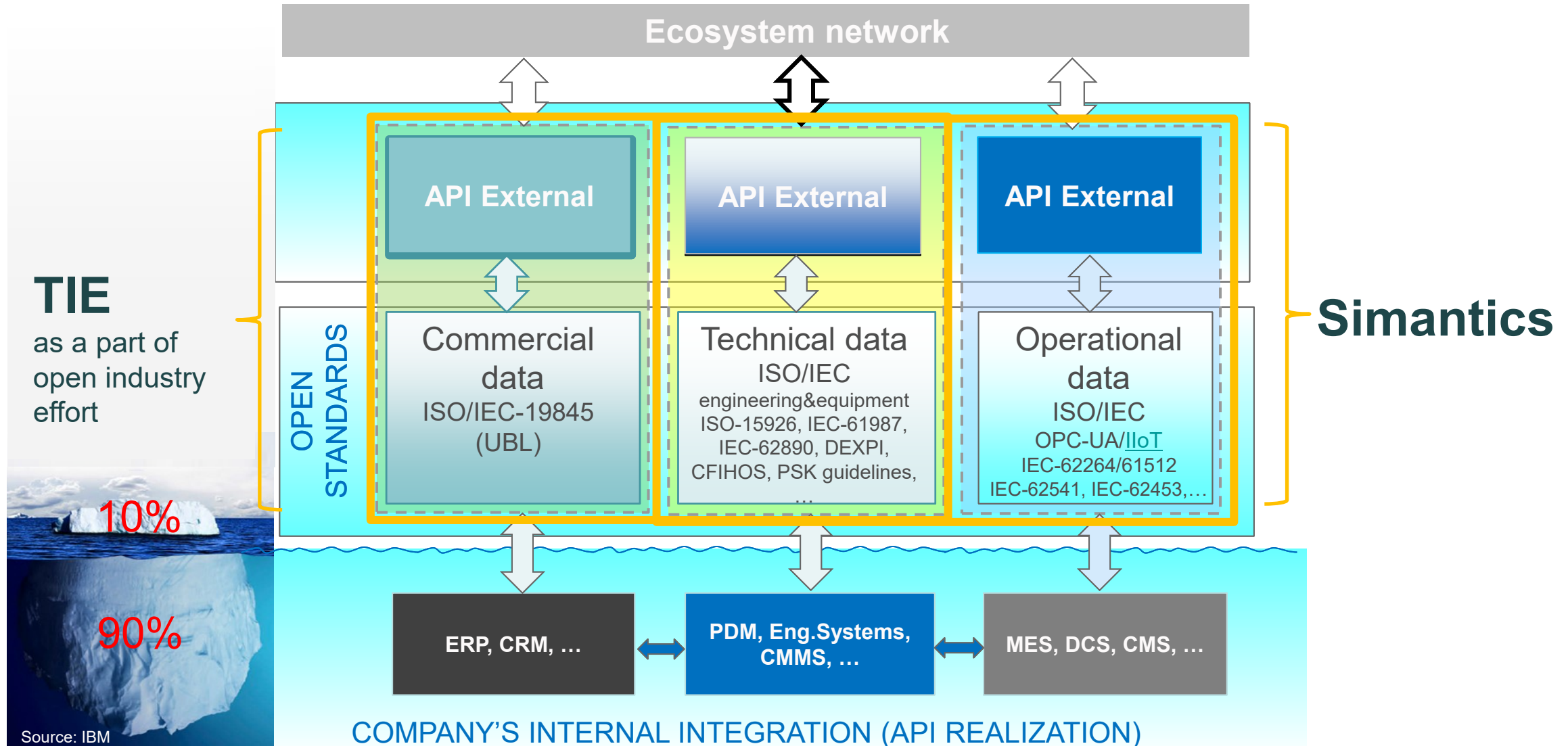
- TIE project vision – a part of international process industry vision (Marttinen/THTH)
- Nordic Interoperability Cooperation – a research project preparation (Hästbacka/TUNI)
- Companies own TIE-visions
 - NES/Kainulainen, ABB/Säynevirta, UPM/Varala, Sulzer/Salmi, Neles/Sjöholm,...
- Joint discussions – what would be the role and task of TIE division

