

In partnership with



AFNeT Standards Days

Digital Twin

by Joseph Briant (AIF)

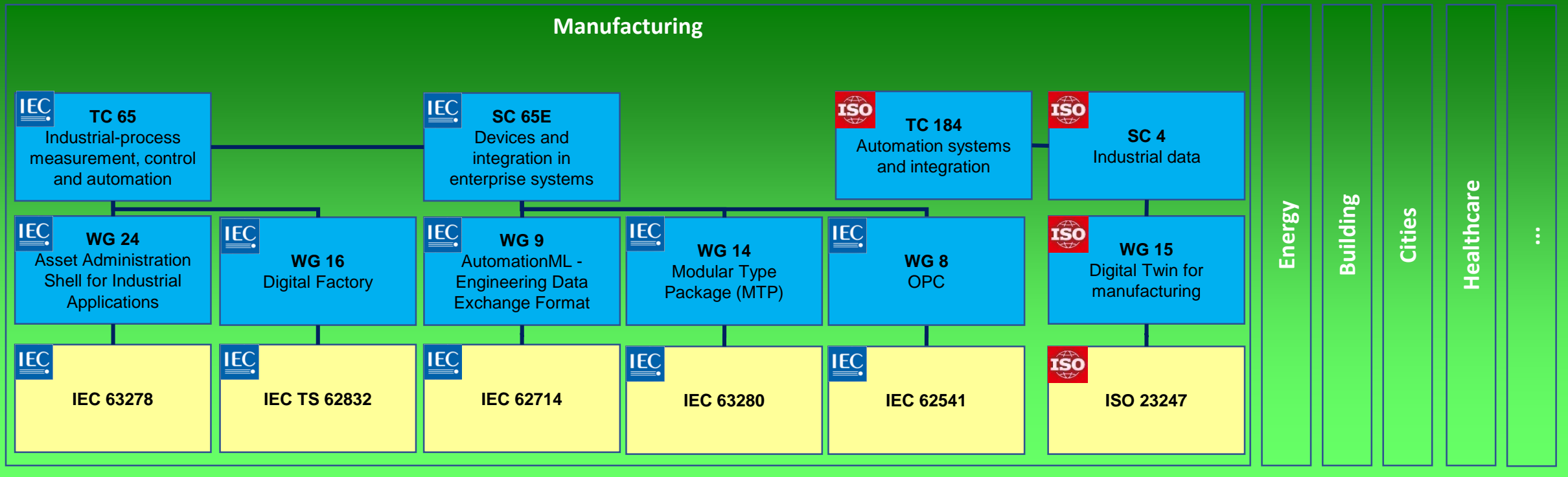


- 63 years old, Schneider Electric
- Career: System integrator engineer, industrial network testing lab manager, electromechanical switchgear and electrical motor drives: project manager, product manager, project marketing manager
- Since 2007, international standardization (IEC and ISO), currently:
 - Chairman of IEC/SC 65E Committee "Devices and integration in enterprise systems" (OPC, AutomationML, FDT, FDI, ISA 95, MTP ...)
 - Co-convenor of ISO/IEC/SM2TF (IEC/SyC SM/OF 1) Committee "Smart Manufacturing Standards Map Task Force"
 - Member of IEC/SyC SM "System Committee Smart Manufacturing"
 - Chairman of AFNOR/UF 65 French committee "Industrial-process measurement, control and automation" (Mirror of IEC/TC 65)
 - Chairman of AFNOR/UF 3 French committee "Information structures, documentation and graphical symbols" (Mirror of IEC/TC 3, SC 3C and SC 3D)
 - Member of AFNOR/CP IDMI French committee "Engineering of data and models for industry" (Mirror of ISO/TC 184)
 - Board Member of AutomationML e.V.
- Digital Twin success story: Editor of "Structure of the Administration Shell edition 2" [Germany, France, Italy] published in April 2018

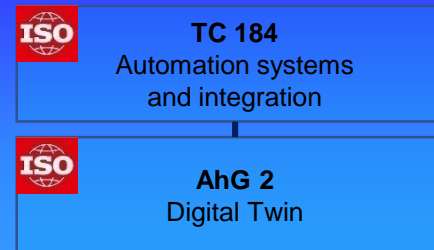
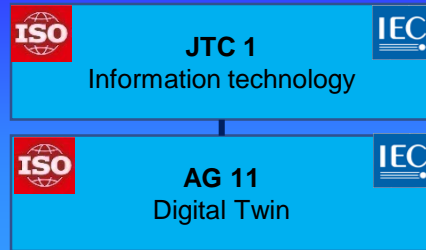
Harmonization of the Digital Twin concepts



Digital Twin standards

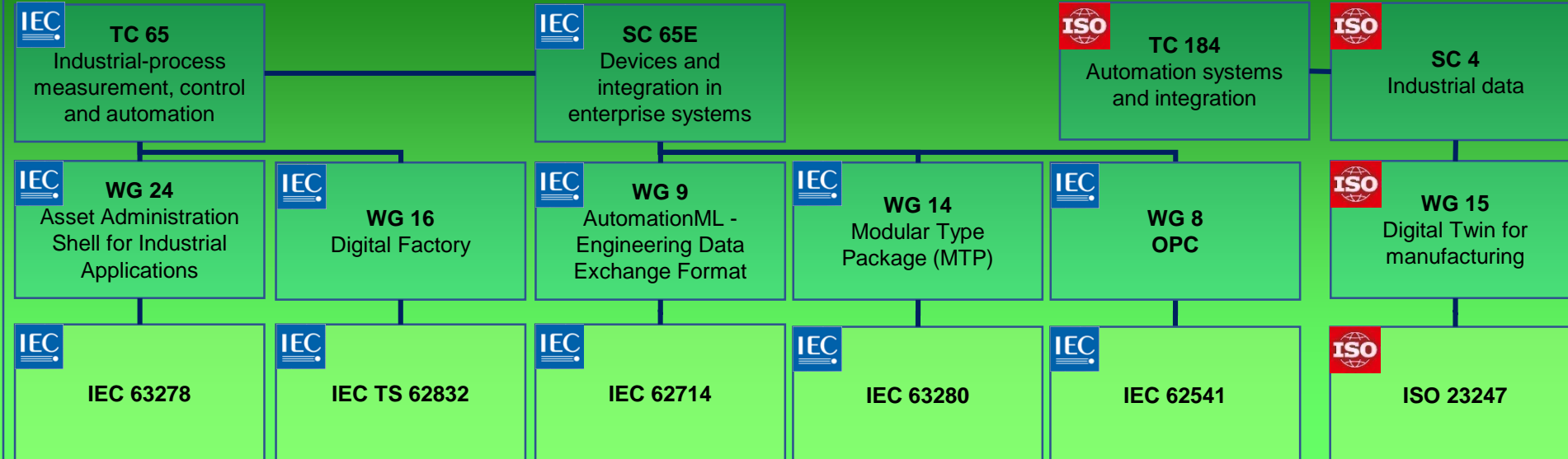


Harmonization of the Digital Twin concepts



Digital Twin standards

Manufacturing



Energy

Building

Cities

Healthcare

...

Terms of reference

Resolutions Adopted at the Meeting of ISO/IEC JTC 1, 6-10 May 2019 in Hawaii

- Provide a description of **key concepts and relevant terminology** related to Digital Twin.
- Identify **current technologies and reference models** that are being deployed in Digital Twin.
- Promote the awareness of JTC 1 activities on Digital Twin outside JTC 1.
- Assess the current state of standardization activities relevant to Digital Twin within JTC 1, in other relevant ISO and IEC Committees, in other SDOs and in consortia.
- Identify and propose the relevant standardization issues of Digital Twin that needs to be addressed by JTC 1, covering at least foundational areas, ICT standardization needs, etc.
- Engage with standards setting organizations that are involved in Digital Twin standardization as approved by the AG on Digital Twin.
- Prepare a report and recommendations to JTC 1, which may include proposed New Work Items.

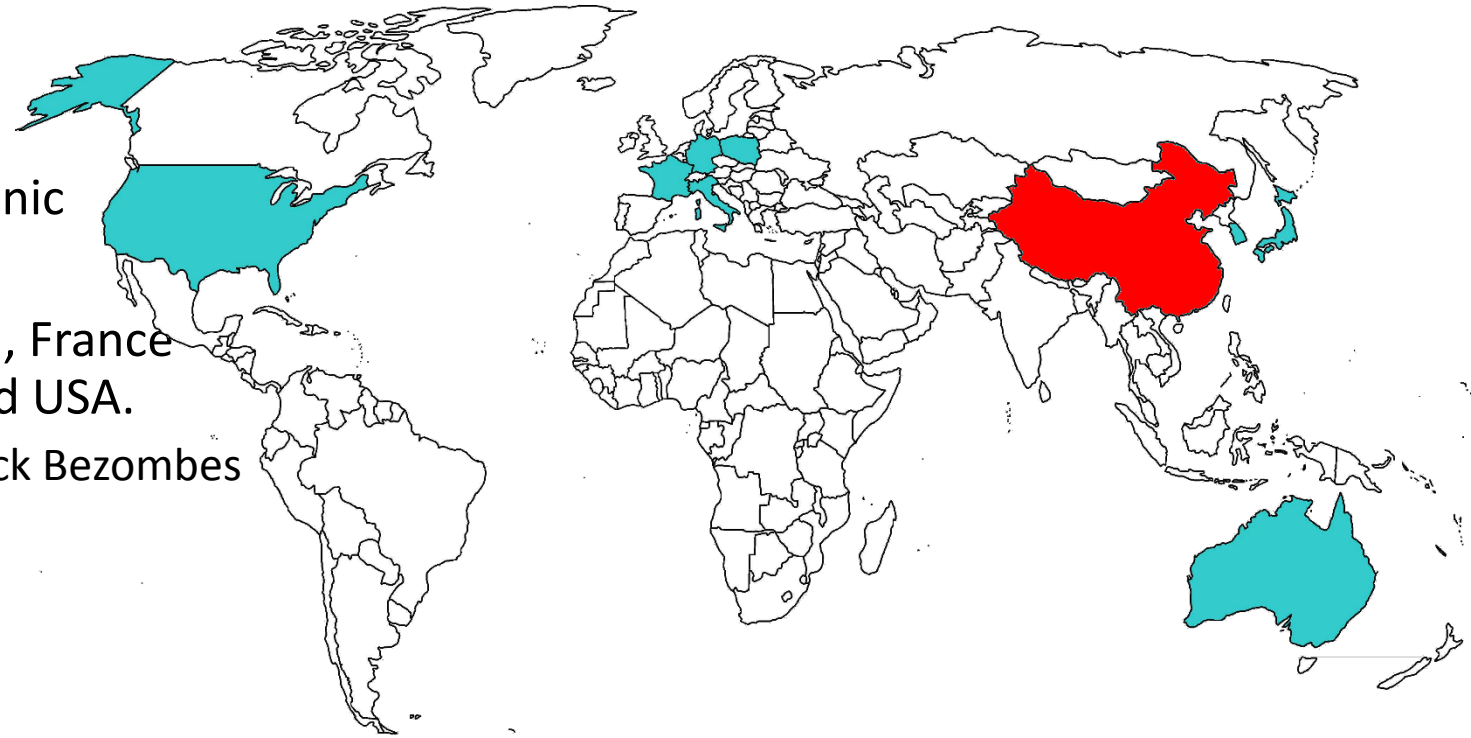
ISO/IEC JTC1 AG11 Digital Twin

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- Status: Intermediate report circulated, a NP prepared

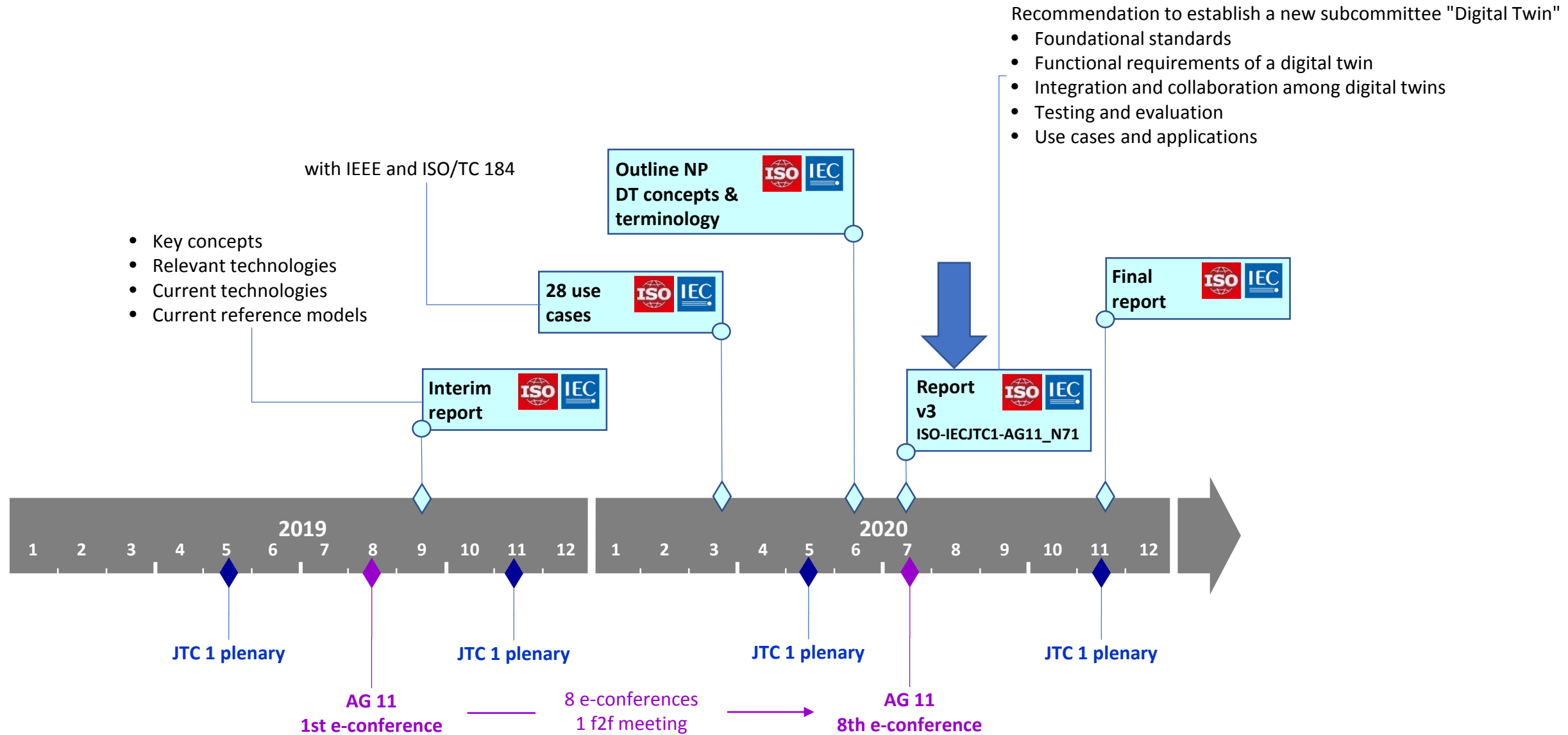
Standardization main data

- Convenor: Dr. Sha WEI (China, China Electronic Standardization Institute (CESI))
- 46 members of 9 countries: Australia, China, France (2), Germany, Italy, Japan, Korea, Poland, and USA.
 - France: Christophe Mouton (EDF) and Patrick Bezombes (DGA)



