

IDS 2017  
Industrial Data Science Conference

# Application of Data Mining for Prospective Assembly Time Determination

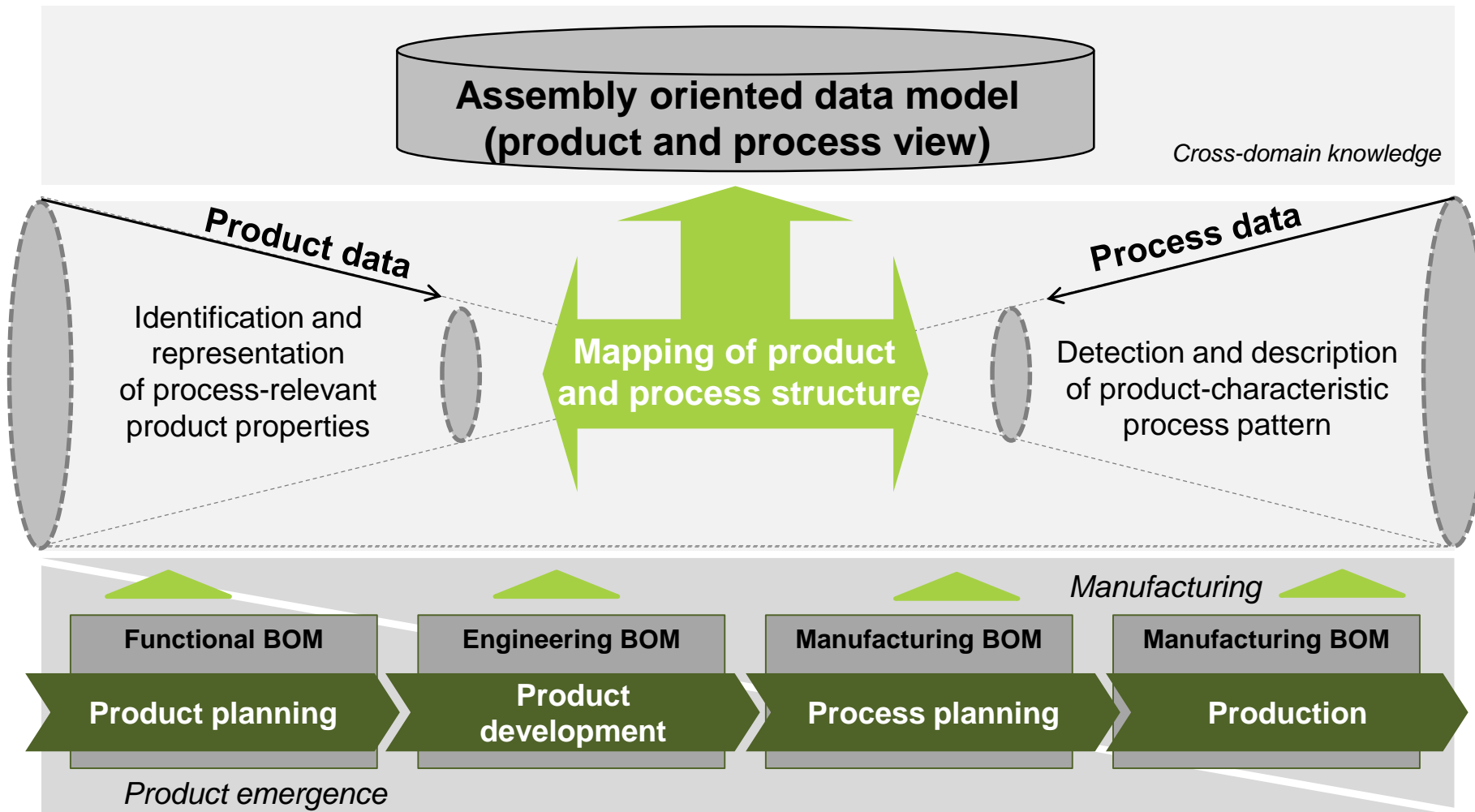
Dortmund / 05.09.2017, Dr. Olga Erohin and Ralf Kretschmer

# Agenda

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- **Miele Group and Business Unit Professional**
- **Research Project „Pro Mondì“ and time data management**
- **Knowledge discovery for prospective assembly time prediction**
- **Assembly time prediction in the product development phase**
- **Conclusion**

