VIRTUAL ENERGY SYSTEM

Workstream 2 - Developing the underpinning frameworks

Show & Tell

March 2022

Note to reader:

These slides are a snapshot of the work to date on the Virtual Energy System underpinning framework. The intent is to share the evolving knowledge and learnings with industry. For more information on the latest developments please contact VirtualES@nationalgrideso.com

Lois Milner Elkharouf

Project Manager, Arup

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AGENDA – THE NEXT 60 MINUTES

- **Introductions & context**
  10mins: Dial-in buffer, introductions, context and objective of Show & Tells
- **Key socio-technical factors**
  15mins: Key factors, priority recommendations
  10mins: Questions and feedback
- **SIF discovery: demonstrating the common framework**
  15mins: Introduction to scope, objectives, how to get involved
  10mins: Questions and feedback

Introductions

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CATAPULT Energy Systems

IB1 Icebreaker One

Show & Tell objective

Share knowledge and learnings from the work to date with industry

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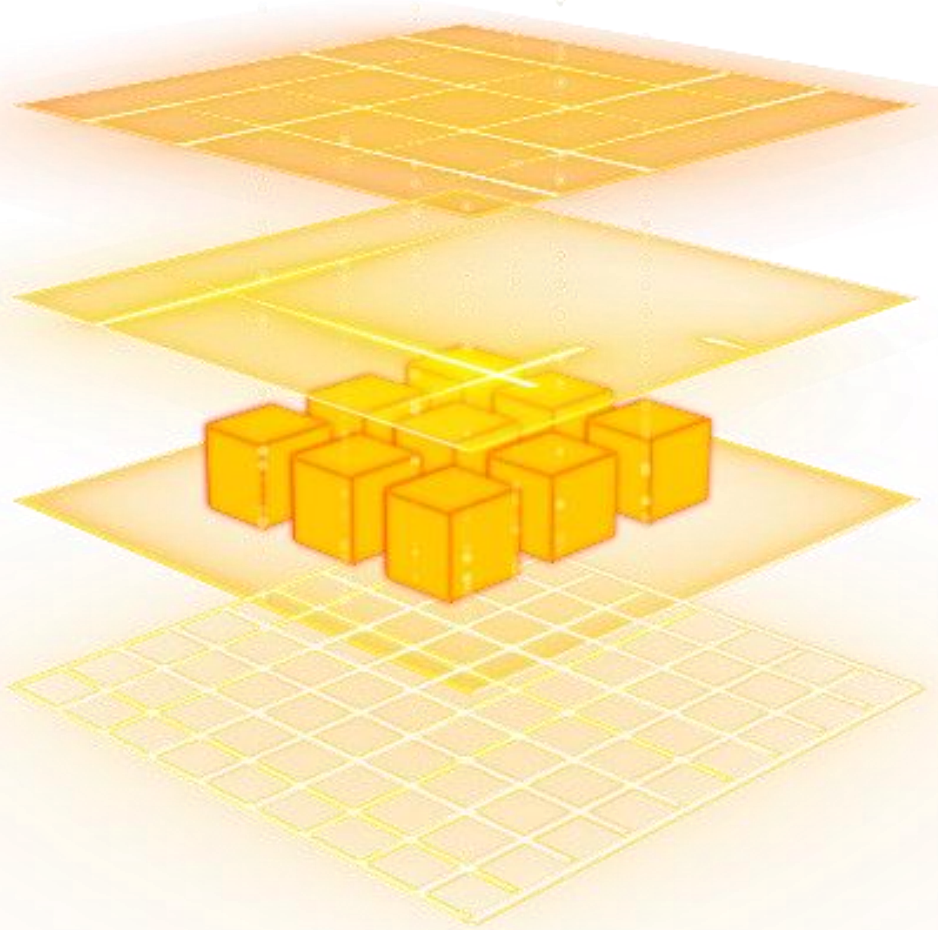
VIRTUAL ENERGY SYSTEM

Objective:

Enable the development of an ecosystem of connected digital twins for the GB energy system



3 workstreams:

- Stakeholder engagement
- Common framework & principles
- Use cases

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VIRTUAL ENERGY SYSTEM: COMMON FRAMEWORK

1. **Benchmarking:** Understanding the current cross-sector and global best practice for connecting assets, systems, and digital twins.

