Potential usage of AutomationML to feed back data from the shopfloor into the digital planning models

5th AutomationML User Conference

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Problem Statement

Planning: New vehicle

Without feedback (current scenario)

Welding of component

Welding defects recognized

Parameter optimized

With datafeedback (aim)

Feedback from errors recorded automatically

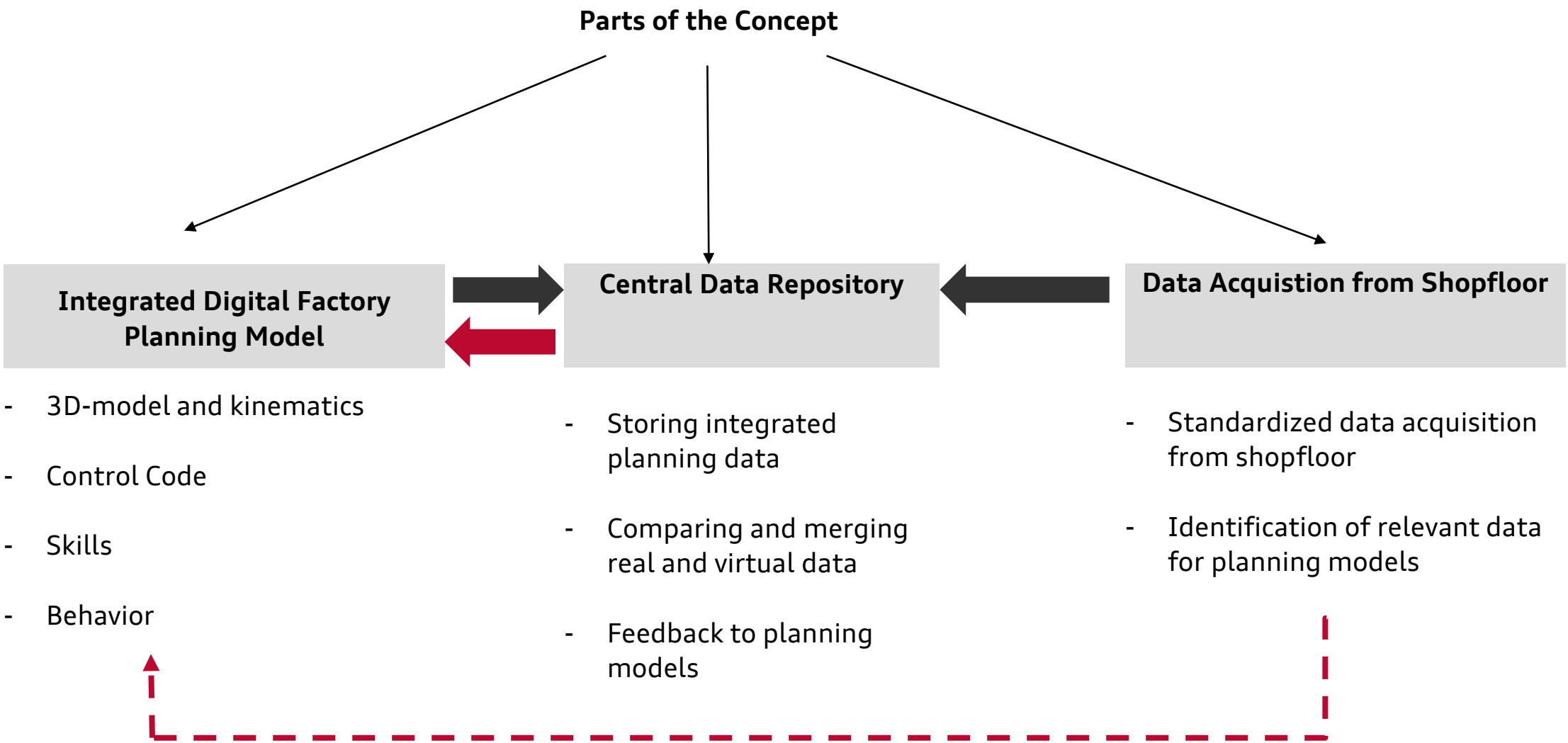
Integration of feedback in the planning process

Planning: Following ramp-up

Optimized parameter not fedback to the new planning process
→ Errors get repeated

Optimized parameters automatically Flows back to planning tools
→'Old' errors are avoided and planning process optimized; faster and error-free ramp-up

