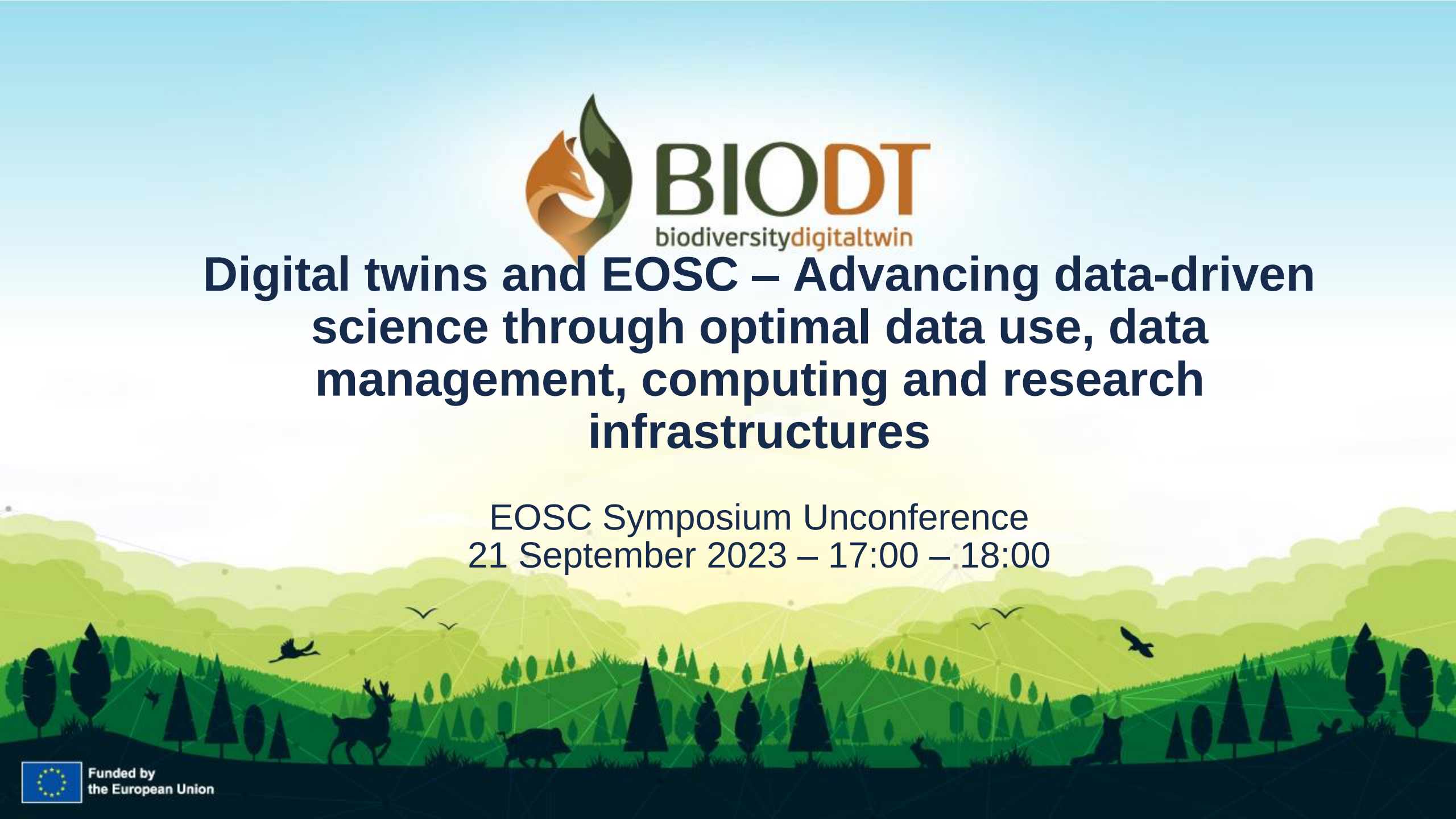

Digital twins and EOSC – Advancing data-driven science through optimal data use, data management, computing and research infrastructures

EOSC Symposium Unconference
21 September 2023 – 17:00 – 18:00

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Agenda

	Moderated by Rob Carrillo, Trust-IT Services
17:00 - 17:10	**Introduction and setting the scene - BioDT, digital twins and EOSC** Christos Arvanitidis, BioDT and LifeWatch
17:10 - 17:20	**Enabling connections to EOSC, the FAIRCORE4EOSC and BioDT collaboration** Tommi Suominen, FC4E and CSC - IT Center for Science
17:20 - 17:30	**InterTwin plan for integration with EOSC and synergies with other digital twins** Christian Briese, InterTwin and EODC, InterTwin and EODC
17:30 - 18:00	**Panel discussion** *How can various digital twin projects bring value to EOSC and benefit from integrations, common tools, building blocks and use cases*
	Christos Arvanitidis, BioDT and LifeWatch Ignacio Blanquer - UPV and EOSC A Christian Briese, InterTwin and EODC Tommi Suominen, FC4E and CSC - IT Center for Science

The Biodiversity Digital Twin Ambition

- The **Biodiversity Digital Twin prototype** provides **advanced models for simulation and prediction capabilities**, through **practical use cases** addressing critical issues related to **global biodiversity dynamics**.