2. **Key socio-technical elements:** Determining the key socio-technical factors that need to be considered for the Virtual Energy System to succeed.

3. **Demonstrating the common framework:** Collaboratively prove and demonstrate, with industry, how the socio-technical principles work

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IB1 Icebreaker One

KEY SOCIO-TECHNICAL FACTORS

Work package 2

Andy Kervell

Information Management Specialist, Arup

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KEY SOCIO-TECHNICAL FACTORS

"Determine the key socio-technical factors that need to be considered for the Virtual Energy System to succeed"

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SUMMARY OF KEY SOCIO-TECHNICAL ELEMENTS

People	**Defining roles & responsibilities** Formalise R&R for the VirtualES with the intentions of consumer benefits	**Raising awareness & fostering culture** Share vision, belief & behaviours. Enabling practices to support VirtualES objectives	**Building capabilities & skills** Understand skills & competency needs & develop capacity building strategies	PRIORITY FACTOR
Process	**Aligning around industry codes & standards** Identify standardised practices in industry & align around them	**Engaging Stakeholders** Nurture industrial, governmental and political support	**Creating a governance framework** Set strategy and operational governance of the VirtualES	**Determining operating environment** Business models, cross organisational legal, policy, & contractual framework
Data	**Aligning models & taxonomies** Harmonise existing data standards, taxonomies and ontologies.	**Establishing management & governance** Data management & governance requirements	**Increasing visibility & enabling sharing** Nurture effective data sharing to support interoperability	**Managing security** Set the core rules needed to address security, privacy and risk implications surrounding VirtualES data
Technology	**Connecting physical infrastructure** Physical infrastructure, devices and their connectivity required to operate the VirtualES	**Enhancing modelling and analysis** Modelling / simulation & analysis software used for current & future modelling	**Creating interoperable tech-stack** Communication, cooperation & sharing across VirtualES & other in/cross sector projects	

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PRIORITY FACTORS RECOMMENDATIONS

People

Raising awareness & fostering culture

Shared vision, belief and behaviours and enabling practices to support the VirtualES objectives

- Raising awareness through articulating the tangible benefits of the VirtualES through realistic use cases.
- Providing a framework and roadmap for the necessary changes to the sector's digitalisation and sharing of data to enable its vision.
- Engaging with digitalisation leadership and encourage active involvement.
- Promoting user-centred design through end-to-end whole-system thinking.

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PRIORITY FACTORS RECOMMENDATIONS

Process

Engaging stakeholders

Nurture industrial, governmental, and political support

- Clarifying and communicating how VirtualES fits into the current landscape of digital initiatives across the sector.
- Identifying roles and responsibilities for stakeholders and set a mechanism for collaboration.
- Establishing regular cadence of engagement and lock in their support (e.g. governmental actors).
- Engaging and leveraging existing forums.

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PRIORITY FACTORS RECOMMENDATIONS

Process

Creating a governance framework

Set strategy and operational governance of the VirtualES

- Defining and agreeing the VirtualES role in the wider energy ecosystem, in terms of decision making power and responsibilities.
- Establishing clear reporting lines across the system.
- Providing transparency on independence and funding of the VirtualES.
- Ratifying core ways of operating, such as stakeholder engagement and delivery assurance processes.

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PRIORITY FACTORS RECOMMENDATIONS

Data

Aligning models & taxonomies

Define an approach to harmonise existing data standards, taxonomies and ontologies

- Adopt and adapt what already exists, for example align data standards with the NDTp Information Management Framework (IMF) where possible.
- Extract the lessons learned from the CReDo project in the use of the IMF for the energy sector's adoption.
- Create ontologies that are missing and not yet covered by the existing approaches.
- Follow the main phases of ontology development.

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PRIORITY FACTORS RECOMMENDATIONS

Data

Increasing visibility & enabling sharing

Nurture effective data sharing to support interoperability

- Publishing machine-readable, open metadata in a manner that can be included in Open Energy
- Reviewing current data sharing initiatives to bring in key advances in development in how data will be accessed across the industry in future.
- Actively engaging in programmes addressing standards for publishing data and metadata;
- Engaging with the future delivery orchestrator for the Energy Asset Register.