Concept of an Optimized Manufacturing Digital Process Planning



Data Acquisition from Shopfloor Devices via OPC UA

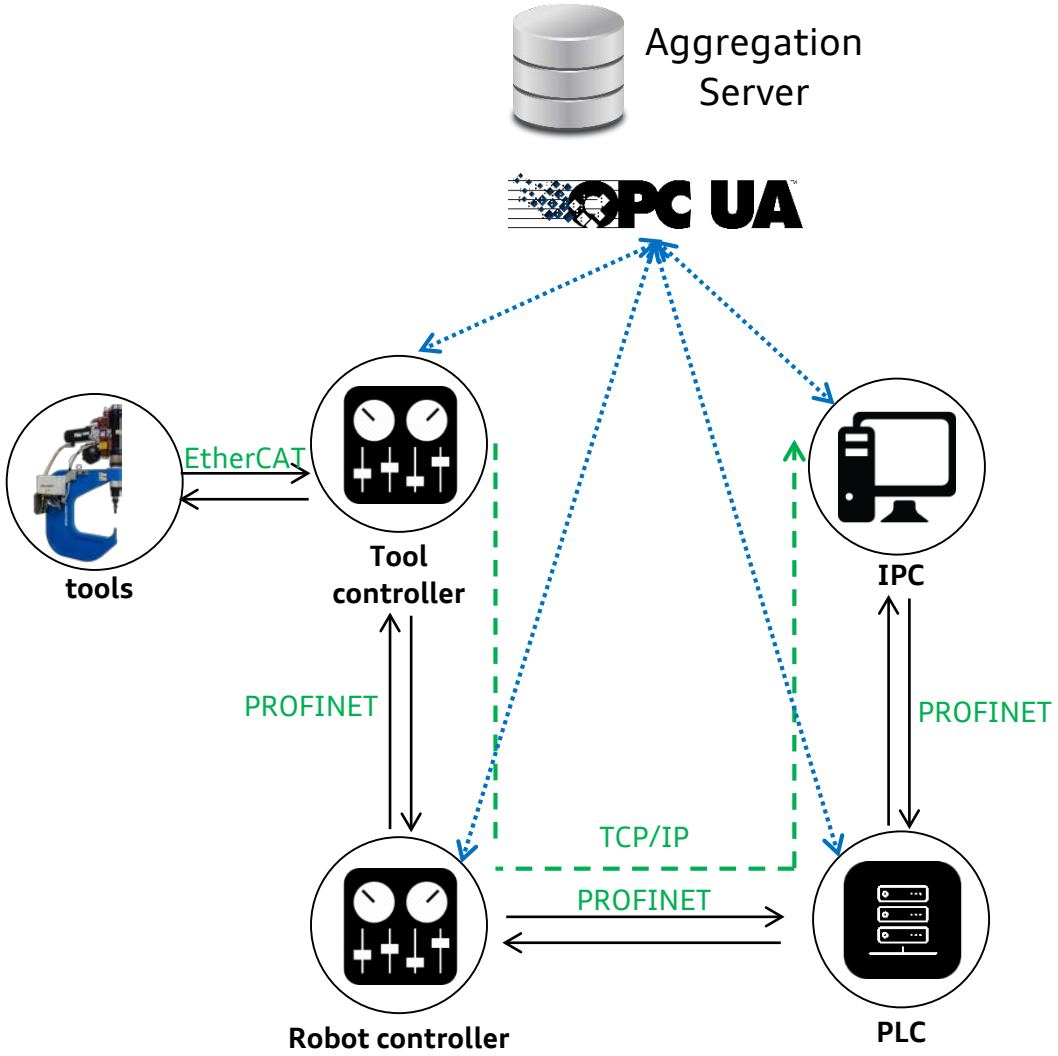
Benefits through standard OPC UA Specifications provided by OPC Foundation and Companion Specification e.g. developed in cooperation with VDMA.

