



# Digital Twins Aid Earth Stewardship

Digital twin technology is the latest tool helping environmental scientists to understand and attend to ocean floors and forests.

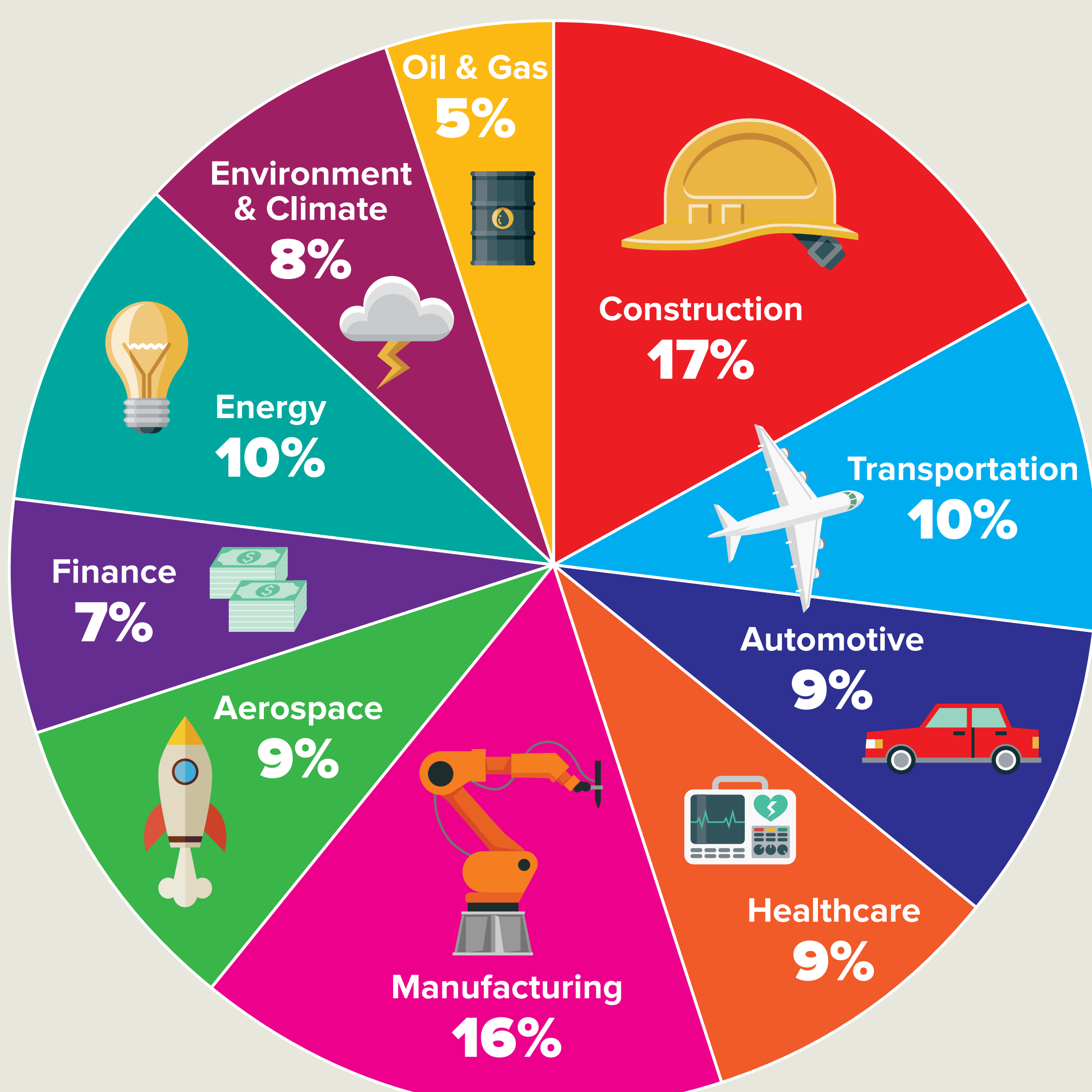
BY CATHY CECERE

**D**igital twins use core technologies to create virtual replicas of some of the most complicated systems on Earth. Found in manufacturing, healthcare, and the energy sector, digital twins combine the Internet of Things (IoT), artificial intelligence (AI), and cloud computing with the analysis of historical data and real-time feedback from sensors and cameras. These interactive models present a digital representation that allows researchers to understand a complex issue and predict what may happen when a situation changes.

One area that currently represents about 8 percent of the digital twin market are the projects that examine how infrastructure will cause environmental changes, how industry can implement changes for better climate outcomes, and more. Such projects also have the ability to inform government agencies that have the ability to enforce regulations and make suggested changes to lawmakers.

