Digital twin standards roadmap workshop

3rd December 2020
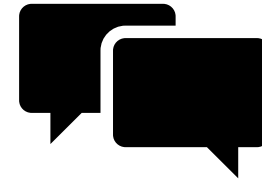
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Housekeeping

Record

Mute

Engage

Agenda

1. Introduction and Housekeeping
2. NDT Programme Context   Sam Chorlton
3. Standards landscape   Shona Macdonald
4. Standards roadmap   Dan Rossiter

Goals

Today's goals:

- Understand the standards landscape;

- Understand the standards roadmap;

- Discuss/Challenge the recommendations; and

- Agree areas for prioritization.

NDT Programme Context

Standards landscape

Shona Macdonald

Information Specialist, Research & Intelligence

December 2020

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Presentation outline

1. Standards landscape definition and objectives

2. Research methodology & scope

3. Findings

4. Summary

5. Questions

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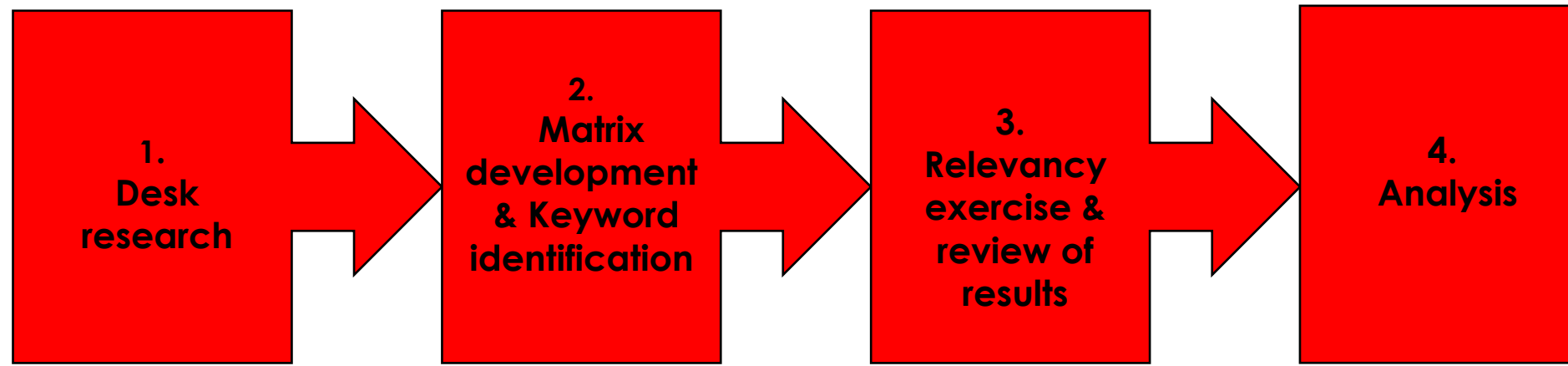# Standards landscape – definition and objective

Definition:

A Standards Landscape provides a quantitative picture of existing standards in relation to a particular domain, in this case Digital Twins. It also assists in the identification of relevant standards that may need to be referenced in a new PAS/Standard.
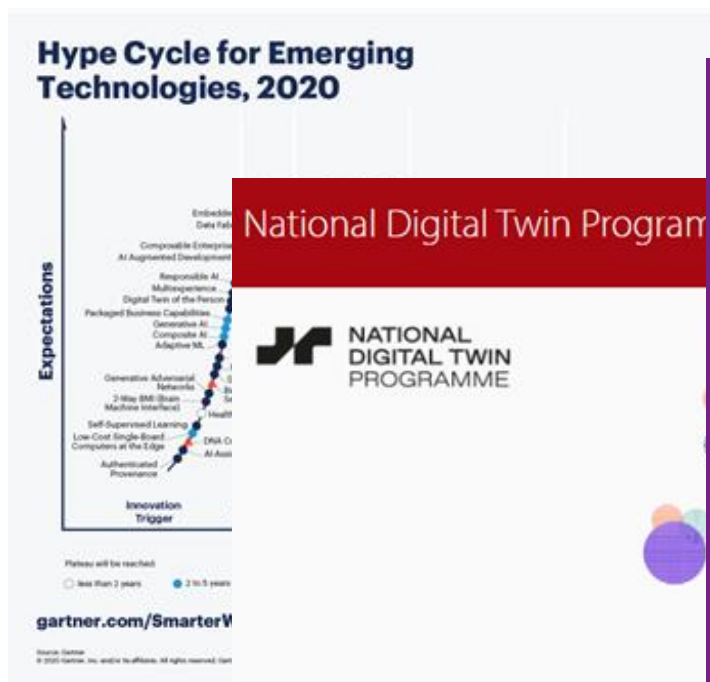
Objectives:

