Inn4Mech 2018

Creating an Embedded Digital Twin: monitor, understand and predict Device Health Failure

IRS Ingegneria Ricerca Sistemi

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INNOVATION MANAGER

01. Digital Twin : what?
02. Creating an embedded digital twin
03. Embedded digital twin benefit
04. Conclusions

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Digital Twin: what?

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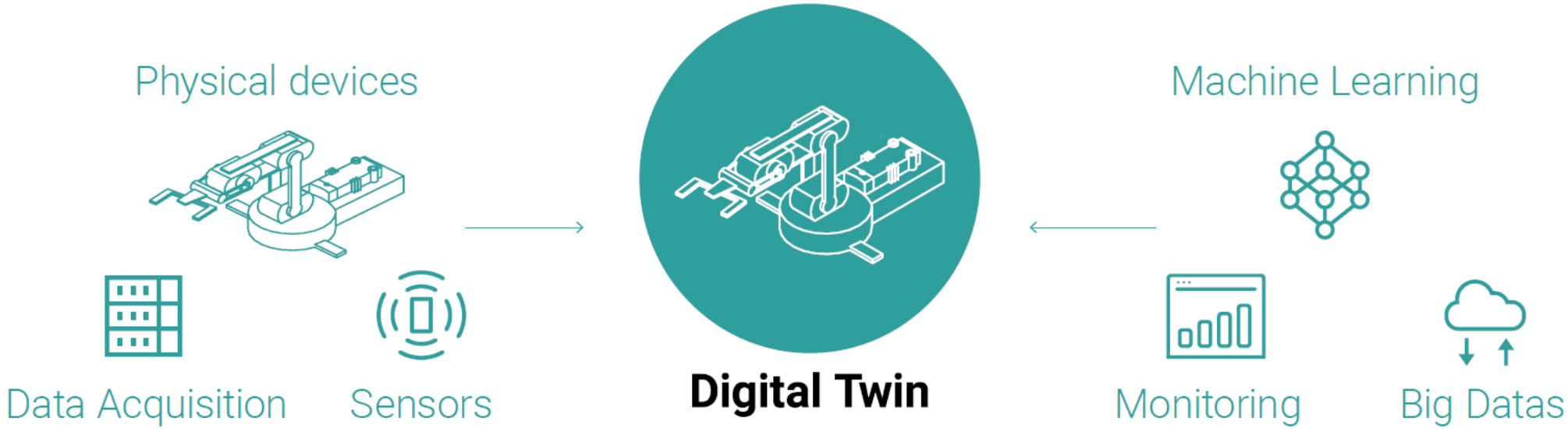
> Digital twins are becoming a business imperative, covering the entire lifecycle of an asset or process and forming the foundation for connected products and services. Companies that fail to respond will be left behind.
>
> — Thomas Kaiser, IBM

> For every physical asset in the world, we have a virtual copy running in the cloud that gets richer with every second of operational data.
>
> — Ganesh Bell, GE Power & Water

A Digital Twin is a real-time digital replica of a physical device



It is a bridge between the physical and digital world.

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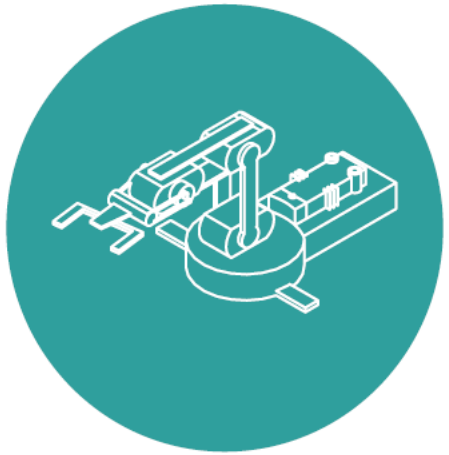
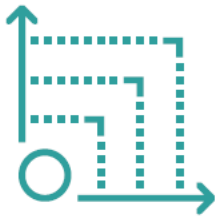
History
Logs the history of all devices and products.