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PRIORITY FACTORS RECOMMENDATIONS

Technology

Creating an interoperable 'stack'

Communication, cooperation & sharing across VirtualES & other in/cross sector projects

- Defining a high-level interoperable architecture for the Digital Spine.
- Contributing to the leadership in the coordination and delivery of the Digital Spine
- Providing data visibility to users of VirtualES.
- Identifying a set of best practices that promotes wider integration and data exchange

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OVERARCHING RECOMMENDATIONS

1. Social + technical factors
2. Maximise for cohesion and interoperability
3. Priority factors first
4. Make it additive
5. Articulate the benefits
6. Use case driven
7. Test assumptions
8. Cross sector consensus
9. Engage for confidence
10. Enable the participation of everyone
11. Flexible governance
12. Align with the National Digital Twin Programme

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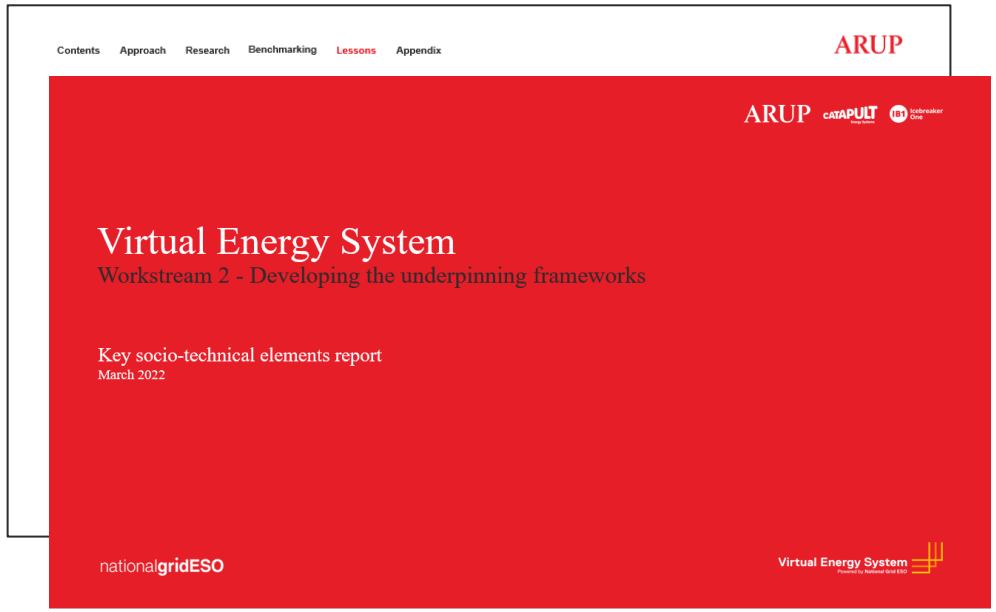
Public release



Public release of key socio-technical factors report coming soon

For more information, contact:
VirtualES@nationalgrideso.com

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DEMONSTRATING THE COMMON FRAMEWORK

SIF discovery project

Simon Evans

Digital Energy Leader, Arup

DEMONSTRATING THE COMMON FRAMEWORK

"Collaboratively prove and demonstrate, with industry, how the socio-technical principles work"

Project Supporters:

