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Digital twin for improved performance

Darya Botkina, 2019-05-22, Siemens

Industrial motivation

Industrial motivation

Challenge:

- Digitalization of the manufacturing line
- Effective data exchange and communication
- Brownfield approach

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Industrial motivation

Goals:

- Rapid and well-structured access to the data collected throughout the whole manufacturing lifecycle
- Connectivity of all the manufacturing parties

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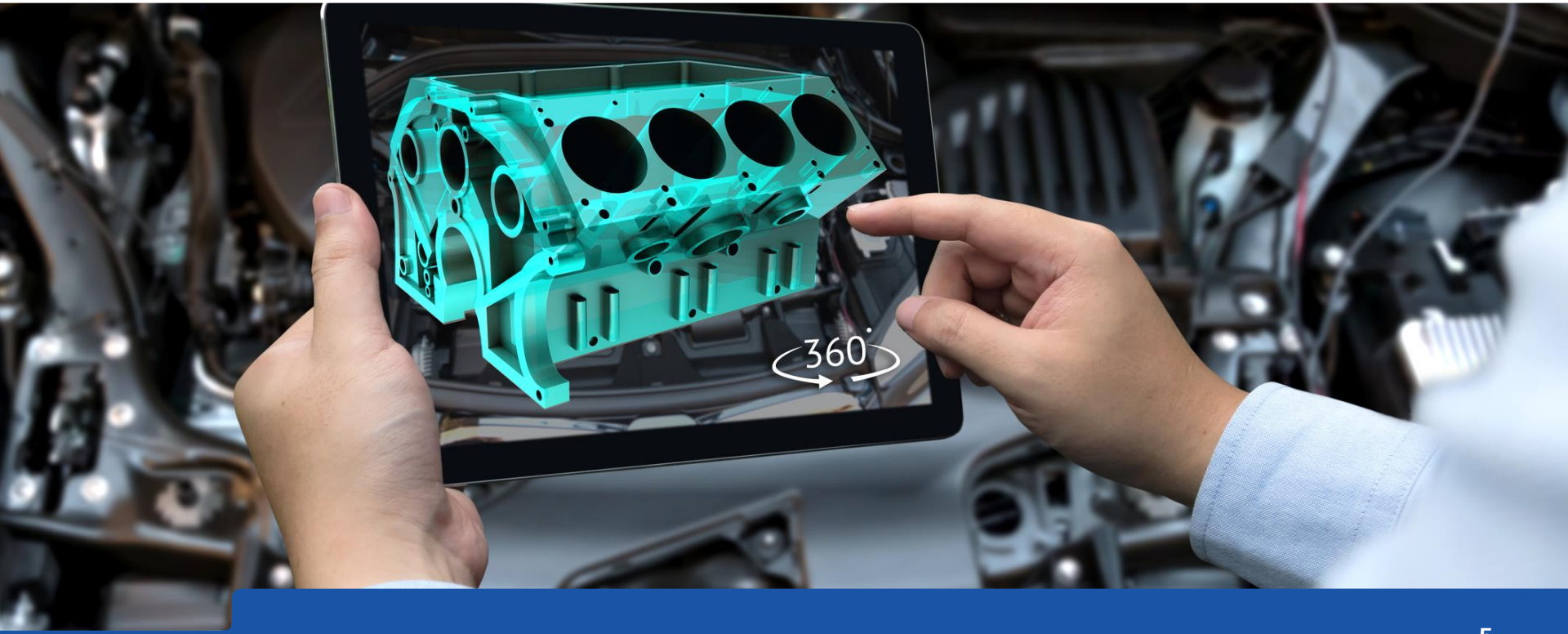
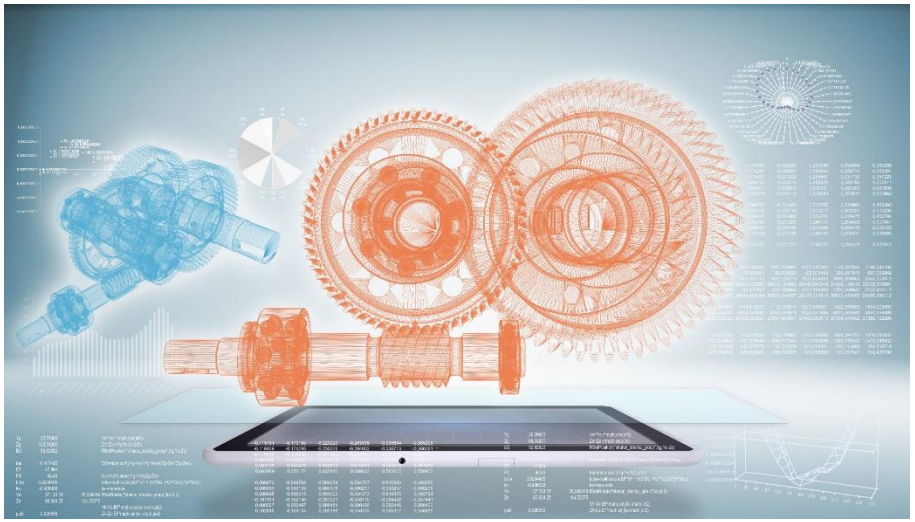
Digital twin



