Why bother with information?

A Strategy for a National Digital Twin

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Matthew West

30 years with Shell
- Originally a Chemical Engineer
- 30+ years in information management
- Information Quality/ Data Modelling/ Ontology/Master & Reference Data
- Downstream One - $2+bn project to integrate Shell’s Downstream Business
  - Downstream Data Model
  - Master and Reference Data standards and architecture

Consultant with CPNI since 2017
- Advising on Digital Built Britain

25+ years in standards development
- ISO 15926, ISO 18876, ISO 8000, ISO-IEC 21838
- ISO TC 184/SC4 Policy and Planning Committee, Founding Chair of EPISTLE

Co-founder of Information Junction 2008

Author of “Developing High Quality Data Models”
Vision for a National Digital Twin
What is the sort of thing we are trying to achieve?

Grenfell Tower

- What would it take to support a query like “Which tower blocks have the same type of cladding as Grenfell Tower?” across multiple databases of local planning and building control data.

- What do local databases need to comply with to enable such a query?
Information quality basics
Why bother with Information?

- Increased effectiveness
- Reduced Cost
- Reduced Risk
- Identify Business Opportunities
- Responsive to change

Information supports Decision, which in turn drives Business.
Definition

Information Quality

Clarity
- The meaning is unambiguous
- Informs the decision being made

Accessibility/Security
- Easily accessible to authorised users, but not to unauthorised users

Consistency
- Data is according to the same data model, reference data, and identification scheme.
- Who created the data, when and where did it come from?

Relevance
- Informs the decision being made

Accuracy
- How close to the truth is the data?

Provenance
- All the information being available when decisions need to be taken

Timeliness/Completeness
- All the information being available when decisions need to be taken

Cost/Benefit/Risk
- Is the cost of data justified by the benefit it gives or risk it reduces in decision taking?

Values

Property related to information definition

A key concern for a distributed National Digital Twin

Property related to information value
The ambition is that any user will be able to see ...

- Publicly available data everyone is authorized to see
- Data the user is authorised to access as a virtual database
- The register of data that is available that the user is authorized to know exists
- The user will not be able to see data on the register that he is not authorised to know exists
Information Quality Management System (ISO 9001)

Management responsibility

- Management commitment
- Customer focus
- Information and information management policy
- Responsibility authority and communication
- Management representation
- Management review

Customers

Requirements

Measurement analysis and improvement

Information

Satisfaction

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Enterprise and Industry Integration
Some Digital Twin Integration Architecture Options

Point to Point

Each interface specific so difficult to maintain

25 nodes 72 connections (Max 300)

Hub and Spoke

The hub can be virtual

25 nodes (plus hub) 25 connections – needs an integration data model
A distributed Integration Architecture

- **Corporate applications**
  - Map and Publish
  - Buffer database
    - Prevents direct access to operational systems
    - Provides a virtualization layer for users showing only what is authorized for that user. May be location based.
  - Authorization layer
    - Query
    - Response
  - Reference Data Library
    - Uses Foundation Data Model and Reference Data
    - May have multiple buffers for different security levels
  - Querying buffer
    - Map and use
  - Messaging System
    - Corporate applications
      - Map and Publish
      - Buffer database
      - Authorization layer
        - Query
        - Response

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The Digital Framework

Information held as data

You must be able to query the data through the same data model across NDT.

Same classification scheme used.

the methodologies approved for developing elements of Digital Built Britain that ensure the quality and consistency of the deliverables.

the standards that deliverables shall meet in order to be considered part of the National Digital Twin.

the standards that data shall meet.

Managing information is a quality management process.

Data accessible through operational interfaces.
Relevance of DTL elements to Digital Twin Quality

**Definition**

- Digital Twin Quality
- Clarity
- Accessibility/Security
- Consistency
- Accuracy
- Provenance
- Interface Operations
- Timeliness/Completeness
- Data Quality Standards
- Application Portfolio
- Roles and Responsibilities
- Foundation Data Model
- Physical Twin Processes
- Digital Twin Data Model
- Strategy & Operating Model
- Key Performance Indicators
- Relevance
- Plans & Justification
- Cost/Benefit
- Reference Data
- Integration Architecture
- Reference Data
- Data Model

**Values**

- Digital Twin Processes
- Foundation Data Model
- Foundation Data Model
- Digital Twin Processes
- Foundation Data Model
Relevance of DTL to the Quality Management System for Digital Twins
Questions?