# Scope and goals of the research project Pro Mondri

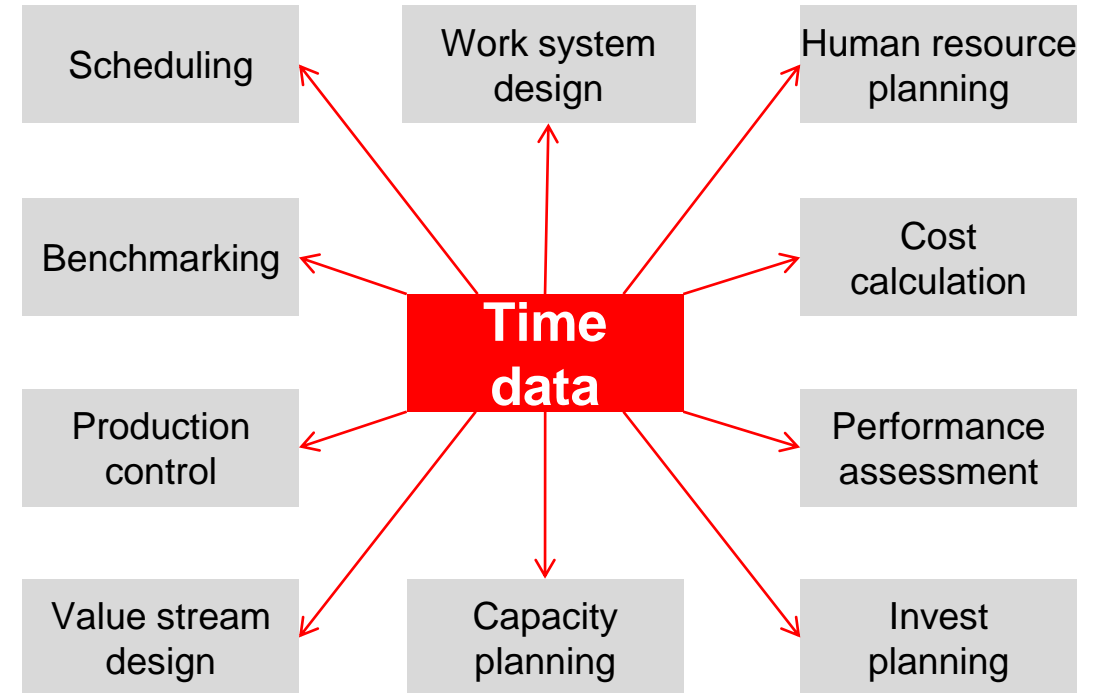


Research project (2012-2015):  
„Prospective determination of assembly work content in digital factory (Pro Mondri)“



BOM=Bill of Materials

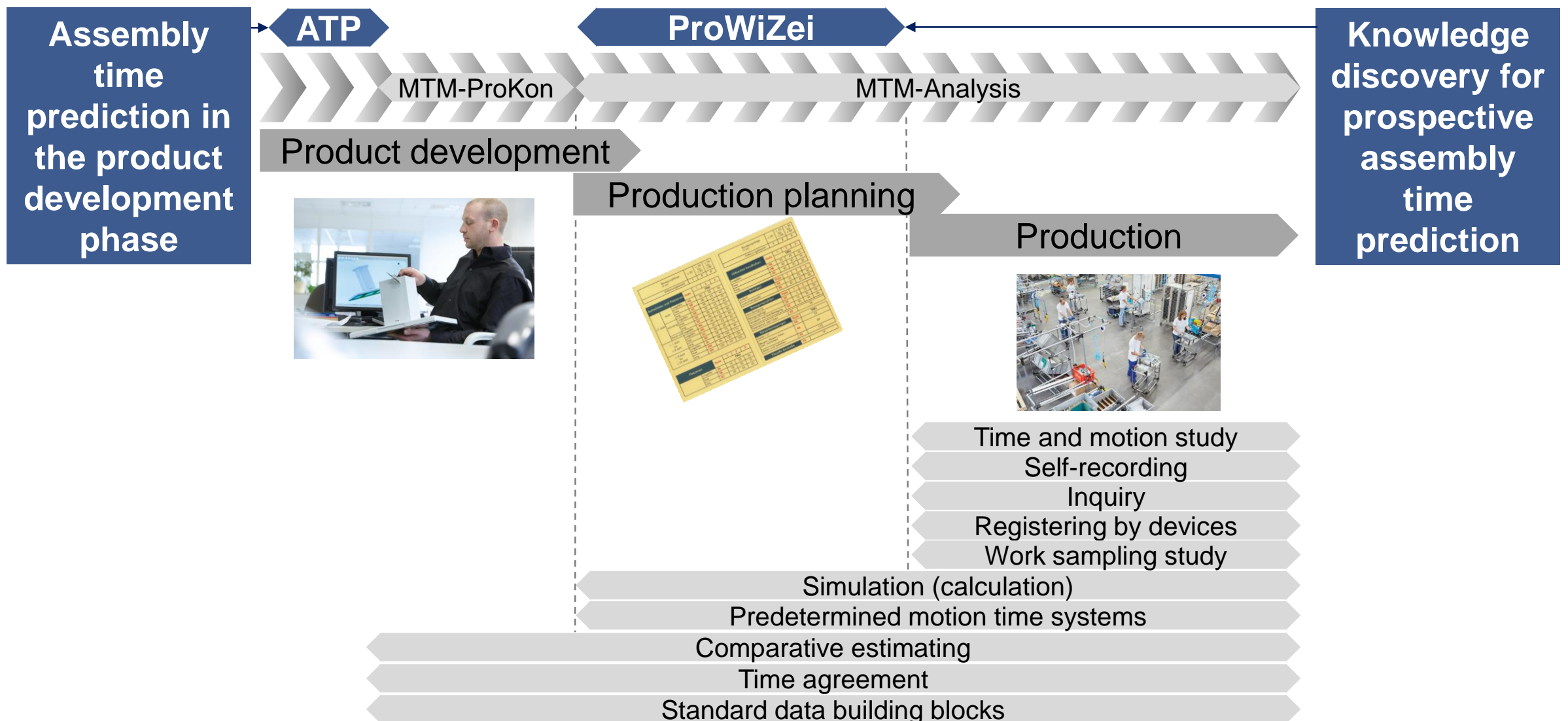
# Assembly time is the basis for various processes



