

DIGITAL TWINS: IDENTICAL, BUT DIFFERENT

BUILDING VIRTUAL AVATARS TO IMPROVE COMPLEX PHYSICAL PRODUCTS

AUTHORS

Jérôme Bouchard, Partner





DIGITAL TWINS:

IDENTICAL, BUT DIFFERENT

BUILDING VIRTUAL AVATARS TO IMPROVE COMPLEX PHYSICAL PRODUCTS

In the music and entertainment space, consumers are used to physical products that are digitized. It is more difficult to grasp the idea of digitized industrial products, such as a train, jet engine or even a power plant. But with the ability to collect real-time data on almost anything, thanks to Industry 4.0 in Europe and the Industrial Internet of Things in the US, the notion of a “digital twin” for complex physical products is an emerging reality.

The digital-twin concept is built on three pillars:¹

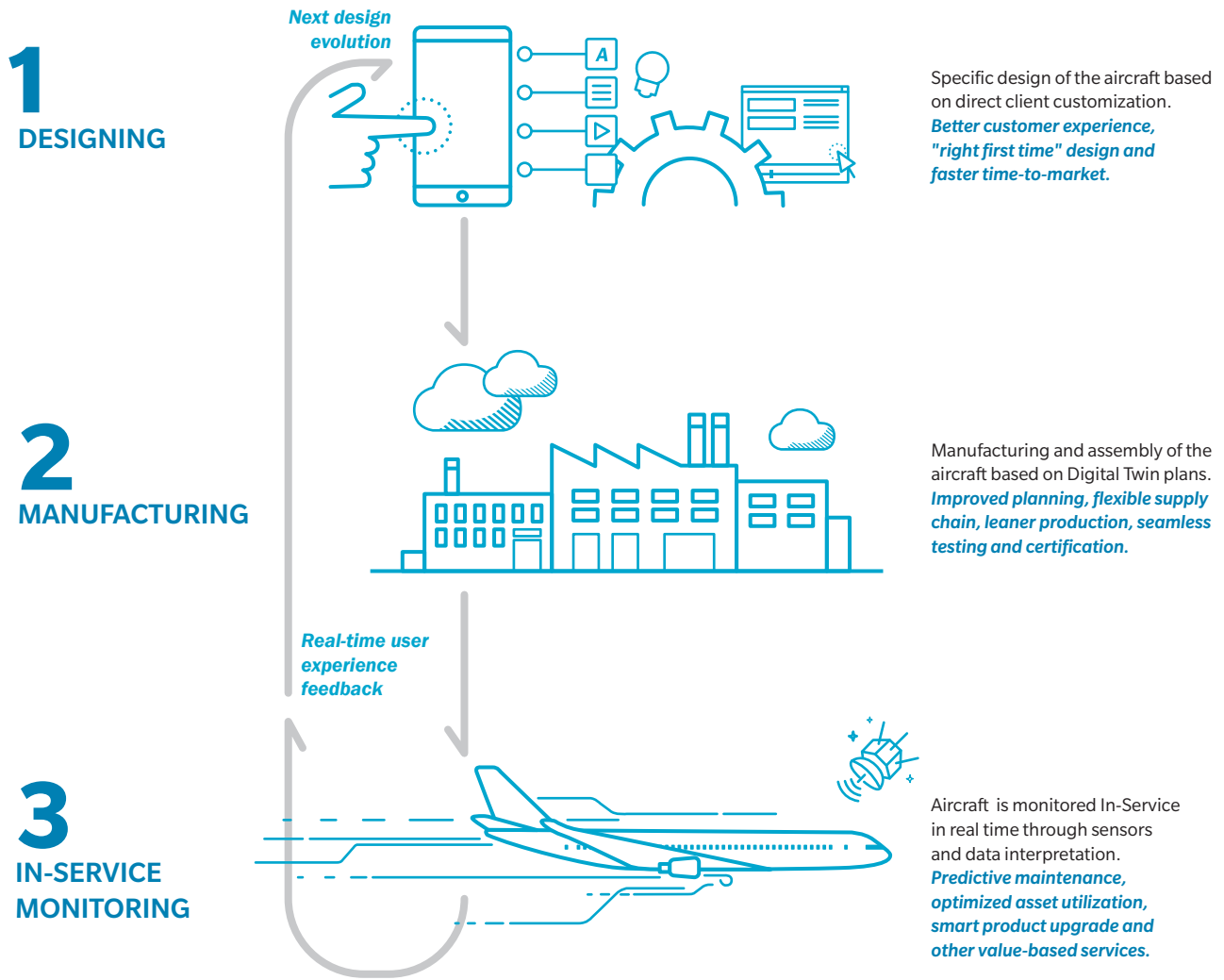
- A physical product in real space.
- A virtual product in virtual space.
- The connection of data and information that ties the virtual and real products together.

