



DEFENCE SUPPORT DIGITAL TWIN COMMUNITY OF PRACTICE

Multi Domain Operations

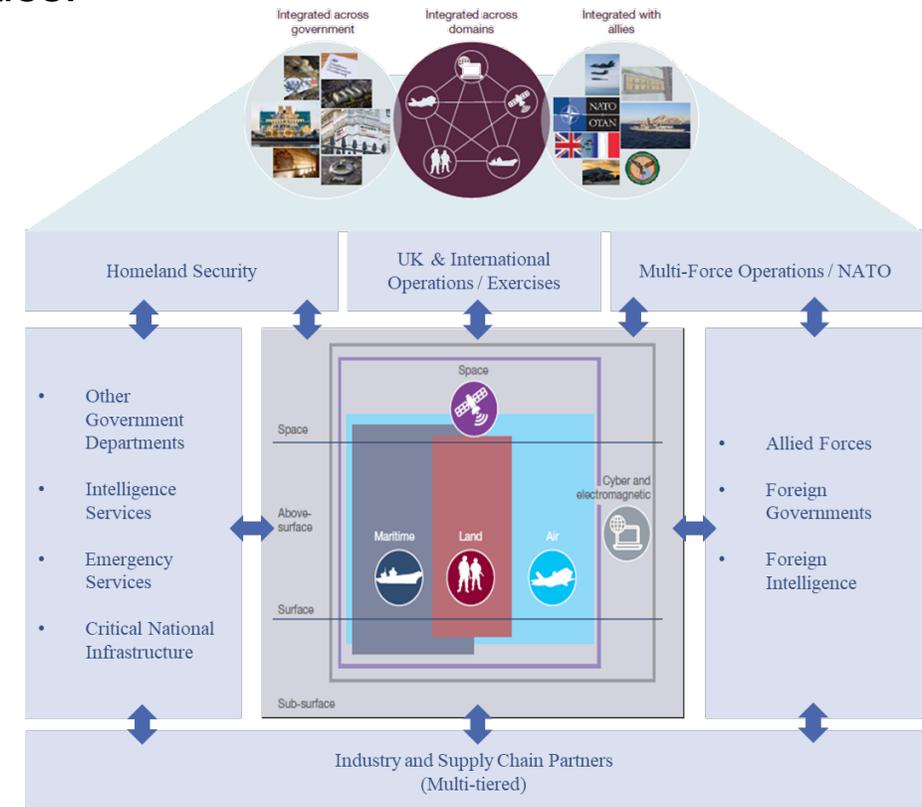
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PROBLEM

- ⚠ Multi-domain operations is complex and requires bringing together disparate entities to deliver capability and effect at scale. It cannot be described by a single set of use cases and requires interoperability across disparate organisations and entities.

Tenets

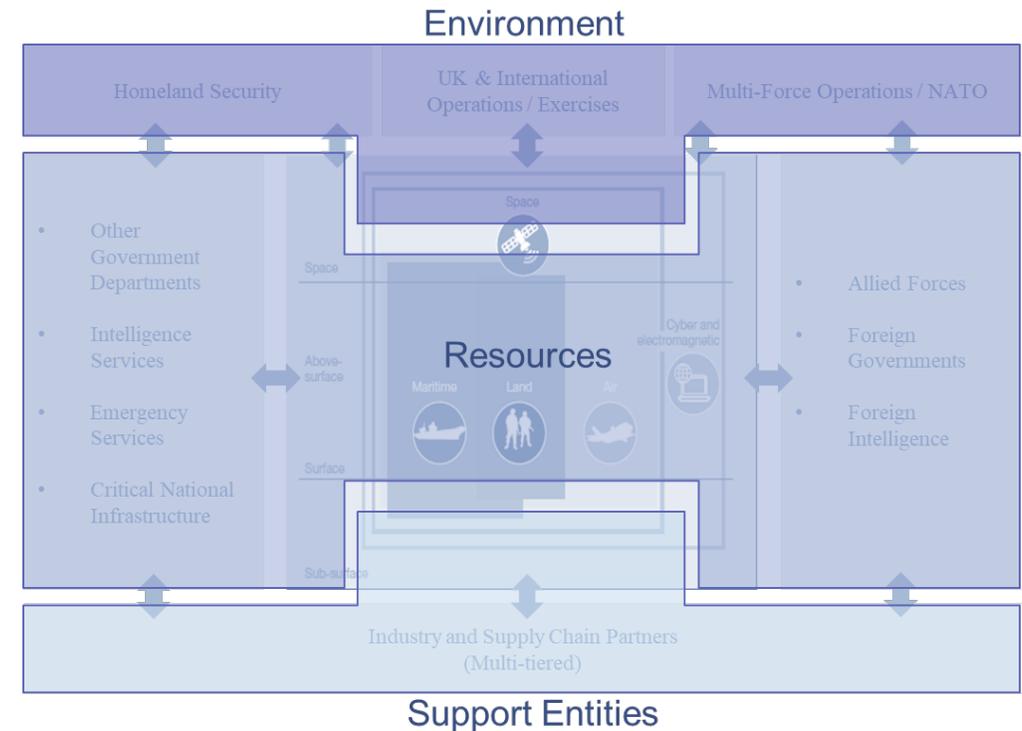
1. Information advantage. Enabling and effecting orchestration through comprehensive and persistent sensing and understanding of environments and audiences, which must be common across government and with allies;
2. Strategically postured. The global, domain-centric arrangement of capabilities;
3. Configured for environments. Readiness for multi-domain activity in operating areas and environments (including human, physical and information sub-environments) to influence the behaviour of selected audiences;
4. Creating and exploiting synergy. Generating, timing, and exploiting windows of opportunity for relative advantage by creating synergy of interactions and across domains;