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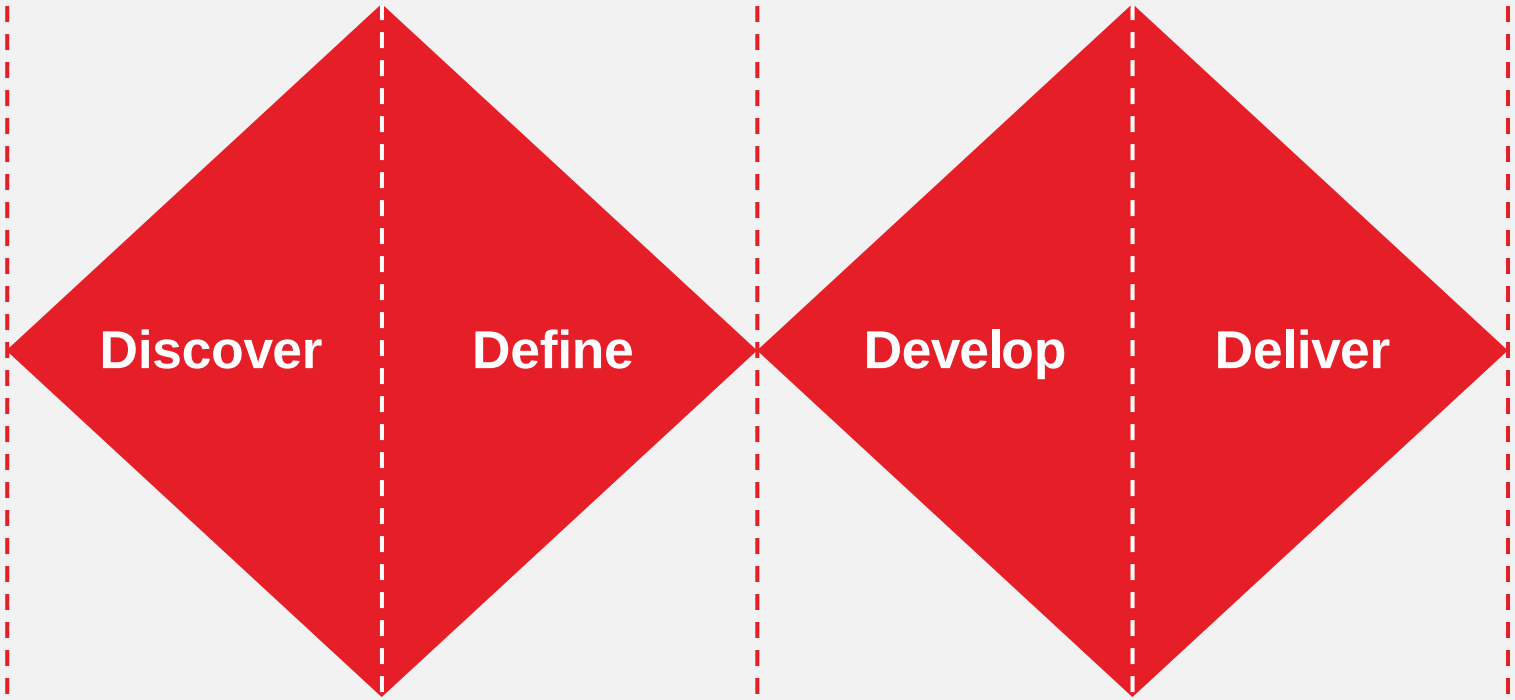
DISCOVERY APPROACH & OBJECTIVE

British Design Council Double Diamond



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DISCOVERY OBJECTIVE & OUTCOME

Objectives

1. Prioritise the user and business requirements
2. Determine what is already in place that could address the priority socio-technical factors
3. Understand the barriers to achieving the priority factors effectively
4. Determine investment requirements & development roadmap

Outcome: discovery report detailing

1. Verified the business requirements for the priority socio-technical factors
2. A prioritised list of user needs
3. Identified existing standards and approaches and how they fit with the proposed solution
4. Outline the Alpha phase development requirements, including the riskiest assumptions identified during Discovery
5. Recommendation for consideration

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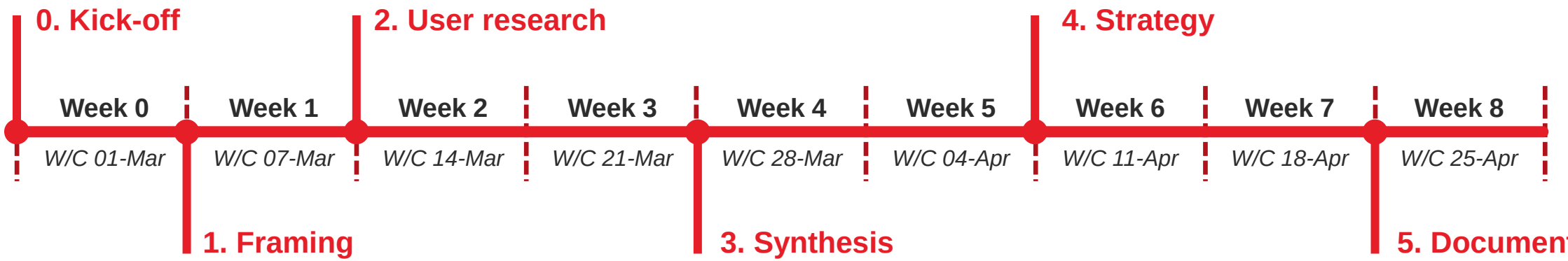
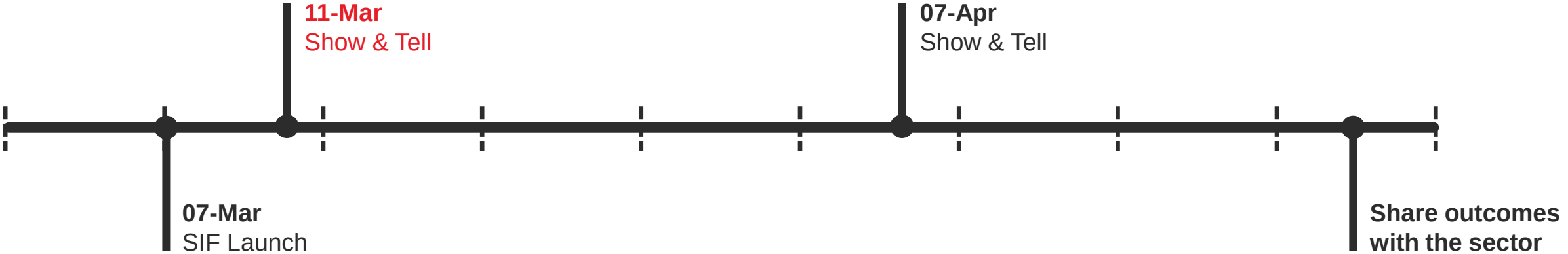
DISCOVERY TIMELINE