The main benefit of the digital twin is to provide an integrated outlook of any project, to any user, at any point of the product lifetime. This “single source of truth” allows organizations to foster collaboration across various teams and departments, and even outside the organization.

The digital – twin model has the potential to radically change the design, manufacturing, sales, and maintenance of complex products in multiple industries. Thanks to leaner development cycles and increased collaboration, both internally and with external partners and suppliers, companies have been able to cut development time on complex products by 25 percent, with cost savings of 10–15 percent. With real-time mirroring, engineers can simulate the behavior of complex systems to predict and prevent mechanical breakdowns.

¹ Digital Twin: Manufacturing Excellence through Virtual Factory Replication, Dr. M. Grieves, 2014.

Exhibit 1: The Digital Twin of a physical object is a digitalized version of the object itself



SINGLE SOFTWARE SUITE WITH APPLICATIONS TAILORED TO EACH PURPOSE

UNIQUE CLEAN DATA LAYER: SINGLE SOURCE OF TRUTH

DIGITAL TWINS

Enable smart cost reduction thanks to process right-sizing and increased organizational agility

Open the door to alternative business models and are a source for revenue/profit growth

“The ultimate vision for the digital twin is to create, test and build our equipment in a virtual environment”

“Only when we get it to where it performs to our requirements do we physically manufacture it. We then want that physical build to tie back to its digital twin through sensors so that the digital twin contains all the information that we could have by inspecting the physical build.”

John Vickers, manager of NASA’s National Center for Advanced Manufacturing.

“The ultimate vision for the digital twin is to create, test and build our equipment in a virtual environment,” said John Vickers, manager of NASA’s National Center for Advanced Manufacturing. “Only when we get it to where it performs to our requirements do we physically manufacture it. We then want that physical build to tie back to its digital twin through sensors so that the digital twin contains all the information that we could have by inspecting the physical build.”²

In the digital-twin model, embedded sensors on industrial assets, such as a jet engine or wind turbine, collect real-time operating data and feed it into virtual avatars that behave as if they were in the physical world. In 2013, for example, the US Air Force launched the Airframe Digital Twin Spiral 1 program, with the objective of improving individual aircraft tracking.³ The data in the digital twin of an aircraft includes the specific geometry of parts, aerodynamic models, engineering changes, material properties, inspection, and operation and maintenance data.

The concept of a digital twin is not limited to a single product, but can be extended to a set of several industrial assets, such as an entire power plant, as GE Power & Water has shown. The aerospace, ship-building and construction industries are most advanced in the development of digital twins. Nonetheless, few companies have implemented digital twins.

As with any other aspect of technology transformation, unlocking efficiency gains from digital twins requires certain capabilities in terms of technology, data & analytics, organization and innovation. Many companies have the building blocks in place, as they are already transforming data collection and analytics, organizations, and IT infrastructure to increase agility. For companies that have individual digital projects, often developed in silos, the idea of creating a digital twin is a great organizing principle and framework. A digital twin can be both a flagship for and driver of other digital initiatives.

² The digital twin, Could this be the 21st-century approach to productivity enhancements?, The Economist, Sept 2015.

³ US Federal Business Opportunities (fbo.gov), 2013.

Oliver Wyman is a global leader in management consulting that combines deep industry knowledge with specialized expertise in strategy, operations, risk management, and organization transformation.

For more information please contact the marketing department by email at info-FS@oliverwyman.com or by phone at one of the following locations:

AMERICAS

+1 212 541 8100

EMEA

+44 20 7333 8333

ASIA PACIFIC

+65 65 10 9700

www.oliverwyman.com

Copyright © 2016 Oliver Wyman

All rights reserved. This report may not be reproduced or redistributed, in whole or in part, without the written permission of Oliver Wyman and Oliver Wyman accepts no liability whatsoever for the actions of third parties in this respect.

The information and opinions in this report were prepared by Oliver Wyman. This report is not investment advice and should not be relied on for such advice or as a substitute for consultation with professional accountants, tax, legal or financial advisors. Oliver Wyman has made every effort to use reliable, up-to-date and comprehensive information and analysis, but all information is provided without warranty of any kind, express or implied. Oliver Wyman disclaims any responsibility to update the information or conclusions in this report. Oliver Wyman accepts no liability for any loss arising from any action taken or refrained from as a result of information contained in this report or any reports or sources of information referred to herein, or for any consequential, special or similar damages even if advised of the possibility of such damages. The report is not an offer to buy or sell securities or a solicitation of an offer to buy or sell securities. This report may not be sold without the written consent of Oliver Wyman.