Implementation Status and Extension Opportunities

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Background

The Biodiversity Digital Twin (BioDT) project brings together experts in high-performance computing and ecology to develop prototype digital twins (pDT) that push the limits of predictive biodiversity modeling.

Objectives

1. Build and deploy a BioDT technical platform for pDT operation and access, using the LUMI supercomputer
2. Support interoperability of data and services through integration with biodiversity research infrastructures
3. Ensure interoperability of BioDT with Destination Earth (DestinE) and the European Data Infrastructure

The digital twins developed in BioDT are designed to serve a broad range of end-users (Fig. 1), following FAIR principles.

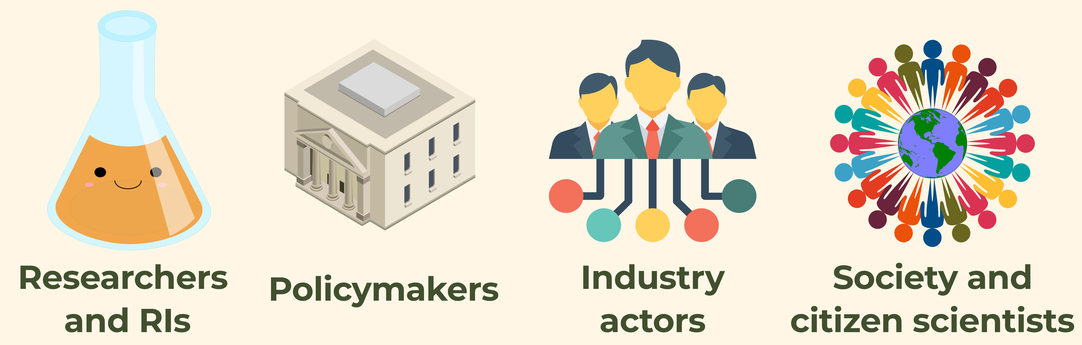

Fig. 1. BioDT end-user groups.

Implementation status

- The platform architecture has been designed (Fig. 2), with technical implementation in progress.
- The first pDT has been made available to biodiversity research infrastructures. The pDT focuses on interactive maps of honey bee viability in Germany, produced using the simulation model BEEHAVE (Fig. 3).
- A total of 10 pDT designs are in process of being implemented, covering topics including:
  - Biodiversity dynamics and ecosystem services
  - Invasive alien species
  - Crop wild relatives and genetic resources for food security
  - DNA-detected biodiversity in cryptic environments
  - Pollinator survival and disease outbreaks

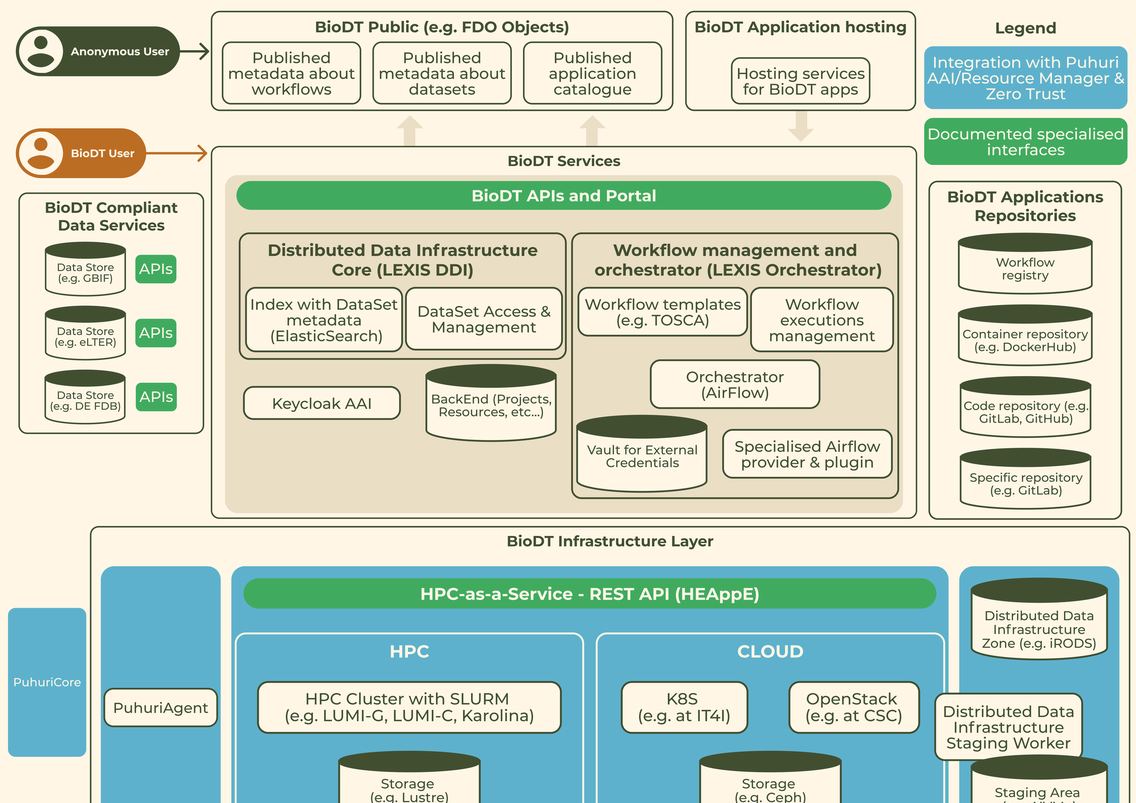

Fig. 2. BioDT technical platform architecture.

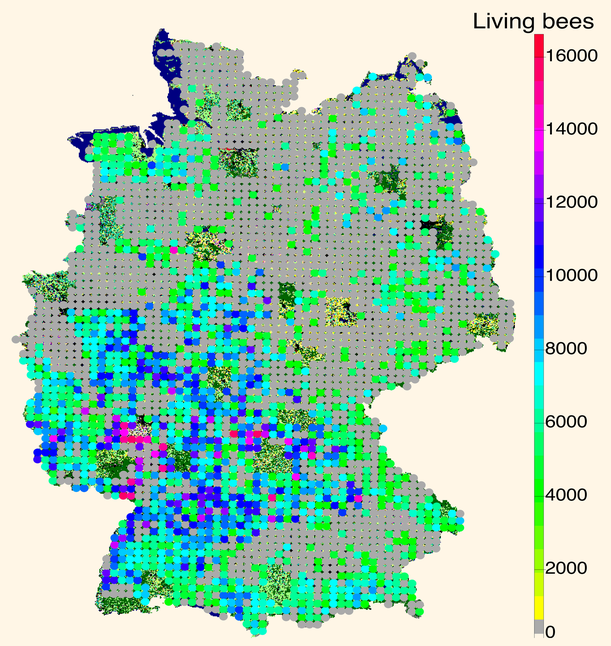

Fig. 3. BEEHAVE test output for Germany.

Interoperability with DestinE

Extension opportunities explored in the project include:

- Federated sharing of biodiversity data using the DestinE Data Lake (e.g. via GBIF and individual pDTs)
- Use of high-resolution DestinE climate simulation data within BioDT (pDTs focusing on the consequences of climate change to agricultural crops over Europe, and forestry impacts on bird diversity)
- Sharing knowledge and exchanging working practices with other Horizon Europe funded DT projects, such as FAIRCORE4EOSC, interTwin, DT-GEO and DTO-BioFlow

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