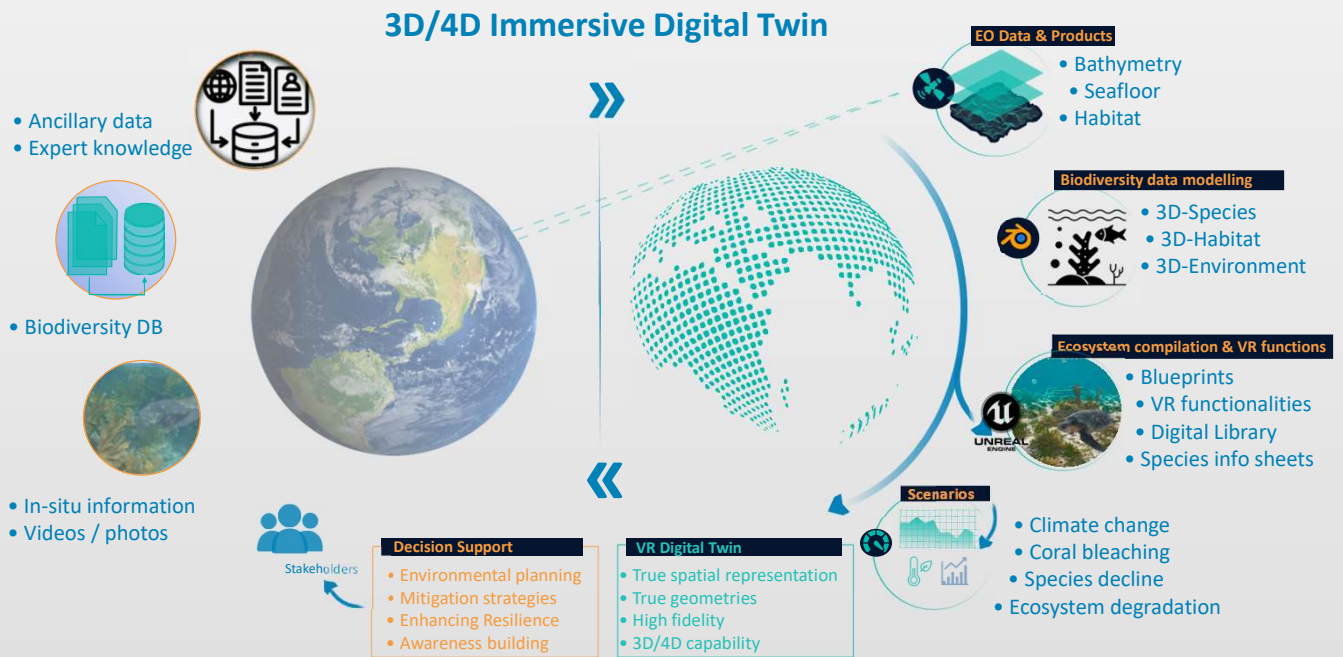# Immersive Virtual Reality Digital Twins (IDT) of natural ecosystems based on true geometries and biodiversity information

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Ghengis de la Borbolla, Veronica Aguilar Sierra, Oscar Paz, Daniel Quezada Daniel, Raúl Jiménez Rosenberg. National Comission for the Knowledge and Use of Biodiversity (**CONABIO**). Mexico

Immersive digital twins are promising technologies that enable the connection of Virtual Reality (VR) with real geometries. We have applied this innovative method for visualizing the biodiversity of a tropical coral reef in Mexico. By integrating precise 3D models - based on real geodata - into VR environments, we enable users to explore coral reefs with unprecedented detail accuracy.

3D/4D Immersive Digital Twin

- Ancillary data
- Expert knowledge
- Biodiversity DB
- In-situ information
- Videos / photos

Stakeholders

EO Data & Products
- Bathymetry
- Seafloor
- Habitat

Biodiversity data modelling
- 3D-Species
- 3D-Habitat
- 3D-Environment

Ecosystem compilation & VR functions
- Blueprints
- VR functionalities
- Digital Library
- Species info sheets

Scenarios
- Climate change
- Coral bleaching
- Species decline
- Ecosystem degradation

Decision Support
- Environmental planning
- Mitigation strategies
- Enhancing Resilience
- Awareness building

VR Digital Twin
- True spatial representation
- True geometries
- High fidelity
- 3D/4D capability

In our example, the focus is on a realistic visualisation of the content components of a high-resolution digital twin. The data used includes satellite-based information on bathymetry and benthic habitats, as well as local biodiversity data. This approach allows for an accurate reproduction of the reef geometry and surrounding habitats.

Multi-source & true geometries Immersive VR visualisation

Satellite-derived base information

- Seafloor
- Land cover
- Bathymetry (SDB)

Species & Reef modelling

Our Immersive Digital Twin of a tropical coral reef demonstrates the potential of this technology for exploring and protecting endangered ecosystems. VR visualisation not only provides a realistic, immersive experience, but also facilitates monitoring of the fragile ecosystem by integrating multiple data sources. This makes complex scientific findings accessible and attractive to a wide audience, opening up new possibilities for scientific research and environmental awareness building.

Folie 1

RR0 @Helena: Can we clean the lower
artefacts (white) of the lens image?
Rainer Ressl; 2024-09-30T11:10:58.405