VISION, MISSION AND OBJECTIVES

 Digital Twins can be used to simplify complexity and provide a scalable systems of systems approach to Multi Domain Operations

- Digital Twins are a key enabler for sensing, modelling, orchestration and simulation of complex physical and cyber systems.
- Federation and integration of Digital Twins can support virtual, physical and cognitive Multi-domain Operations.
- They can be used to model an environment, the resources and support entities that can deliver an effect in the environment.



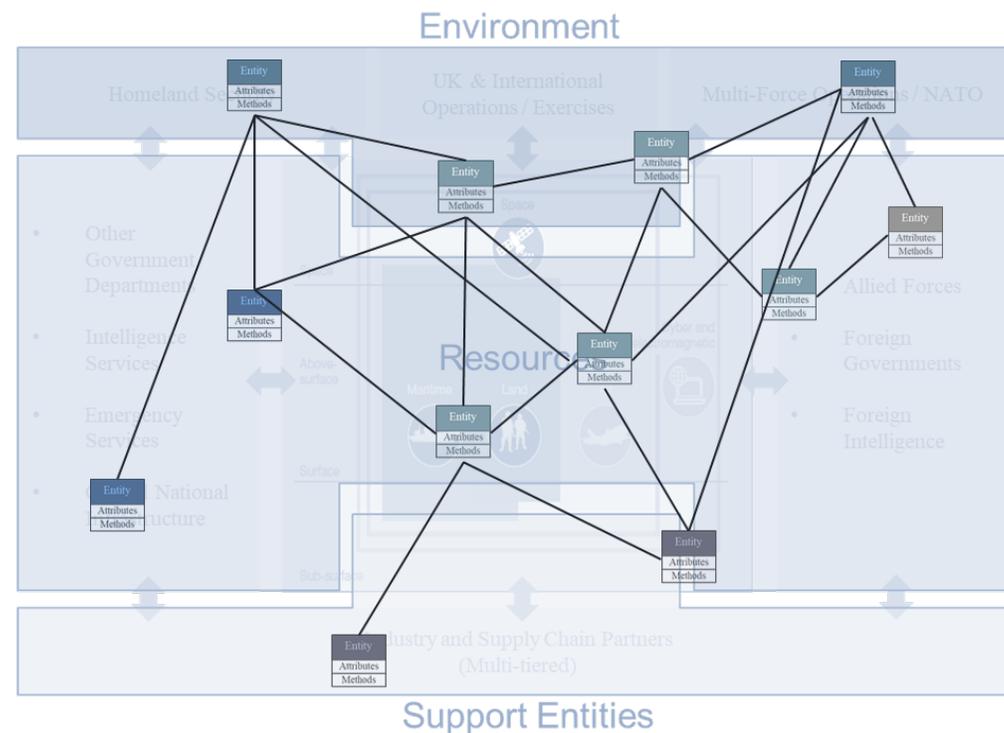
VISION, MISSION AND OBJECTIVES

-  To create an ecosystem of Digital Twins that can be developed and managed independently but which can be quickly integrated together in a federated way to meet the needs of Multi Domain Operations

- Understand the purpose and value of individual twins; how these twins can be combined to support Multi-Domain Operations and the considerations that need to be made to enable this.