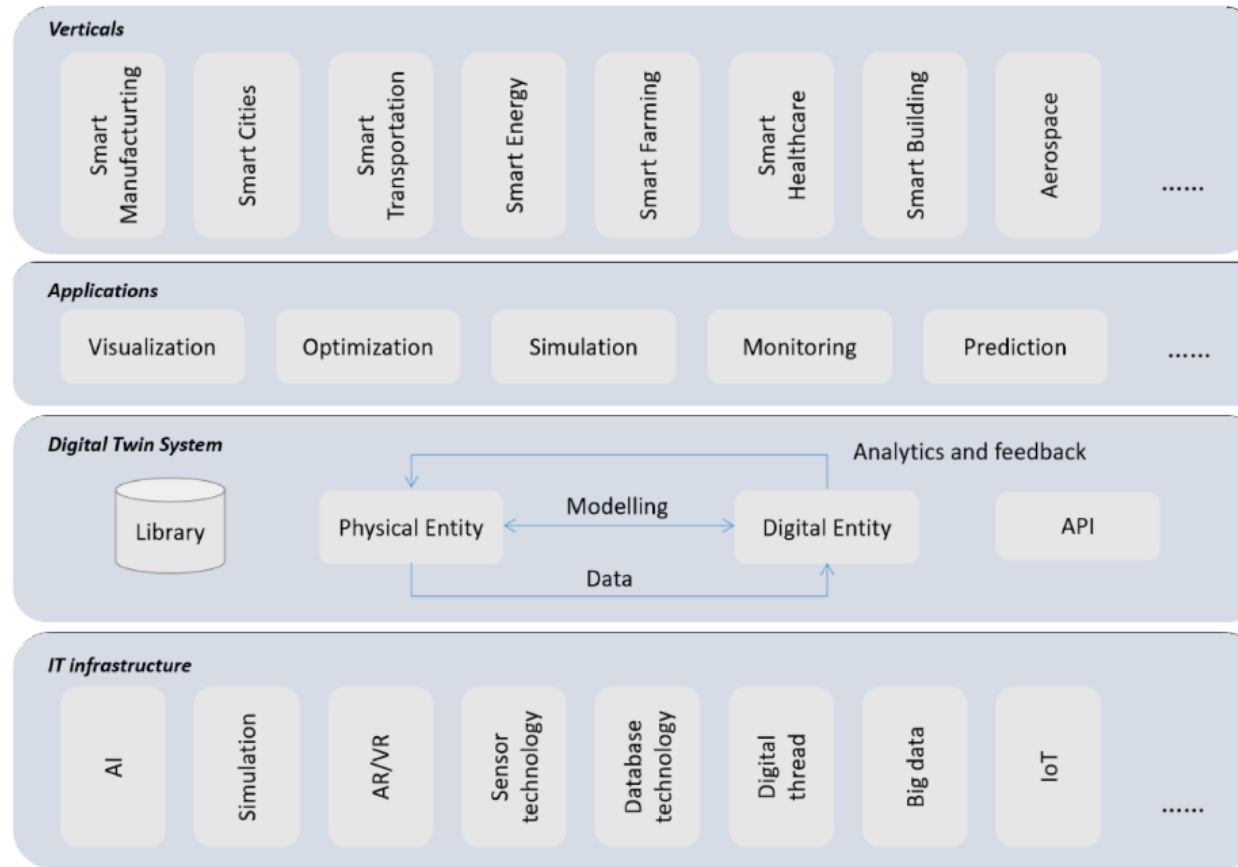
- 8 liaison representatives:
 - IEC/TC 100 "Audio, video and multimedia systems and equipment"
 - ISO/IEC JTC1/SC29 "Coding of audio, picture, multimedia and hypermedia information"
 - ISO/IEC JTC1/SC41 "Internet of Things and related technologies"
 - ISO/IEC JTC 1/SC 42 "Artificial intelligence"
 - ISO/TC 184 "Automation systems and integration"
 - ISO/TC 184/SC 4 "Industrial data"
 - ISO/TC 211 "Geographic information/Geomatics"

Standardization schedule



In current report

Digital twin ecosystem

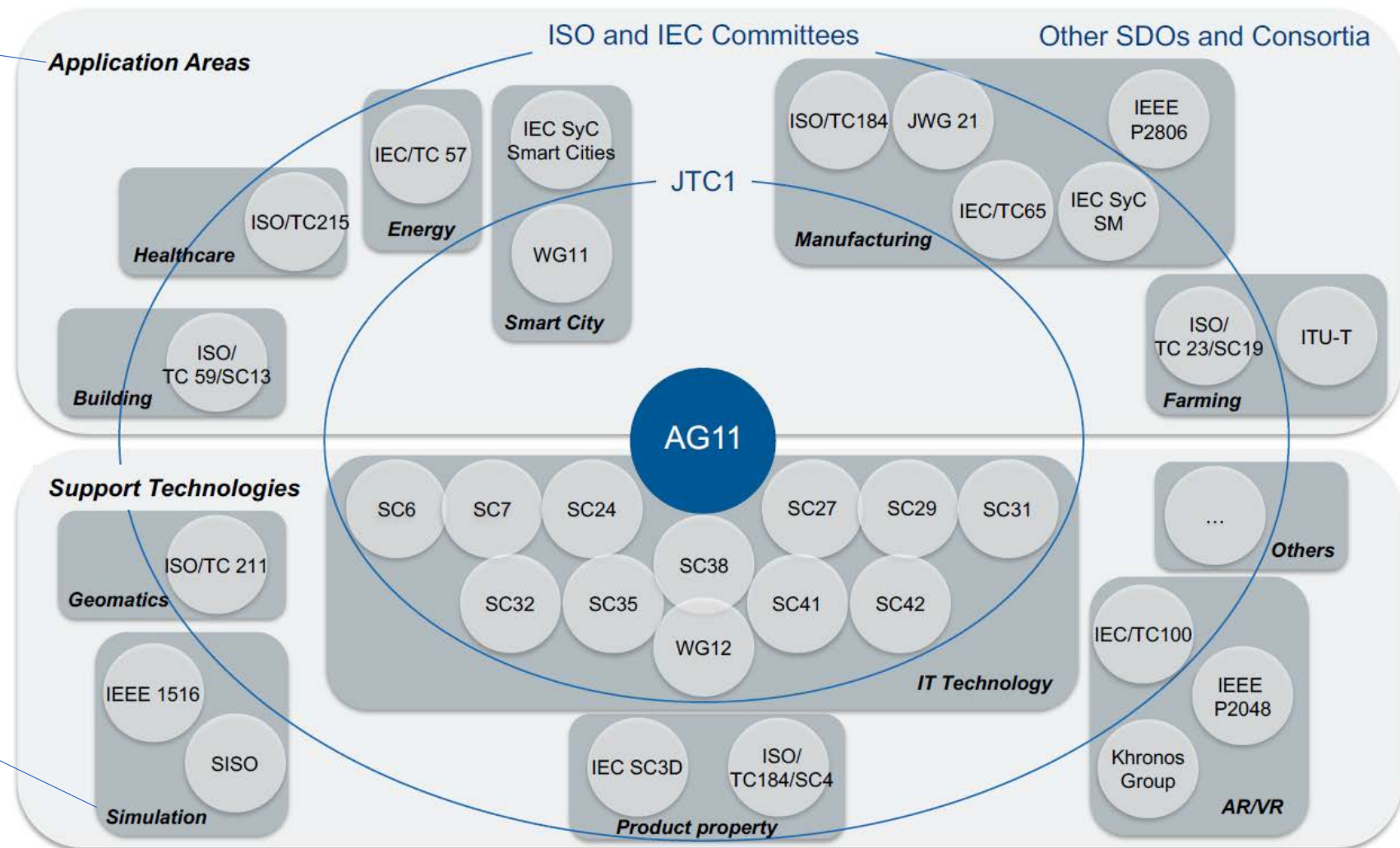


In current report



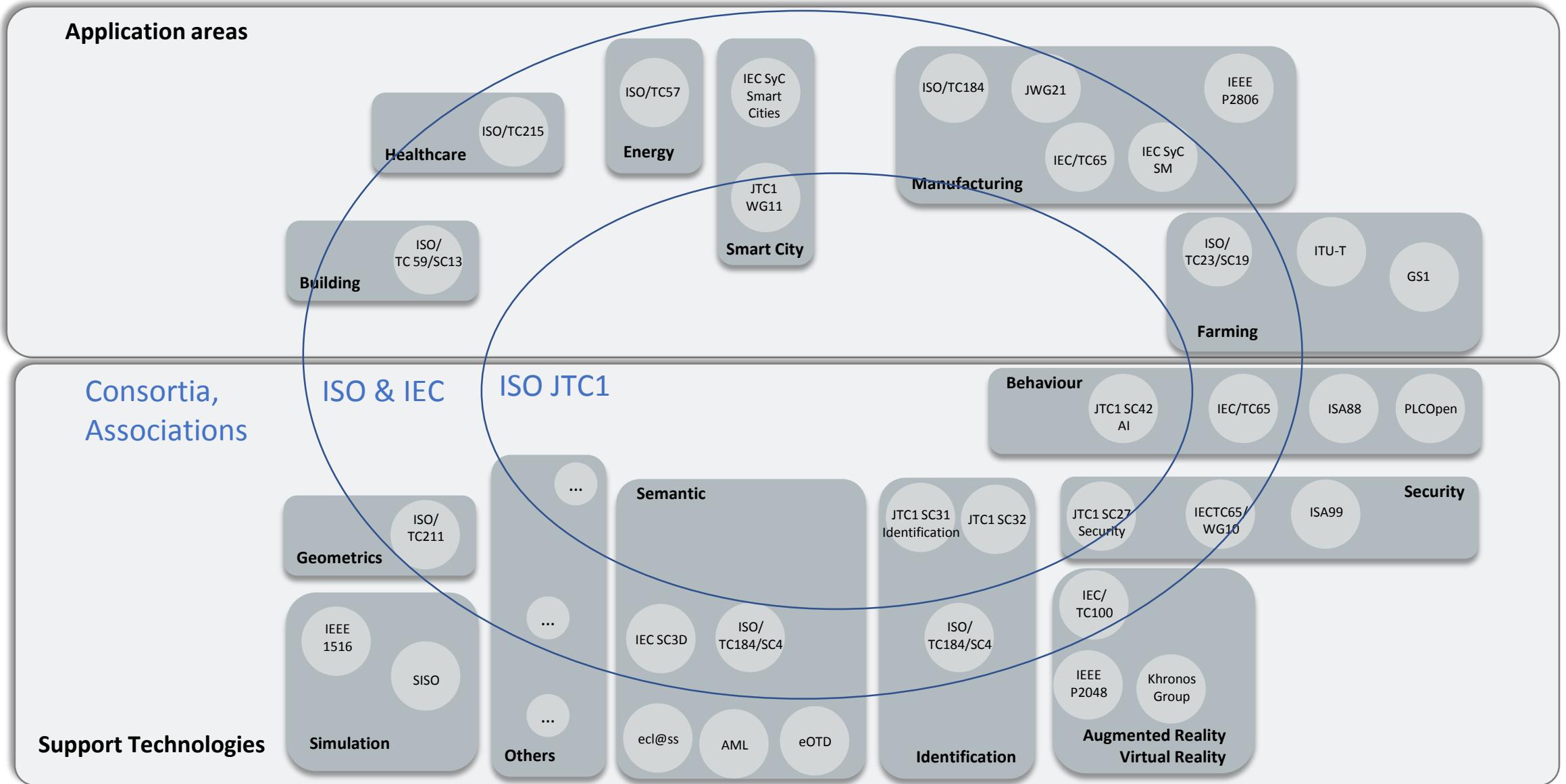
Relevant SDOs and Consortia

"Verticals"



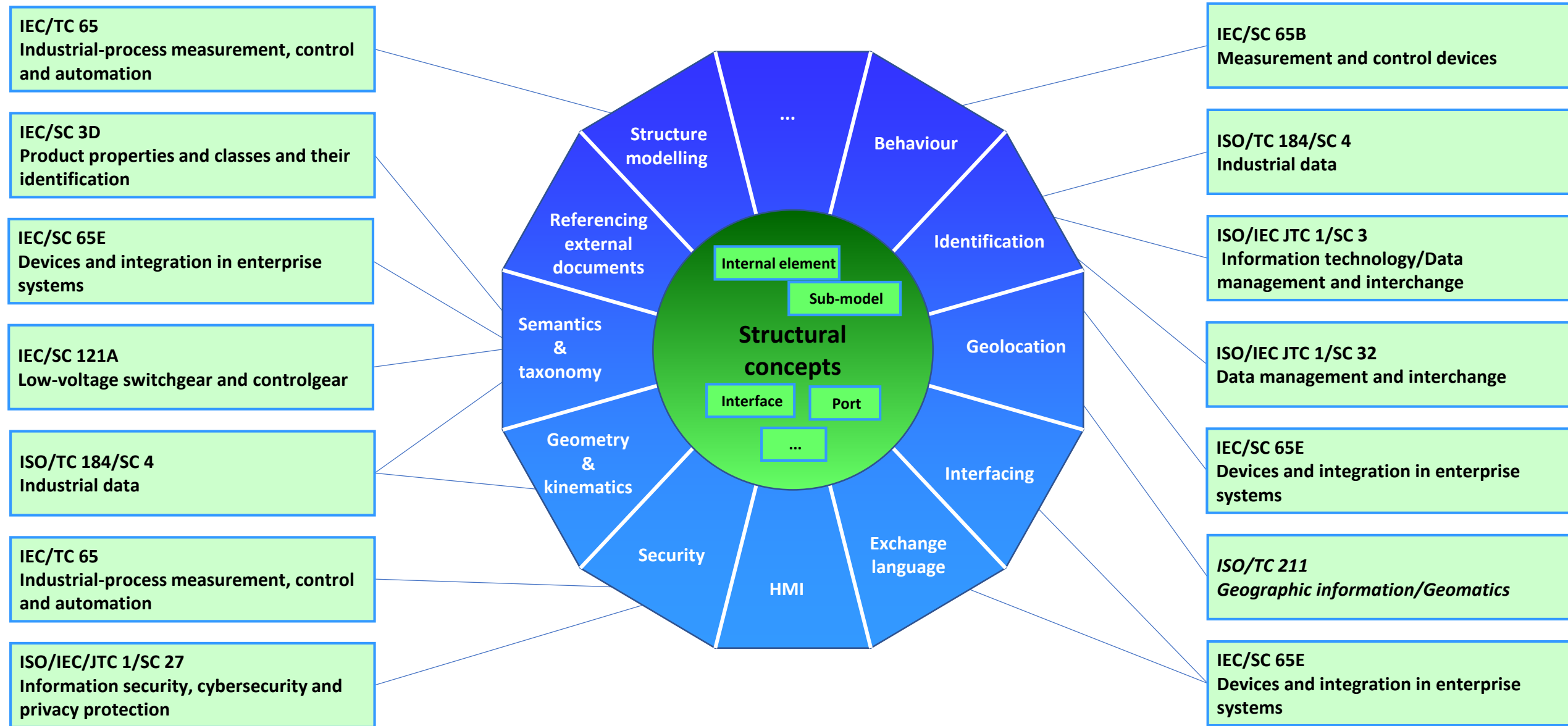
"Application"