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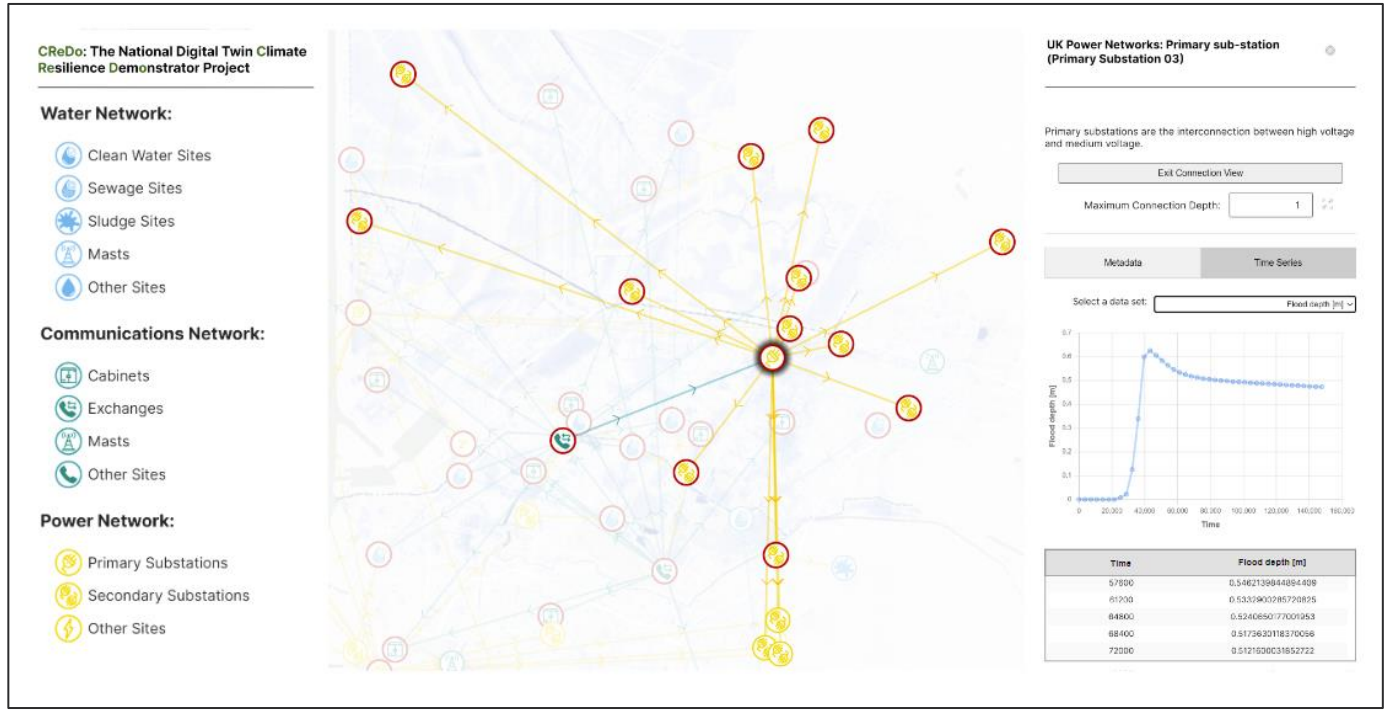
CReDo: National Digital Twin Climate Resilience Demonstrator