1. To identify the elements of a digital twin that are currently supported by standards.

2. To establish potential areas which may benefit from further standardization in the digital twin arena.

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Research methodology

| 1. Desk research | → | 2. Matrix development & Keyword identification | → | 3. Relevancy exercise & review of results | → | 4. Analysis |

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Research methodology – desk research

Scope of Standards Landscape

Status

- **Current** (published)

- **In development** (proposals/drafts)

Standard type

- **Formal** (published by National Standards Bodies)

- **Informal** (industry-led standards published by Standards Development Organizations)

Geography

	International (ISO/IEC)
	Europe (CEN/CENELEC/ETSI)
	USA (ASTM/ASME)
	UK (BS)
	Australia
	Singapore

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Research methodology – scoping

Digital Twins

Design

Development

Operation

Built Environment

Sectors

Sources

Data

ICT

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Scope – areas of focus

Areas of focus

Data	ICT	Application	Outcome
The data that makes up a DT.	The infrastructure that enables & supports a DT.	Applications of a DT & insights generated to achieve an improved outcome.	Outcomes that can be achieved by applying the insights generated by a DT.

Sub-areas of focus

Data	ICT	Application	Outcome
Structure	Enabling technologies	Use cases	Resilience/ sustainability
Quality	Digital/physical technologies	Insights	Performance
Openness/sharing			
Security			

Scope – areas of focus

Sub-areas of focus

Data

The data that makes up a DT.

Structure

Quality

Openness/sharing

Security

Majority of standards results came from the "data" area of focus.

Relevancy assessment

Low relevancy	Medium relevancy	High relevancy
Criteria: If the standard met the search criteria but did not appear to support a digital twin.	**Criteria**: If the standard met the search criteria but appeared to be only applicable for specific use cases or purposes.	**Criteria**: If the standard met the search criteria and appeared to be applicable regardless of how a DT would be utilized.

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Relevancy assessment

Full results

25%
19%
56%
5,960

Analysis focus

25%
19%
2,513

● High relevance   ● Medium relevance   ● Low relevance

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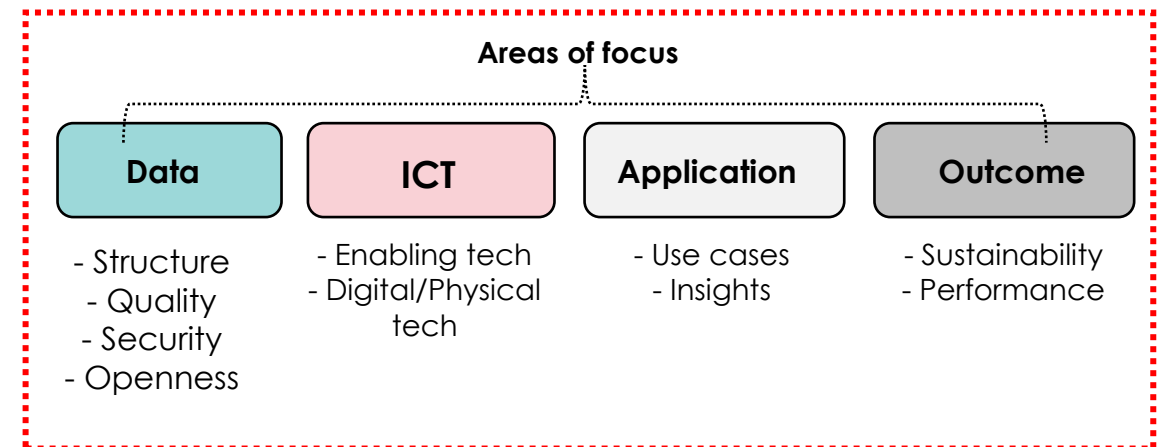
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Results & Findings

Total standards and overlaps cross areas of focus

2,513 Unique standards

Occurrences	Medium relevance	High relevance
1 occurrence	619	1049
2 occurrences	224	313
3 occurrences	120	119
4 occurrences		
5 occurrences		
6 occurrences		

● High relevance   ● Medium relevance

Standard: ITU-T Y 4461 *Framework of open data in smart cities*

Areas of focus

Data	ICT	Application	Outcome
- Structure	- Enabling tech	- Use cases	- Sustainability
- Quality	- Digital/Physical tech	- Insights	- Performance
- Security			
- Openness			

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Total standards and overlaps cross areas of focus