Draft from France

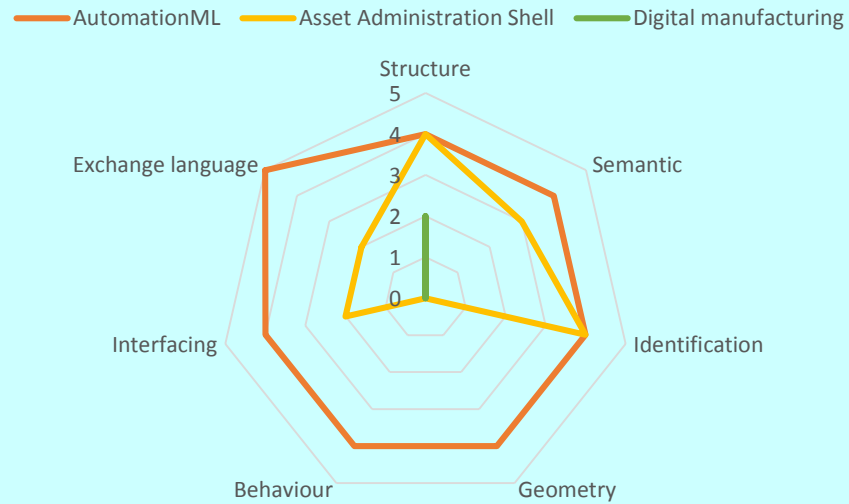


Aspects and supporting standards - Proposal (1)

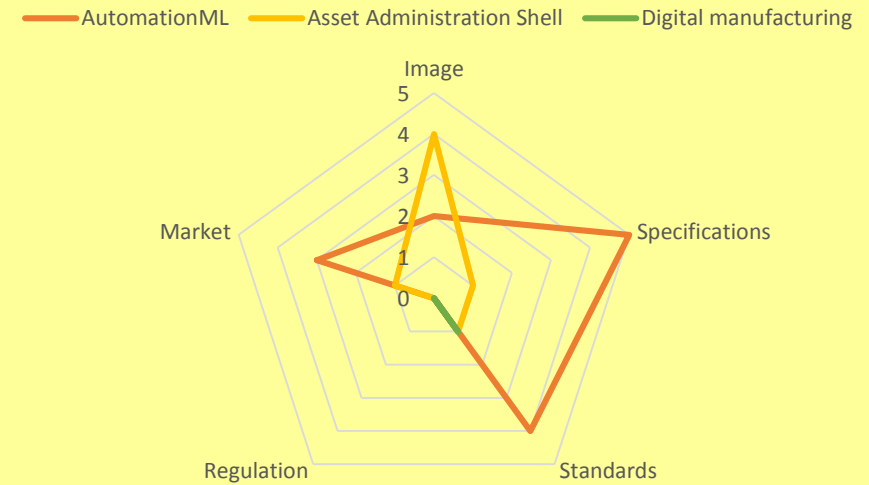




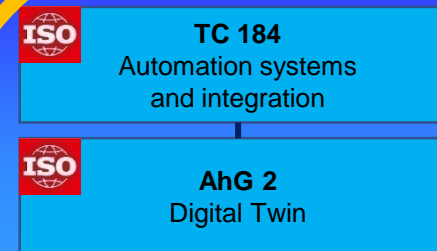
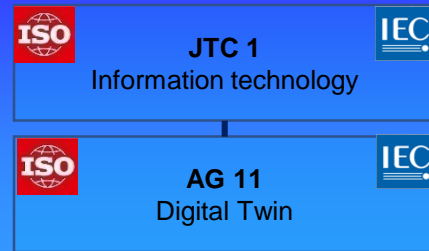
Supporting technologies



Market access

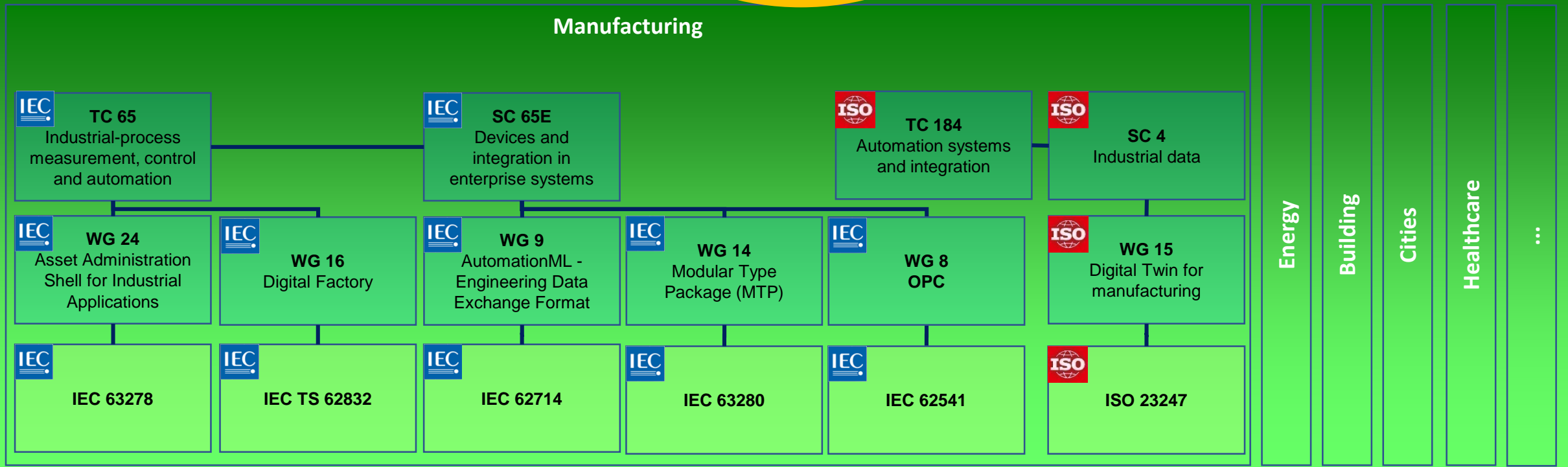


Harmonization of the Digital Twin concepts



Digital Twin standards

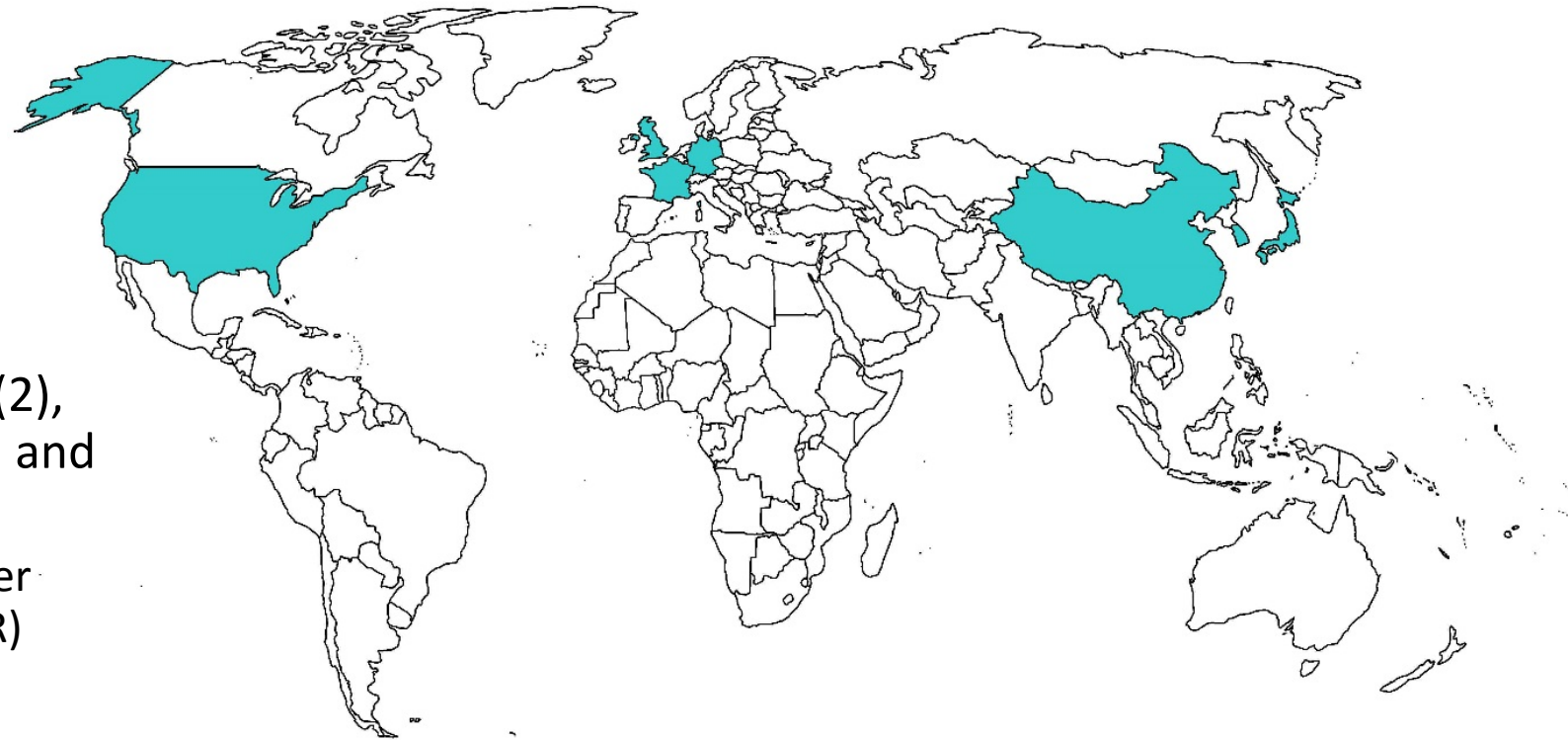
Manufacturing



Standardization main data

- ToR: To study the formalization of the “Digital Twin” and assess the current portfolio of standards developed within ISO/TC 184 and relevant liaison committees against the resulting data architecture proposal.
- Status: Report in preparation, current version v2 rev 2 June 2020

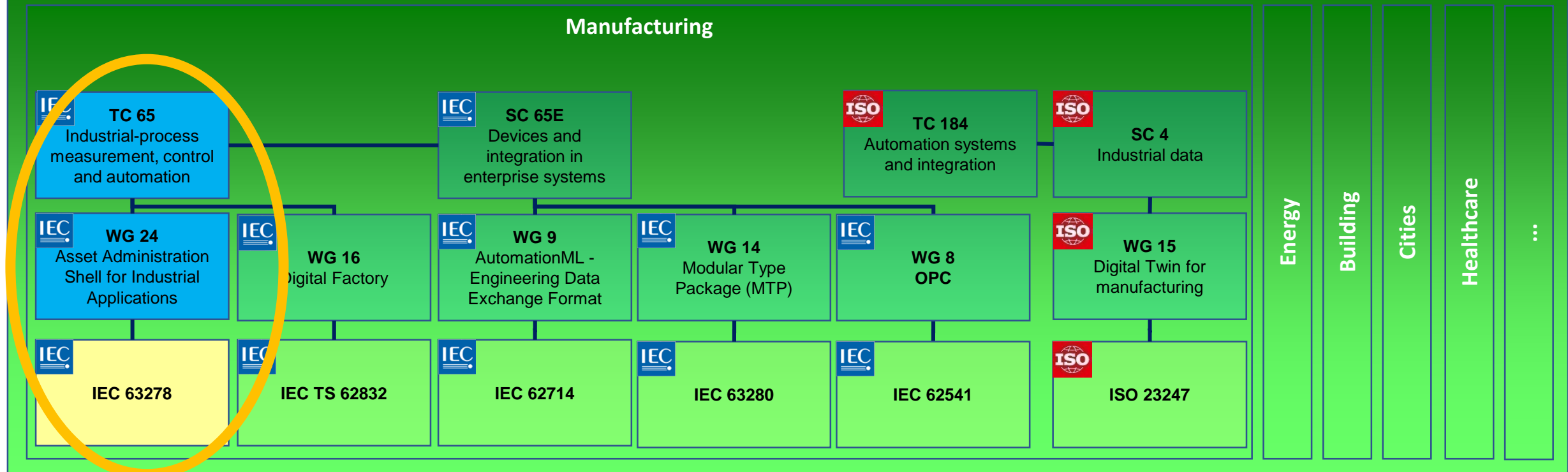
- Chair: Kenneth Swope (USA, Boeing)
- 16 members from 7 countries: France (2), USA (5), Japan (1), Germany (2), UK (2) and Korea (2)
 - France: Dr. Patrick Lamboley (Schneider Electric) and Ms. Melissa Jean (AFNOR)