Digital model

Previous way of storing data



Current way of storing data

Digital twin is not just a digital model

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Digital twin

Repository

Production data

Design and simulation

Physical data

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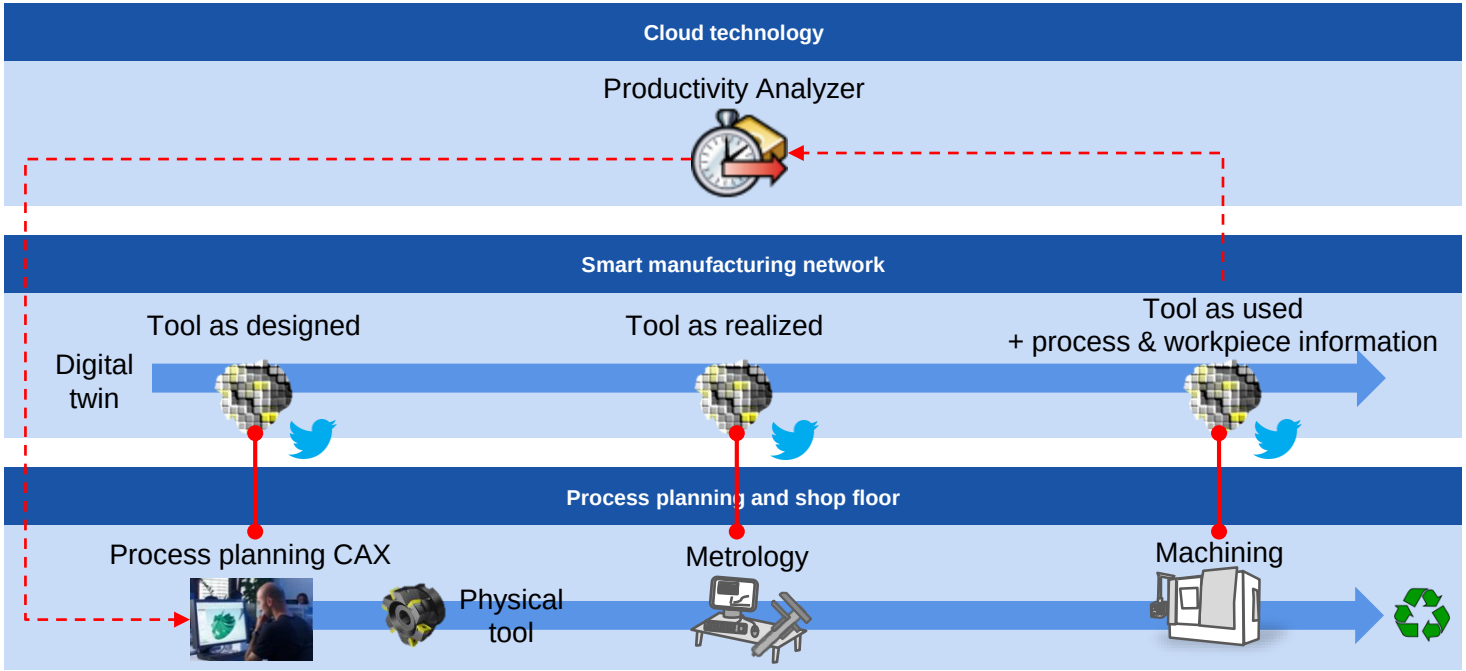
Use cases

