Building and Connecting Digital Twins of the Ocean

Hands-on training and launch of a free self-paced DTO course

DITTO Summit 2026 – Pre-Summit Training
Yokohama, Japan | 9 November 2026, 14:00–17:30 and 10 November 2026, 09:00–12:00
Proposed format: Two connected half-day hands-on training sessions

Who is it for: The training is designed for scientists, DTO developers, data and infrastructure specialists, application developers, marine managers, project coordinators and other professionals involved in building or using Digital Twins of the Ocean. It is suitable both for participants already working on DTO initiatives and for those seeking a structured introduction to how user needs, observations, models, interoperability, analytics and user services come together in a Digital Twin. No advanced programming skills are required.

Trainers: Bente Lilja Bye, BLB; Marco Oliveira, INESC TEC; Sigmund Kluckner, IEEE; Robert Atkinson, OGC; Arne-Jørgen Berre, SINTEF; and others.

Short description

How do we move from an ocean challenge, observations and models to a useful Digital Twin of the Ocean, and how can that twin connect to a wider ecosystem of regional, national and global digital twins?

This hands-on training takes participants through the main steps involved in developing and connecting a Digital Twin of the Ocean. The programme is organised as two complementary half-day sessions. On the afternoon of 9 November, participants will focus on **building the twin**: defining the user challenge, identifying relevant observations and data, linking these to models and analytics, and designing user-oriented outputs and services.

On the morning of 10 November, the focus shifts to **connecting the twin**. Participants will explore interoperability, metadata, APIs, semantics, standards, provenance and reusable components, and will examine what is needed for Digital Twins of the Ocean to connect across different platforms, applications and geographical regions. Through practical group exercises, participants will test how well elements of one twin can be discovered, understood and reused by another.

Together, the two sessions follow a practical pathway: **ocean challenge, observations, models and analytics, user services, interoperability, reusable building blocks, federated Digital Twin ecosystem**.

BLB IEEE SINTEF Open Geospatial Consortium INESCTEC JAMSTEC

The training combines short introductory presentations with practical exercises and group work. Participants will progressively develop a Digital Twin concept using a structured Digital Twin Canvas and will leave the training with an end-to-end DTO workflow, an assessment of interoperability and reuse requirements, and an initial roadmap for applying the approach in their own work.

The workshop builds on practical experience and training material developed through European Digital Twin of the Ocean activities, including the course **“Build Your Own Local Digital Twin of the Ocean”** The DITTO training will mark the launch of this course as a free, online, self-paced learning resource.

The underlying course addresses the full pathway from problem definition and stakeholder engagement through observations, data management and interoperability to architecture, modelling, analytics, applications and user services. The DITTO training translates this material into a compact, collaborative format with particular emphasis on interoperability, portability and the transition from individual digital twins towards a connected and federated Digital Twin of the Ocean ecosystem.

9 November — BUILD YOUR DIGITAL TWIN

Time	Session	Activity / output
14:00–14:20	**Welcome and orientation**	Introduction to the training, Digital Twins of the Ocean and the common training case. Participants form small groups and receive the **Digital Twin Canvas**.
14:20–14:55	**Lab 1 — Start with the challenge**	Define the user, decision context and the key **"What if?" question**. Identify what the twin should help the user understand or decide. **Output:** Challenge & User section of the Canvas.
14:55–15:35	**Lab 2 — Observe the ocean**	Identify the observations needed: satellite EO, in-situ, models, citizen science and other sources. Consider data availability, resolution, timeliness and quality. **Output:** Observation & Data Map.
15:35–15:50	**Break**	
15:50–16:30	**Lab 3 — Build the Digital Twin workflow**	Connect observations, models, analytics/AI, scenarios and outputs. Participants sketch the end-to-end information flow of their twin. **Output:** DTO workflow.
16:30–17:05	**Lab 4 — From simulation to user value**	Define indicators, alerts, maps, forecasts, dashboards or decision-support information. Discuss uncertainty, provenance and update frequency. **Output:** User-facing DTO service/product.
17:05–17:25	**Preparing to connect**	Short introduction to interoperability, reusable components and federation. Teams identify one element of their twin that another twin should be able to discover and reuse.
17:25–17:30	**Day 1 wrap-up**	Explain the connection exercise for the following morning.

10 November — CONNECT YOUR DIGITAL TWIN

Time	Session	Activity / output
09:00–09:15	**Reconnect and recap**	Quick review of the twins developed on Day 1 and introduction to the morning challenge: **Can another team understand and reuse your twin?**
09:15–09:55	**Lab 5 — Make the pieces understand each other**	Practical interoperability exercise covering metadata, APIs, semantics, identifiers, provenance and standards. Where do OGC standards, Ocean Information Models and FAIR principles enter? **Output:** Interoperability requirements.
09:55–10:35	**Lab 6 — Connect the Twins Challenge**	Teams exchange their twin designs. Another group tries to discover, understand and reuse a data source, model, workflow or service. **Output:** Connection Gap Analysis.
10:35–10:45	**Break**	
10:45–11:15	**Lab 7 — What must be common?**	Teams identify what needs harmonisation across twins and what can remain local. Discuss APIs, semantics, metadata, workflows, Application Packages, containers and reusable building blocks. **Output:** Common–Local–Reusable Matrix.
11:15–11:40	**Lab 8 — Take your Twin Home**	Map the proposed twin onto existing resources and platforms such as EDITO, Destination Earth, Copernicus Marine, EMODnet, OGC resources and other DTO components. **Output:** short implementation roadmap.
11:40–11:55	**Twin pitches**	Very short team presentations: **Challenge → Data → Twin → User Value → Connection**.
11:55–12:00	**Closing and next steps**	Introduce the self-paced training resources and point participants towards the afternoon **Connecting the DOTs** workshop.