- BioDT exploits the **LUMI Supercomputer** and employs **FAIR data combined with digital infrastructure**, **predictive modelling and AI** solutions, facilitating evidence-based solutions for **biodiversity protection and restoration**.

- The project responds to **key EU and international policy initiatives**, including the **EU Biodiversity Strategy 2030**, **EU Green Deal**, **UN Sustainable Development Goals, Destination Earth**.

Use Cases split into four groups

Species response to environmental change

- Biodiversity dynamics
- Ecosystem services

Genetically detected biodiversity

- Crop wild relatives and genetic resources for food security
- DNA detected biodiversity, poorly known habitats

Dynamics and threats from and for species of policy concern

- Invasive species

Species interactions with each other and with humans

- Disease outbreaks
- Pollinators

Data from four RIs

GBIF, eLTER, LifeWatch ERIC and DISSCo

GBIF

The Global Biodiversity Information Facility (GBIF) is an international network and data infrastructure providing open access to biodiversity data.

LifeWatch ERIC

LifeWatch ERIC is the e-Science European infrastructure for biodiversity & ecosystem research.

eLTER

The Integrated European Long-Term Ecosystem (eLTER) focuses on critical zone and socio-ecological research.

Helmholtz Center for Environmental Research (UFZ), UK Centre of Ecology & Hydrology (UKCEH), Environment Agency Austria (EAA) and University of Helsinki (UH)

DiSSCo

The Distributed System of Scientific Collections (DiSSCo) is a Research Infrastructure (RI) for Natural Science Collections.

Naturalis Biodiversity Center (Naturalis) and Senckenberg Society for Nature Research (SGN)

Objectives

- Build and deploy a pre-operational Digital Twin for addressing biodiversity dynamics
- Support the interoperability of data and services through the integration of the BioDT with research infrastructure platforms and workflows
- Ensure interoperability of the BioDT with Destination Earth, and the European Data Infrastructure

BioDT's Approach to Digital Twins

- A digital twin is a virtual representation of real-world entities and processes, synchronized at a specified frequency and fidelity.
- A digital twin is typically composed of:
  - Data that is updated at specified intervals
  - Models and data analysis pipelines
  - 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

BioDT – Collaboration and Integration with Strategic Initiatives

- BioDT focused effort to ensure the **effective connection and alignment** between BioDT and other related initiatives and programmes – European data and advanced computing ecosystems such as EOSC and Destination Earth
- Looking into technical and other alignment
- Different integration scenarios are aiming at making
  - BioDT developments available in other European platforms and infrastructures to increase the uptake and use in research workflows - **the case of EOSC**
  - A valuable contribution to strategic efforts and and the biodiversity component and biosphere system – the case of Destination Earth

Why EOSC?

- Digital twins can strongly benefit from an integration in e-infrastructures like EOSC.

- BioDT aims to align its architecture with the EOSC developments and aims for integration and onboarding of services in the EOSC platform.

Model building and updates for digital twins strongly depend on **data ingress**. EOSC can help facilitate the integration of the BioDT infrastructure and the various digital twins in an infrastructure that facilitates access to various data sources.

BioDT involves several research infrastructures, which provide rich data, EOSC is a springboard for more **research infrastructures establishing themselves as data providers for various thematic data spaces**. This is also relevant for other initiatives like Destination Earth.

Why EOSC?

- EOSC platform makes services provided by BioDT and other digital twins more easily discoverable and thanks to a common AAI infrastructure accessible.

Generic computing and data services available through EOSC will provide researchers with the means of tapping into data provided by BioDT's digital twins to do their own data processing and analysis.

- It is also key forum to explore use cases and science projects that showcase the value add.

For platforms like BioDT as well as connected research infrastructures, EOSC can provide a framework that is important for making these efforts sustainable in the long term.

Objectives and questions for the session

- Map ongoing alignment and integration work between digital twin projects and EOSC
- Learn about common tools, building blocks and use case
- On the EOSC side – Is there a vision for future engagement with Digital Twin projects? And more specifically are the plans and a roadmap of EOSC supporting data integration, and and provision of resources that would be critical for digital twin efforts?


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