Under the patronage of **H.E. Dr. Abdullah Belhaif Al Nuaimi** - Minister of Infrastructure Development

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Under the Theme:
Enhancing Maintenance Through Big Data Management

OEM IIoT-based Maintenance with Digital Twins

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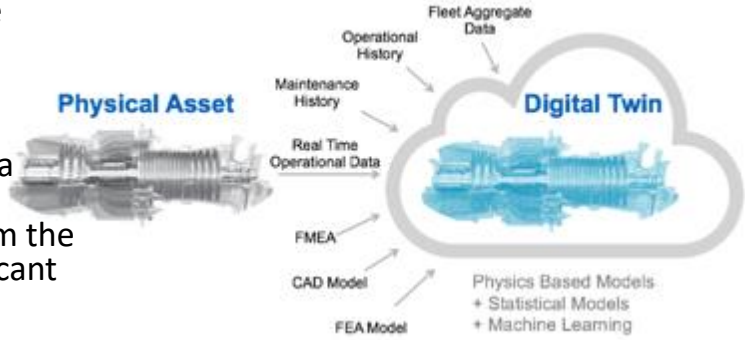
What is a Digital Twin

- A virtual replica of a physical object such as a device, equipment, or a tool
- Gartner has predicted that by 2021 "half of large industrial companies will use digital twins, resulting in those organizations gaining a 10 percent improvement in effectiveness
- The digital twin provides OEMs with a virtual software clone of the physical machine. This clone is generated from the actual blueprints and requires significant man-hour investments of machine designers and software engineers



Benefits

- Failure Predictivity through Machine Embedded Sensing
  - Downtime reduction
  - Maintenance cost reduction
- Improvement of Future Models through Feedback Loop
- Digital twins are much more than graphical models. Machine learning algorithms applied to production data detect correlations, enable extrapolation, and form predictions about the remaining useful life (RUL) of assets.

The Business Case

- According to ARC Research, the predictive maintenance category is growing at a compound rate of 39 percent and is expected to reach $11 billion in worldwide sales by 2022
- Hardware OEMs should use the disruptive change brought about by Industry 4.0 to reposition their products as services and benefit and reorient their business models
- Digital Twins is the immediate answer and a key pillar in The Future Factory both for failure predictability and the elimination of logistical hurdles associated with monitoring, control, and configuration enhancements

Digital twins are becoming a business imperative, covering the entire lifecycle of an asset...and forming the foundation for connected products and services. Companies that fail to respond will be left behind.