Digital Twin



Future
- Forecast failure and maintenance need
- Predict user interaction
- Insight for your next products and service

It is more than just a digital replica

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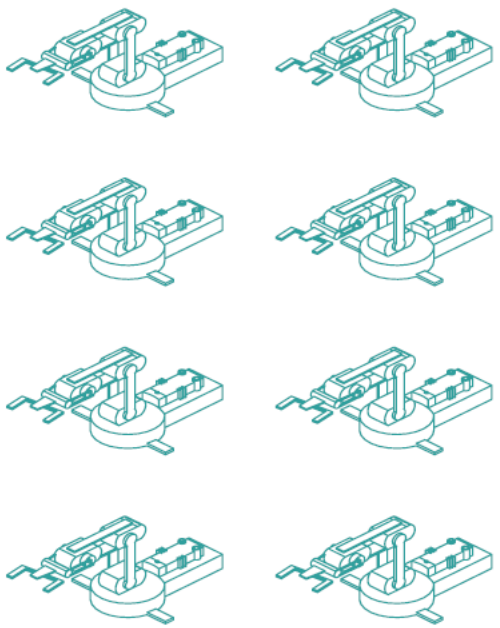
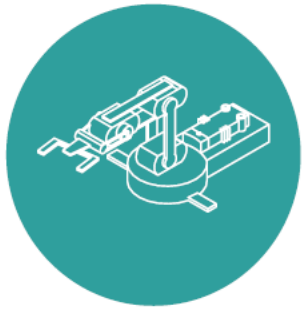
/// Beneficiaries

Physical products



Different customers
Different models
Different locations

Digital Twin



A twin
for each device

Market

Performance
Geographies

Design

Features
Usage

Quality

Suppliers
Procedures

Operation

Efficiency
Reliability

Service

Events
Incidents

Sales & Marketing

Manufacturing

Engineering

Customer Support

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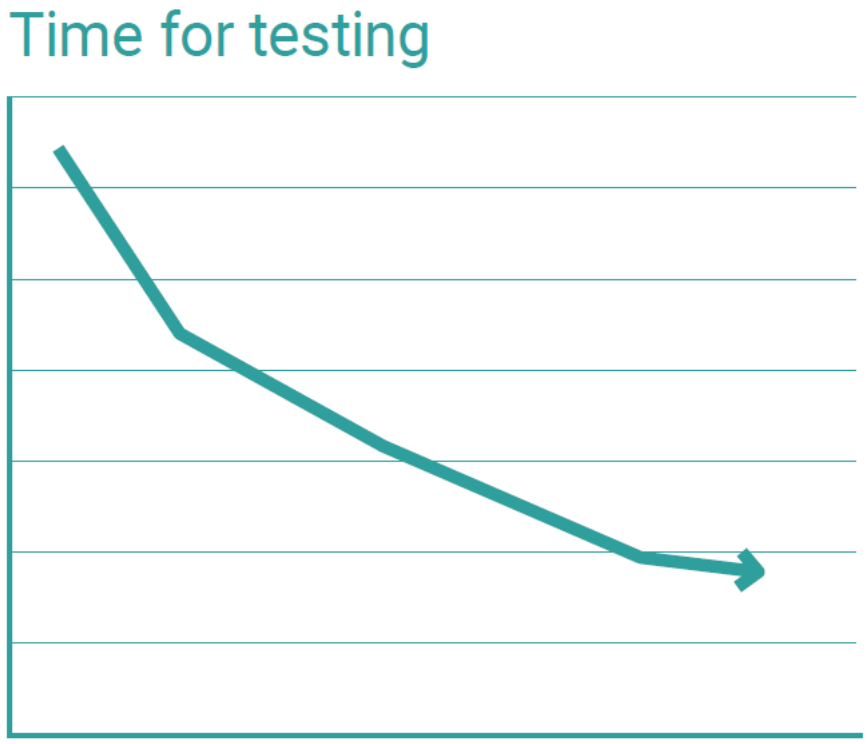
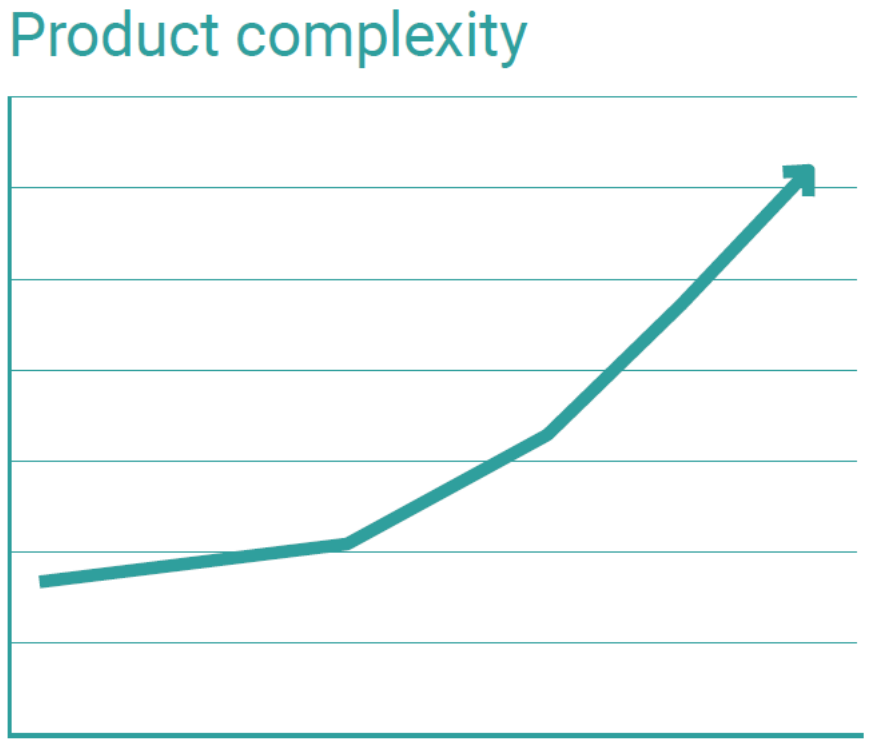
Creating an embedded Digital Twin