10:20 – 10:40 Break

10:40 – 12:00: Theme: Digital Twin development as a part of Simantics and TIE divisions' activities

- Simantics visions (Karhela)
- Companies own Digital Twin –visions
 - Hexagon/Hänninen/Park, Fortum/Tuuri, ABB/Lukkari
- Joint discussions

Open networks are based on standards



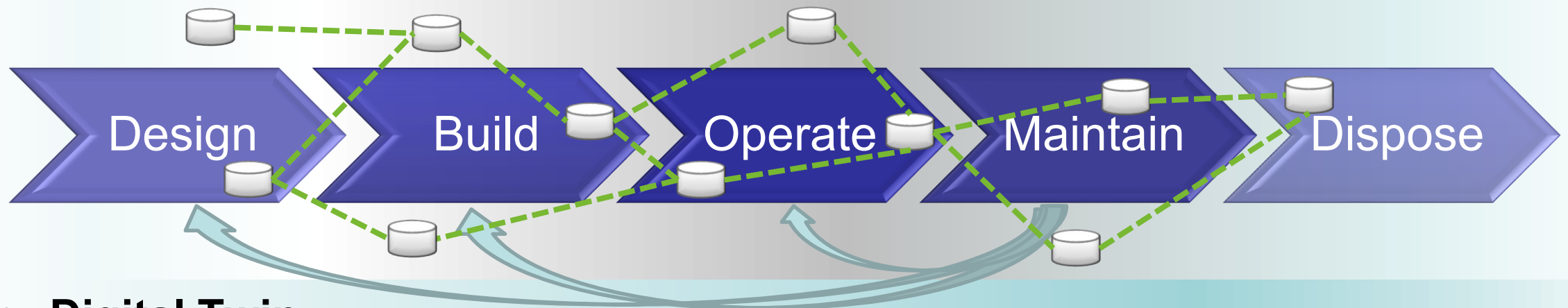
Process industry digitalization

- **Standards**

International, industry and enterprise standards with common ecosystem principles how to apply them

- **Operative information exchange - Digital Thread**

refers to a communication and data flow framework that allows an integrated view of a product's or asset's data throughout its complete lifecycle



- **Digital Twin**

a digital twin is the virtual representation of a product, asset or system; which exactly mimics the physical object with current, as-built and operational data

TIE
TECHNICAL INFORMATION EXCHANGE

TIE project and division

TIE project 11/2019 – 11/2021 → TIE division

Commonly approved standards

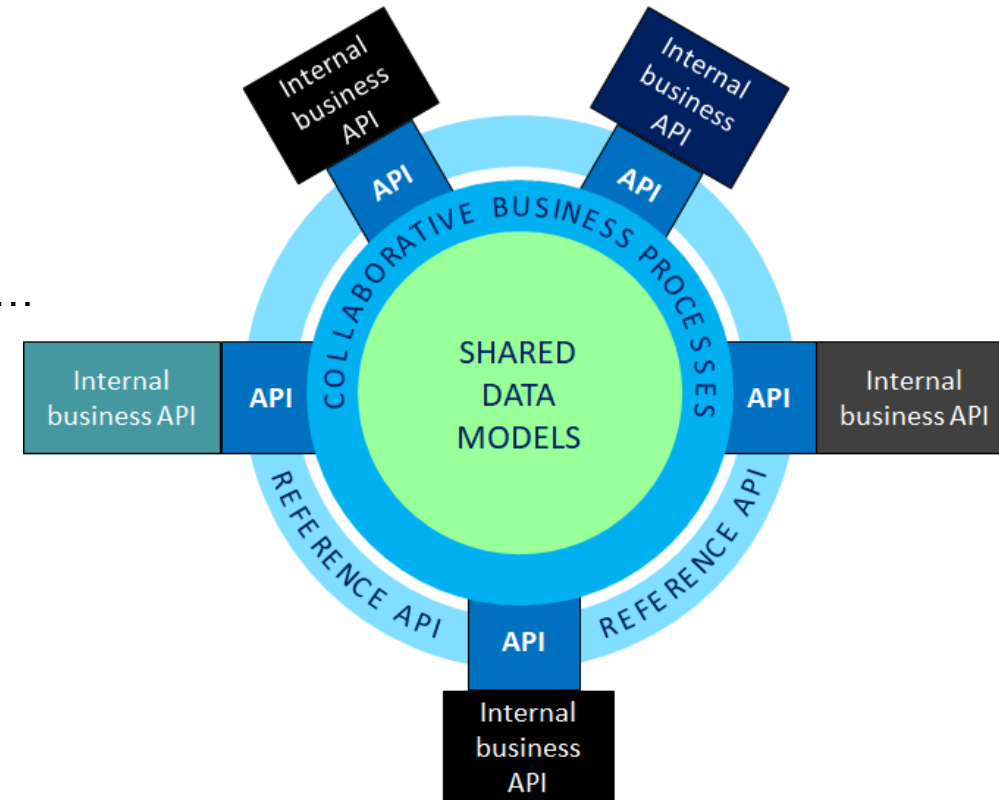
- International and industry standards (ISO/TC184, METSTA, PSK/Finland, PCA/Norway, SEIIA/Sweden, USPI/Netherlands, MIMOSA/USA, CFIHOS/IOGP, DEXPI/Germany, ENAA/Japan, ...)