Use case 1: Digital twin of a cutting tool



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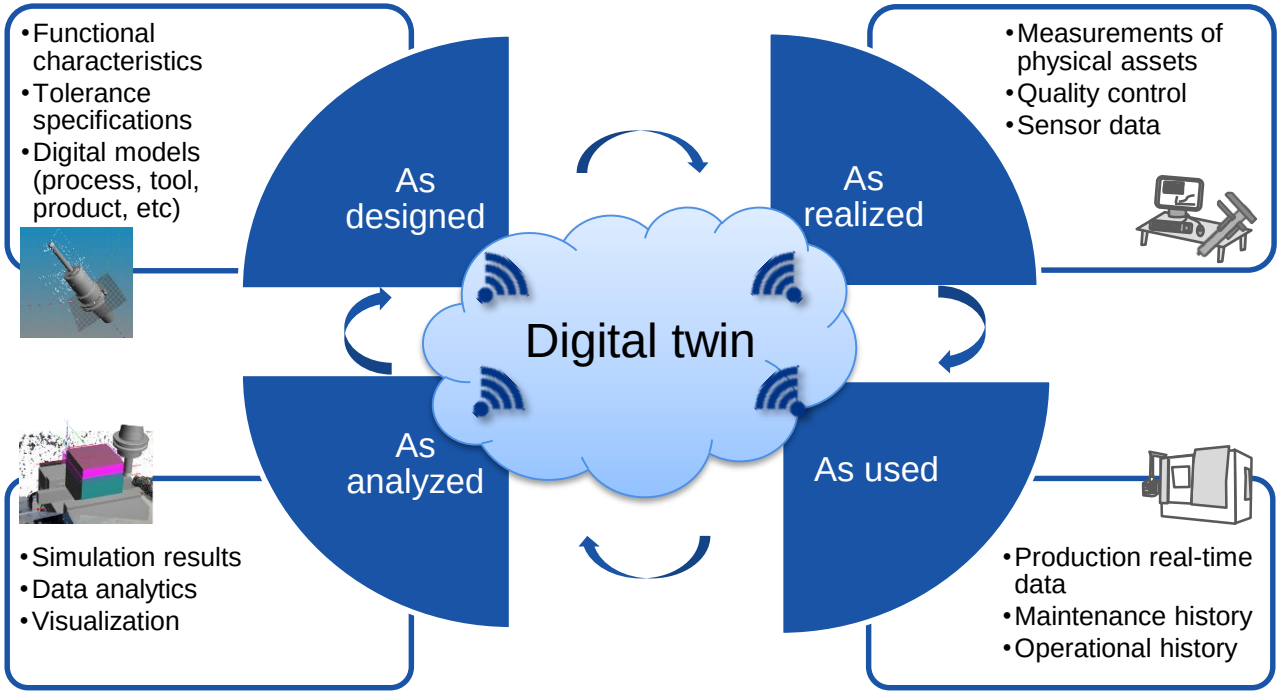
Use case 1: Digital twin of a cutting tool



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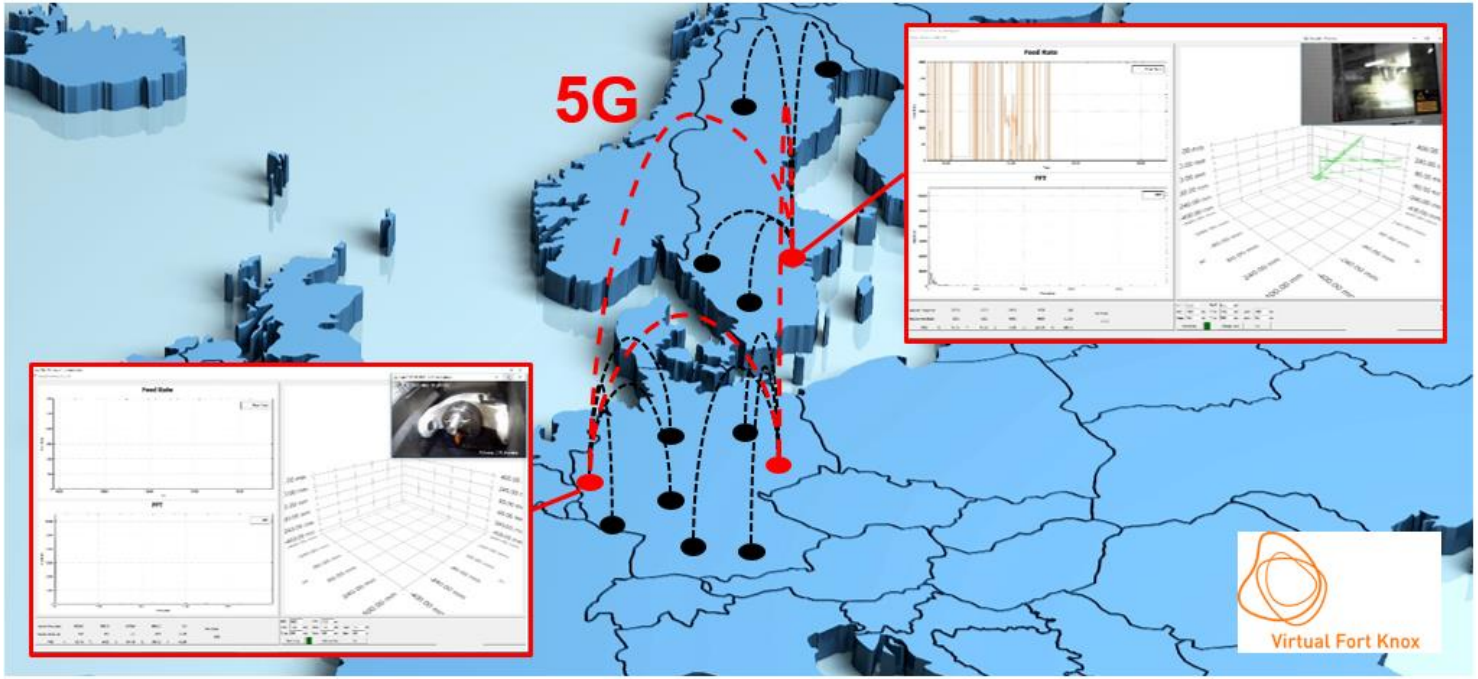
Use case 2: Smart sensing



