

DIGITISATION OF THE QUALITY INFRASTRUCTURE – USING THE EXAMPLE OF ADDITIVE MANUFACTURING

METAL ADDITIVE MANUFACTURING CONFERENCE 2023

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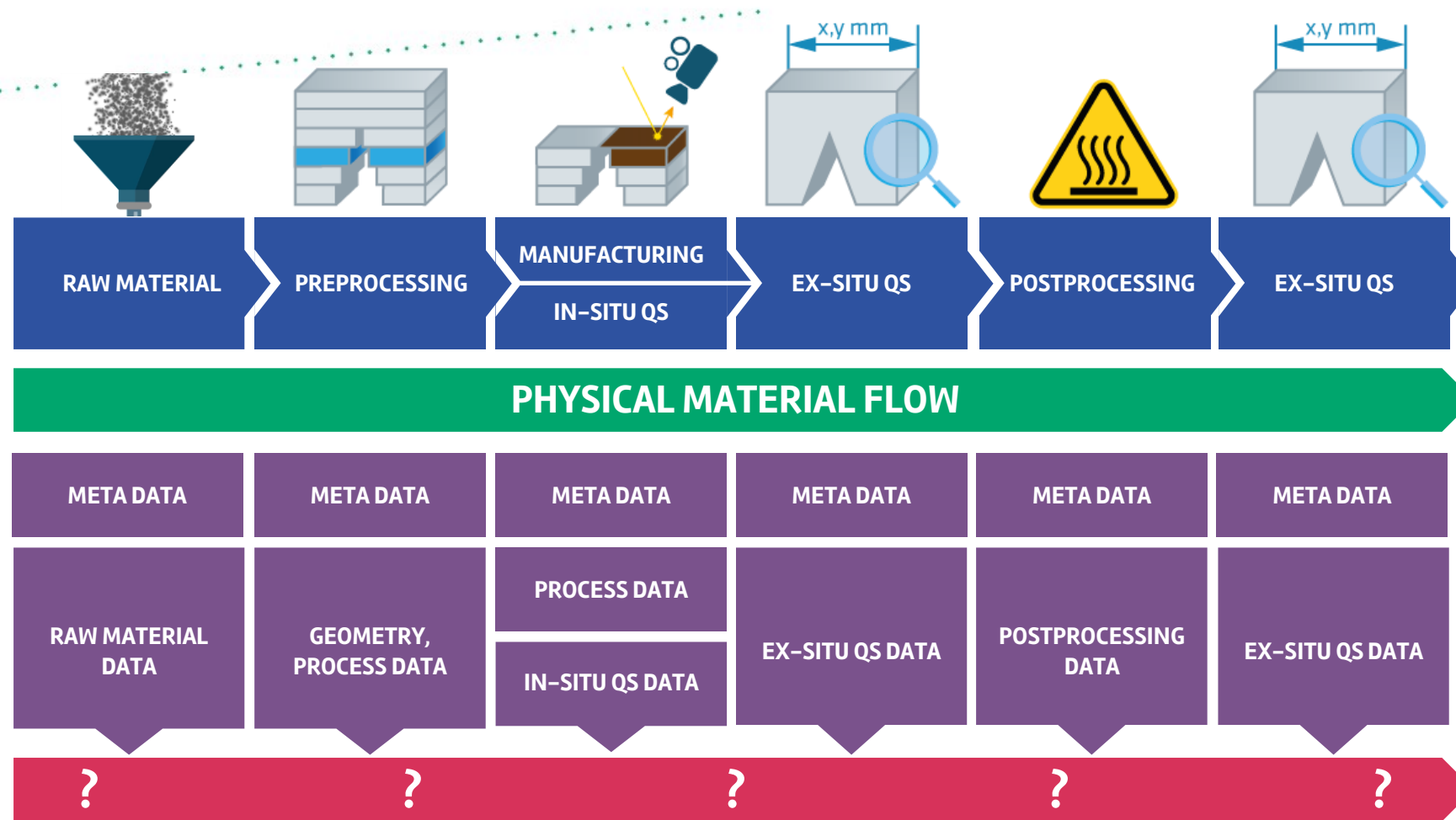
Quality Infrastructure – QI



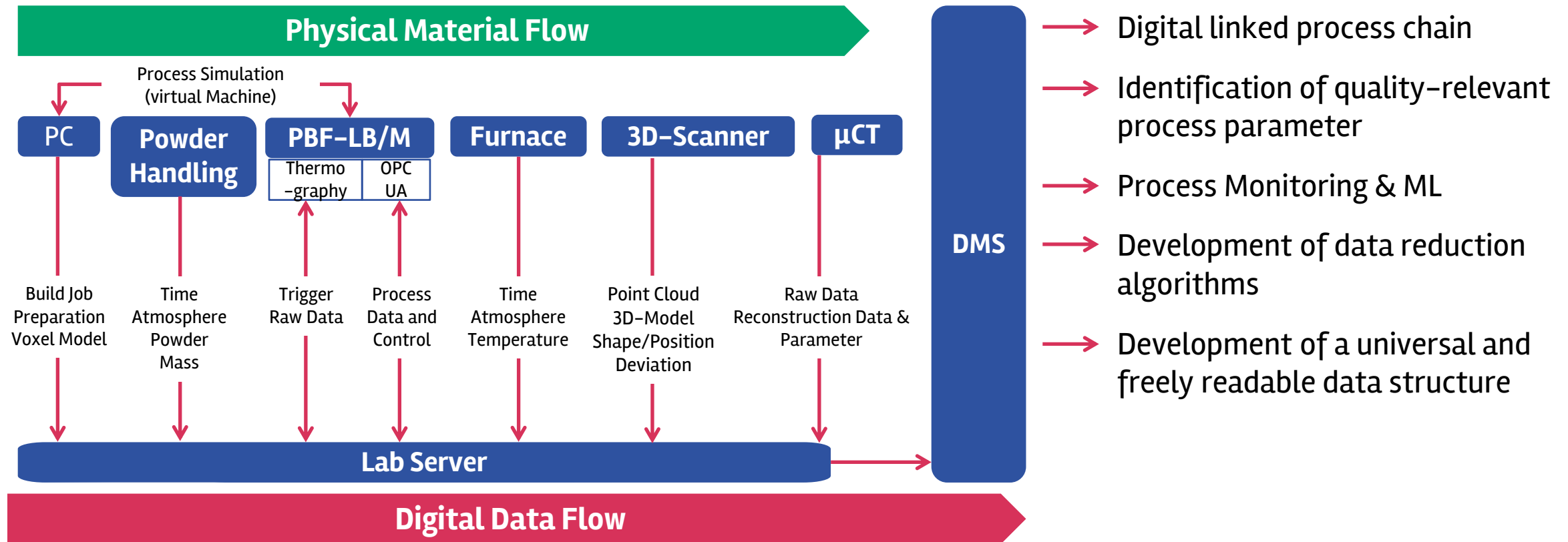
The QI is:

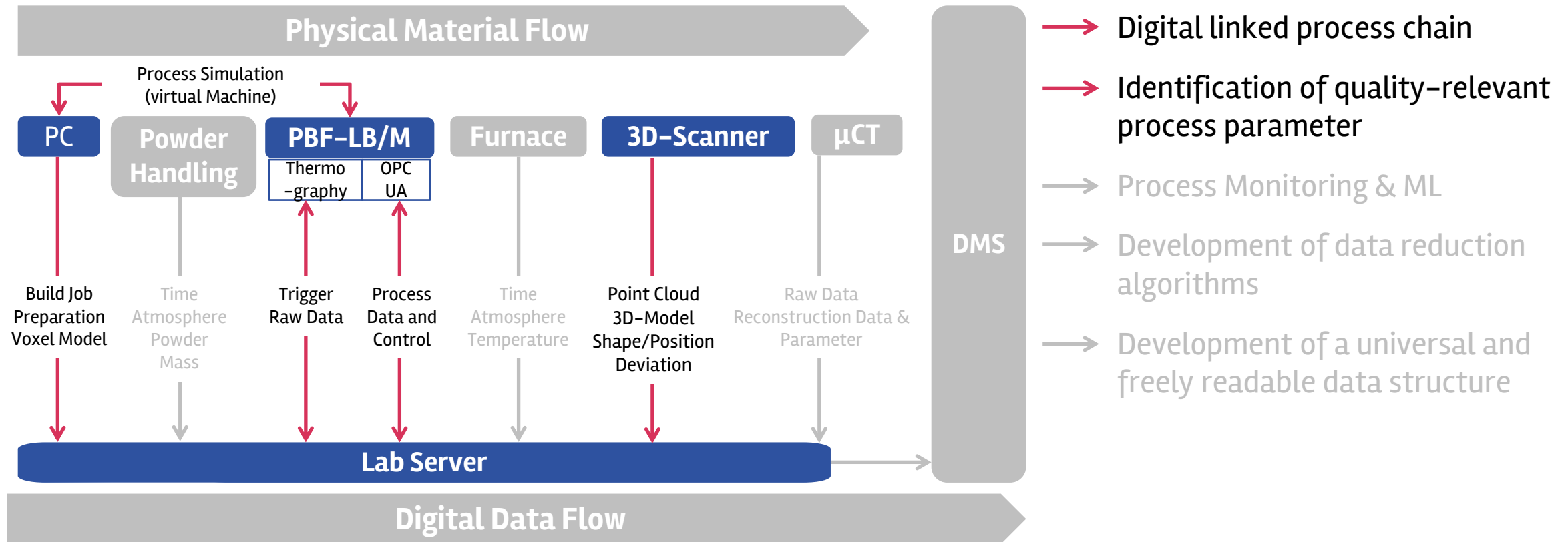
- A System of interacting institutions and processes
- to ensure quality and safety of products, applications and services.
- The Basis for the protection of people, health, and the environment.

CHALLENGES OF A DIGITISED MANUFACTURING



- No continuous data flow
- Lack of system comparability
- Huge amount of data
- Numerous file formats
- Difficult data exchange
- Difficult documentation