Harmonization of the Digital Twin concepts

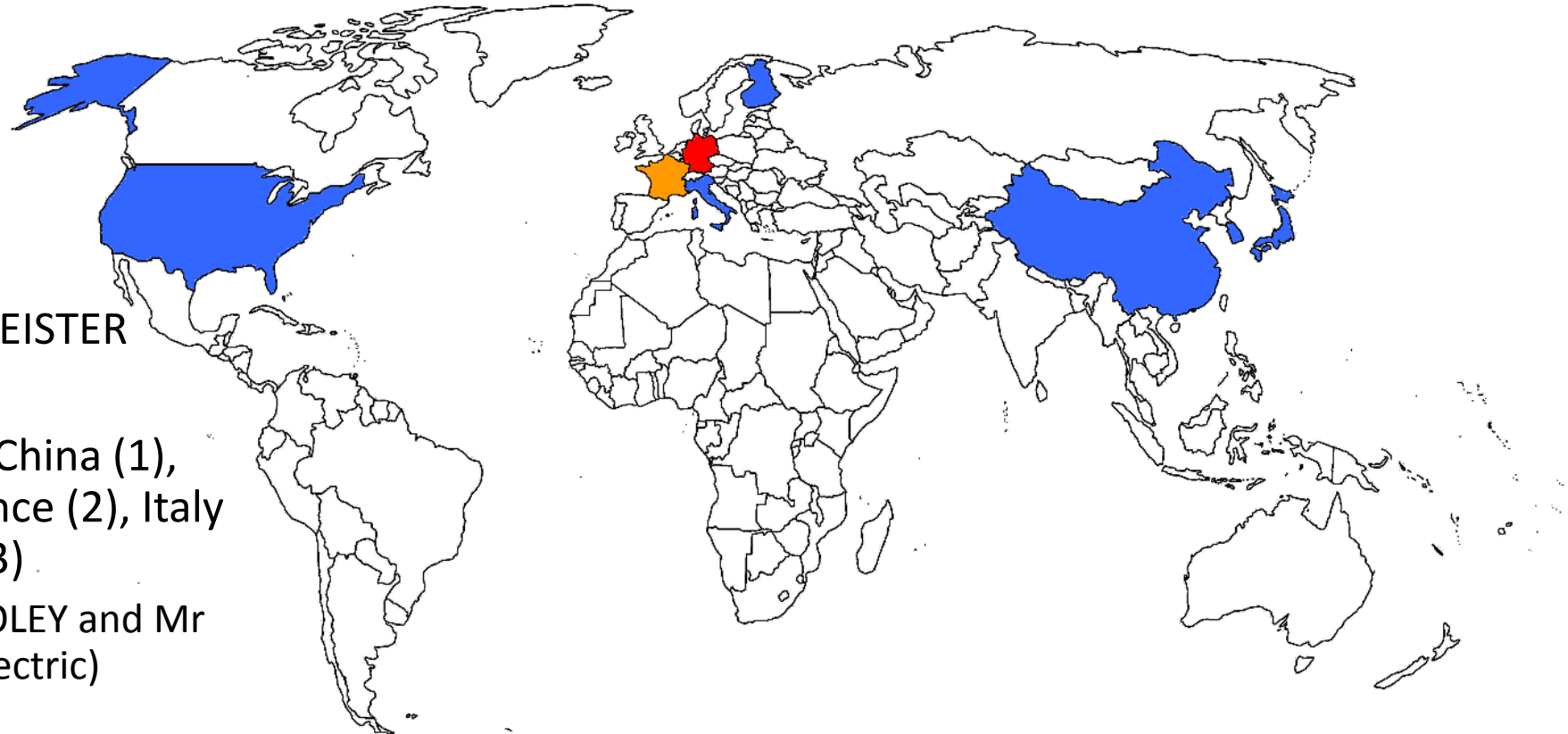


Digital Twin standards



Standardization main data

- Scope: This specification defines how to represent an asset of the real world in the information world by the Asset Administration Shell containing structures, properties and services.
- Status: Specifications published, standard project at draft stage



- Convenor: Mr Michael HOFFMEISTER (Germany, Festo)
- 35 members from 8 countries China (1), Germany (18), Finland (1), France (2), Italy (1), Japan (4), Korea (6), USA (3)
 - For France: Dr Patrick LAMBOLEY and Mr Joseph BRIANT (Schneider Electric)



Industrial Digital Twin Association

The User Organization for Industrie 4.0



Founded on 23.09.2020 with 23 Members

Global View of Industrie 4.0

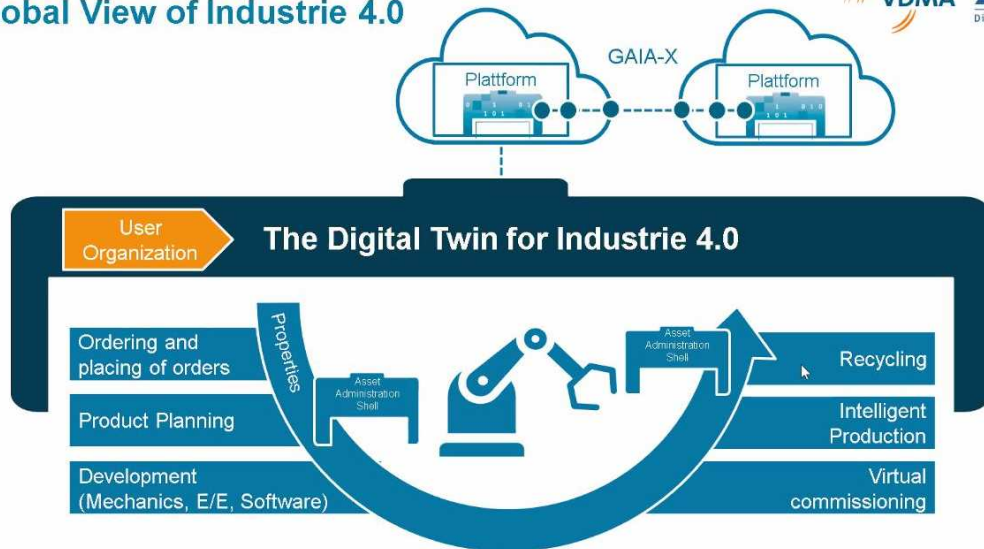
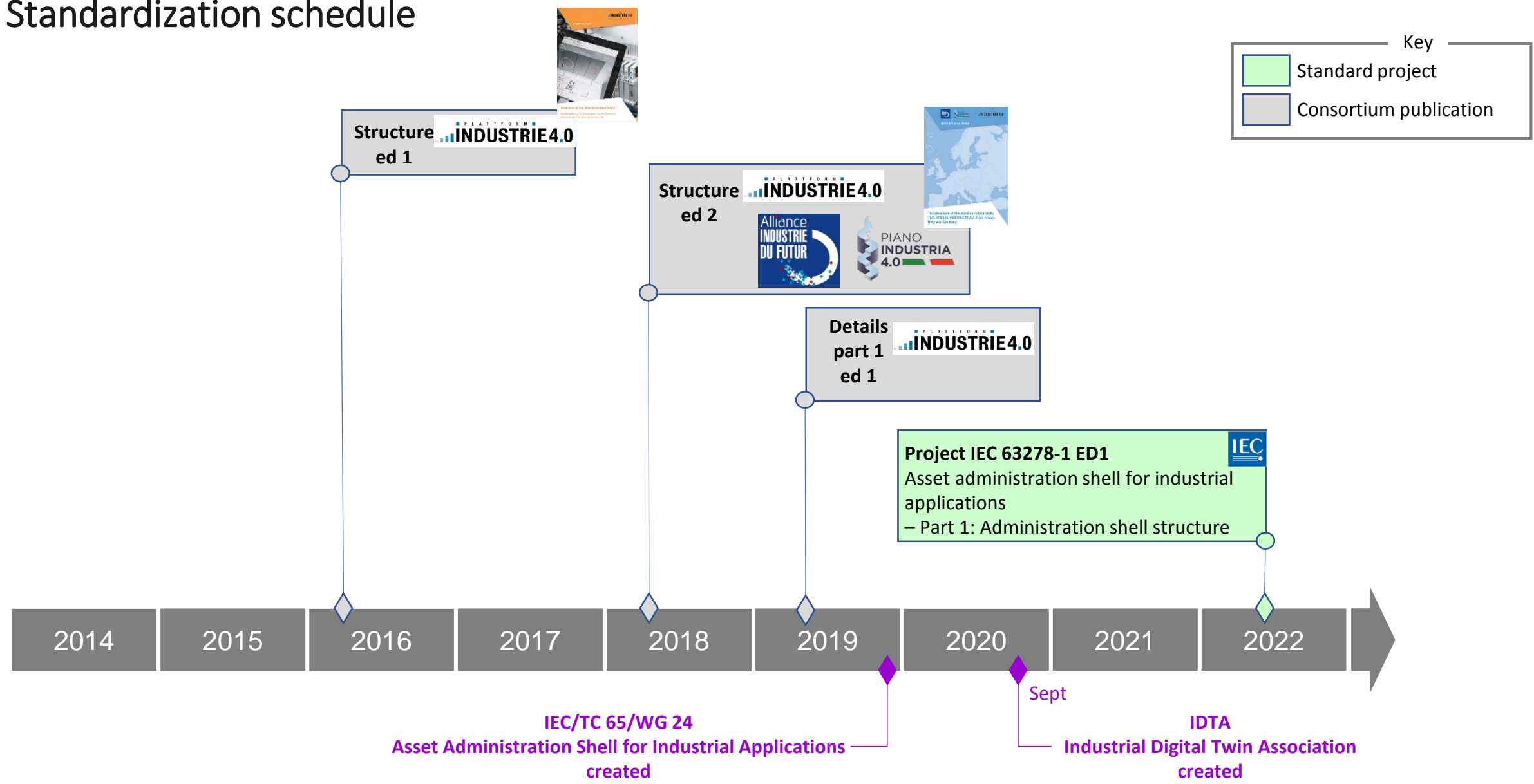


ABB	Asentics	Bitkom	Bosch
Bosch Rexroth	Danfoss	Endress+Hauser	Festo
Homag	KUKA	Lenze	Pepperl+Fuchs
Phoenix Contact	SAP	Schneider Electric	Schunk
Siemens	Trumpf	Turck	VDMA
Volkswagen	Wittenstein	ZVEI	