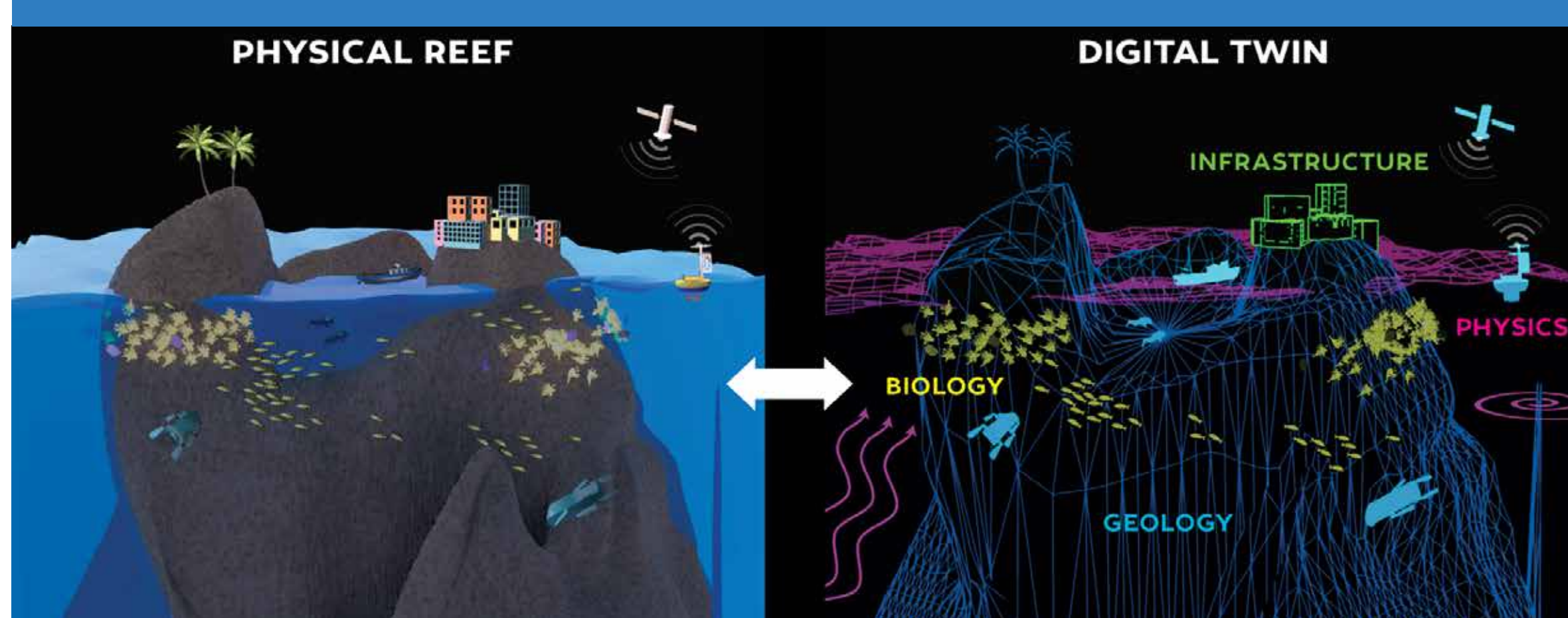
Beyond large environmental projects, there are small ventures that employ digital twins to monitor the health of everything from ocean reefs to stretches of agroforests. One example is the work being done by Woods Hole Oceanographic Institution (WHOI), which was awarded \$5 million from the National Science Foundation. Its task is to build the world's first 4D virtual replica of a living coral reef that allows users to access information about water flow, temperatures, and reef inhabitants.

## DIGITAL TWINS TECHNOLOGY, PERCENTAGE SHARE BY INDUSTRY



Source: StartUs Insights

## DATA FROM SENSORS AND SATELLITES KEEPS A VIRTUAL REPRESENTATION OF A REAL REEF UPDATED



The Coral Reef Digital Twin is a virtual representation of a real reef, with all its features, consistently updated with new data from sensors and satellites. The digital twin allows users access to the dynamic, 3D system from a laptop or cell phone anywhere in the world to get real-time information needed for sustainable harvesting of reef resources.

Image: Cohen Lab © Woods Hole Oceanographic Institution

## PRECISION TECHNOLOGY ACCELERATE THE TRANSITION TO REGENERATIVE AGROFORESTRY



This image from the RegenWorks Analytics Software with a truffle yield heat-map (red-orange) of a truffiere layered on top of the digital tree-twin (light blue circles). The precision agroforestry technology combines sub-area based data layers (such as this yield heat-map) with digital representation of trees/shrubs which opens up for unprecedented possibilities to analyze and optimize agroforestry and tree-crop based production systems. In this case, the heat-maps represent truffle yield maps, but it can also work with a wide variety of other data sources such as yields across arable crops, soil maps, pastures quality maps, and more.

Source: Regen Farmer