Testing challenge

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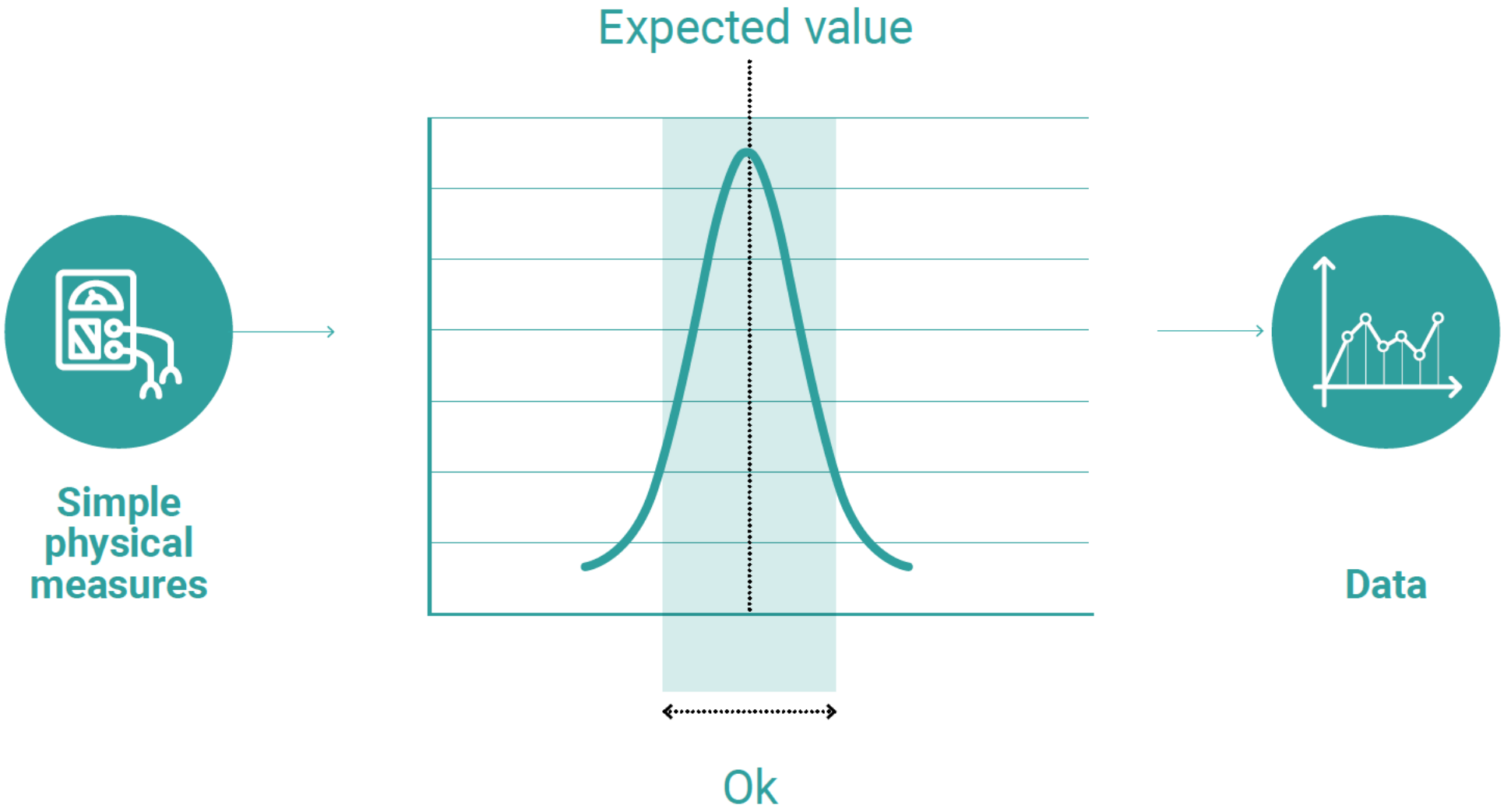
/// Testing challenge