Commonly approved inter-enterprise processes

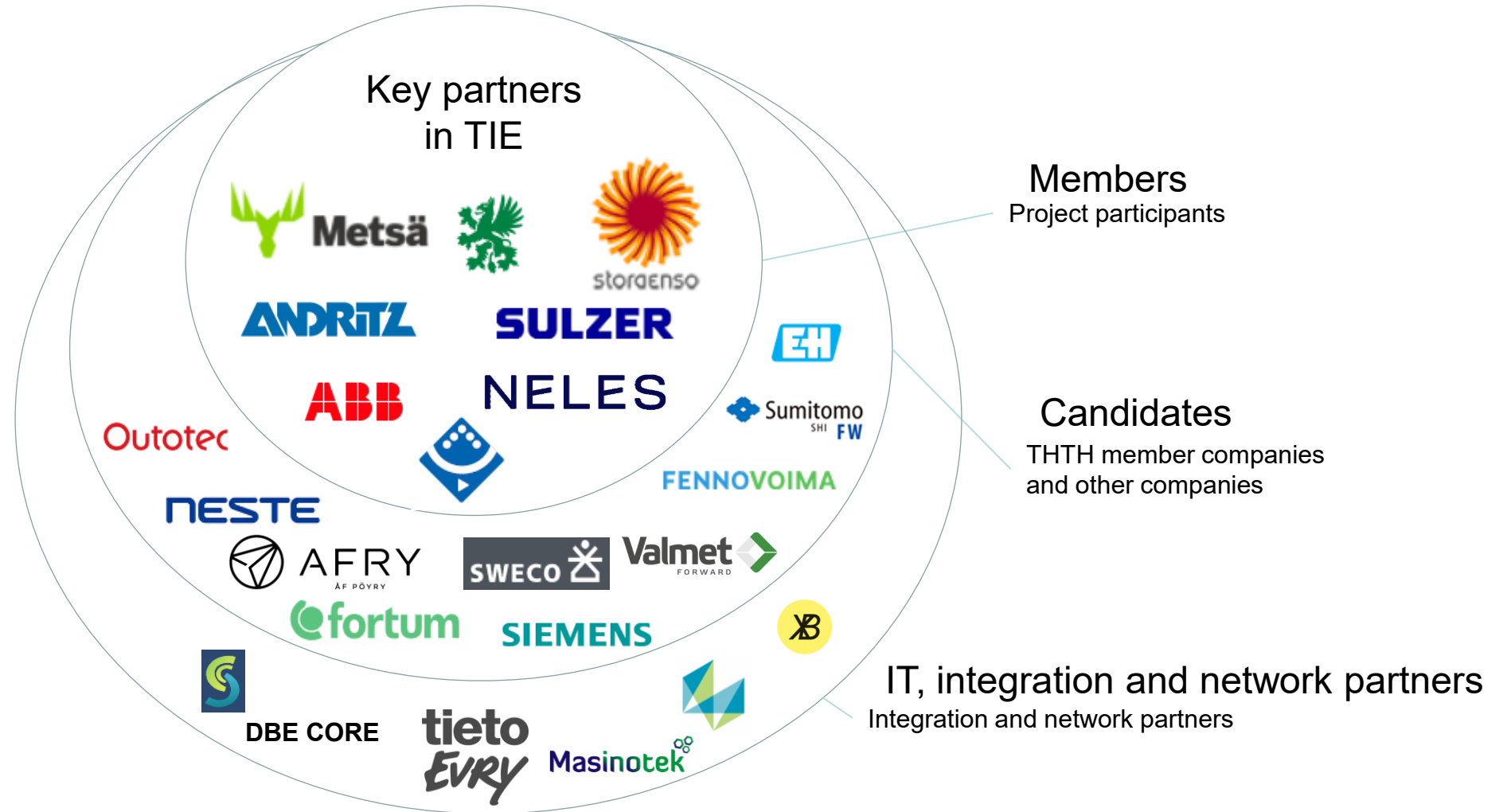
- Business processes based on common ecosystem principles

