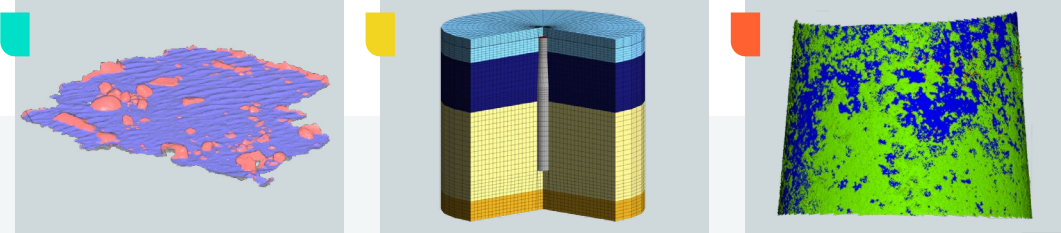


# 3D Digital Twins

A 3D digital twin is a dynamic virtual model of real-world subsea conditions, built from image-based data, that enables ongoing visualization, analysis, and decision-making without repeated site visits — saving time, reducing costs, and improving environmental insight.

3D digital twins include meshes and point clouds reconstructed from data captured in the marine environment, e.g., multibeam echosounder (MBES), or simulated using project specific specifications.



## Why do you need 3D Digital Twins?

- Early Siting Decisions:** 3D data helps identify and characterize key seabed features — like boulders, sand waves, and megaripples — early in project planning. By combining image-based or acoustic data with machine learning, we streamline site selection and de-risk project siting.
- Design, Permitting and Pre-Construction:** We generate project-specific 3D meshes to simulate marine conditions, such as sound propagation during installation. These models integrate environmental data, design specs, and material choices to support permitting and construction strategy.
- Operations & Maintenance:** During operations, 3D point clouds can track asset integrity and environmental criteria over time, such as marine growth, distinguishing soft and hard fouling and quantifying extent and thickness. Our machine learning tools accelerate analysis and support cost-effective maintenance planning.

Our data visualization toolbox also includes our custom mapping tool (INSPIRE Popup) and we can prepare a curated visual report (ArcGIS StoryMap) to facilitate internal discussions or stakeholder engagement.

	MBES	Simulated Mesh	Photogrammetry	Feature Detection w/ Machine Learning	Sound Field Analysis	INSPIRE Popup Map	StoryMap	Efficiency	Added Value
Seabed Features	●	●	●	●	●	●	●	●	●
Sound Propagation	●	●	●	●	●	●	●	●	●
Marine Growth	●	●	●	●	●	●	●	●	●