- Define the framework to assess the Findability, Accessibility, Interoperability, and Reuse of digital assets as part of the eco-system.

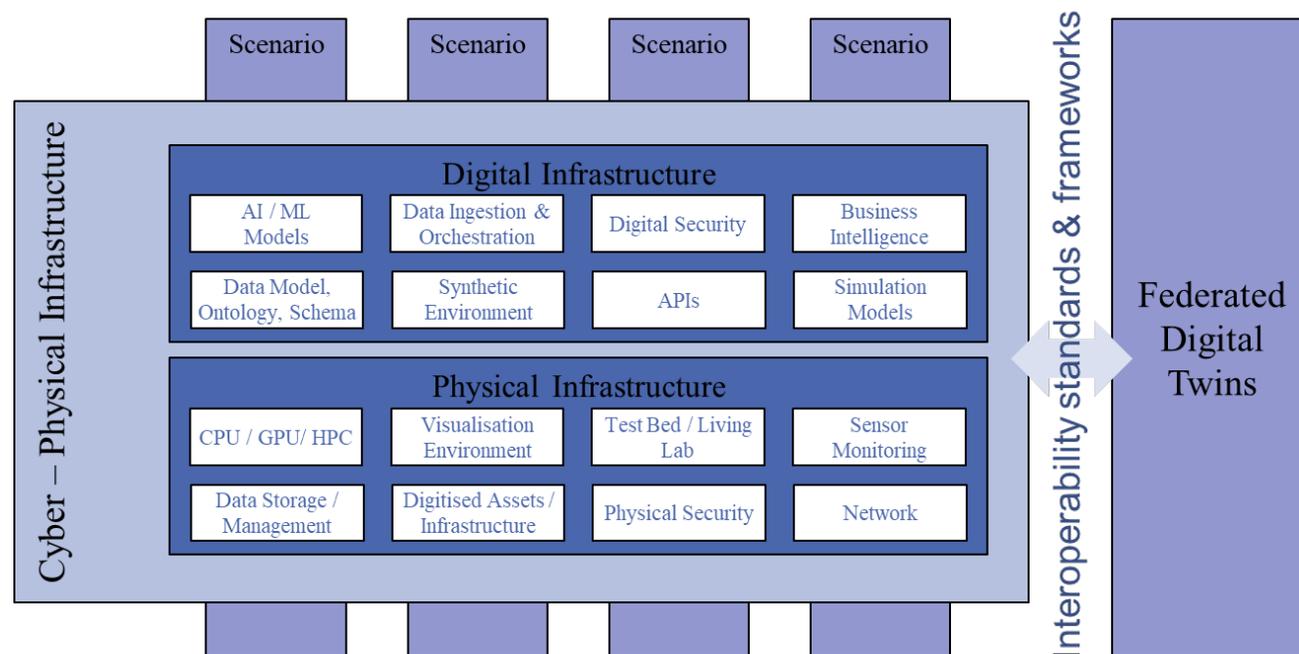


VISION, MISSION AND OBJECTIVES



Define the technical environment, requirements and dependencies of the required eco-system. To consider:

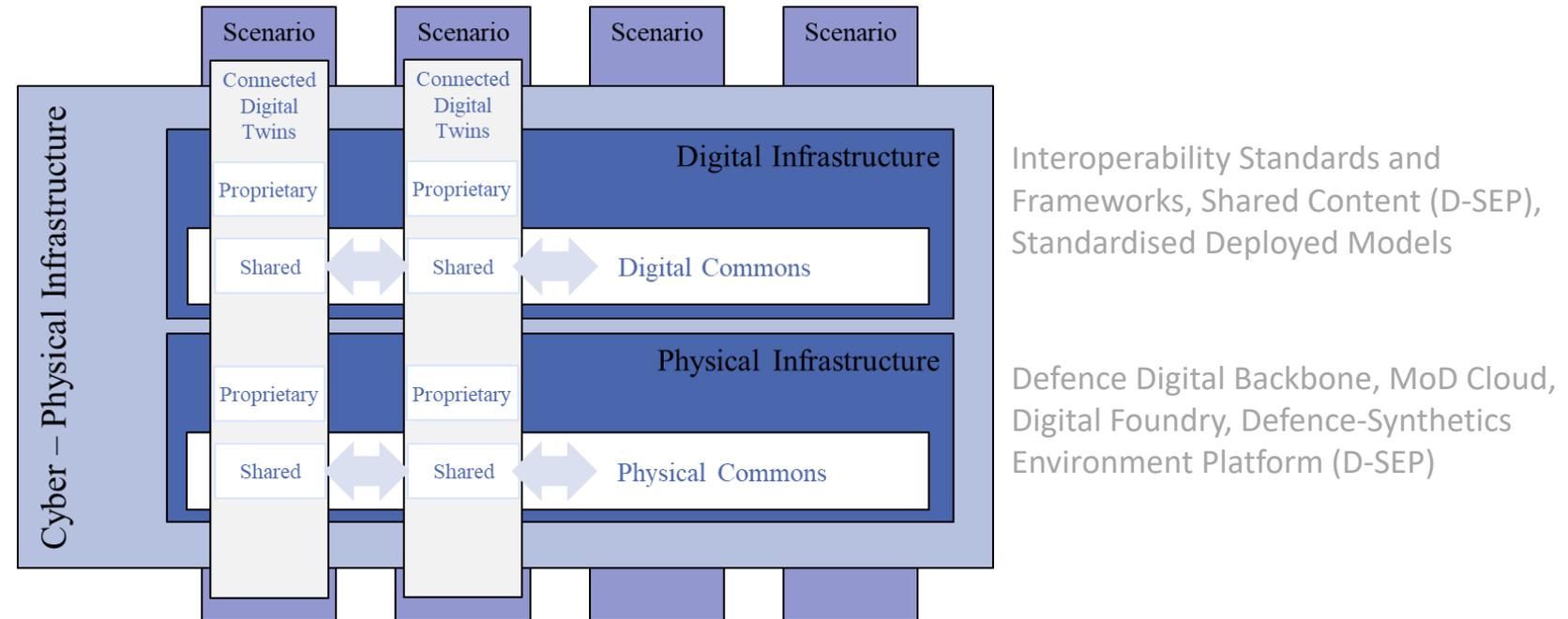
- The technical enablers and any dependencies for the creation, testing, hosting, management, integration and orchestration of Digital Twins at scale
- The management of data flows between interoperable digital twins; the connectivity and interaction with the physical entities and environment they represent.
- The broader Defence Enterprise, recognising digital twins will be developed by different parties, and how any capability can be made interoperable with broader government, allied partners and other organisations required for Multi Domain Operations.



VISION, MISSION AND OBJECTIVES

- Understanding multi-layered nature of Federated Digital Twins in Defence to support MDO, the common physical and digital enablers and how these can be leveraged

- A critical factor is the technical environment and the digital commons that can be leveraged within the defence domain for the creation of a Digital Twins eco-system that can scale to meet the requirements for MDI.



CONCLUSIONS AND RECOMMENDATIONS

- Digital Twins have the potential to simplify complexity and can scale to meet the requirements of Multi domain Operations
- Developing an eco-system of digital twins to meet the requirements of Multi Domain operations needs consideration to allow the re-use and integration of digital twins in a federated way; both within the Defence Enterprise and to provide interoperability to other 3rd party entities (e.g. Other Government Departments, Allied Partners, Emergency Services and Industry partners etc...)
- This will need exploration of the technical enablers within the defence domain, the digital commons to provide consistency and coherence, levels of maturity and how they can be leveraged
- Recommend a pilot to test the feasibility and understand how far digital twins can take us beyond existing capability to meet the needs of Multi-domain operations, the technical complexities and enablers that need to be in place to achieve this

NEXT STEPS

The proposed next phase of activity is to work with the authority to define a scenario and undertake a pilot for testing the use and application of Digital Twins for Multi-Domain Operations, this will collate and build on existing work to explore challenges specific to MDI and linkages to other work across government such as the Department for Business, Energy & Industrial Strategy (BEIS) and internationally

- The purpose will be to understand how the use of digital twins can take us beyond current capability to support the tenets of Multi-domain Operational objectives
- Understand completeness and effectiveness for any given use case and the value that can be derived from the use of digital twins – the types of digital twins required to model an environment; the resources and support entities that can be combined to deliver an effect and how quickly this can be achieved to provide speed of response or to meet mission objectives
- Define technical enablers, dependencies and required areas of focus and effort to achieve complexity and scale needed to support Multi domain Operations, with connectivity to real world entities for real / near real time feedback
- Test Digital Commons – Standards applicability, leveraging of digital capability, the modelling and architecture of the digital twins ecosystem and the definition of building blocks to achieve federation and interoperability