Demonstrator: 5G based process cockpit

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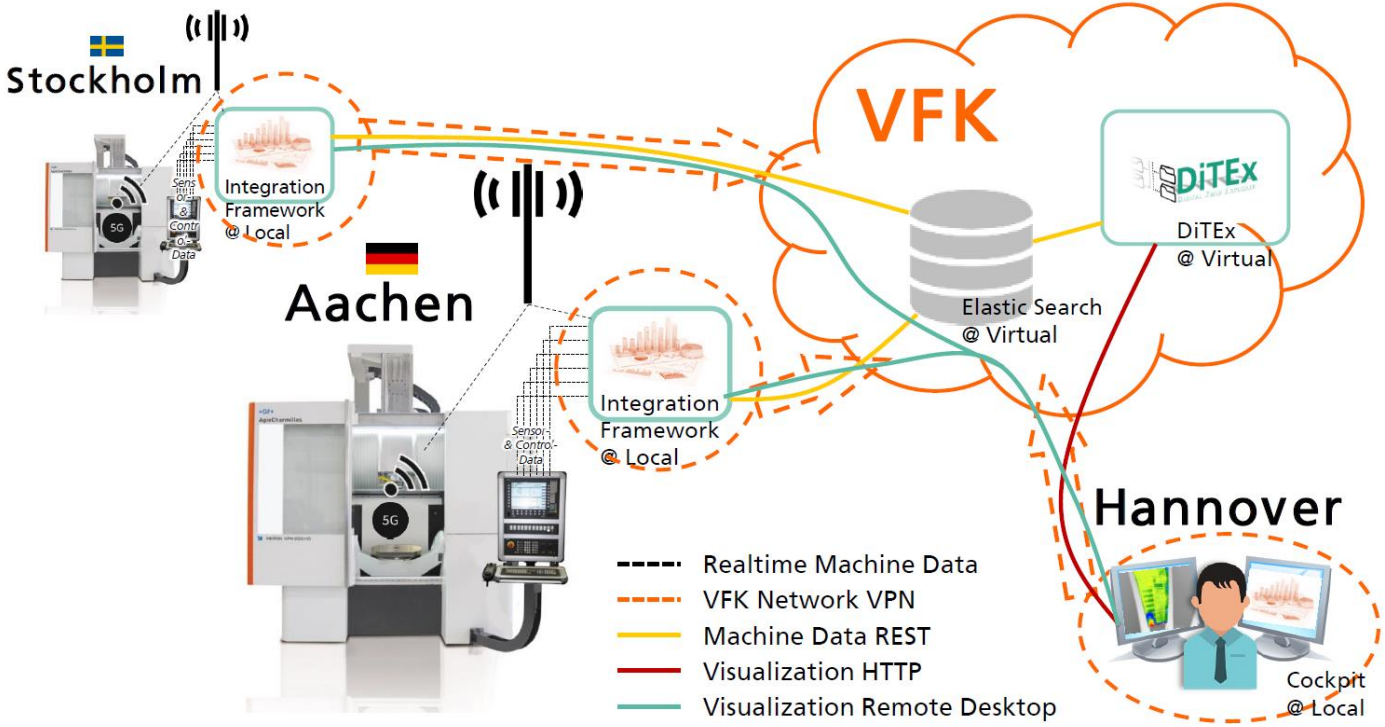
Use case 2: Smart sensing