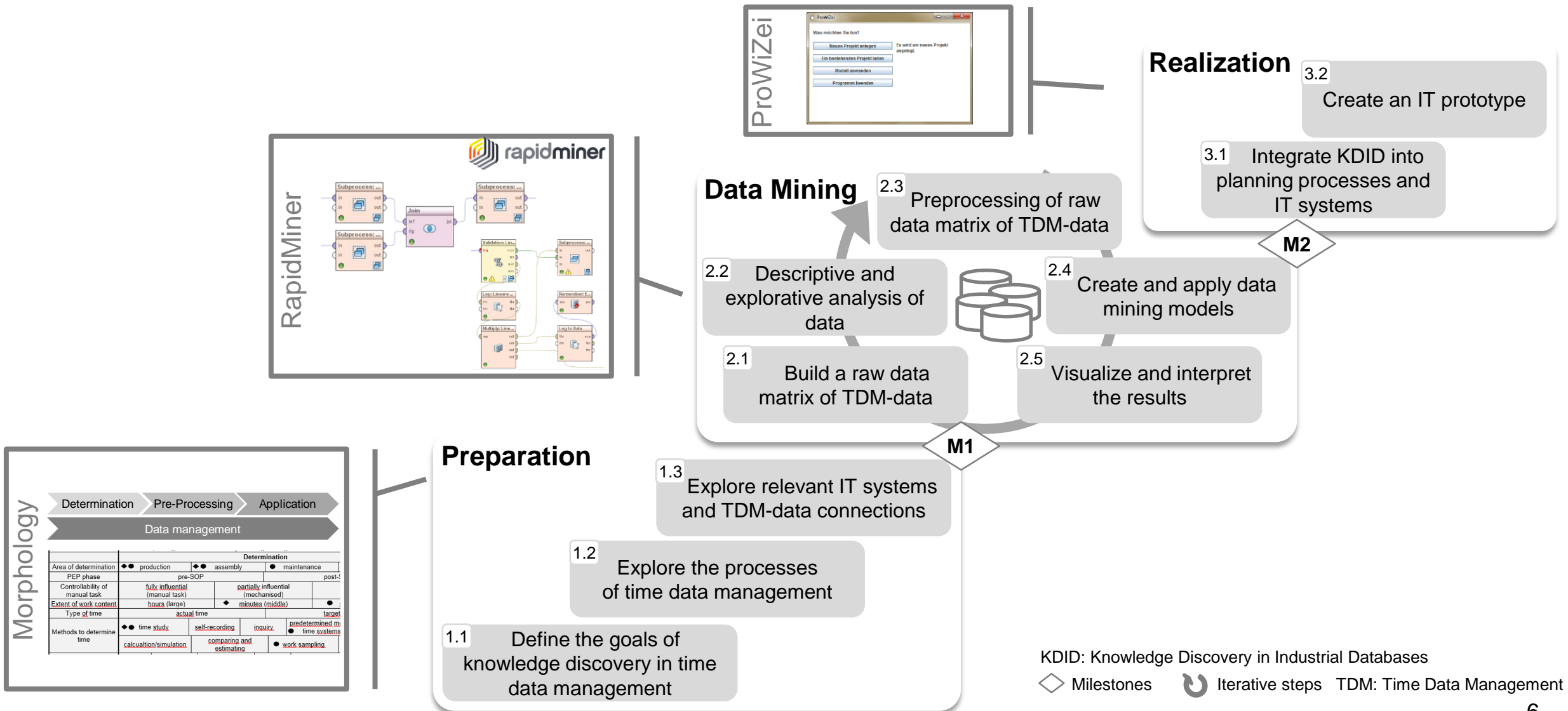
- 15-70% of production time is assembly time
- Manual assembly is a wide-spread assembly method for multi-variant products