Source: Forbes 2018

Digital Twin Benefits Realization – Reported by GE

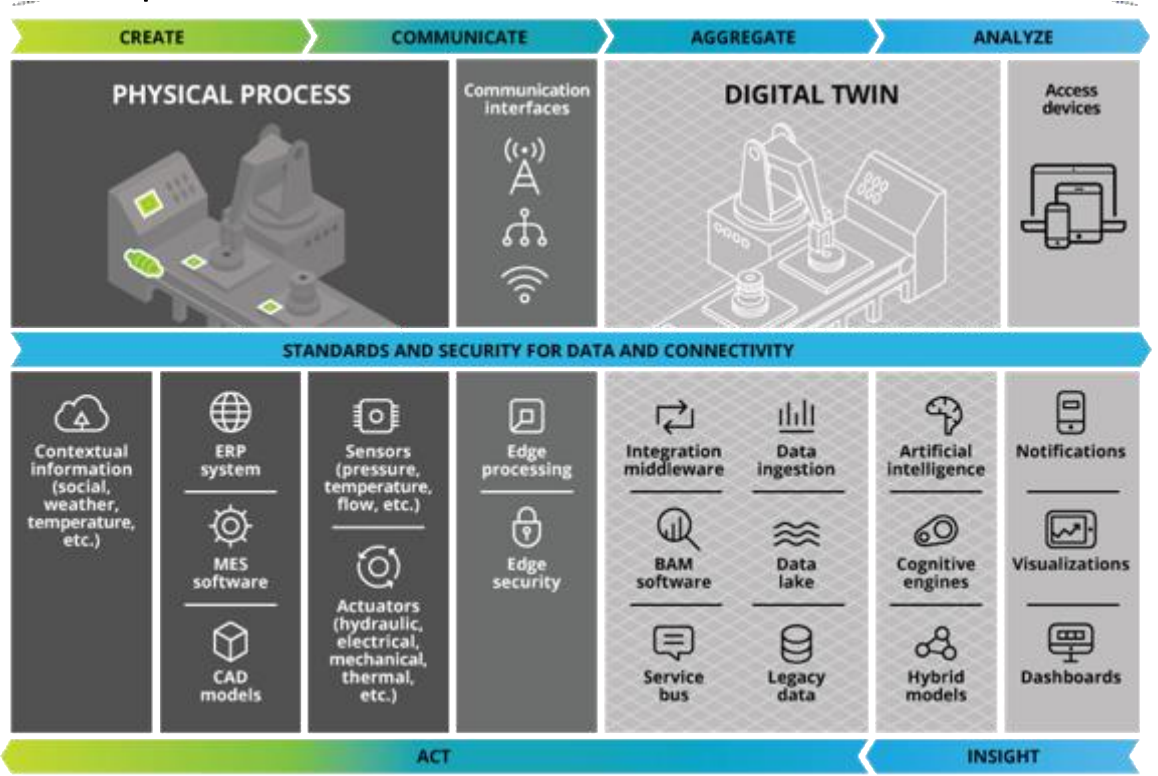
99.49%	40%	75%
• Reliability Increased in less than 2 years from 93%	• Reduced Reactive Maintenance in less than 1 year	• Reduced Time to achieve outcome

The Challenges

- OEMs lack capabilities in Emerging Technologies and must undertake transformations and upskilling in order to integrate strong technology practices as part of their manufacturing process
- The availability of reliable connectivity has not yet reached the level that Digital Twins would require when it goes mainstream. Only 5G and its broad availability will encourage further adoption
- Retrofitting Digital Twins into the deployed manufacturing environments remains a R&D topic to this moment, this places a challenge to those organizations that have invested billions of dollars in newly commissioned assets lacking the IoT components
- Liabilities in maintenance and service contracts will be questioned for the existing manufacturing environments
- Cybersecurity, privacy, and vulnerability need to be considered and calls for counter-measures