Most important spec. for the integration in automotive production environment:

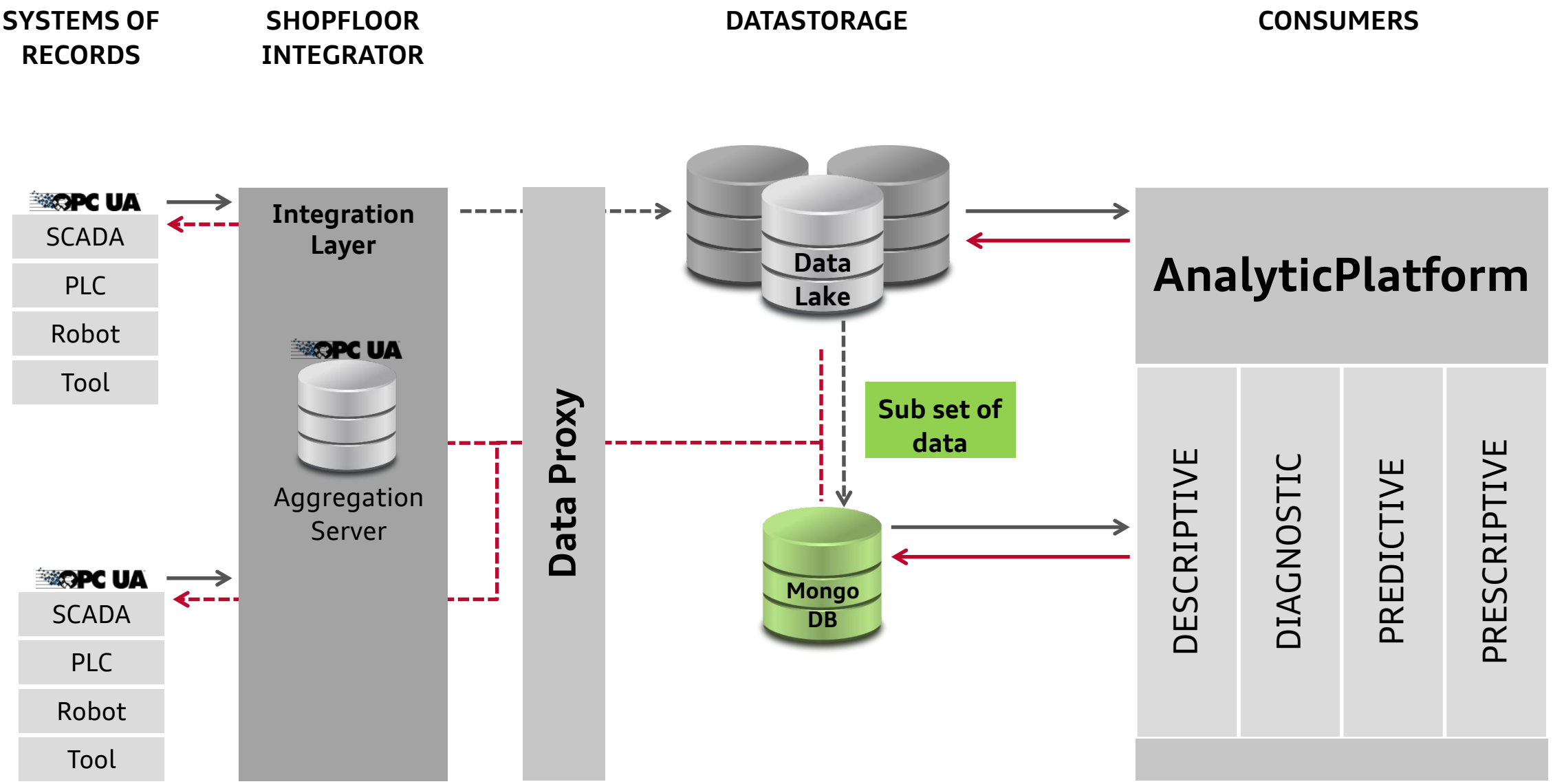
- OPC UA Companion Specifications for FDI
- OPC UA Companion Specifications for Robotics
- OPC UA Companion Specifications for AutomationML
- OPC UA Companion Specifications for PLCOpen

Standardized information models are a key factor for an interoperable data exchange within the production.