- Time-related data are applied in manifold areas
- Time data management (e.g. time studies) is an essential task field of Industrial Engineering

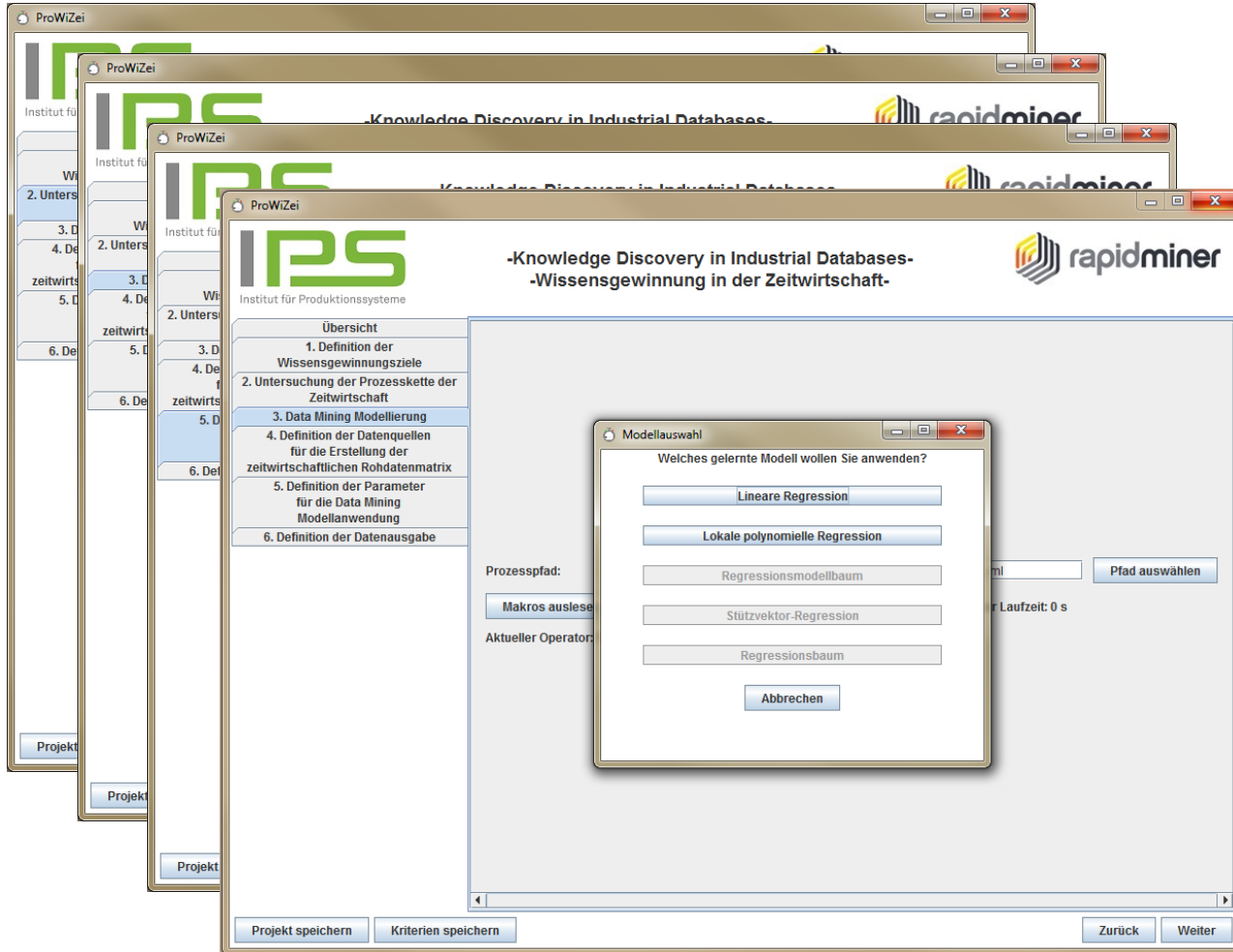
# Two results of the research project Pro Mondri