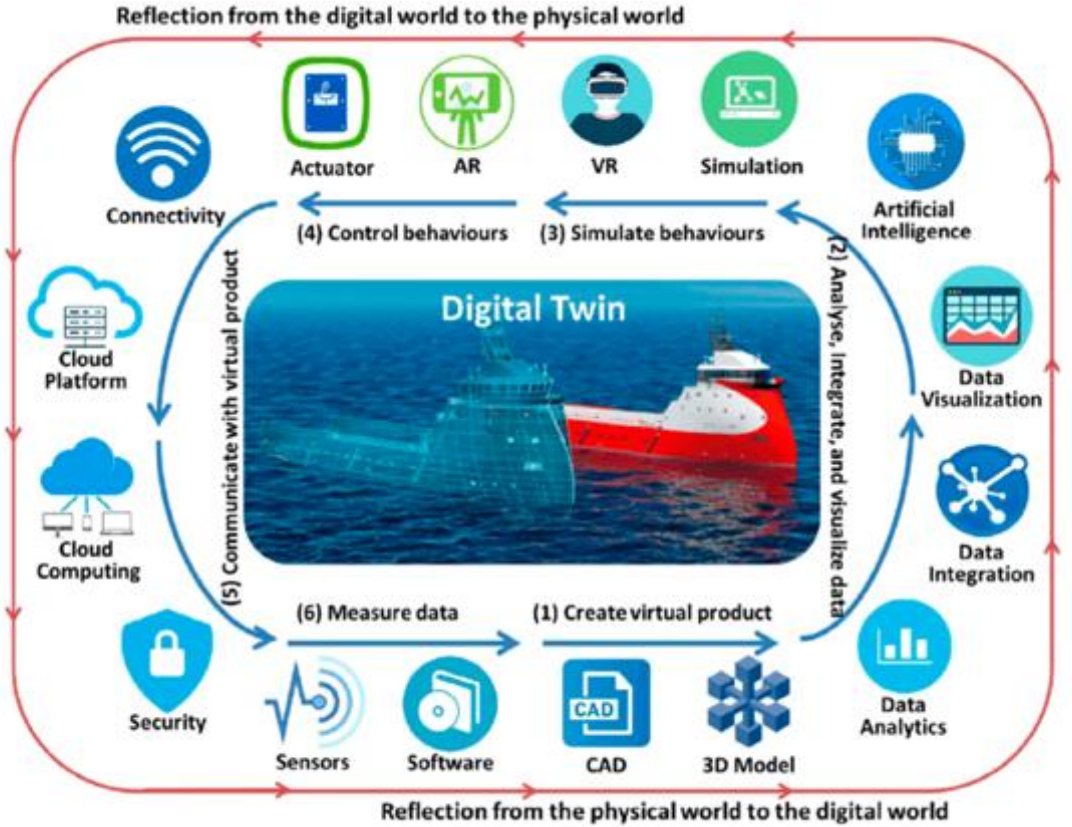
The OEM Value Proposition

Conceptual Architecture



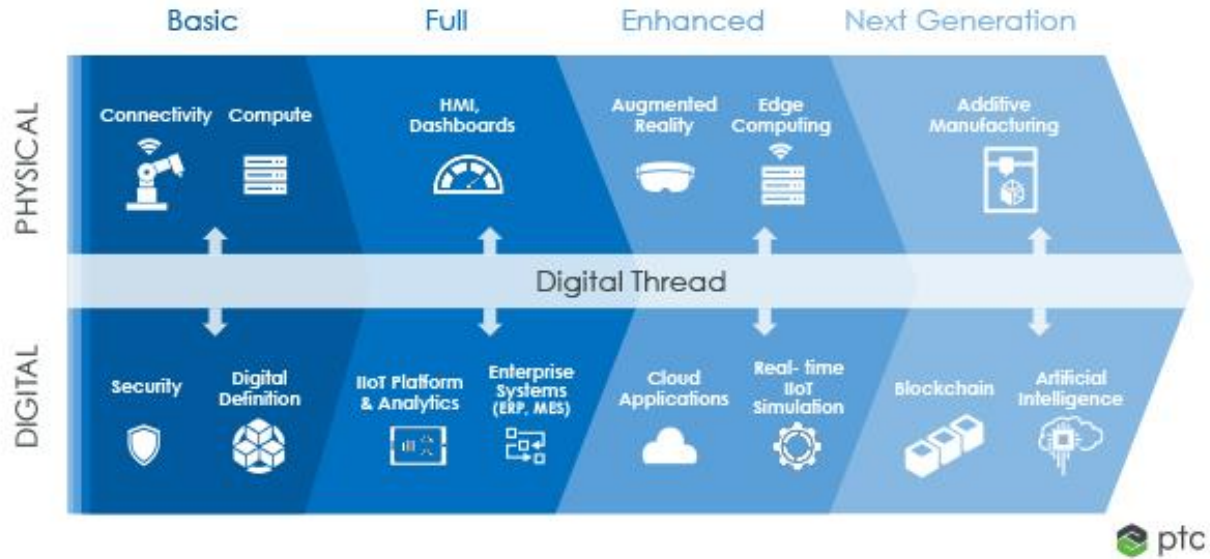
Source: Deloitte

Digital Twin Architecture in Context

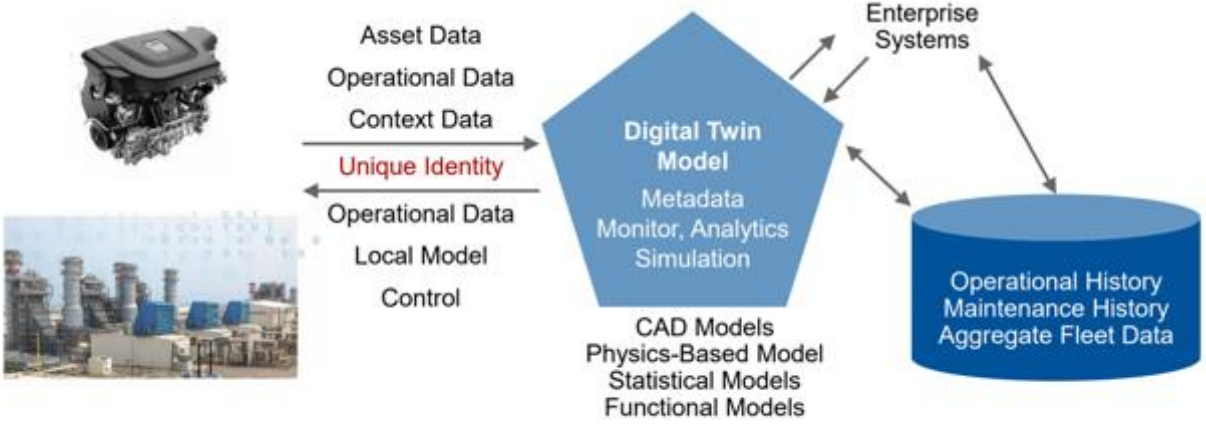


Evolution of Digital Twinning

451 Research claims that ‘Twin implies that what happens to one happens to the other, in a mutable fashion’. To fulfill this, an IIoT Platform is required to connect, contextualize, and interact with these disparate physical systems as well as provide the virtual lens of the digital twin equipped with real-time sensor data and predictive analytics.

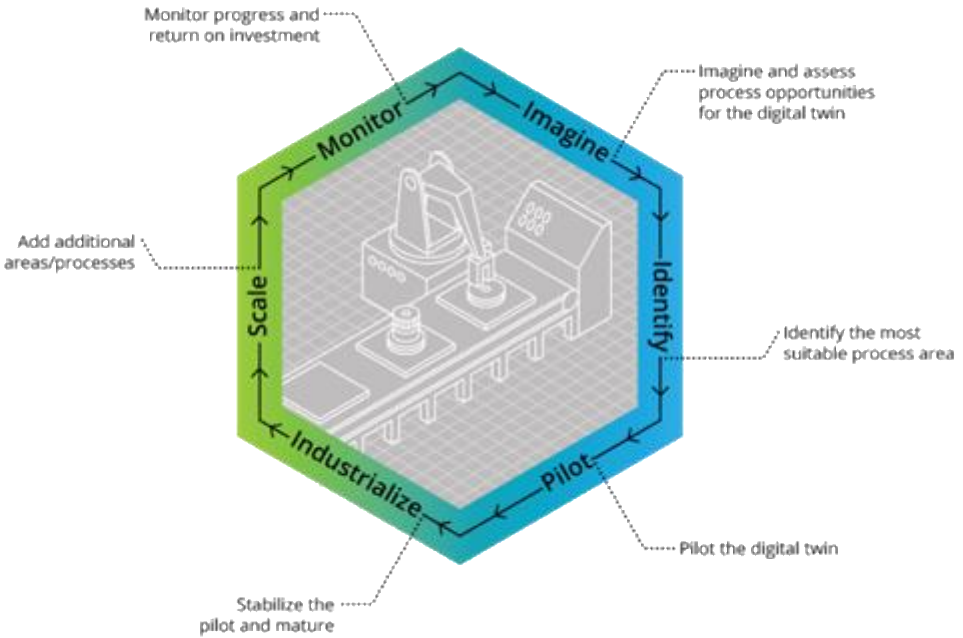


Digital Twin Architecture – A simplified example



Keep Your Digital Twin as Simple as Possible, but No Simpler Than That.

Getting Started with Digital Twinning



Source: Deloitte

Industries Adopting Digital Twin

Urban Planning - Simulated models of towns and cities

Healthcare – Patient medical monitoring

Automotive - Autonomous Vehicle

Asset Management - Real time asset monitoring

Financial Services – Customer Behavior

When do we Digital Twin?

Business Architecture and IT Architecture Alignment on

- Strategy
- Benefits
- Capabilities
- Value Streams
- Stakeholders

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