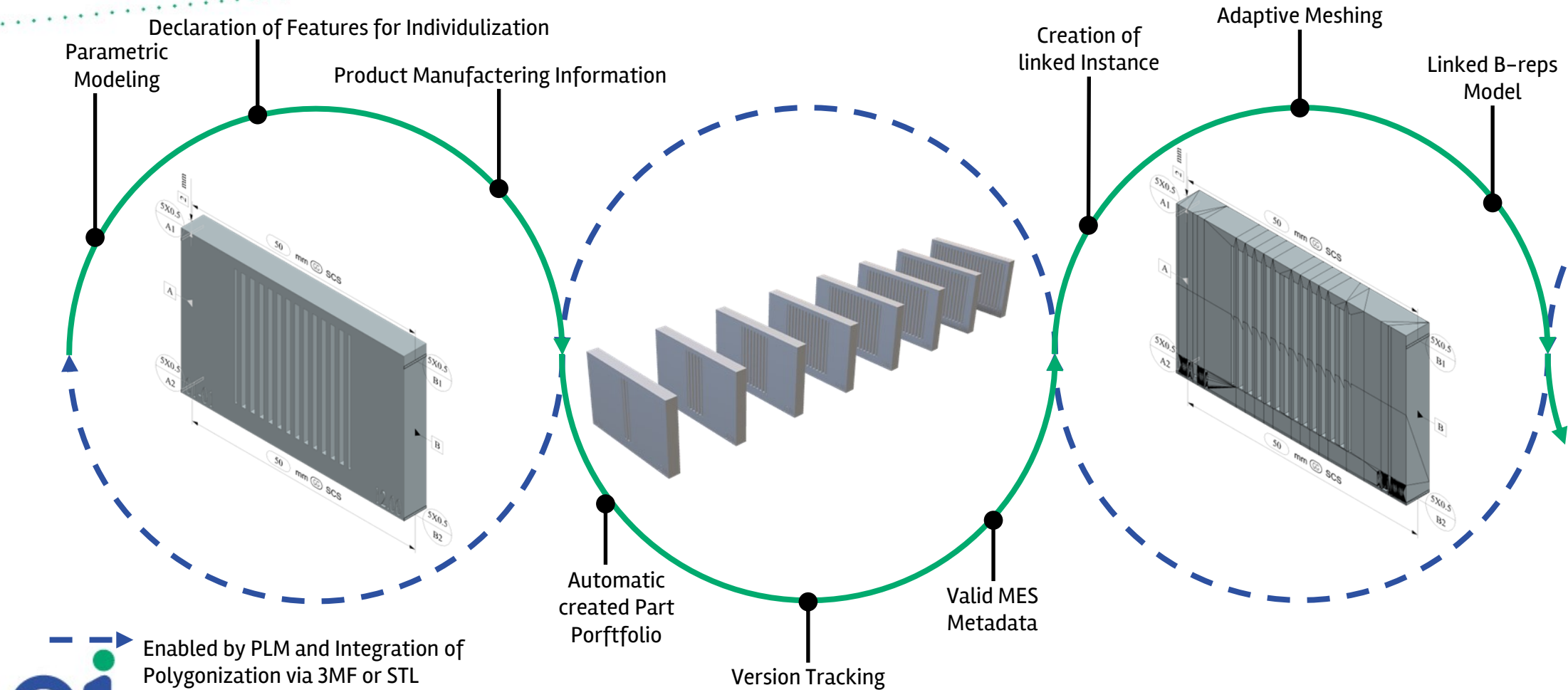




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LINKED PROCESS CHAIN

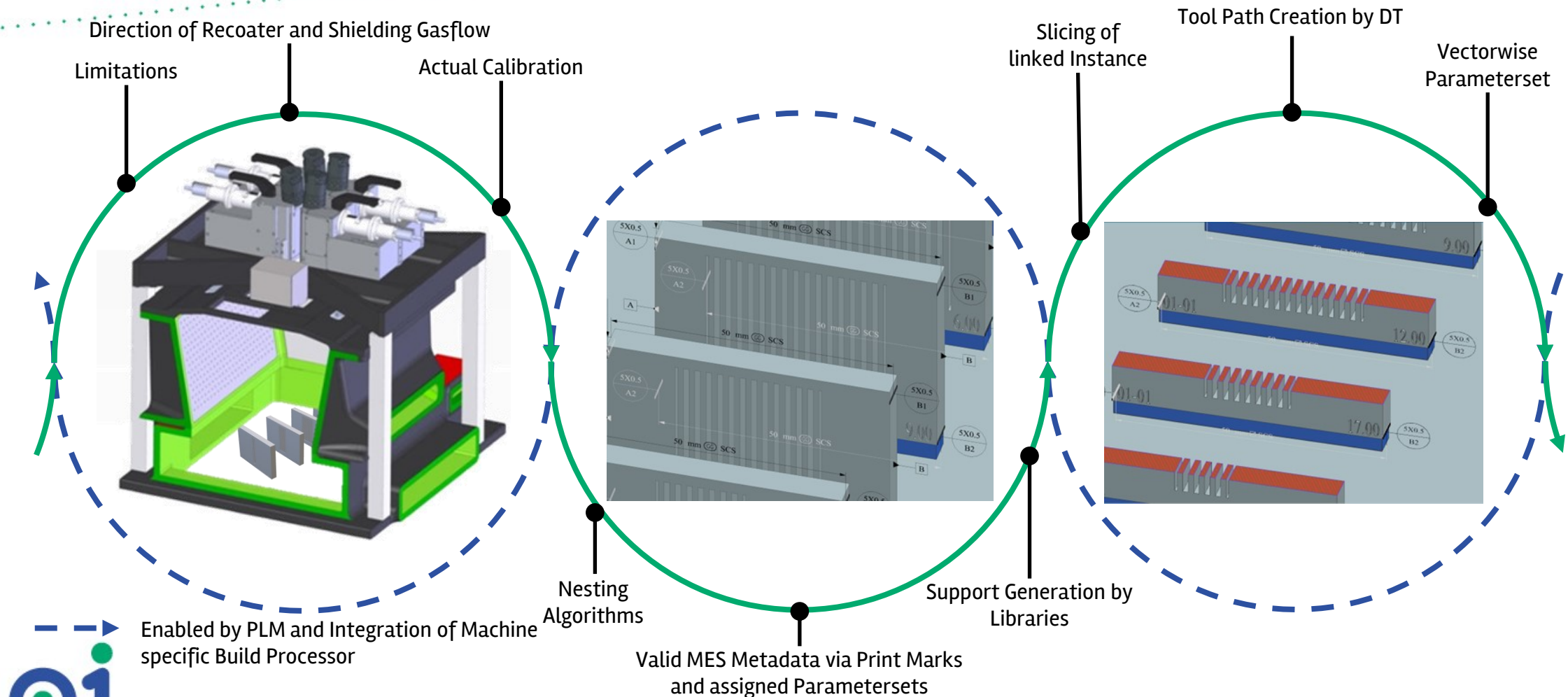
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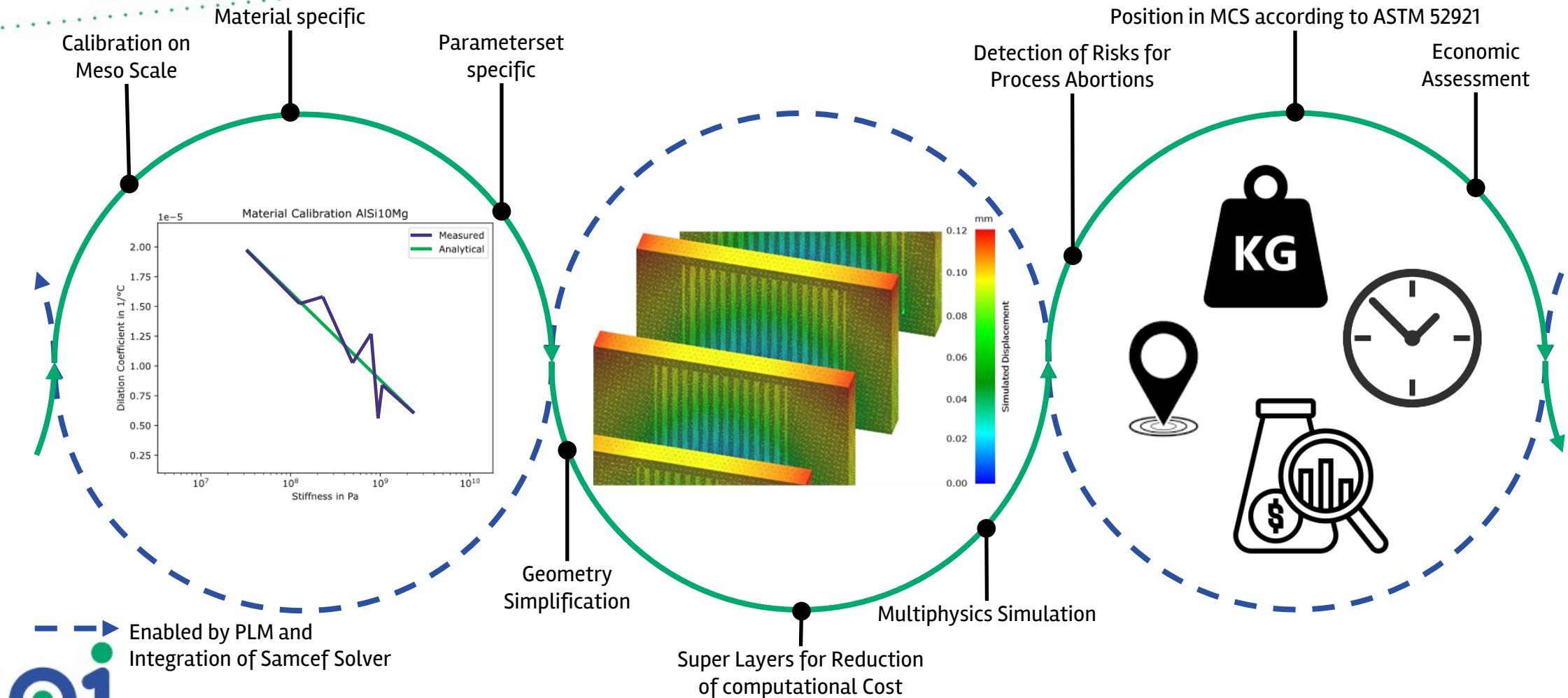
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LINKED PROCESS CHAIN