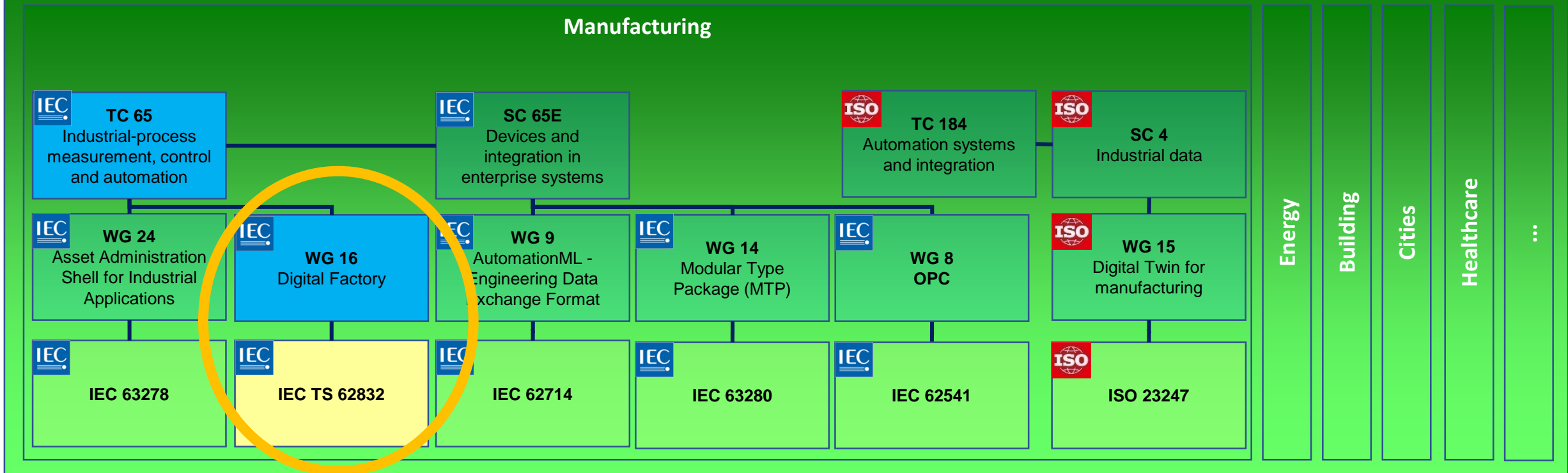
Standardization schedule



Harmonization of the Digital Twin concepts



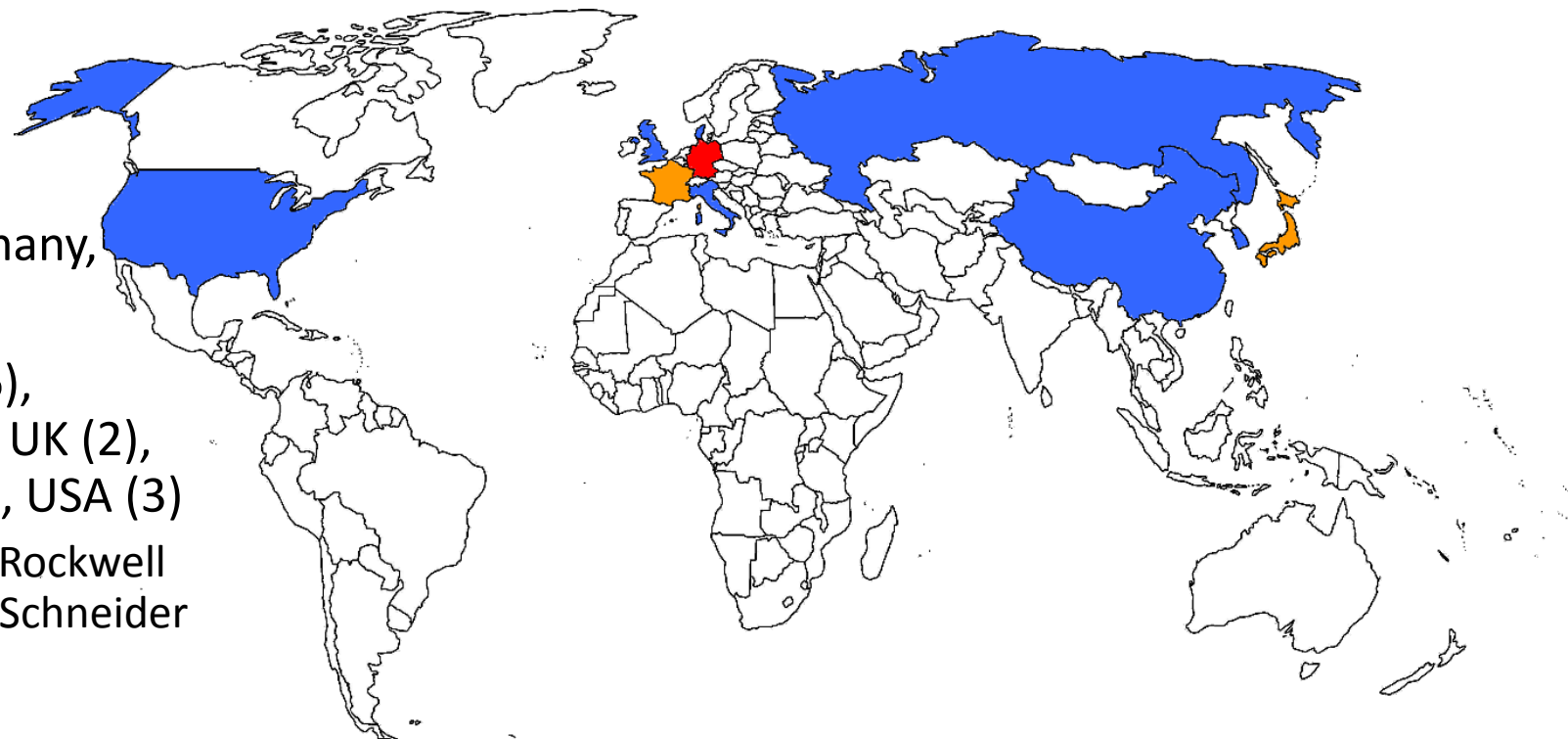
Digital Twin standards



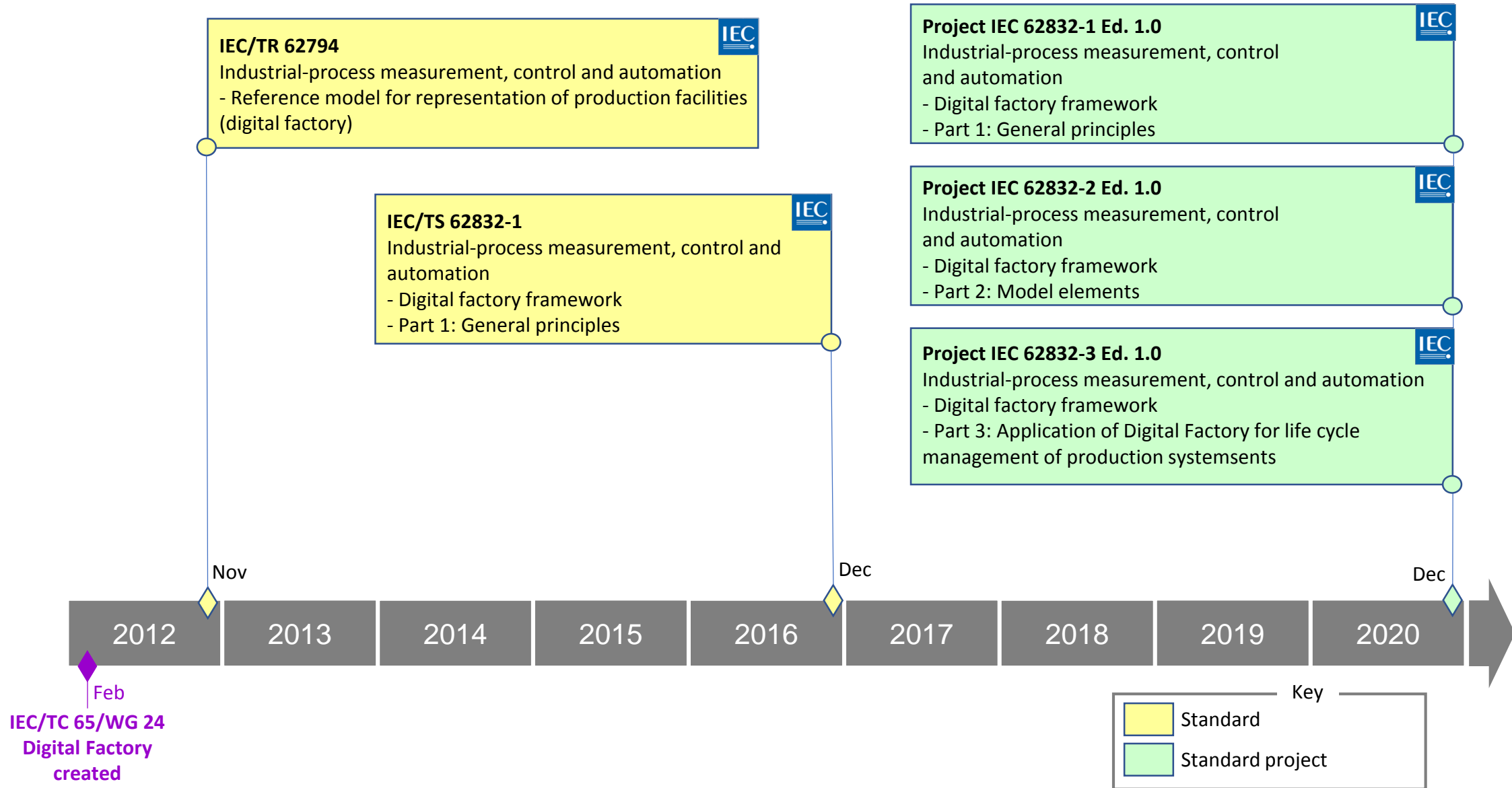
Standardization main data

- Task: Definition of the Digital Factory framework that specifies model elements and rules for creating and managing digital representations of production systems. These digital representations include role-based requirement information as well as physical equipment information and are based on well-defined semantics.
- Status: part 1 published as Technical Specification (2016); part 1, 2 and 3 at standard project final stage

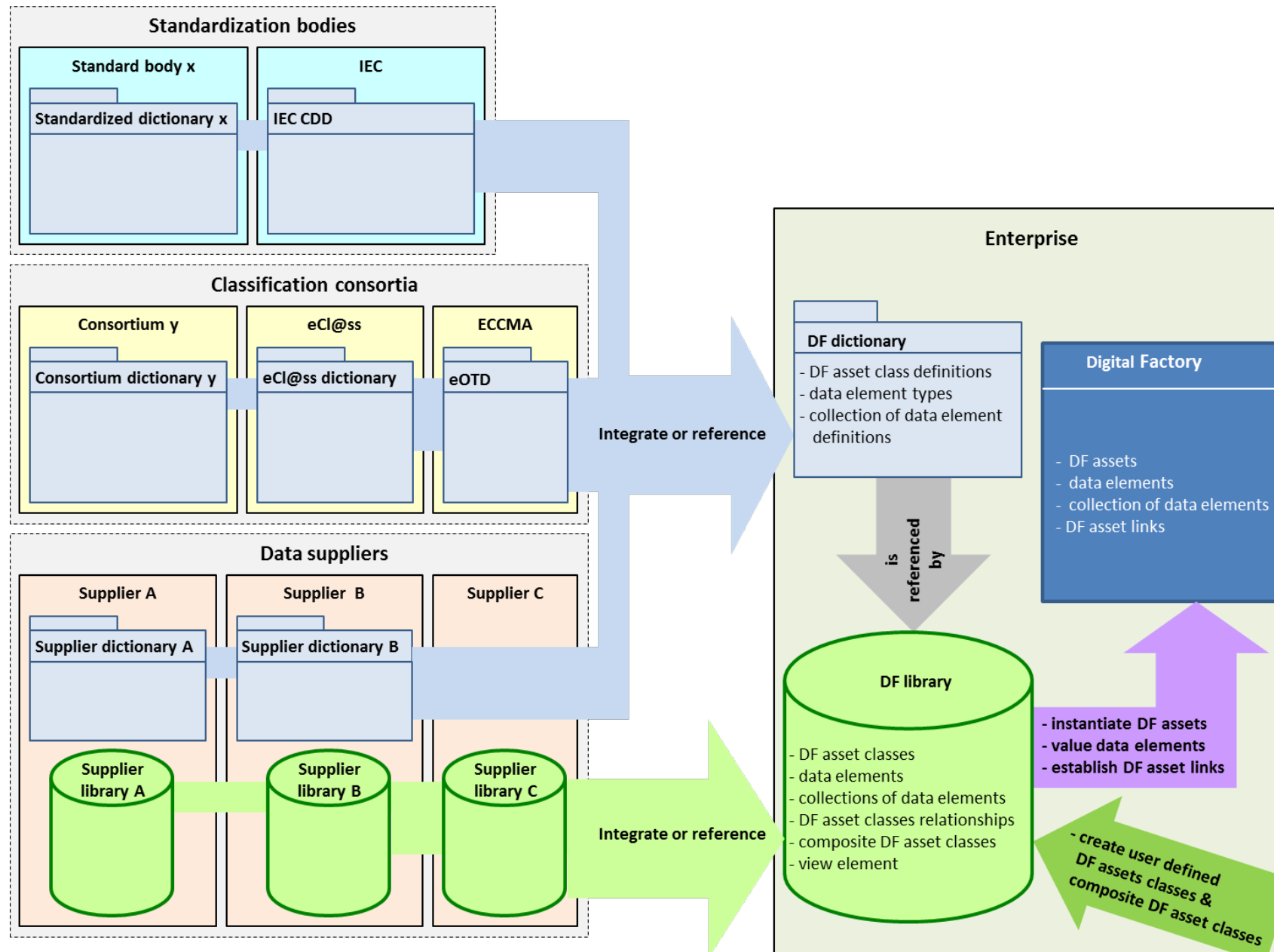
- Convenor: Mr Thomas HADLICH (Germany, Rockwell Automation)
- 36 experts from 10 countries: China (6), Germany (6), Denmark (1), France (2), UK (2), Italy (3), Japan (6), Korea (5), Russia (1), USA (3)
 - For France: Ms Valérie DEMASSIEUX (Rockwell Automation) and Mr Joseph BRIANT (Schneider Electric)



Standardization schedule



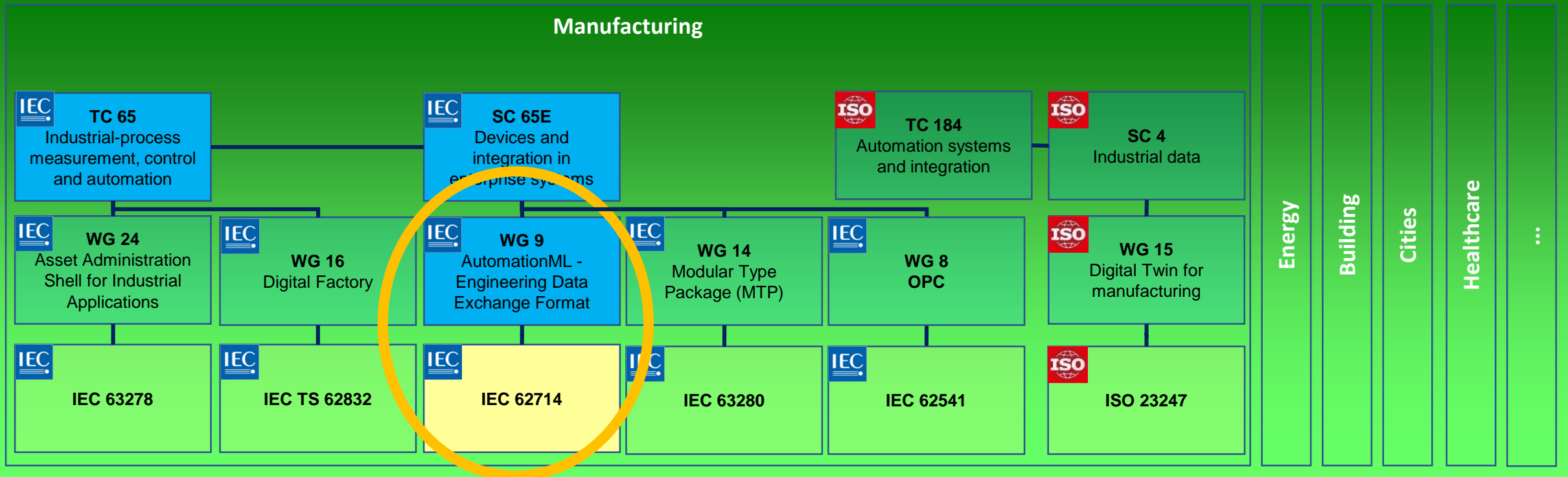
Principle



Harmonization of the Digital Twin concepts

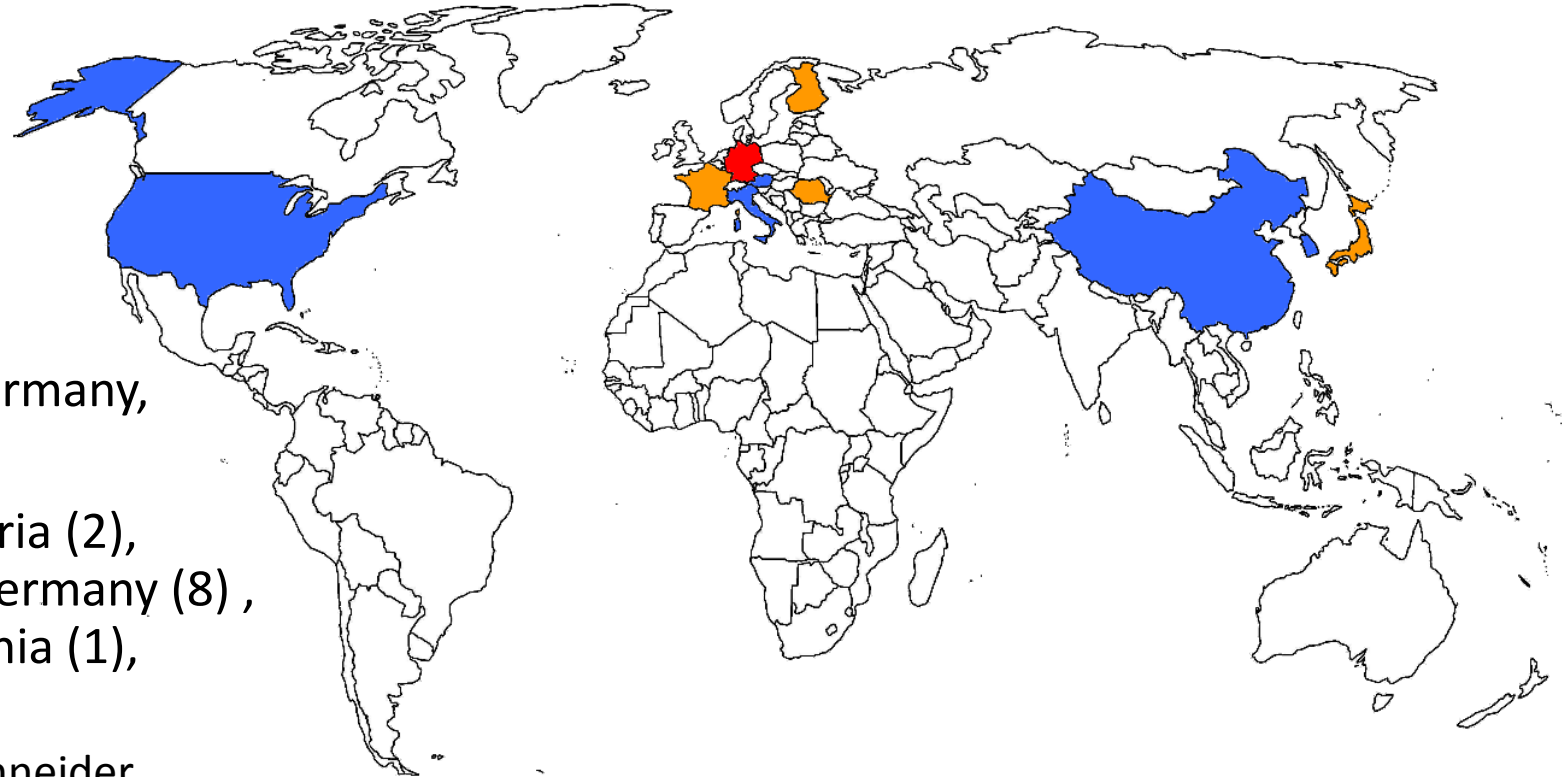


Digital Twin standards



Standardization main data

- Task: To develop IEC 62714 that supports the interoperability among engineering software tools in a heterogeneous landscape. AutomationML is an XML-based data format and offers meta modelling as well as object-oriented concepts...
- Status: Part 1, 2, 3, 4 published as International Standards; part 5 standard project at the draft stage