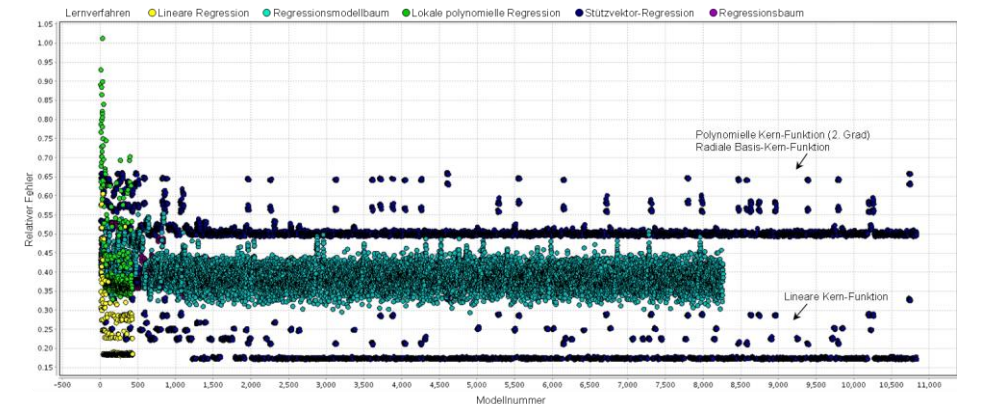
# KDID in context of time data management



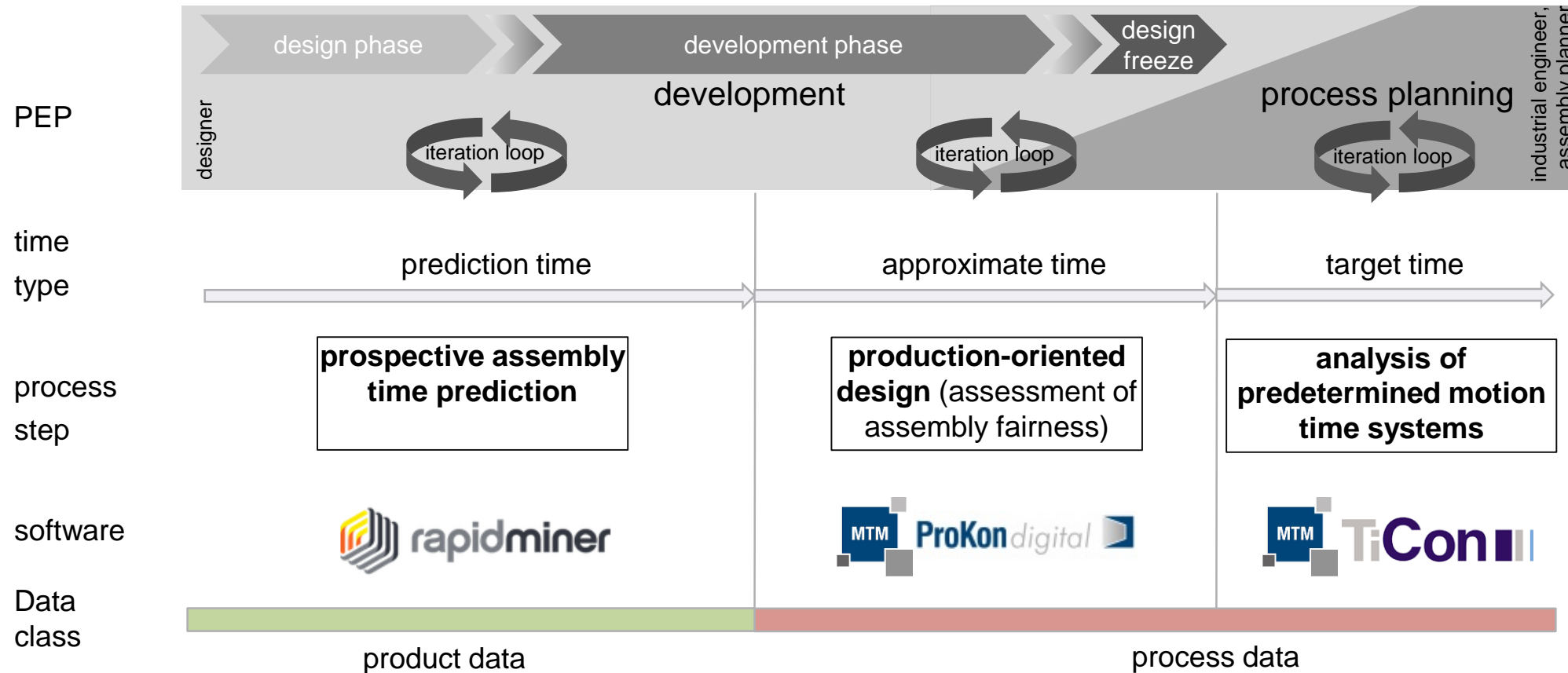
# Realization of KDID and some prediction results