Commonly approved network infrastructure

- Integration (API) and network infrastructure specifications

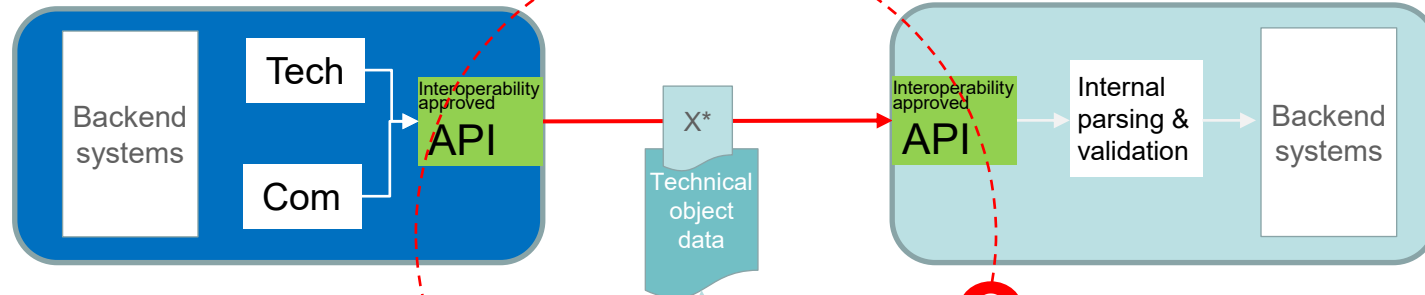


TIE open ecosystem companies



Digital information exchange

Business ecosystem rules and principles



ENTERPRISE INFRASTRUCTURE
 Interoperable implementations
 technologies API, IA, AI, etc. and business cases