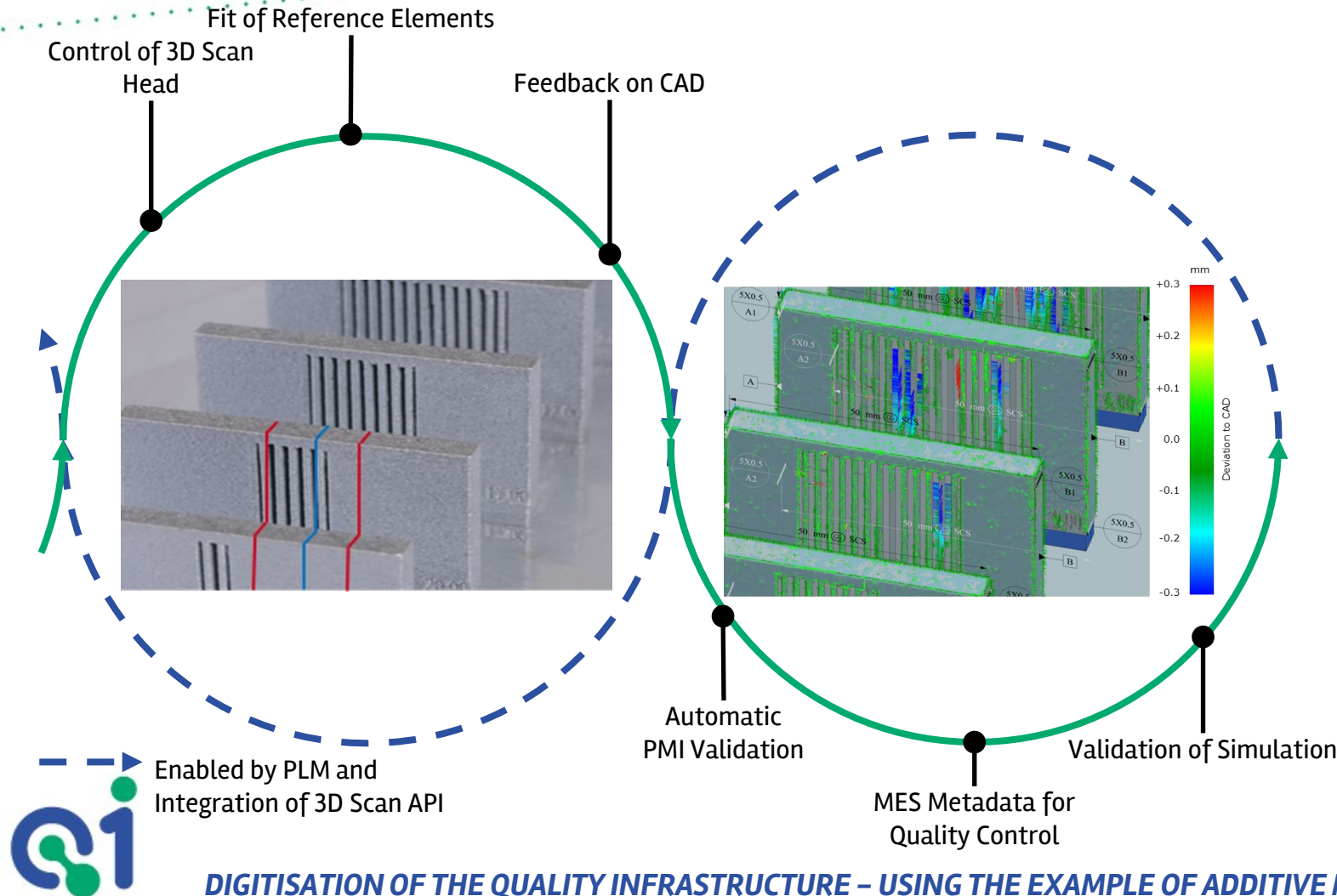
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LINKED PROCESS CHAIN

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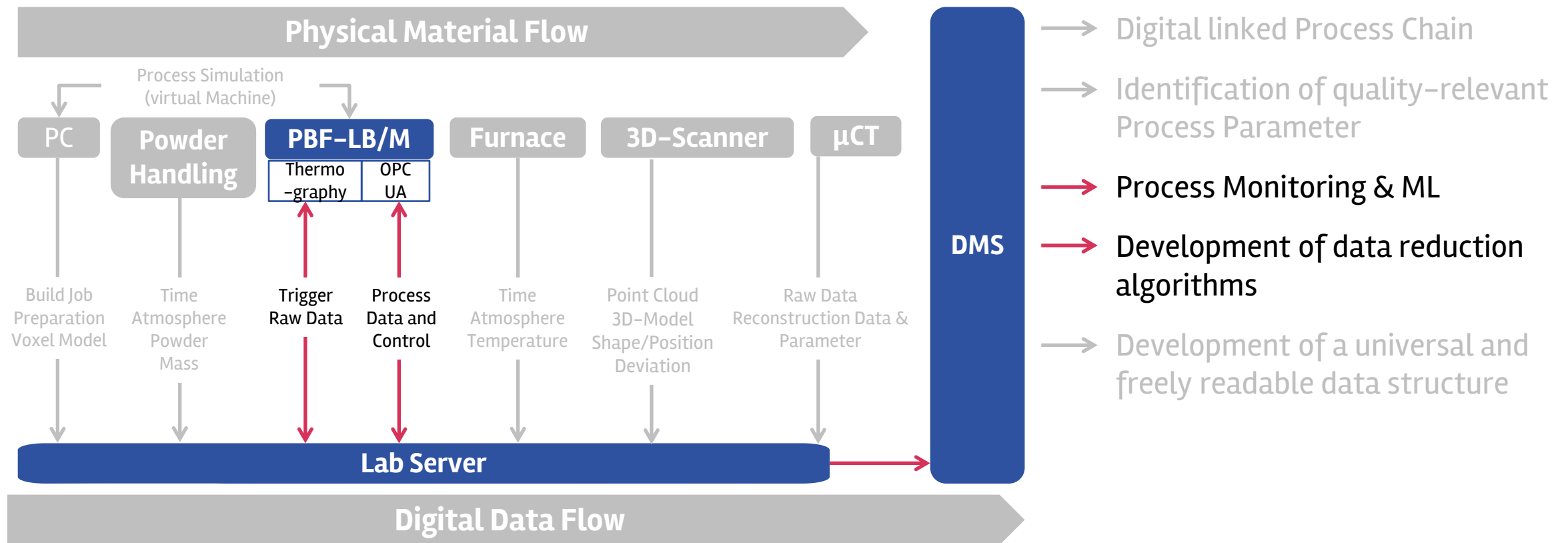


Quality Assurance:

- Root cause analysis
- Quality control
- Valid MES dataset
- Minimized loss of procedural knowledge along the process chain