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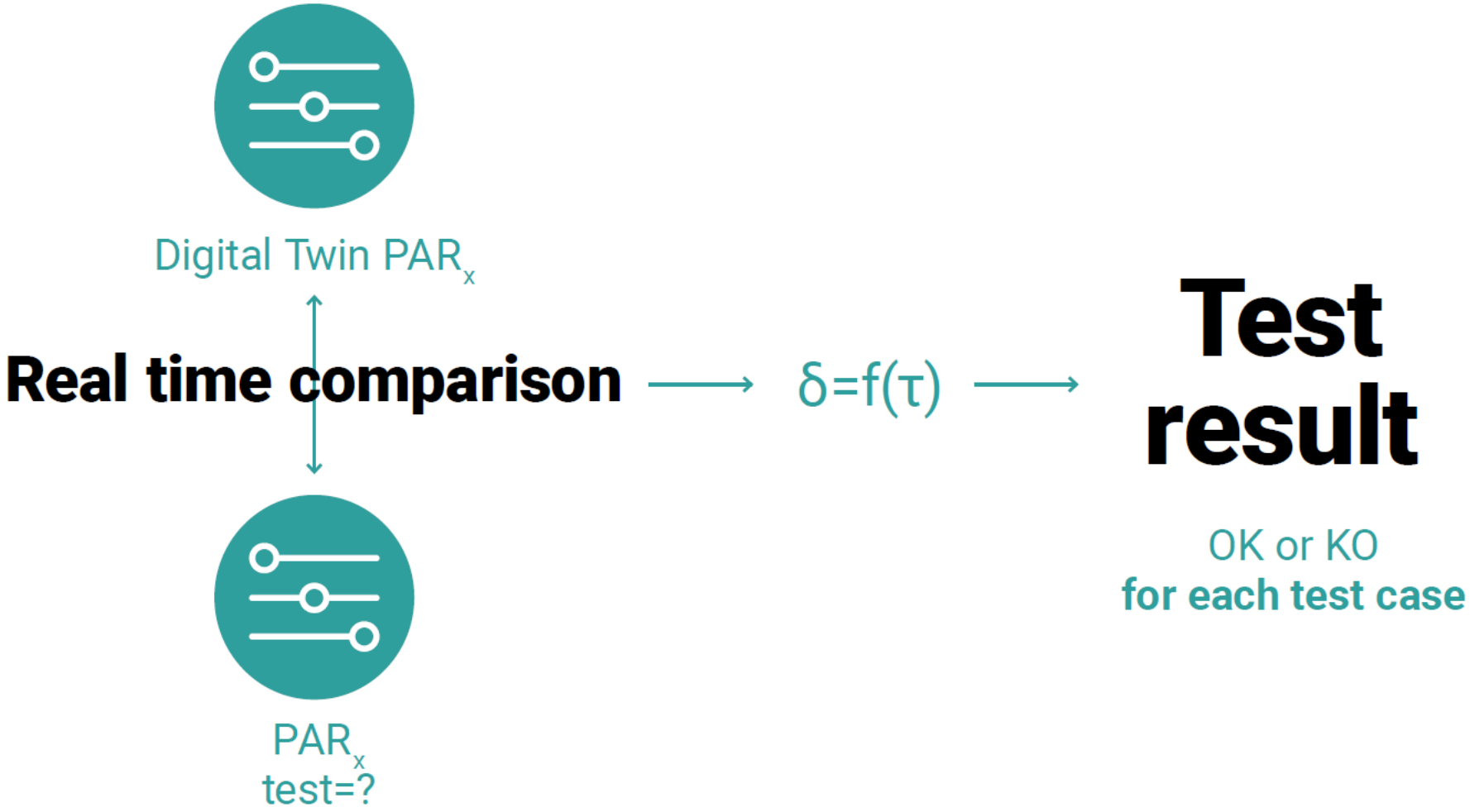