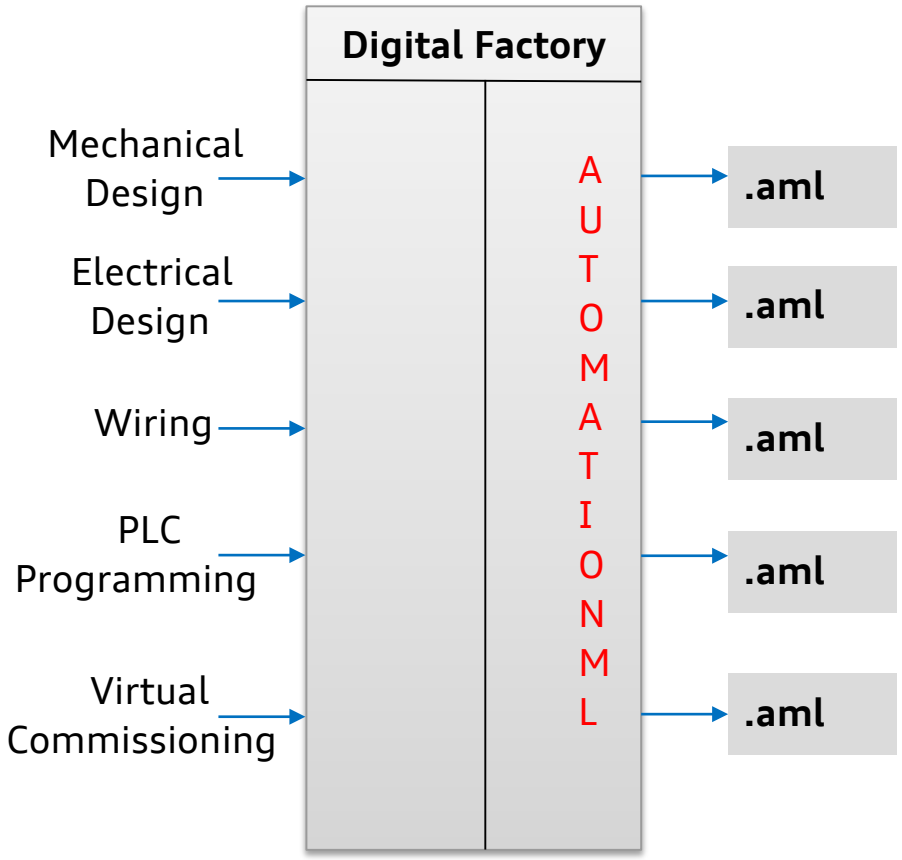
- Hierarchical structure
- Semantically description



Architecture Shopfloor to Data Lake



Digital Factory Framework and AutomationML Data Model



Problems:

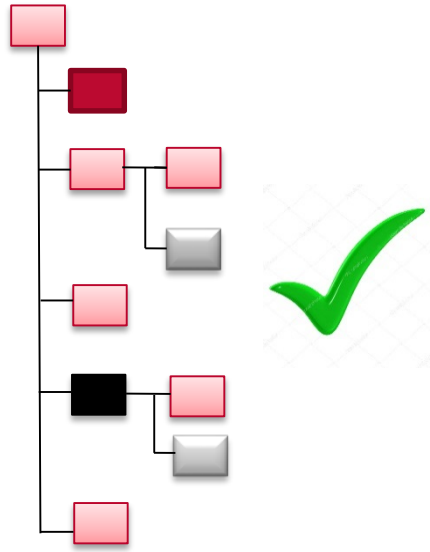
- Diverse perspectives from different domains
- Semantic heterogenity issues
- Lack of a final design, capturing original intent from each perspective

Solution:

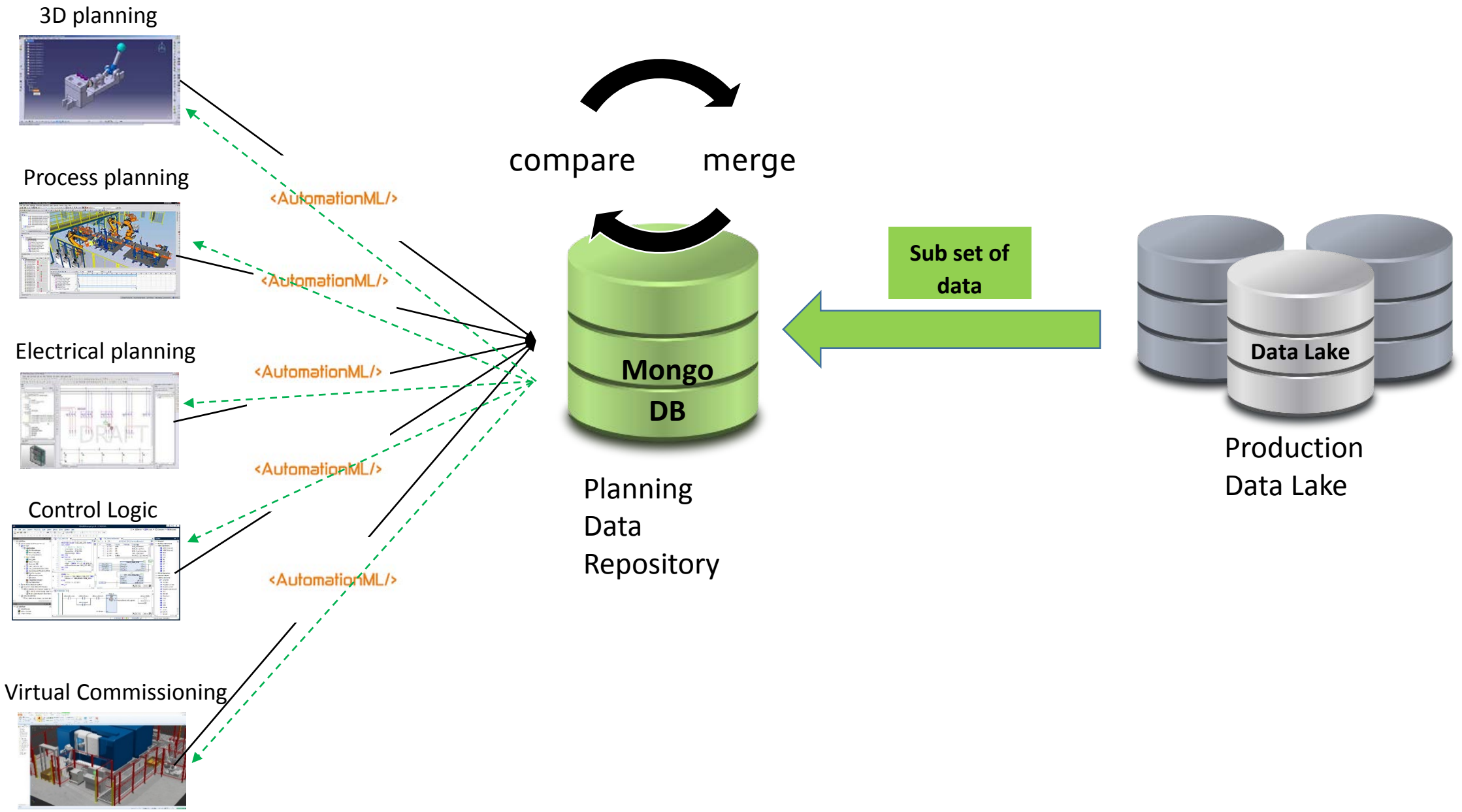
- Integrated AutomationML model semantically representing all engineering phases

Approaches

- Top-down modelling approach (TU Vienna)
- Bottom-up modelling approach: Alligator tool (University of Bonn)
- Combination of both: AutomationML ontology



Concept of an Optimized Manufacturing Digital Process Planning



Why MongoDB?

Central Data Repository

Data Functionality

1. Easy
2. Flexible
3. Fast
4. Versatile

Data Storage and Usage

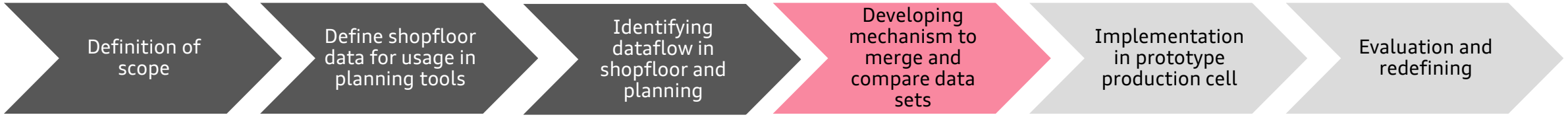
1. High Availability
2. Workload isolation
3. Scalibility
4. Locality

Platform Independence

1. Local
2. On-premises
3. Private Cloud
4. Hybrid Cloud
5. Public Cloud
6. Fully managed cloud service

Slide Courtesy: MongoDB

Research
from the concept into real prototype



Advantages

- Standardized access of data points through usage of OPC UA information models
- Optimization of planning processes through automatized usage of real production data
- Decreasing the commissioning and reducing the ramp-up time in new projects

Thank you.