RDL INFRASTRUCTURE
 Common services to connect RDLs

Open tools

RDL2**

2

1

Interoperable transaction messages

API and integration support tools

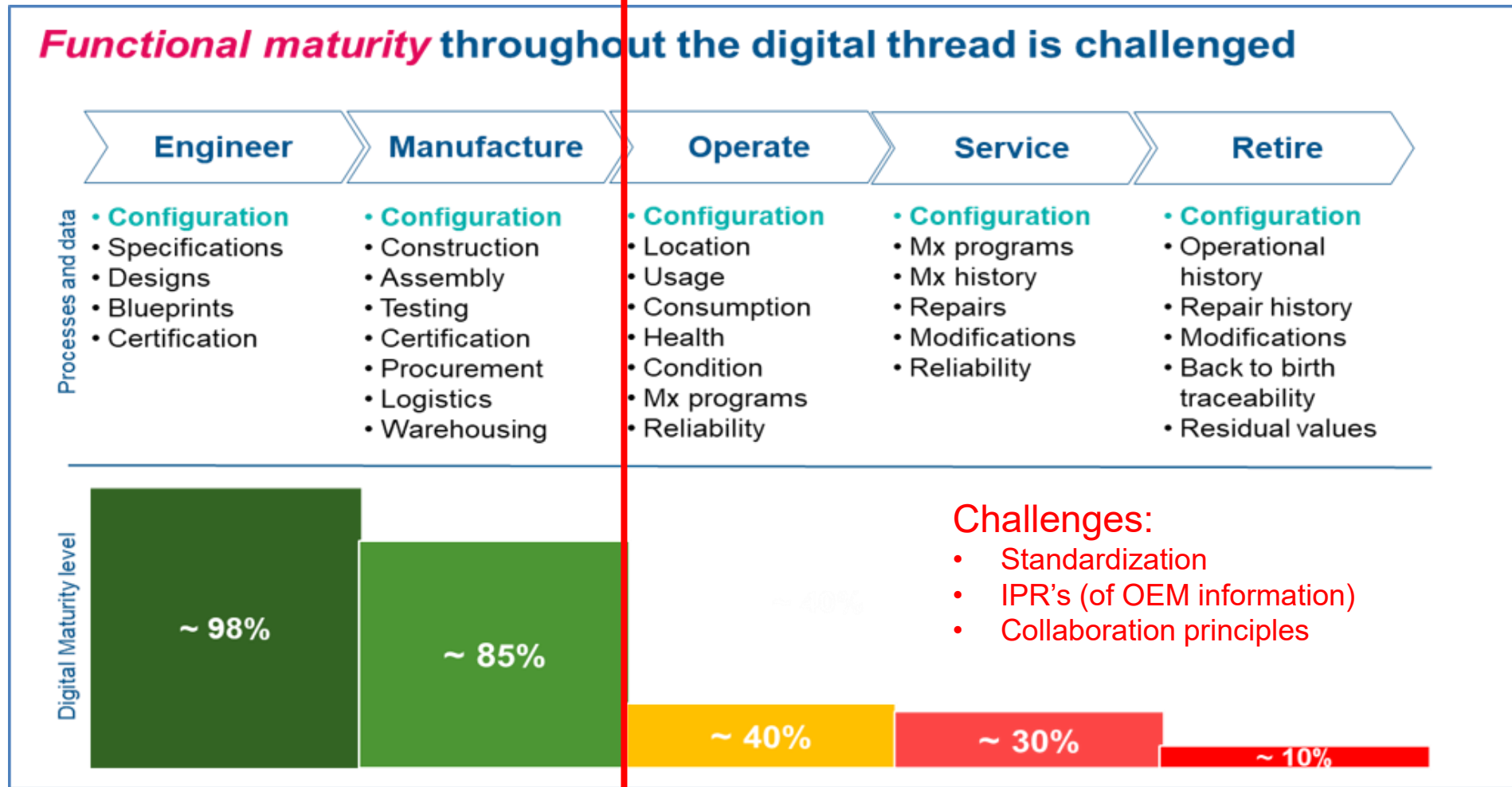
Connectivity to reference standards

*X – THTH TIE will test UBL2.3 for business process standard
 (ISO/IEC-19845:2015 – the UBL2.3 is now under OASIS approval, but not ISO/IEC-standard)

**RDL2 is connecting existing Reference Data Libraries related to
 standardized classes and properties of objects (ISO, IEC, MRAIL, NIC, ...)