Data Mining method	RapidMiner operator	Relative error
Linear regression	Linear Regression	18,2%
Local polynomial regression	Local Polynomial Regression	33,1%
Regression model tree	W-M5P	33,4%
Regression tree	W-RepTree	29,5%
Support vector regression	LibSVM Support Vector Machine	17,1%

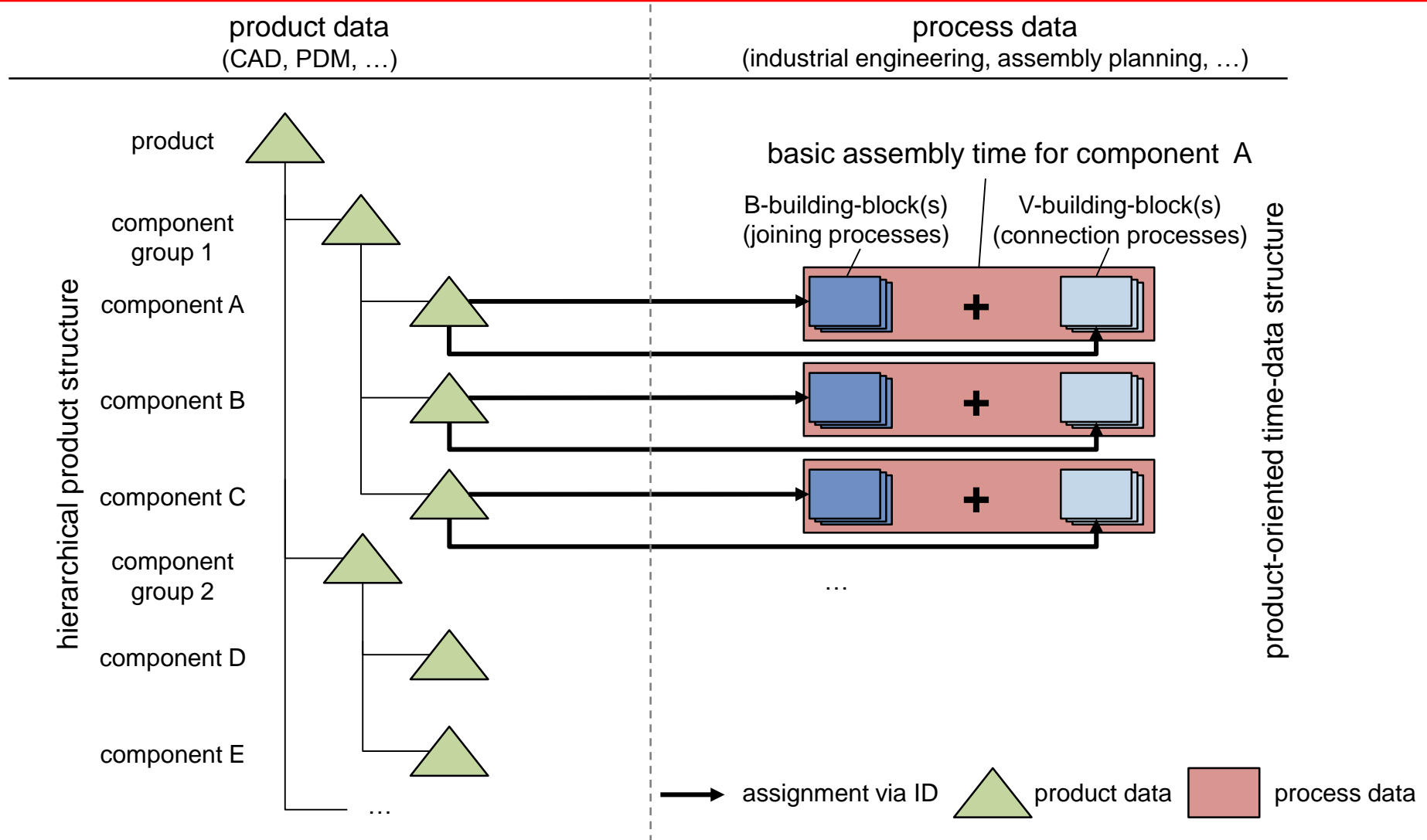


# Continuity of time data determination along the product emergence process (PEP)

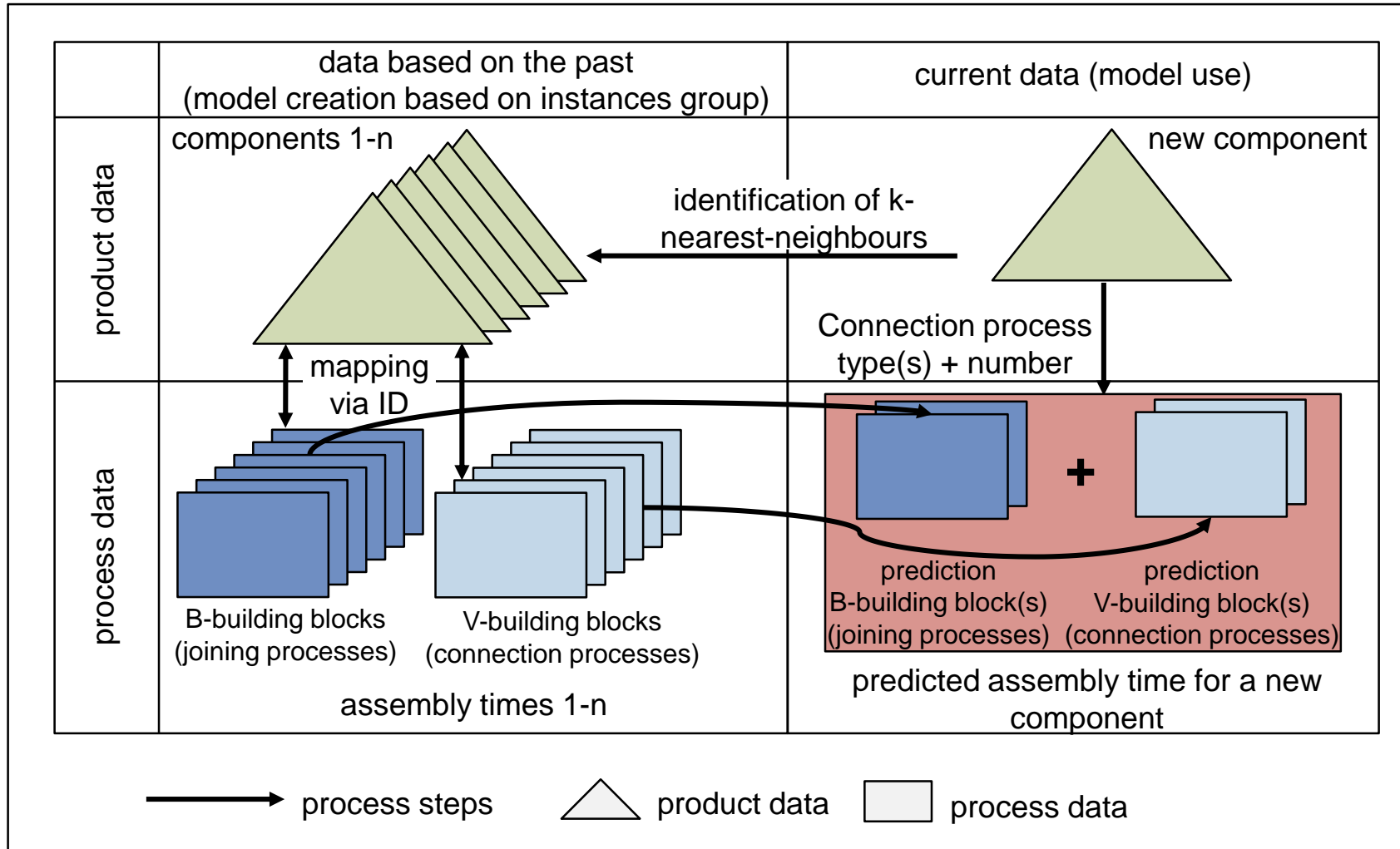




# Mapping of product and process data

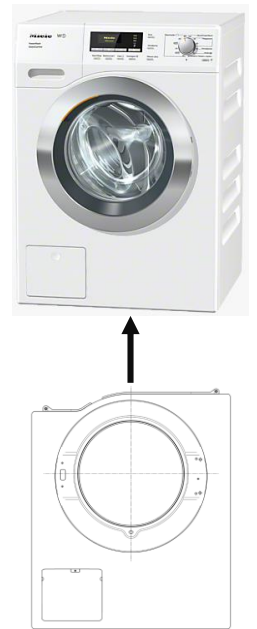
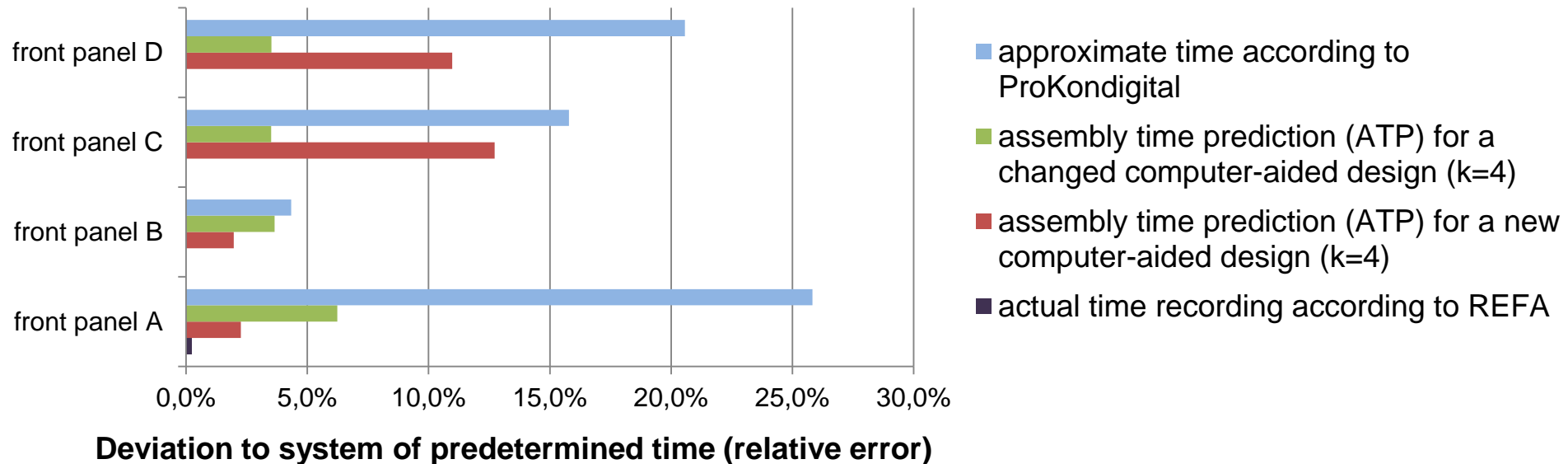


# Concept for assembly time prediction



# Evaluation: Validation and assessment of results

## ■ Assembly-time prediction compared to system of predetermined time (MTM-TiCon) and other established time-determination systems



## ■ Conclusion:

- Best results for further development within the component family
- Widely varying quality of results for complete new design and/or missing component family (=> small data amount for comparable components related to the past)

# Conclusion

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- **Integration of data mining for prospective determination of assembly time leads to essential added value for planning and decision-making**
- **... and supports the idea of simultaneous engineering to reduce the product emergence time.**
- **Current portfolio of methods for time determination can be successfully extended by new data mining methods.**
- **Fundamental factors of success are**
  - Integration of specific know-how of the application area (especially at the beginning of knowledge discovery).
  - Overcoming the challenges of “historically evolved” IT infrastructures.

**Thank you very much for your kind attention!**



**For further information please visit:**

[www.pro-mondi.de](http://www.pro-mondi.de)



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