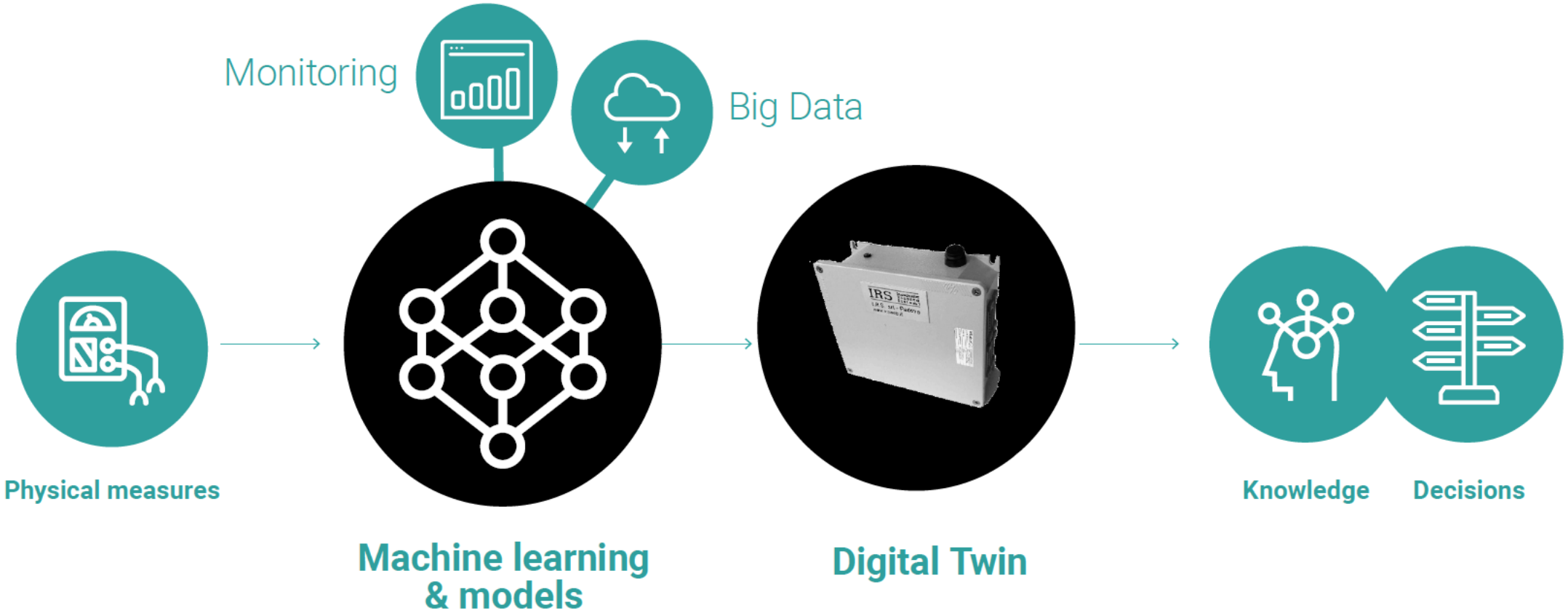
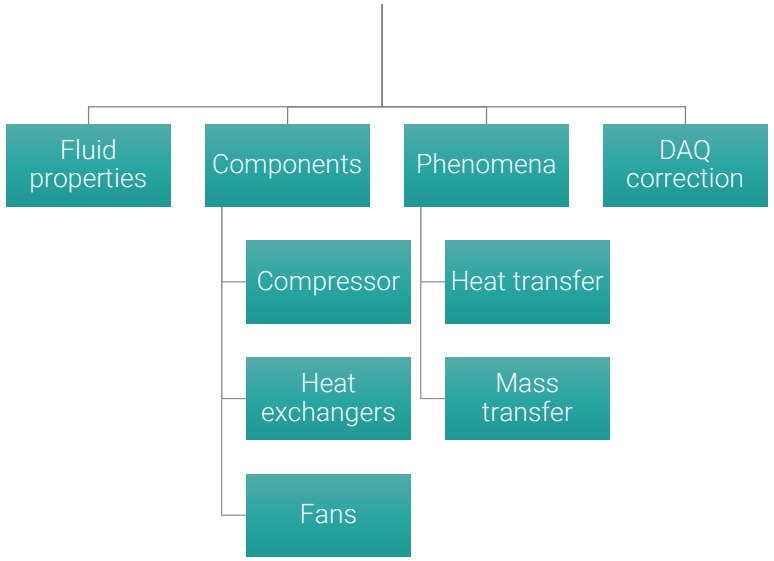
/// Better testing with Digital Twin