- Convenor: Mrs Nicole SCHMIDT (Germany, Daimler Protic)
- 30 members from 9 countries: Austria (2), China (5), Finland (2), France (1), Germany (8), Italy (1), Japan (1), Korea (8), Romania (1), USA (1)
 - For France: Mr Joseph BRIANT (Schneider Electric)

Members

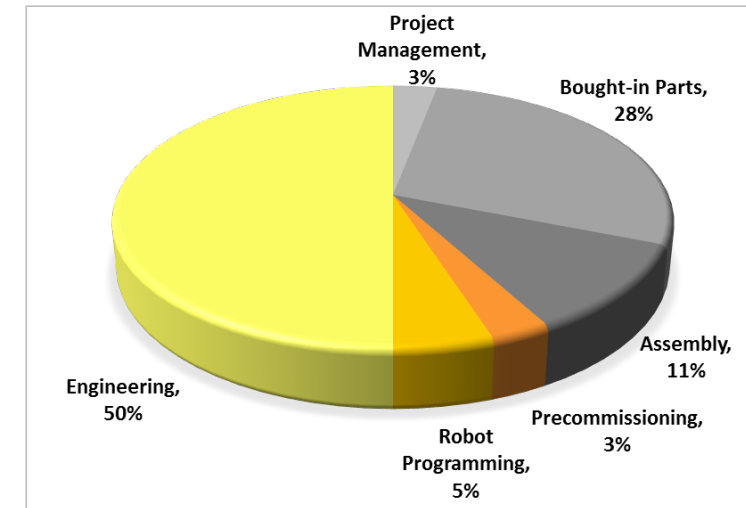
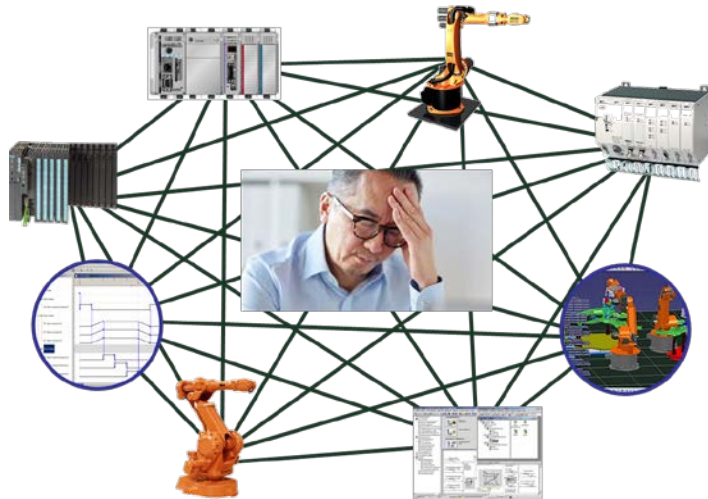


End users	Vendors	System integrators	Software editors	Solution providers	Technology providers	Academics

* Not a member

Motivation

- Engineering is the cost driver number one in factory automation
- Heterogeneous engineering tools landscape
 - Data exchange between tools is an important factor

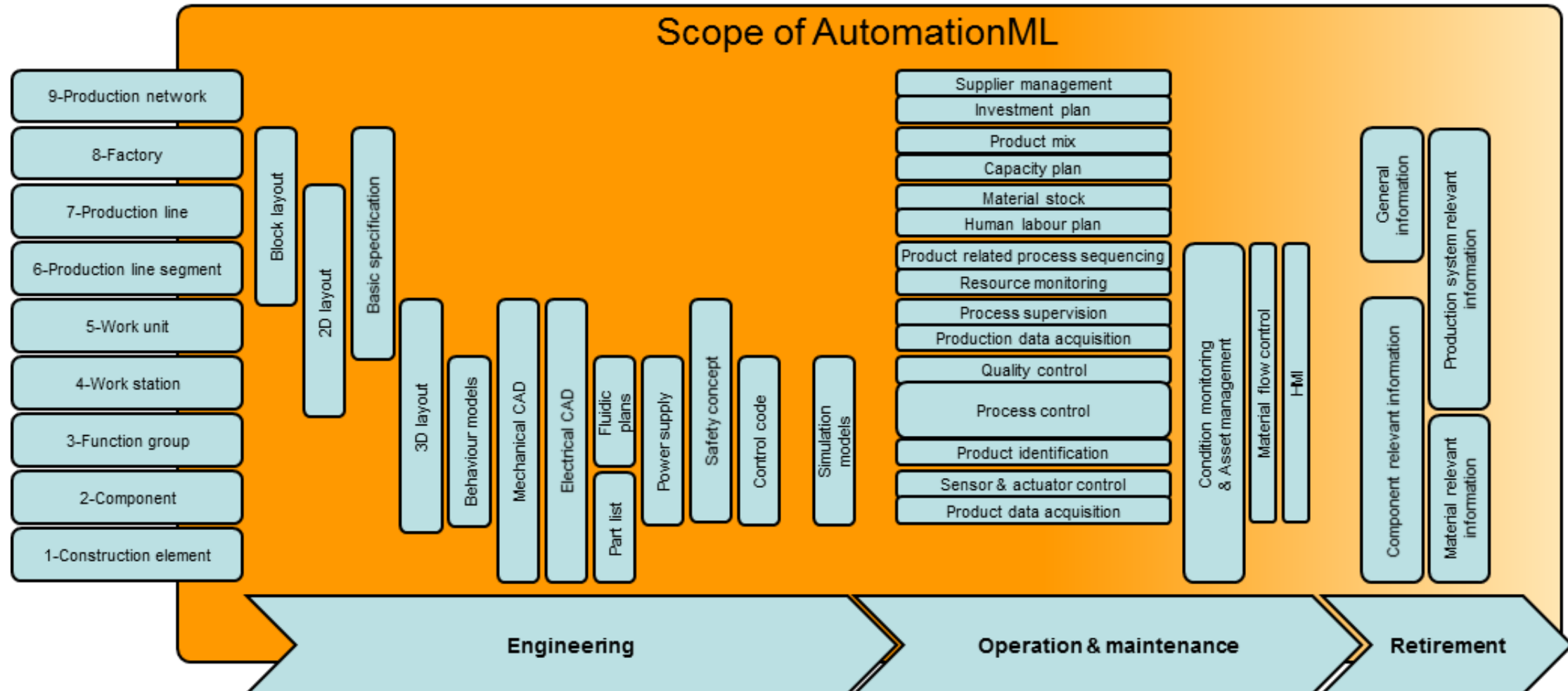


Source: Cost structure analysis of robotics and controls, AIDA 2005

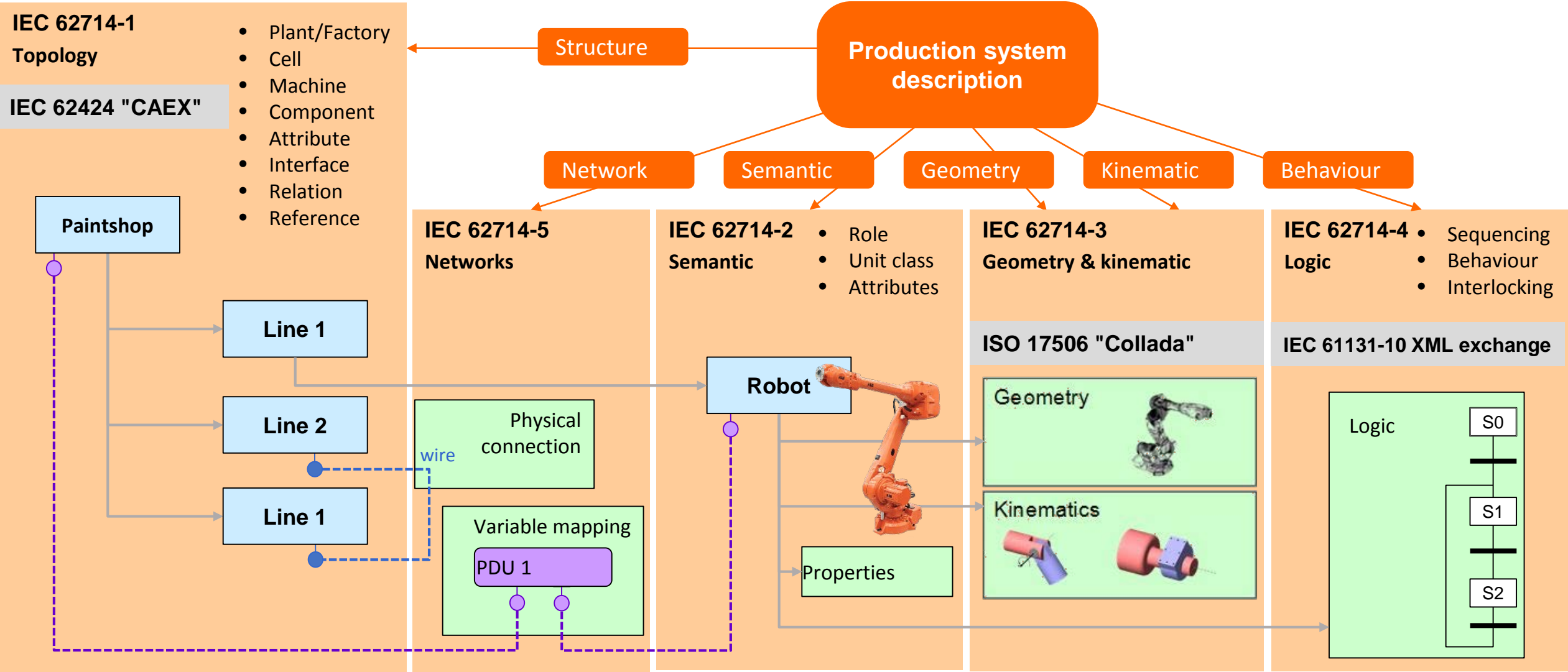
- Data is stored in proprietary file formats
 - User has often no access to his own data.
- Proprietary and numerous interfaces between engineering tools
 - Gaps in passing over information
 - Poor efficiency of the engineering process

Aim

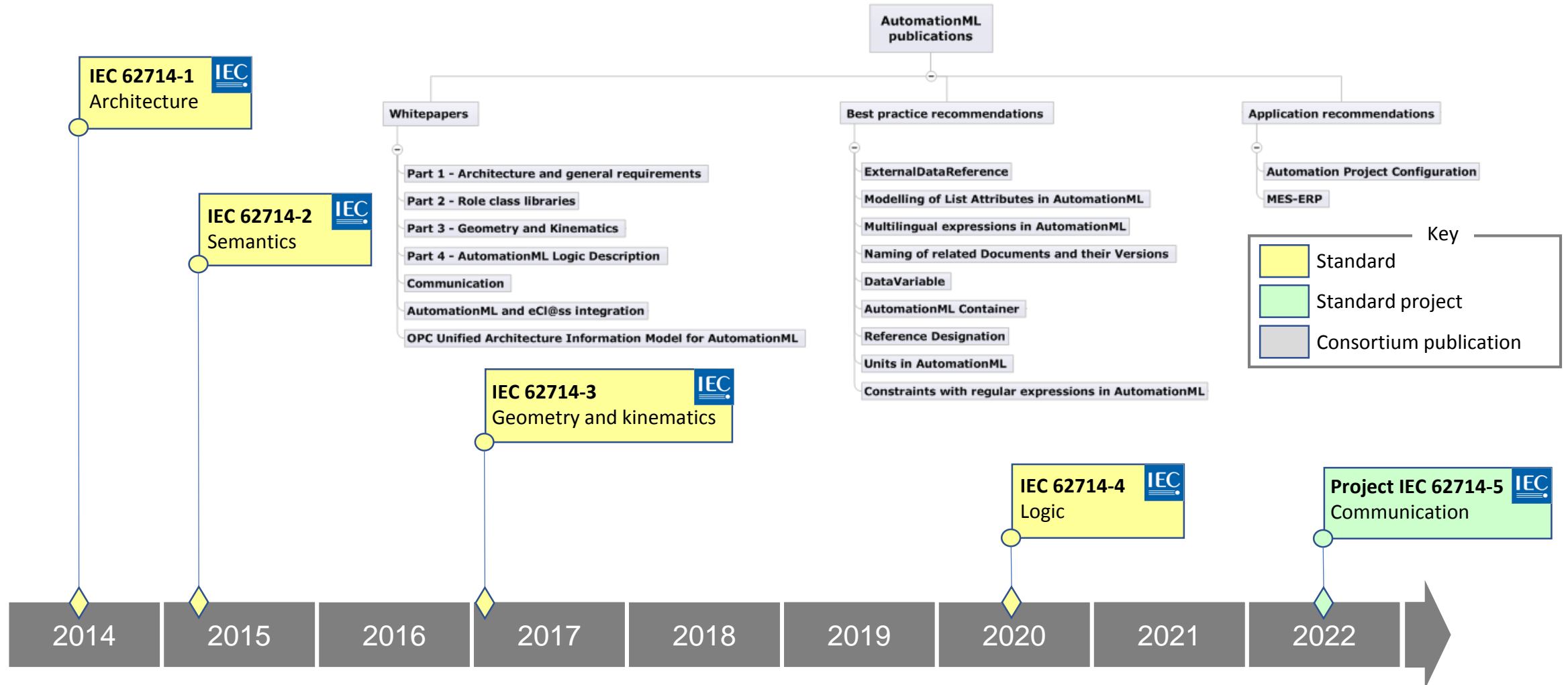
- Exchange of information between engineering tools