2,513
Unique standards

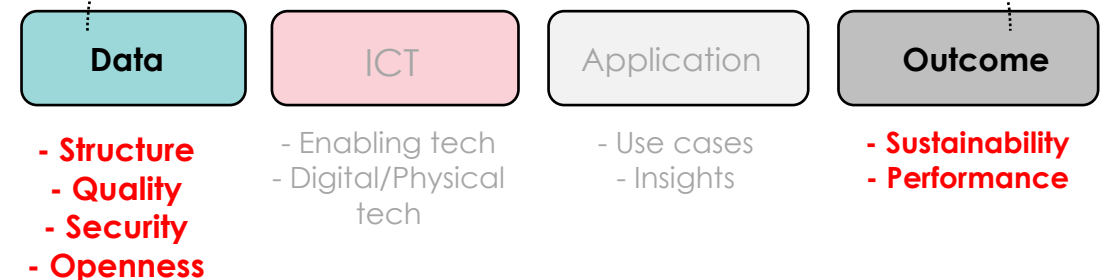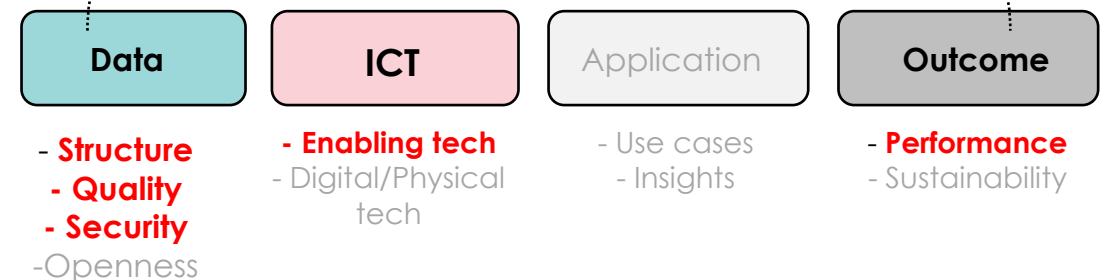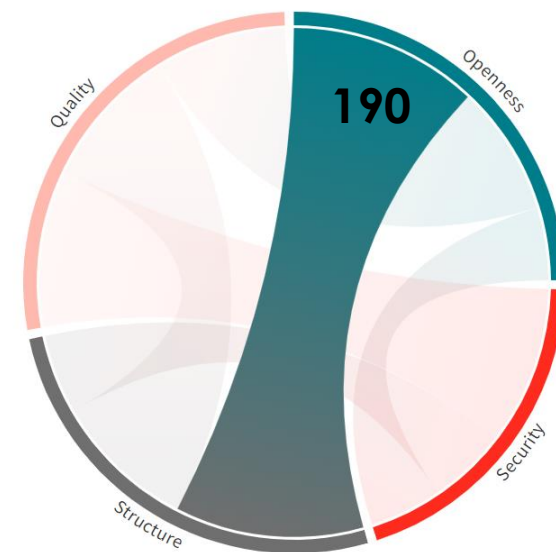| Occurrences	Medium relevance	High relevance
1 occurrence	619	1049
2 occurrences	224	313
3 occurrences	120	119
4 occurrences		
5 occurrences		
6 occurrences		

● High relevance　　● Medium relevance

Standard number: *ISO 19650-5 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information modelling - Part 5: Security-minded approach to information management*

Areas of focus

Data	ICT	Application	Outcome
- **Structure** - **Quality** - **Security** -Openness	- **Enabling tech** - Digital/Physical tech	- Use cases - Insights	- **Performance** - Sustainability

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Data standards crossovers

Data standards crossovers

Standard: ISO/IEC TR
23186 *Information - Cloud computing -*
Framework of trust for processing of
multi-sourced data

Areas of focus: Data (Security, Quality,
Openness, Structure)