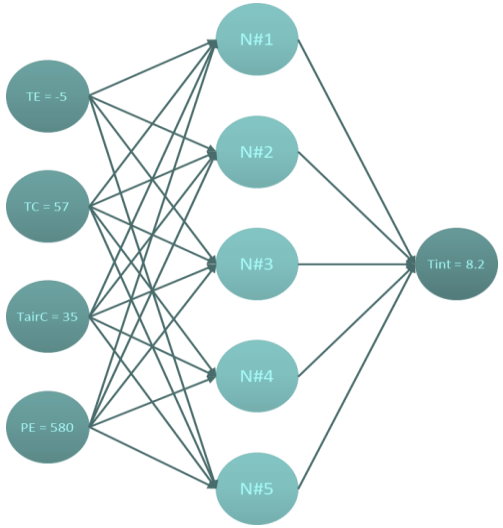

Monitoring
Big Data
Physical measures
Machine learning & models
Digital Twin
Knowledge
Decisions

Physical Model



Models for Embedded Digital Twin

Machine Learning



Real time online measurement platform

Machine learning models

TwinMind®
by IRS

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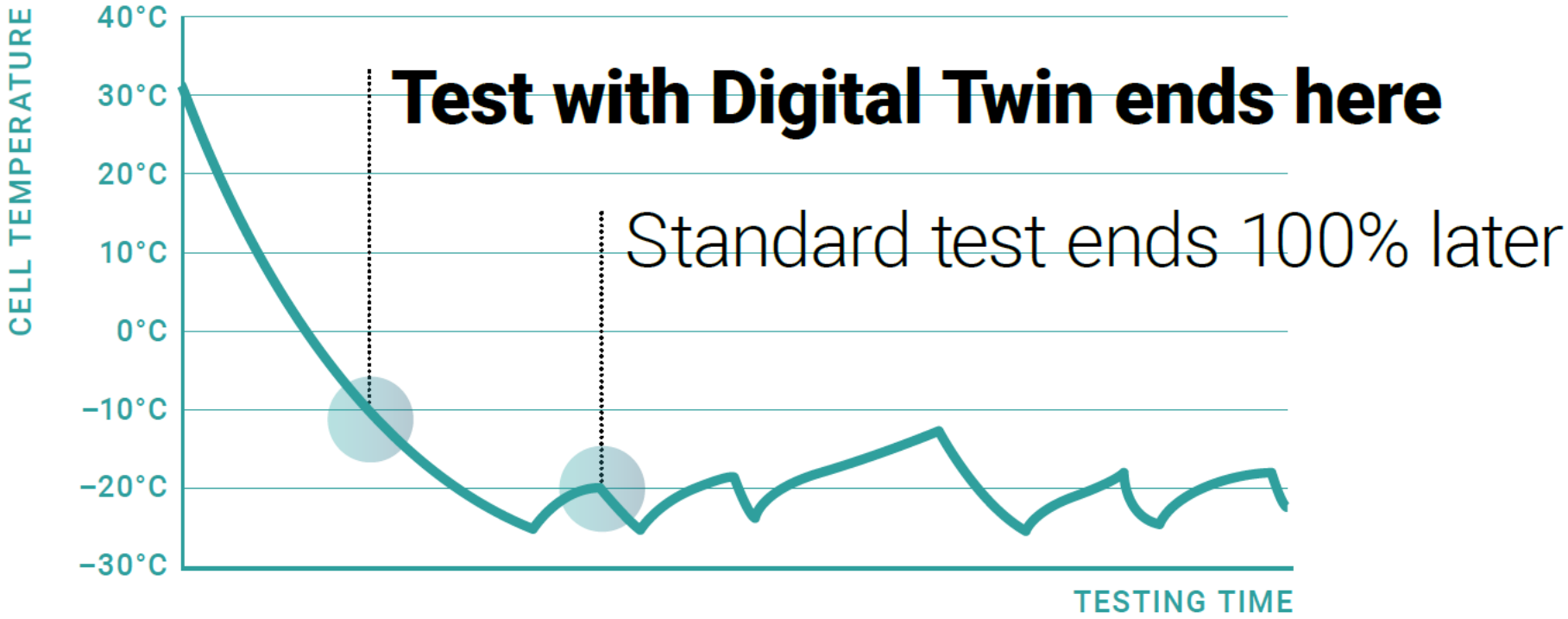
Embedded Digital Twin
Shorter testing time.