Overall Performance:

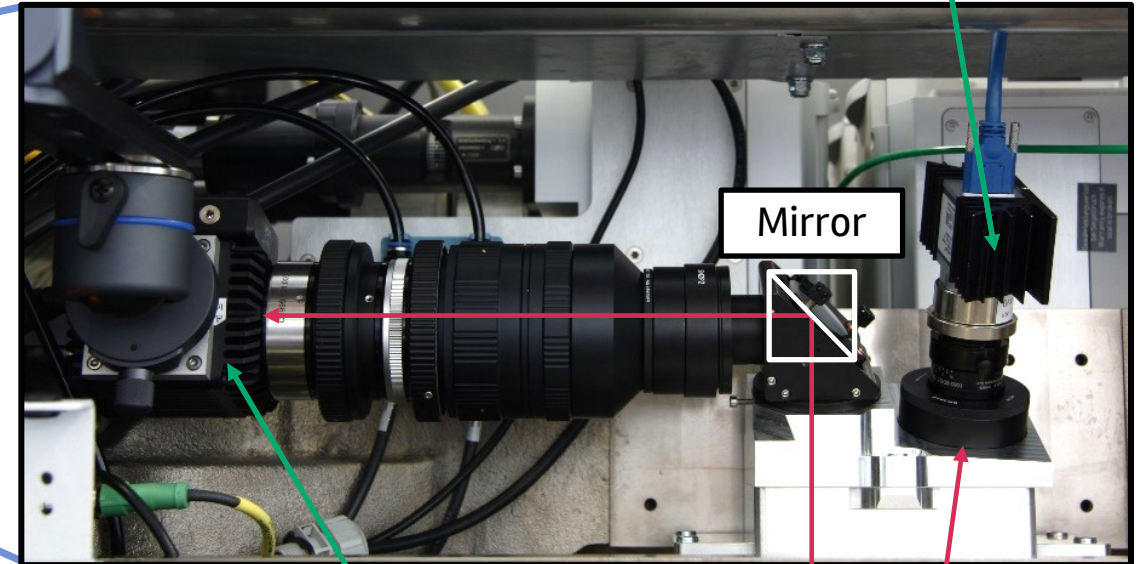
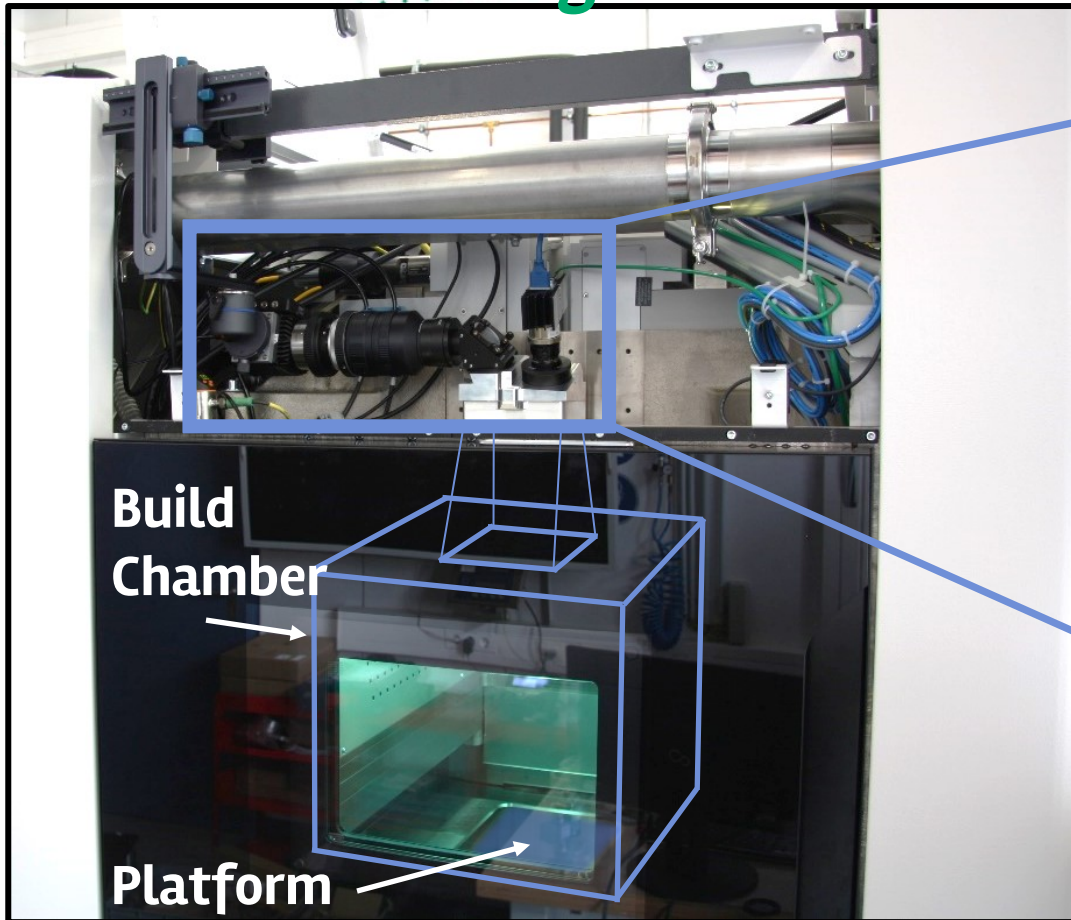
- Reduction of pre-processing time
- Platform enables part to part Variation
- Holistic data for economic assessment



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Process Monitoring & ML



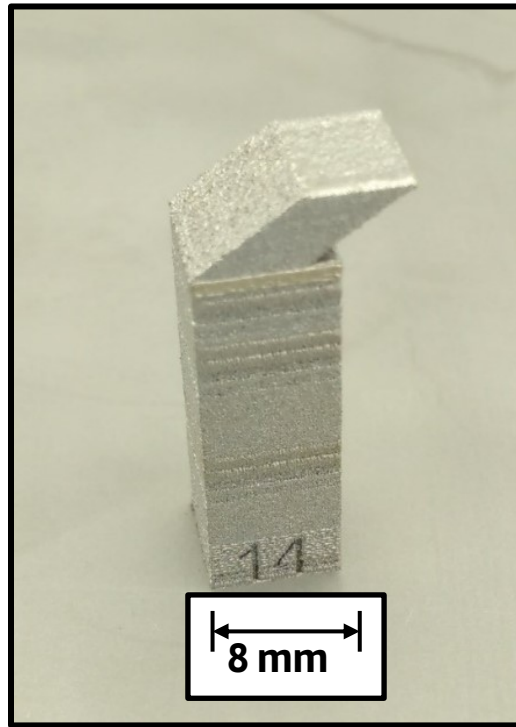
SWIR Camera



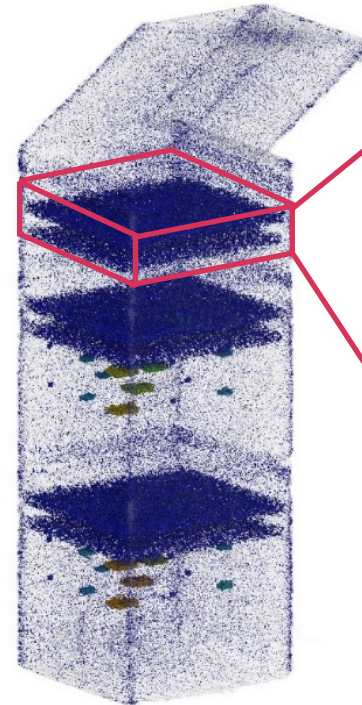
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Process Monitoring & ML