Standard: ISO/IEC
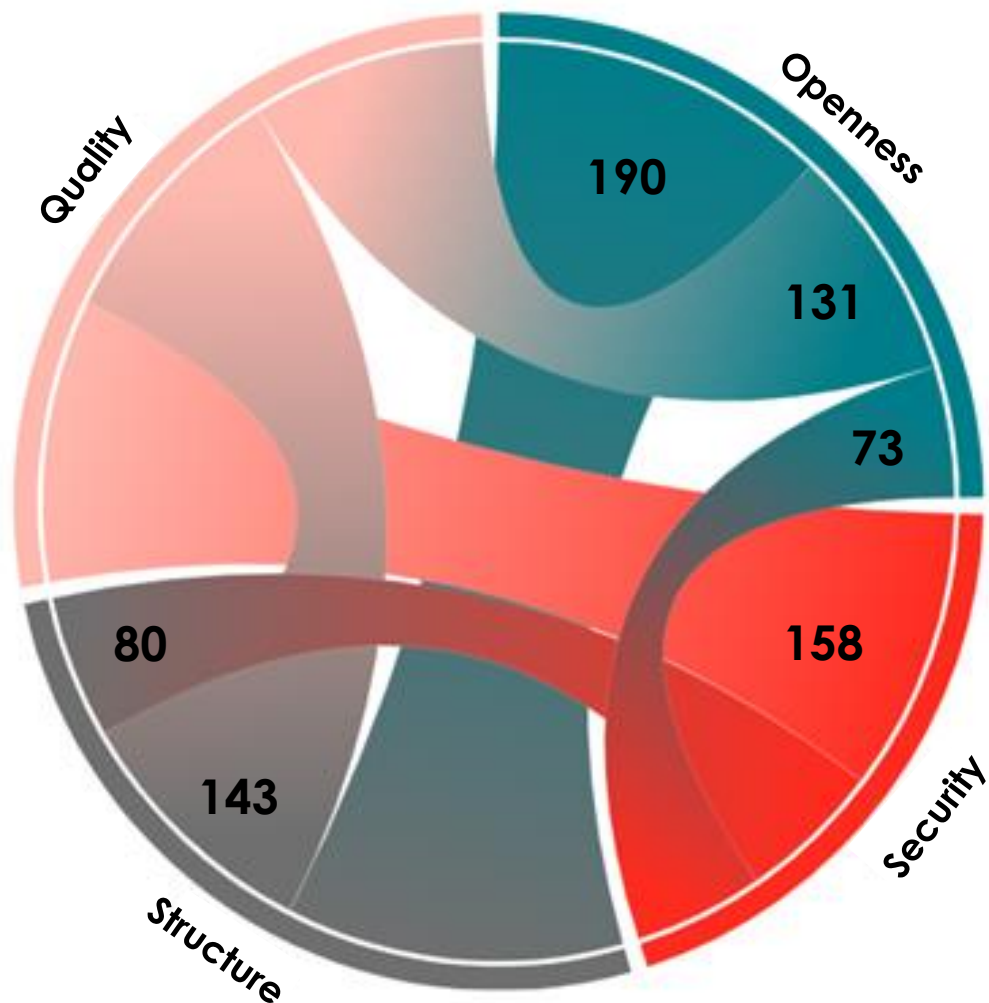29100 *Information technology -*
Security techniques -
Privacy framework

Areas of focus: Data (Security, Quality,
Structure)

Proportion of standards by areas of focus

Data
- Openness: 852 | 155 → 1,007
- Structure: 277 | 218 → 495
- Quality: 238 | 238 → 476
- Security: 214 | 180 → 394

ICT
- Digital/physical: 131 | 263 → 394
- Enabling technologies: 243 | 128 → 371

Outcome
- Performance: 97 | 248 → 345
- Sustainability: 47 | 102 → 149

Application
- Use case: 50 → 85
- Insights: 51

● High ● Medium

2,513 Unique standards

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Origin of standards & adoptions

1,924
- 621
- 1303

291
- 171
- 120

240
- 188

38

15

5

International · Europe · USA · UK · Australia · Sinapore

2,513 Unique standards

Adoptions

38 National British Standards

bsi.

393 Adopted European standards

cen · ETSI · CENELEC

628 Adopted International standards

ISO · IEC · ITU · IEEE

1,059

● High relevance   ● Medium relevance

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Standards by geography & areas of focus

	Application	Data	ICT	Outcome
Australia				
Singapore				
Europe				
International				
UK				
USA				

Key standards for Digital Twins

ISO/DIS 23247-1 Automation systems and integration – Digital Twin framework for manufacturing. Part 1: Overview and general principles

ISO/DIS 23247-2 Automation systems and integration – Digital Twin framework for manufacturing. Part 2: Reference architecture

ISO/DIS 23247-3 Automation systems and integration – Digital Twin framework for manufacturing. Part 3: Digital representation of manufacturing elements.

ISO/DIS 23247-4 Automation systems and integration – Digital Twin framework for manufacturing. Part 4: Information exchange

PD/ISO/TR 24464 Automation systems and integration – Industrial data – visualization elements of digital twins.

ISO Committee:

ISO/TC 184/SC 4 Industrial data

Summary of findings

• Most of the standards identified are about **data** which may be applicable in a digital twin context.

• Limited standards supporting the path of digital twins to generate **insights** and achieve **outcomes** (including performance and sustainability aspects).

• ISO and IEC are the key standards organizations driving standardization activities in this arena.

• ISO committees are currently developing five standards directly specific to Digital Twins specifically relating to automation systems and integration under **ISO/TC 184/SC 4 Industrial data committee.**

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Questions?

Standards roadmap