Shorter testing time



Shorter testing time

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Embedded Digital Twin better accuracy and quality.

Closer acceptance threshold

Better software parameters to threshold

Better accuracy and quality

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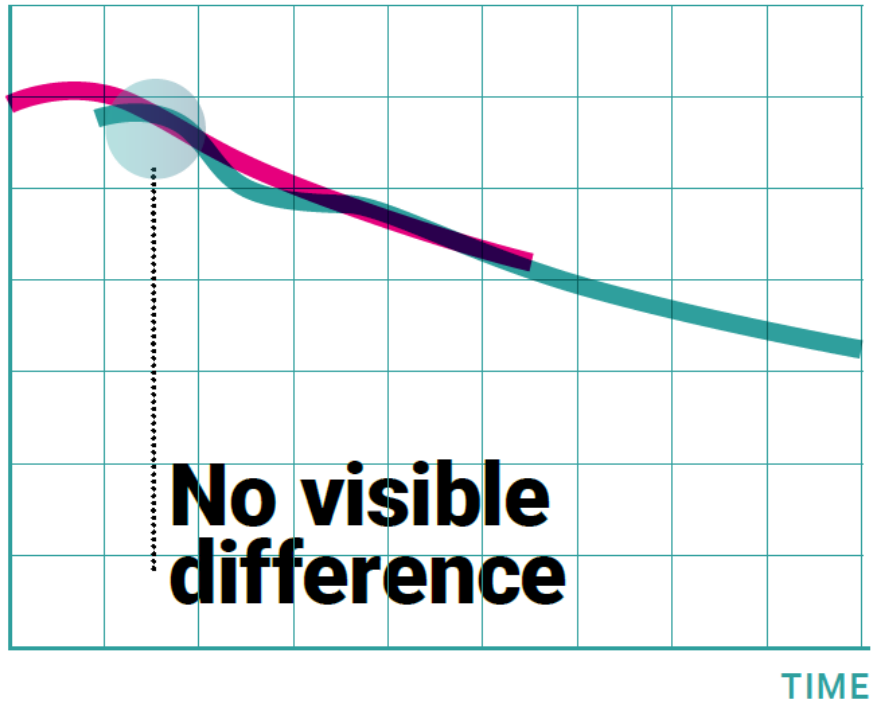
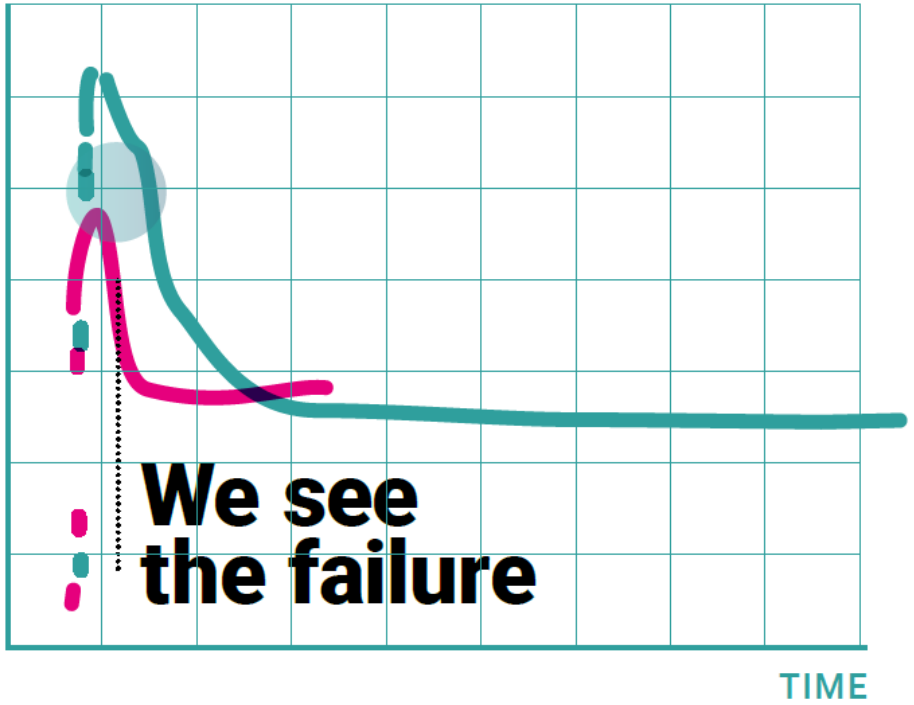
Temperature



COP efficiency by Digital Twin



Better accuracy and quality

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Embedded Digital Twin testing in unfeasable conditions.