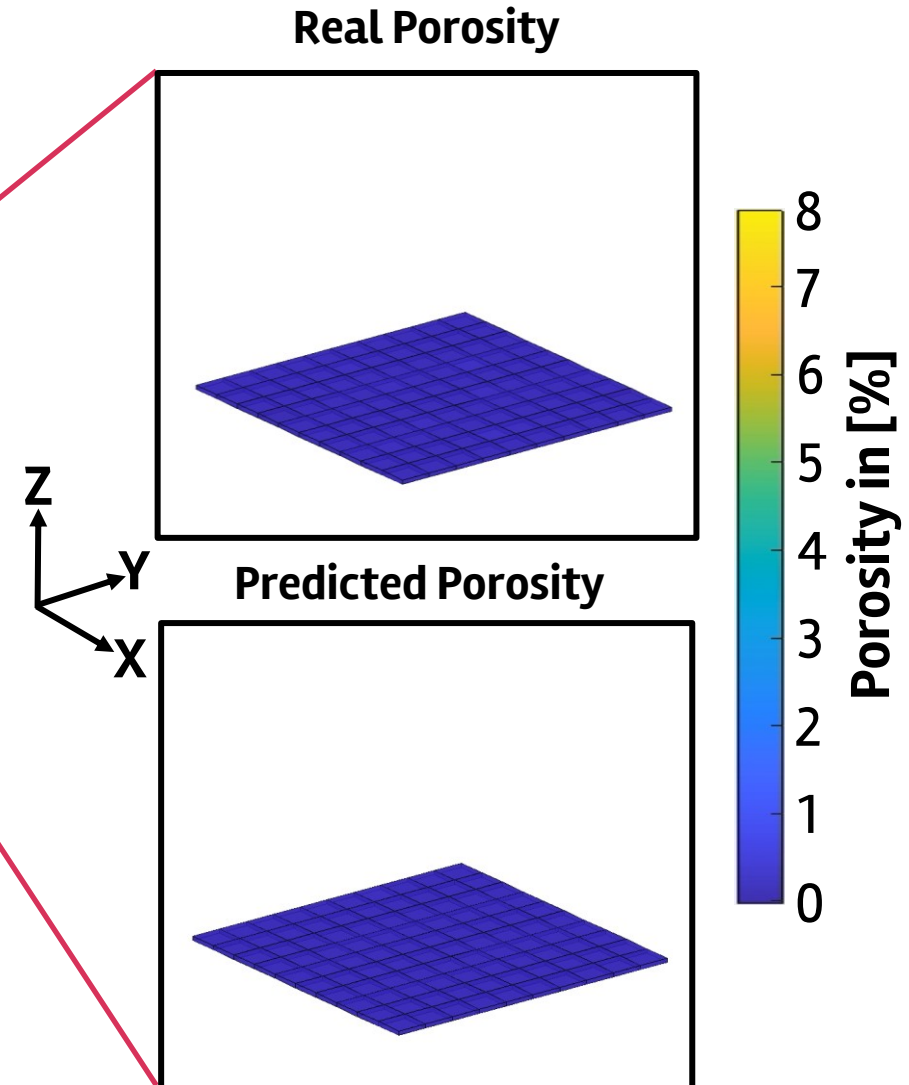
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Printed Part



Defect
Distribution
(XCT)