Information handover in aviation industry

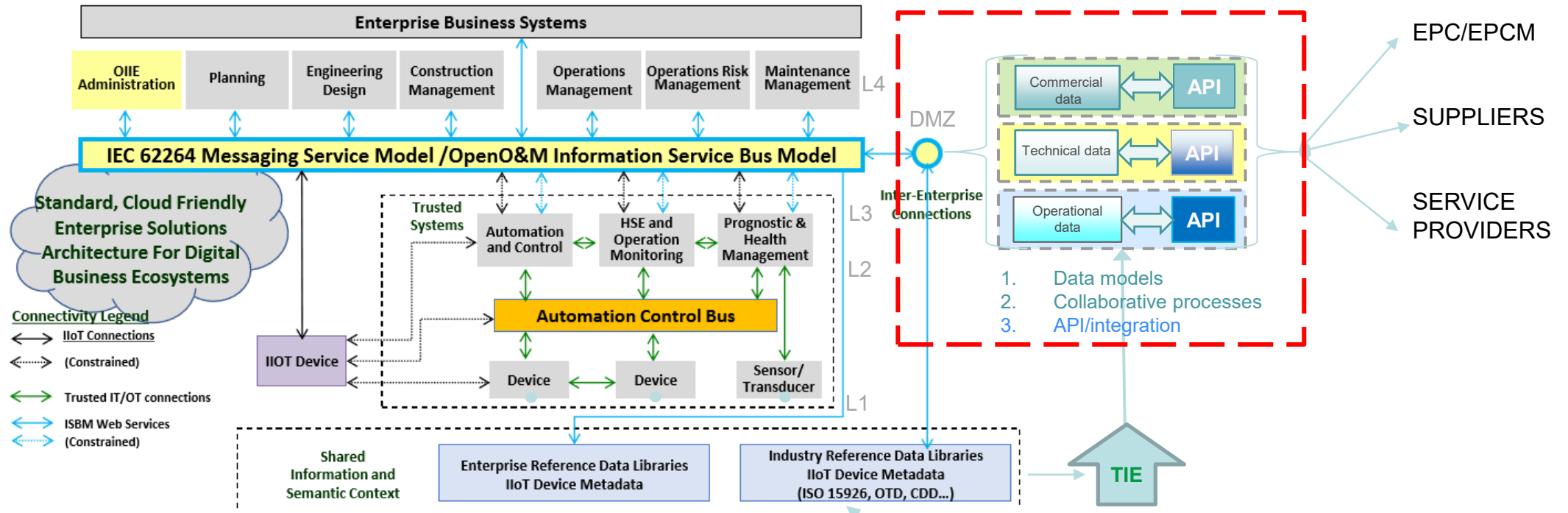
Information handover to owner & operator



Source: Allan Bachan, MRO Operations, ICF, 2020: <https://www.aircraftit.com/articles/digital-threads-and-twins-in-mro>

TIE development field

OWNER-OPERATORS



- Standardization development collaboration: ISO/TC184, METSTA, PSK/Finland, PCA/Norway, SEIIA/Sweden, USPI/Netherlands, MIMOSA/USA, CFIHOS/IOGP, DEXPI/Germany, ENAA/Japan, ...
- National collaboration: SEED-project, METSTA, Teknologiateollisuus ry, ...

TIE project organization

- Finnish process industry companies
- PSK and METSA collaboration
- Nordic collaboration with SEIIA/Sweden and PCA/Norway
- Looking for new collaboration partners