Principle



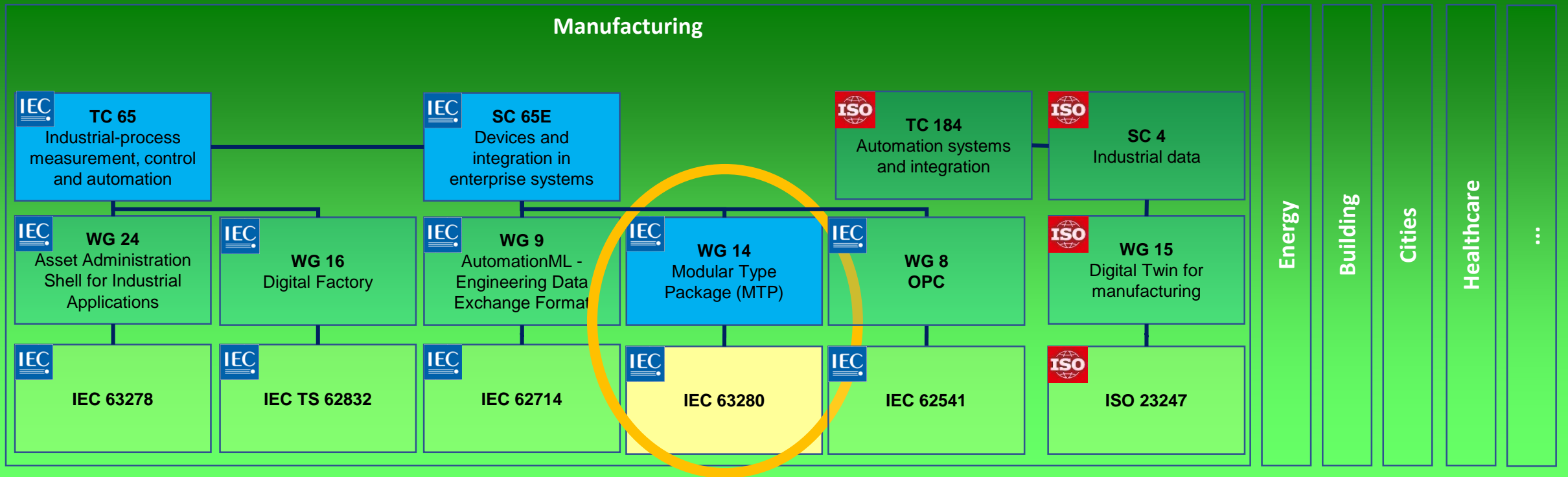
Standardization schedule



Harmonization of the Digital Twin concepts

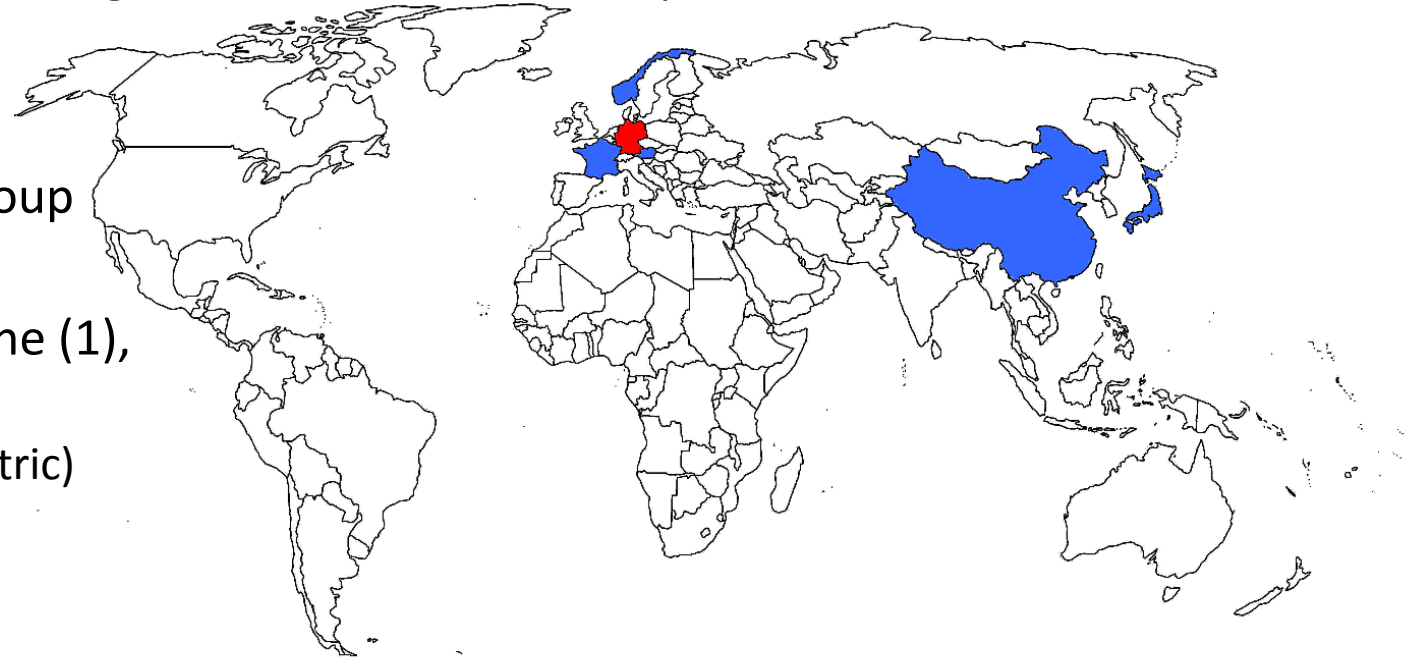


Digital Twin standards

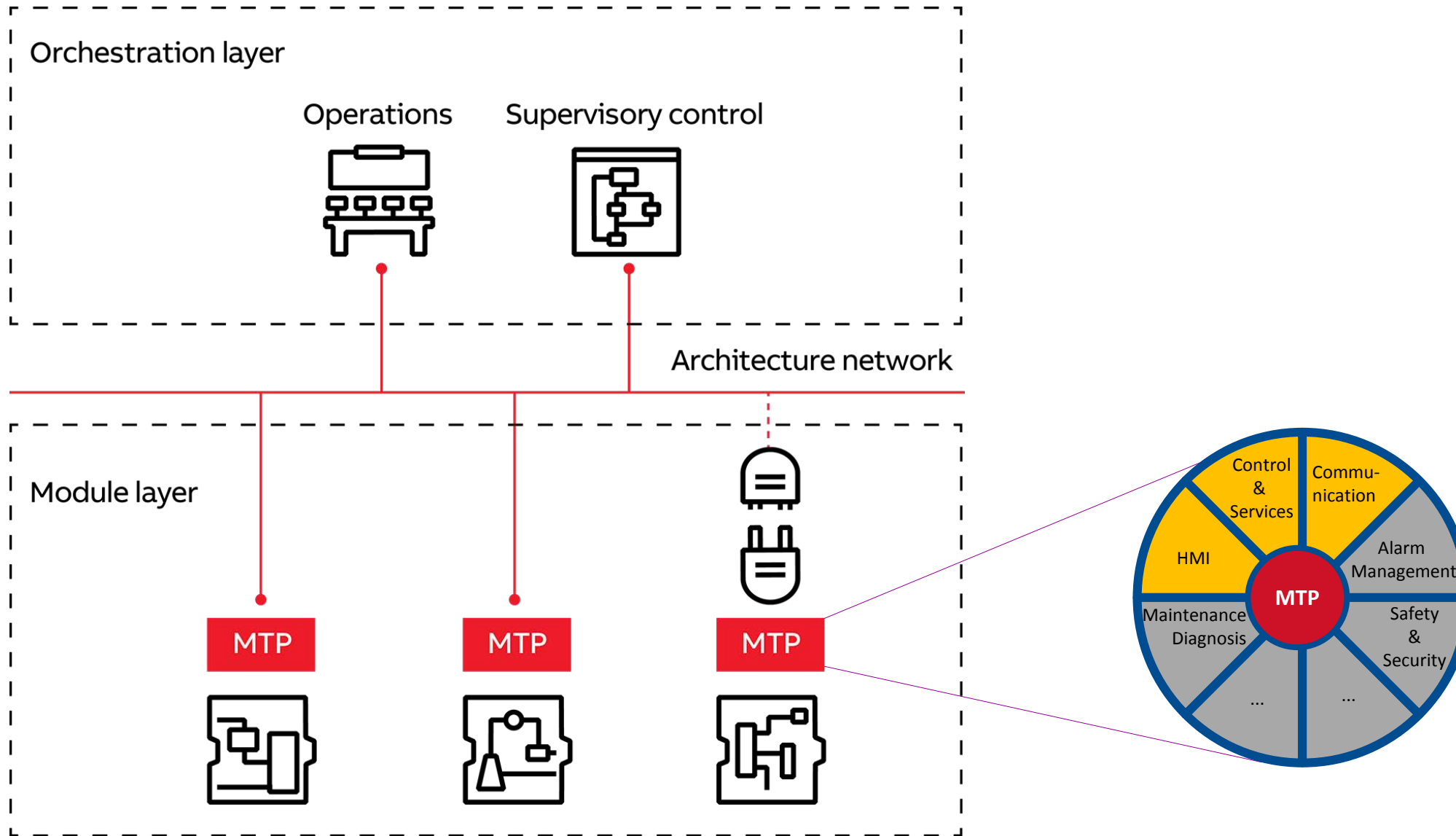


Standardization main data

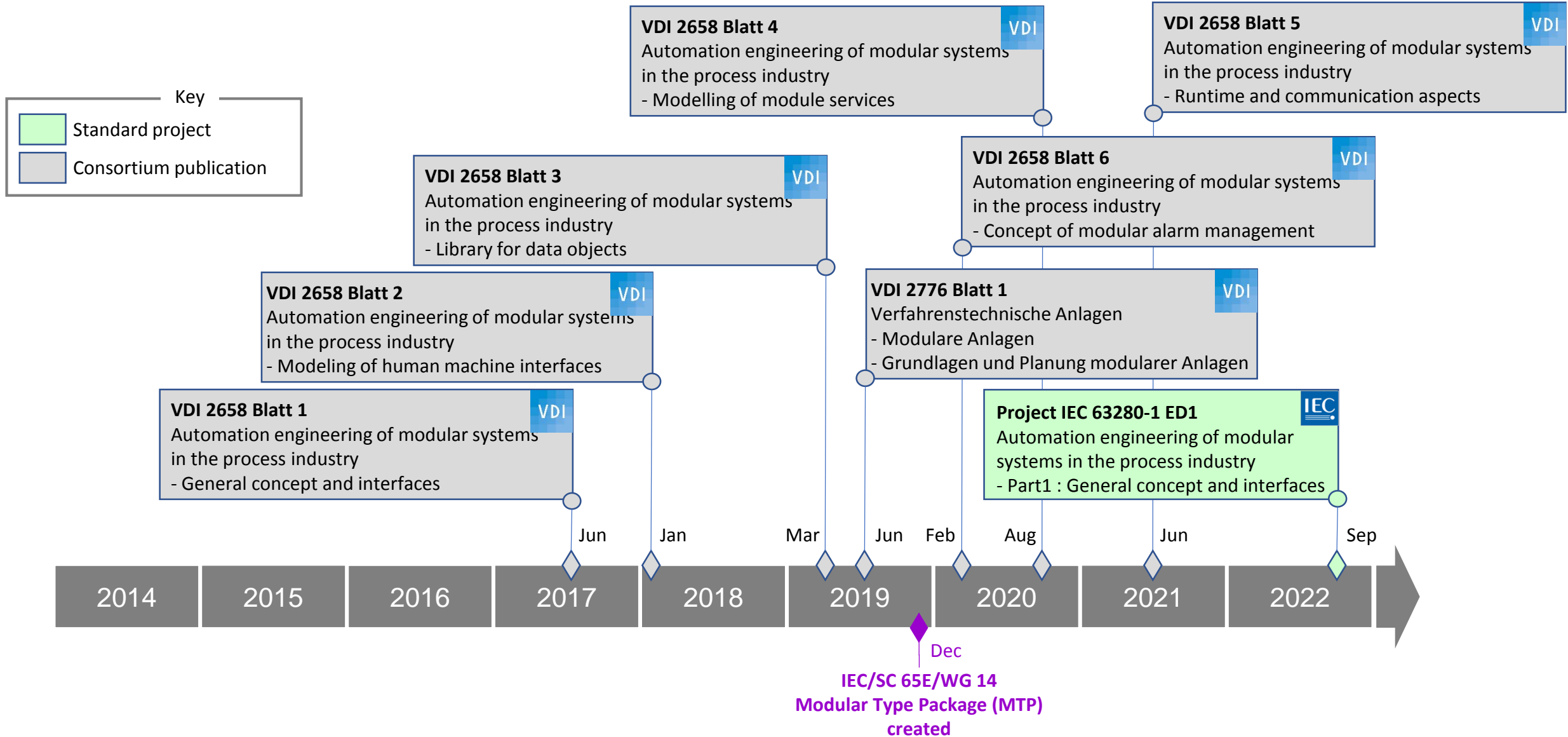
- Scope: The concepts of modular plants/factory are increasingly used in engineering to significantly reduce the planning time of new plants/factories as well as the conversion work on existing plants/factories. The prerequisite for this is the standardization of the interfaces of the modules and of the information necessary for plug-and-produce. Encapsulating module internals reduces the complexity of integration and allows for new business models for module acquisition, replacement and maintenance. To describe the modules, information modules called Module Type Package (MTP) are used that define the interfaces and functions of the automation technology of modules and enable an efficient integration of modules into a process control level.
- Status: Standard project at the draft stage
- Convenor: Mr Gerald Mayr (Germany, SMS Group GmbH)
- 12 members from 6 countries: Austria (1), China (1), Germany (5), France (1), Japan (2), Norway (2)
 - For France: Mr Joseph BRIANT (Schneider Electric)