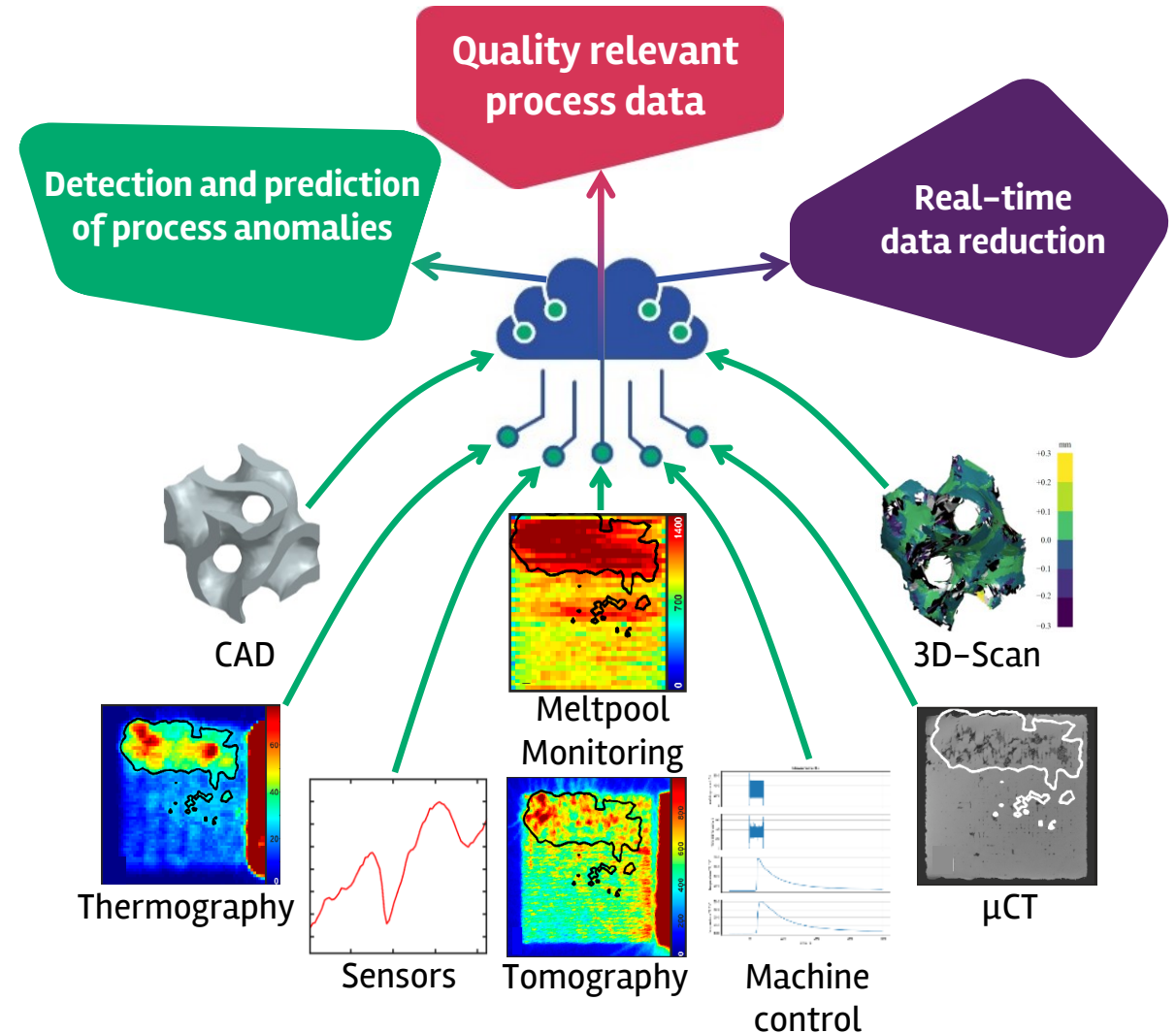


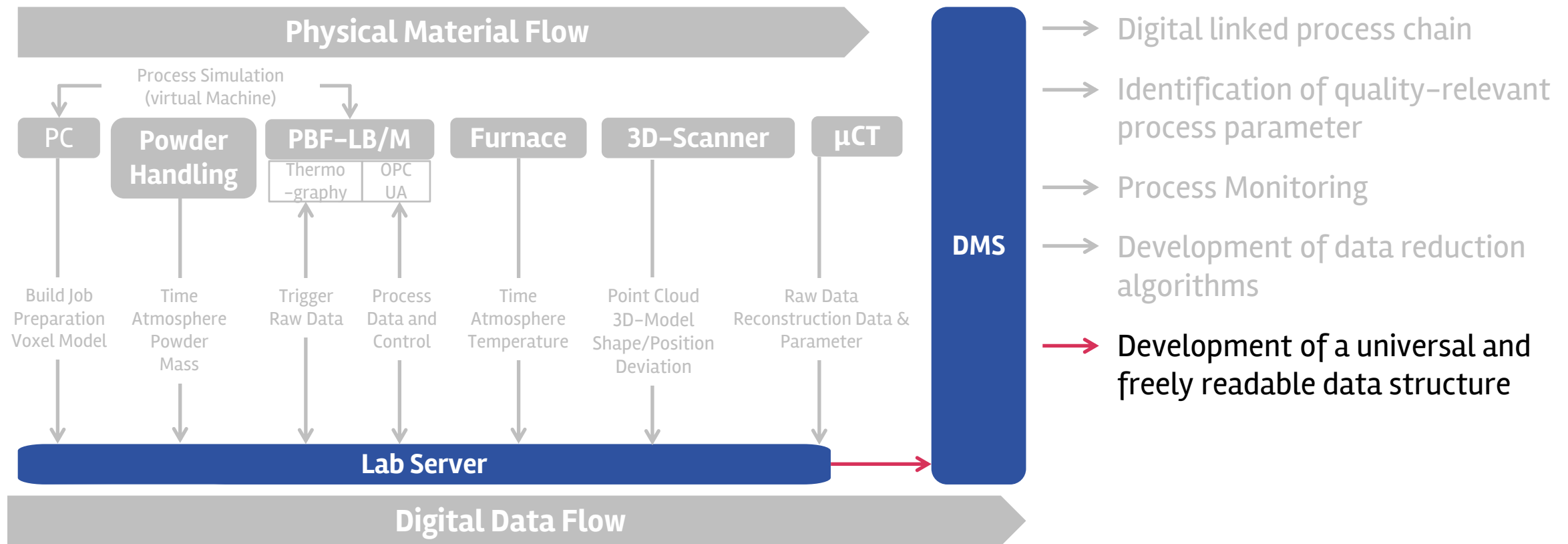
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DATA ANALYSIS

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- Detection of component defects using thermography, OT and other sensor systems
 - Development of measurement systems
 - Modeling (among others by ML)
- Methods for data registration
- Identification of quality-relevant process characteristics
- Identification of uncertainty factors (measurement technology, ML, etc.)





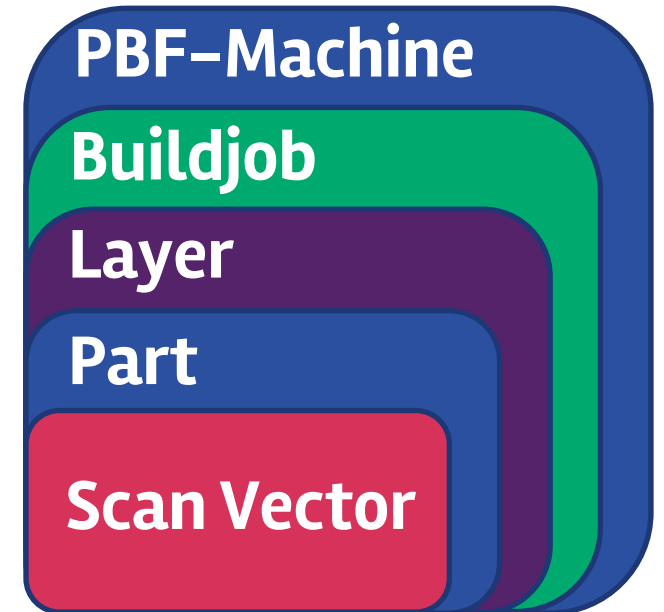
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UNIVERSAL FILE STRUCTURE

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Structure:

- Metadata
- Voxel based geometry incl. build job preparation
- Process data layerwise, incl. in-situ and ex-situ qa-data
- Postprocessing, part specific ex-situ qa-data
- Result section, links, qa-relevant data



Data sources/interfaces:

CAM Software

Build Processor

REST-API

OPC UA

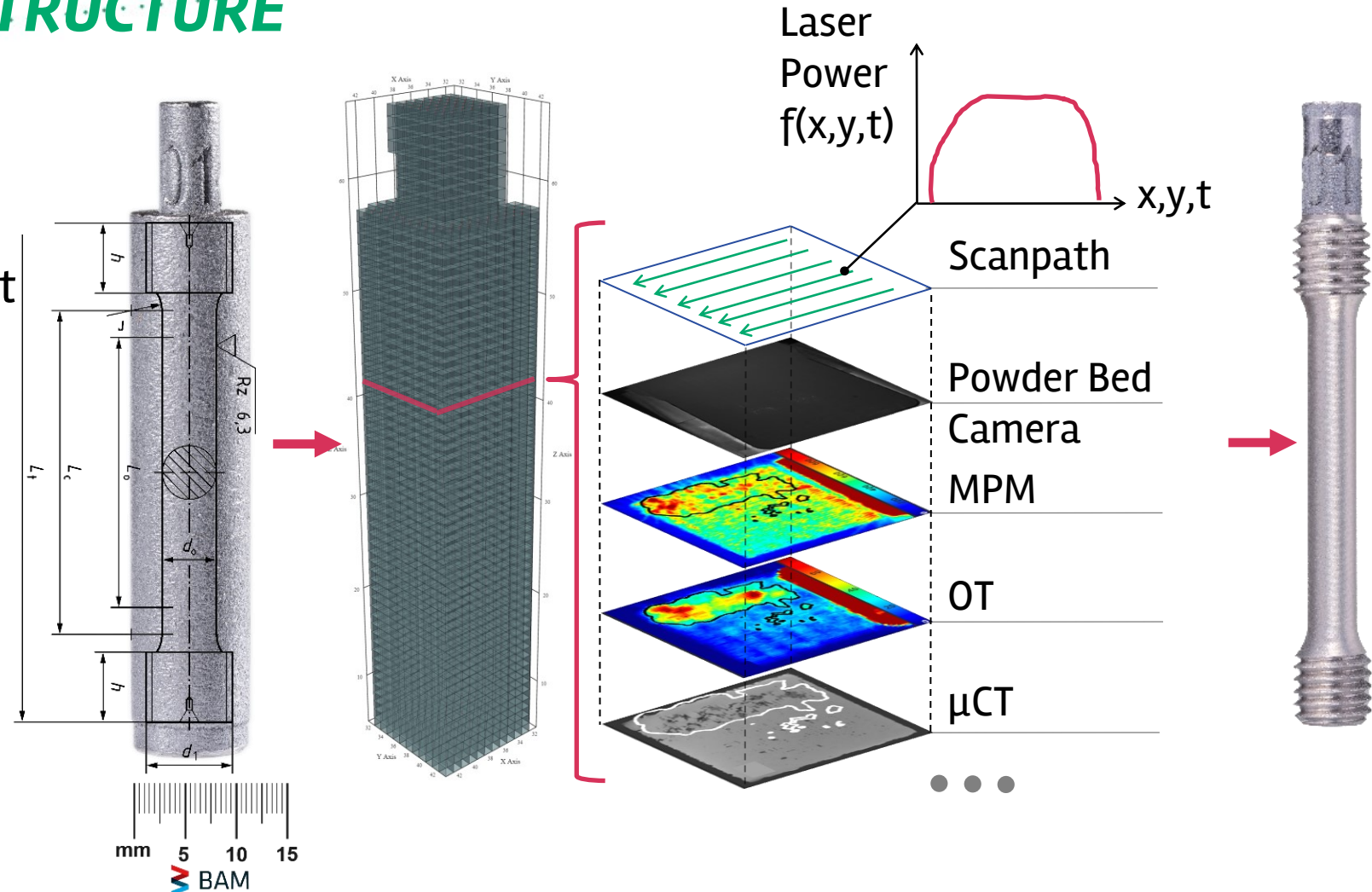


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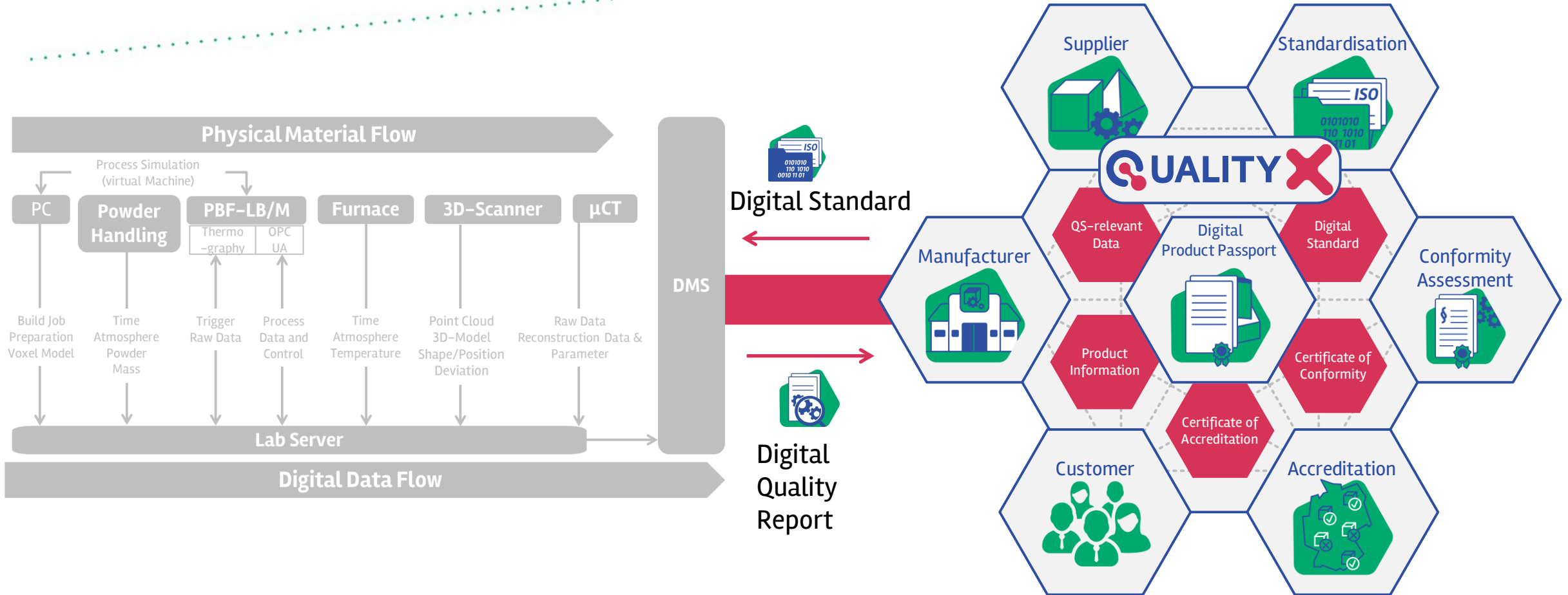
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- Simple process data management for AM
- Provide/exchange part specific qa-data
- Voxelmodel simplifies registration of monitoring data



QI-DIGITAL – VISION OF A DIGITAL QI

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QI-DIGITAL – WHAT HAS BEEN ACHIEVED?

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- Living Lab AM was build up, digital linked process chain incl. monitoring
- ETL data pipeline was build up
- ML methods for real-time process analysis and data registration
- Networking with associations and standardisation
- Working group, create specific standardisation proposals



QI-DIGITAL – WHAT IS PLANNED FOR 2024?

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- Auditing of the Living Lab according to ISO/ASTM 52920
- Derive digitalisation potentials in certification processes
- Integration of standardised process requirements in machine-readable form
- Parameter studies for the identification of QA-relevant process information
- Connection of the Living Lab to Quality-X and demonstration of a digital QA for AM



CONTACT US!



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