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Use case 2: Smart sensing

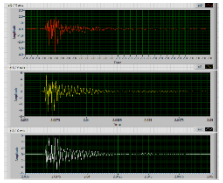
Step 1

- Acquisition of sensor data
  - Use of two acceleration sensors mounted on spindle

MTConnect®

Step 2

- Streaming of machine data
  - MTConnect and Step-NC data streams

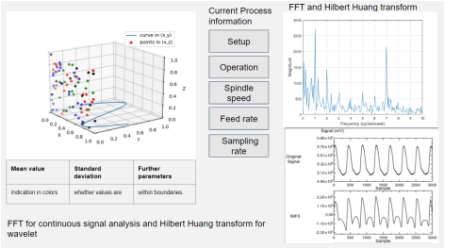


Step 3

- Correlation of data streams
  - Correlation between data through designated parameters
  - Signal processing through FFT and Hilbert-Huang transformation

Step 4

- Visualization tool
  - Vizualization of correlated data streams
  - Further analysis and decision-making



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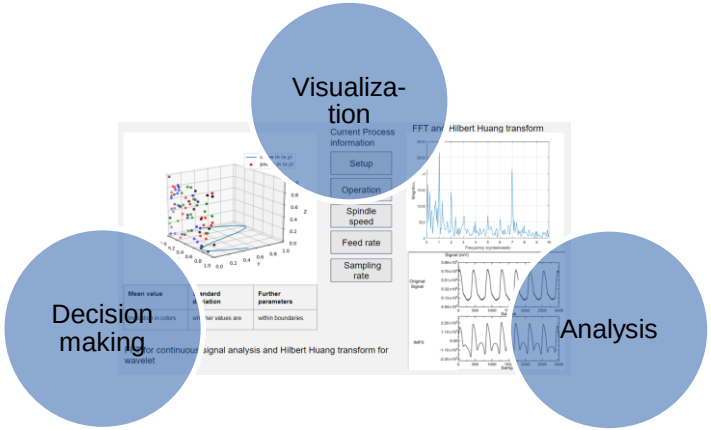
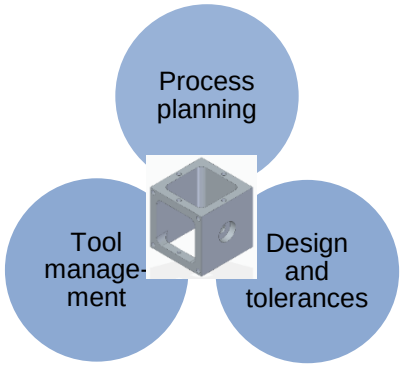
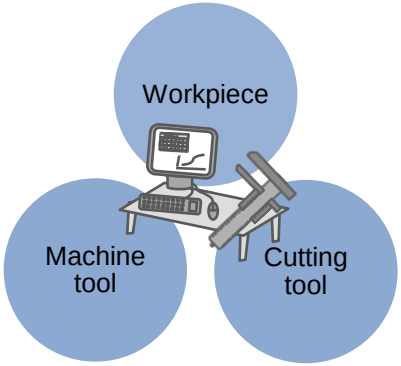
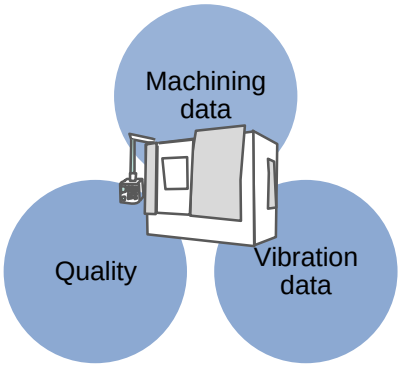


Digital Twin







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Summary and outlook

Summary and outlook

Digital twin:

- Data collection at every production step
- Access to past data and to near real-time data
- Deep understanding of the production process and prediction of the behavior and results
- The need of standardization and new standards

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