Principle



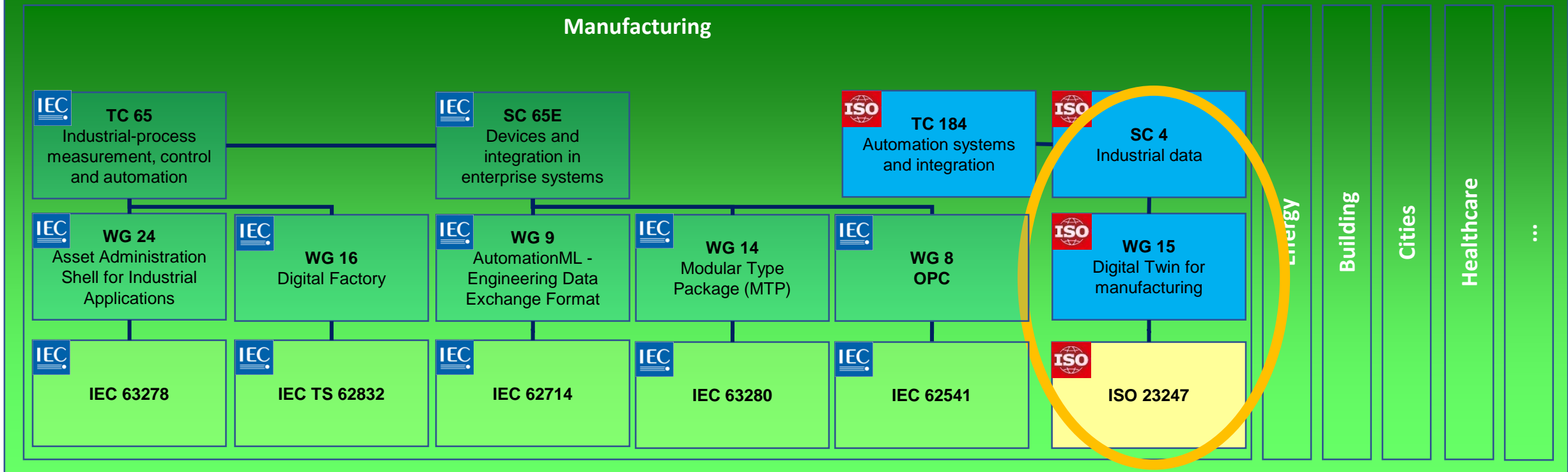
Standardization schedule



Harmonization of the Digital Twin concepts

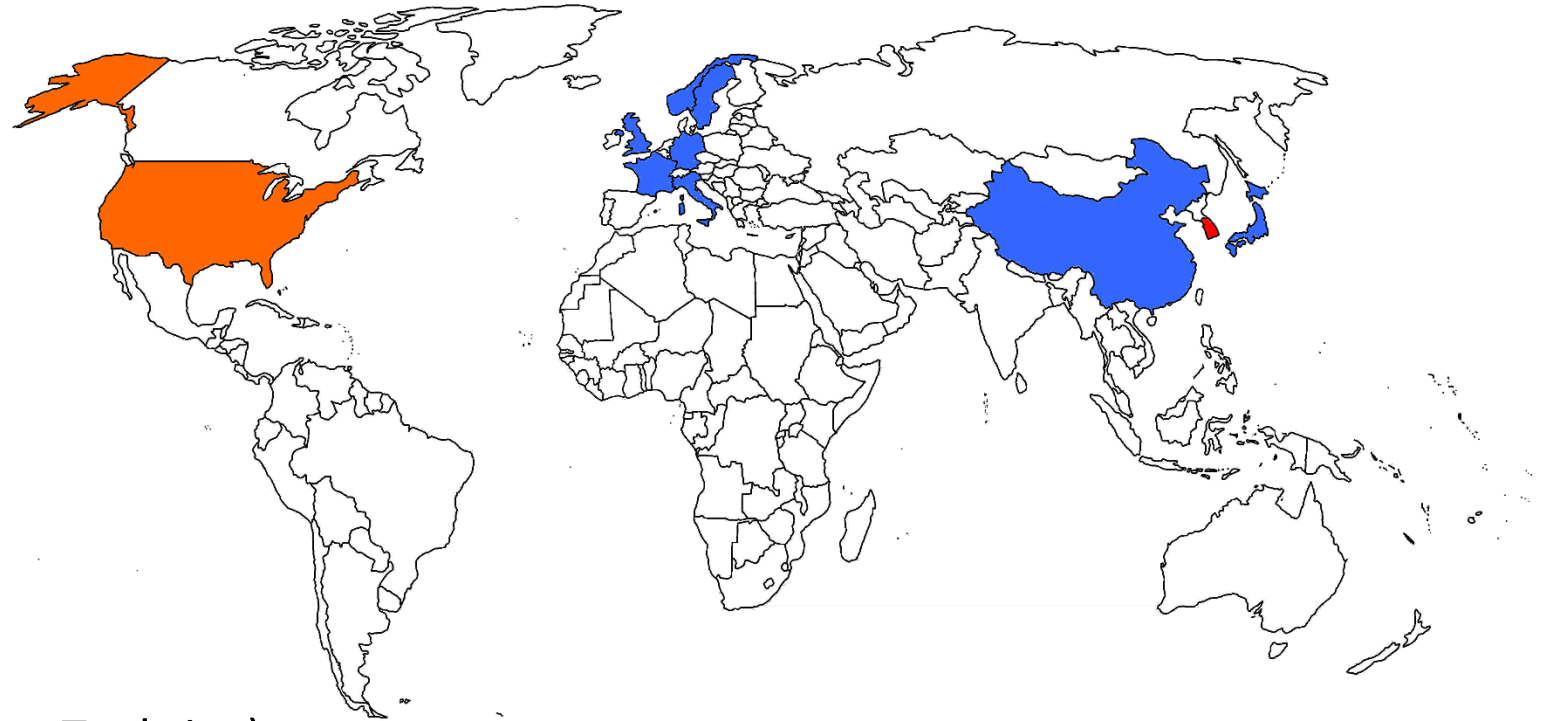


Digital Twin standards

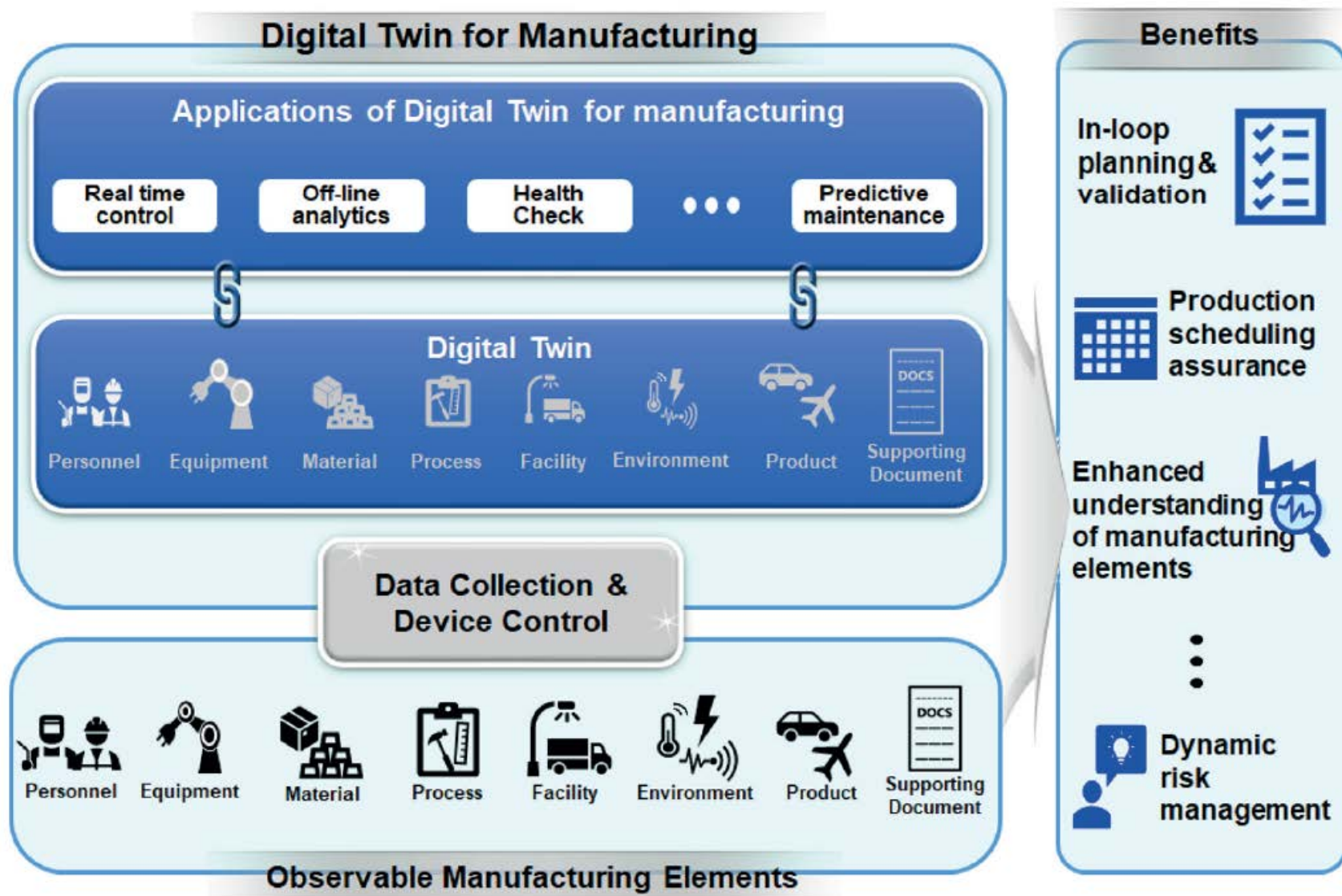


Standardization main data

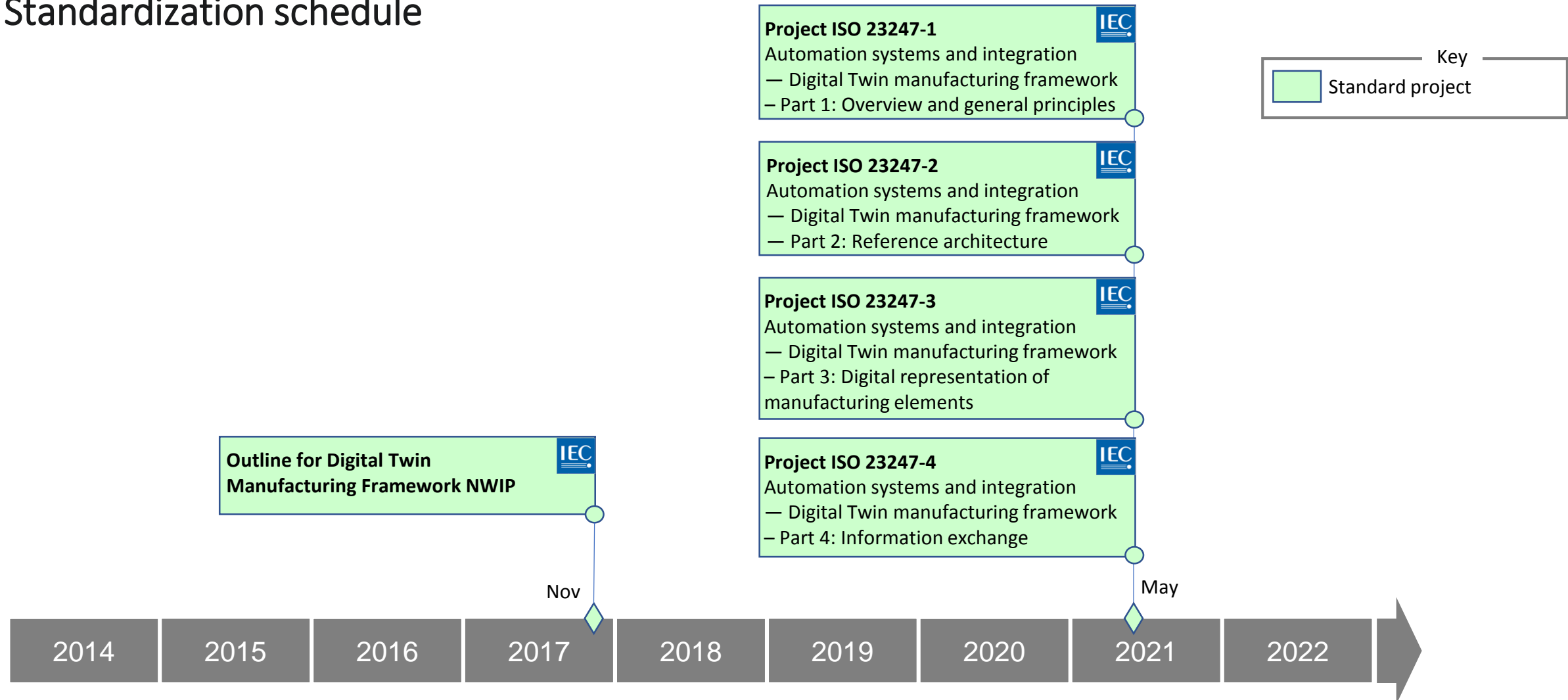
- Scope: The ISO 23247 series defines a framework to support the creation of Digital Twins of observable manufacturing elements including personnel, equipment, materials, manufacturing processes, facilities, environment, products, and supporting documents.
- Status: Standard project at the final stage
- Convenor: Martin HARDWICK (USA, Step Tools inc)
- 79 members from 9 countries: China (7), France (11), Germany (4), Italy (2), Japan (2), Korea (16), Norway (2), Sweden (9), UK (2), USA (24)
 - For France: M. Henri BASSON, M. Joseph BRIANT, M. Christian CAILLET, M. Jean-Yves DELAUNAY, M. Pierre DUCHIER, M. Albert LÉVY, M. Christophe MOUTON, M. Dominique NOZAIS, M. Marc PETIT, M. Ndrianarilala RIANANTSOA, Mme Dalila TAMZALIT



Principle



Standardization schedule



Questions
&
Answers



6th and 7th October

<http://standardsdays.afnet.fr>