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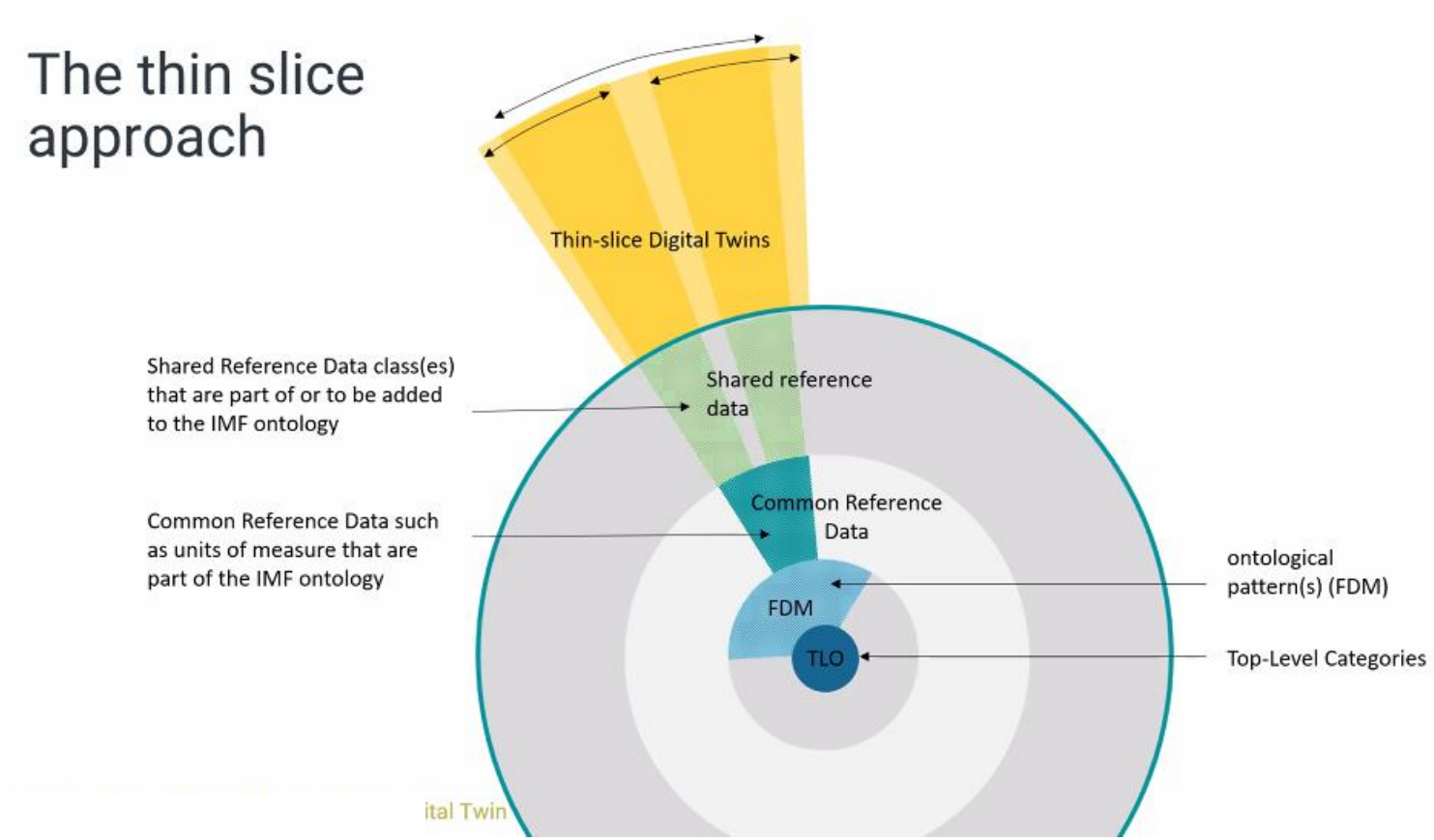
DEMONSTRATING THE COMMON FRAMEWORK

VirtualES as the '*thin slice*' digital twin of the energy sector.



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