Limited physical testing

Set conditions

Digital Twin

Extended virtual testing

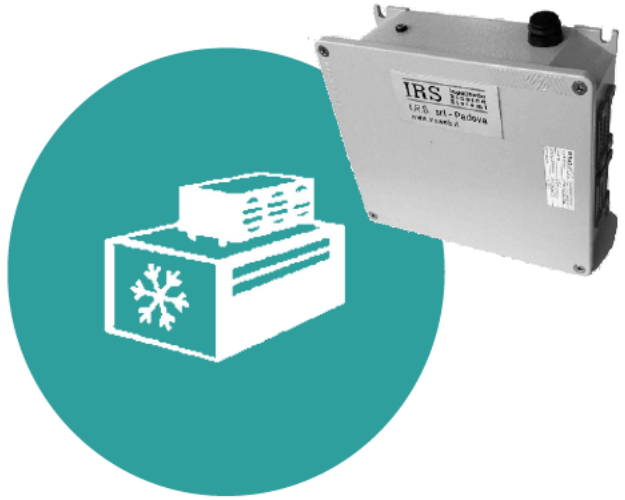
Virtual conditions
As set by standards

Limited physical testing

Monitoring conditions and production test cannot fully test the device

Digital Twin

Extended virtual testing



Thanks to digital twin virtual conditions are tested & device health predicted

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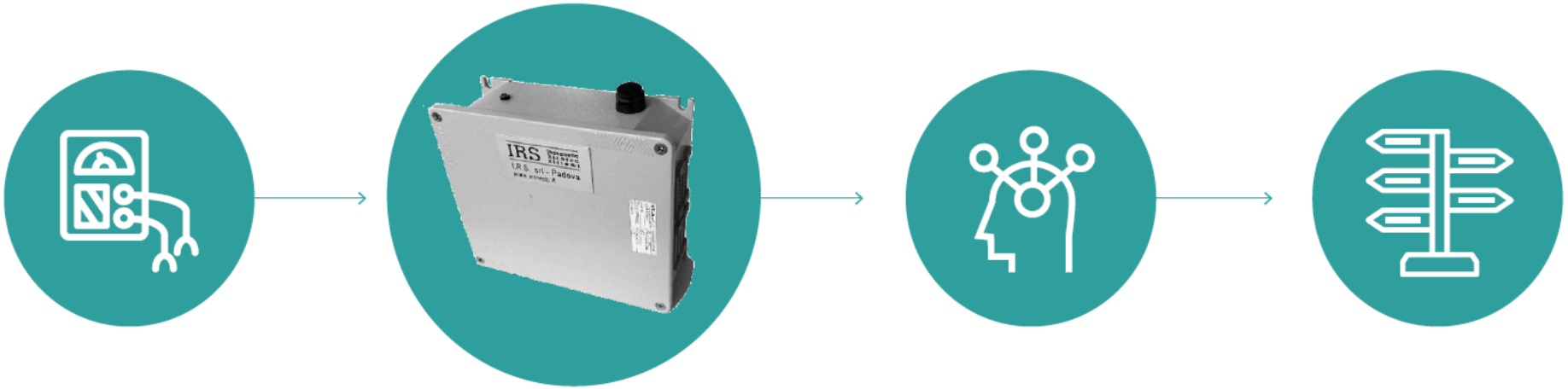
Conclusions



More efficiency, less costs

Thank you!

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What Is Digital Twin Technology — And Why Is It So Important?

www.forbes.com/sites/bernardmarr/2017/03/06/what-is-digital-twin-technology-and-why-is-it-so-important/

Minds + Machines: Meet A Digital Twin

youtu.be/2dCz3oL2rTw/

Digital Twin in manufacturing

irsweb.it/pdf/Fabbrica_Intelligente_Digital_Twin%20_v3.pdf

Smart manufacturing

irsweb.it/pdf/SPS_IRS_Smart_Manufacturing.pdf