



BioDT

Cultural Ecosystem Services prototype Digital Twin vision and roadblocks

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A **digital twin** (DT) is typically composed of:

- 🔥 Data
- 🔥 A model that is the representation in terms of behaviour and
- 🔥 An application that connects the data and model in a way that makes the outputs of the model relevant, given the specific purpose of the DT

Since different scopes require different behaviour and fidelity, there cannot be a single twin answering all possible questions

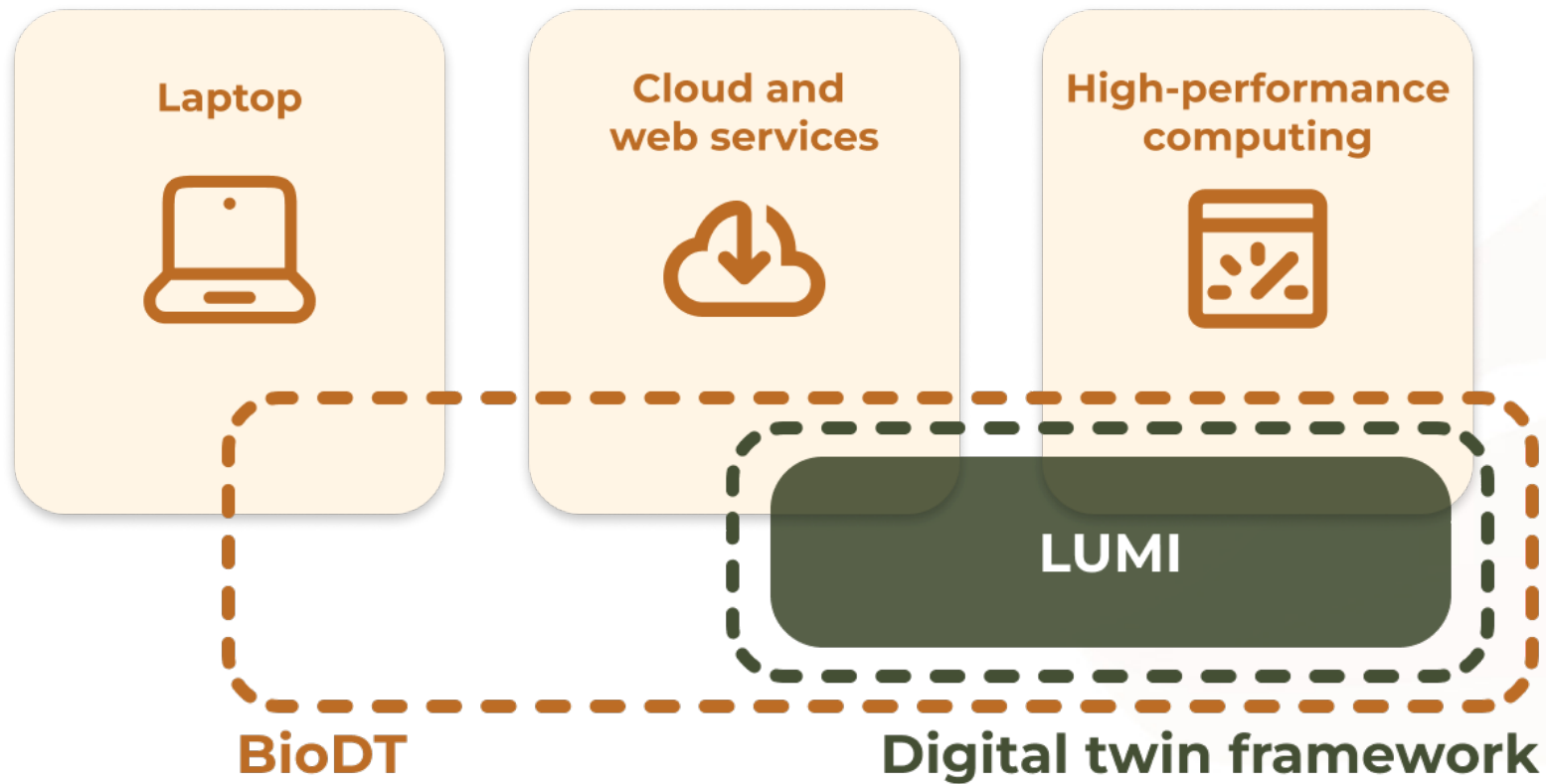
Industrial DTs typically facilitate:

- 🔥 Product design
- 🔥 Operation of machinery

In **BioDT**, DTs used to:

- 🔥 Mimic behaviour observed in nature
- 🔥 Meet requirements of BioDT Use Cases
- 🔥 Contribute toward EC goal of devising a [full DT of the Earth](#)

- 🔥 Digital twins require platforms for **computational simulation**
 - 🔥 Detailed and realistic simulations require large amounts of computing time



Digital Twin Advanced Technical Platform

- 🔥 HPC resources from the LUMI EuroHPC computing facility
- 🔥 Ensuring portability of digital twins across HPC sites and cloud environments
- 🔥 Maintaining service catalogue of shared services for integration with EOSC Core services

Cultural Ecosystem Services

-  “non-material benefits that people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experience”*

Motivation

-  support personalized access to recreationalists and tourists using the study area based on their preferences
-  support the planning and management of cultural ecosystem services by tracking changes in these services and how people use natural resources



*Millennium Ecosystem Assessment (2005) Ecosystems and human well-being: synthesis. Island Press, Washington, DC

Image by [Pexels](#) from [Pixabay](#)

Expected use of pDT

- Search for the areas which provides suitable cultural ecosystem services and recreational opportunities.
- Help plan itinerary based on interests and preferences.
- Enable responsible recreation by highlighting ecologically sensitive and conservations zones.



Image by [Stefan Schwehofer](#) from [Pixabay](#)

Expected use of pDT

- Study distribution of the cultural ecosystem services and how people use these resources in different areas.
- Identify high-value areas.
- Evidence-led decision-making based on the information about the usage, recreational value feedback and biodiversity observations.



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🔥 Current State

- 🔥 App prototype with fixed groups of recreational users
- 🔥 Computational workflow on LUMI

🔥 Challenges

- 🔥 Catering different user types
- 🔥 User interface design
- 🔥 Data sources
- 🔥 Personalisation
 - 🔥 Data storage and authentication
- 🔥 FAIR compliancy (Findable, Accessible, Interoperable, Reusable)



Image by [Mike Sweeney](#) from [Pixabay](#)

- 🔥 Jan Dick, UKCEH
- 🔥 Simon Rolph, UKCEH
- 🔥 Chris Andrews, UKCEH
- 🔥 Nick Oostervink, TNO
- 🔥 Christoph Wohner, EAA
- 🔥 Julian Lopez Gordillo, Naturalis
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