DIGITAL TWIN

VALUE APPROACH

DESIGNING

MANUFACTURING

OPERATING

Communication and Decision Making

Human work minimization

STATIC MODEL

DYNAMIC MODEL

XR
DIGITAL TWIN
Realistic
Informative
Reactive
Configurable

DATA MODEL

CONTROL MODEL

COMMUNICATION AND VISUAL DRIVEN APPROACH

HARDWARE AND DATA DRIVEN APPROACH

USE CASE EXAMPLES



VISUAL REALISM

BEHAVIORAL REALISM

CONTROL REALISM

3D CAD

VIZUALIZATION

KINEMATICS

PHYSICS

VIRTUAL
REALITY

DATA
VISUALIZATION

DATA
ANALYZING

DATA STORING

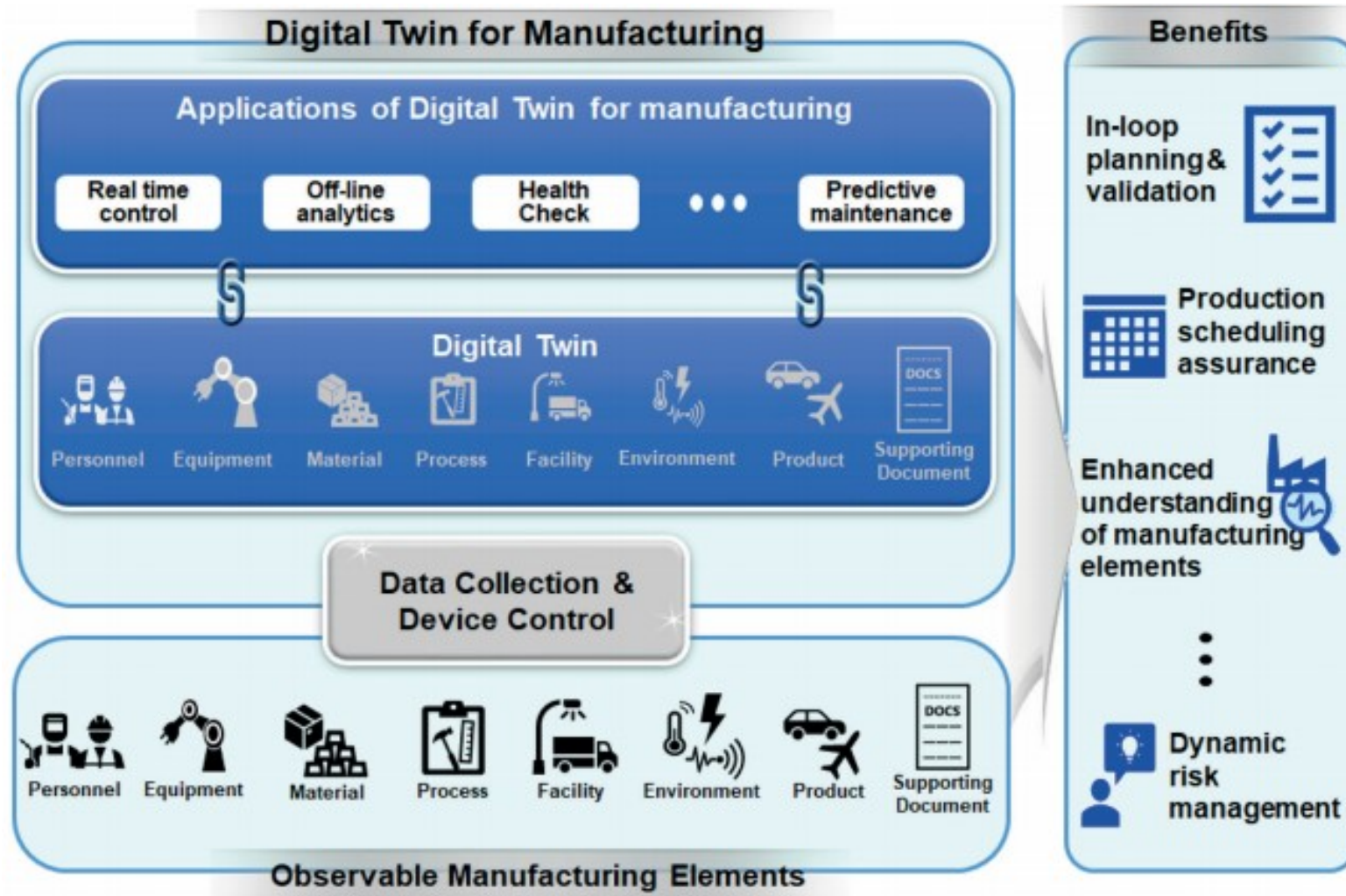
DATA
INTERFACES

SENSORS

CONTROLS

TECHNOLOGY APPROACH

Concept of Digital Twin



Source: ISO/DIS 23247-1:2020 (voting ends 19.10.2020)

Digital Twin standards

- ISO/TC 184 Ad Hoc Group: Data Architecture of the Digital Twin
- ISO/DIS 23247 (balloting of NC's ends 19.10.2020)
 - Part 1: Overview and general principles
 - General principles and requirements for developing Digital Twins in manufacturing
 - Part 2: Reference architecture
 - Reference architecture with functional views
 - Part 3: Digital representation of manufacturing elements
 - List of basic information attributes for the observable manufacturing elements;
 - Part 4: Information exchange
 - Technical requirements for information exchange between entities within the reference architecture

Detailed Quality Management Process according to ISO 9001

