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SMACC
DIGITAL BOOST FOR FINNISH INDUSTRY

CERN

Industrialization and Manufacturing System Modeling Approach for 16T FCC Magnets

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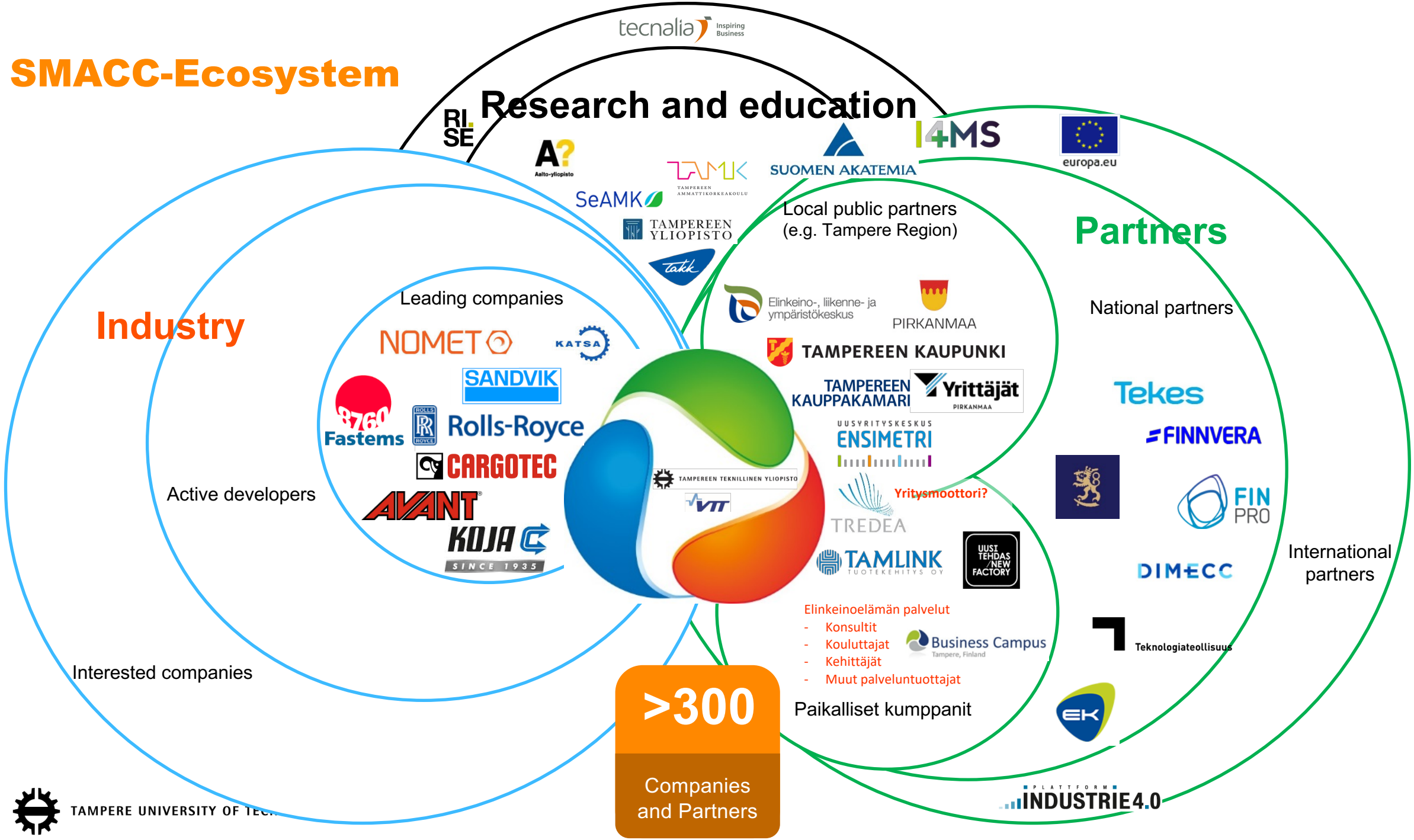
Agenda

1. SMACC Ecosystem
2. SMACC Labs
3. Cost Modeling Methodology
4. Dimension Reduction Methodology
5. Production Monitoring System (MES) – Status
6. Conclusion

SMACC-Ecosystem



SMACC Labs

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VTT

TAMK TAMPEREEN AMMATTIKORKEAKOULU

VTT MIKES METROLOGIA

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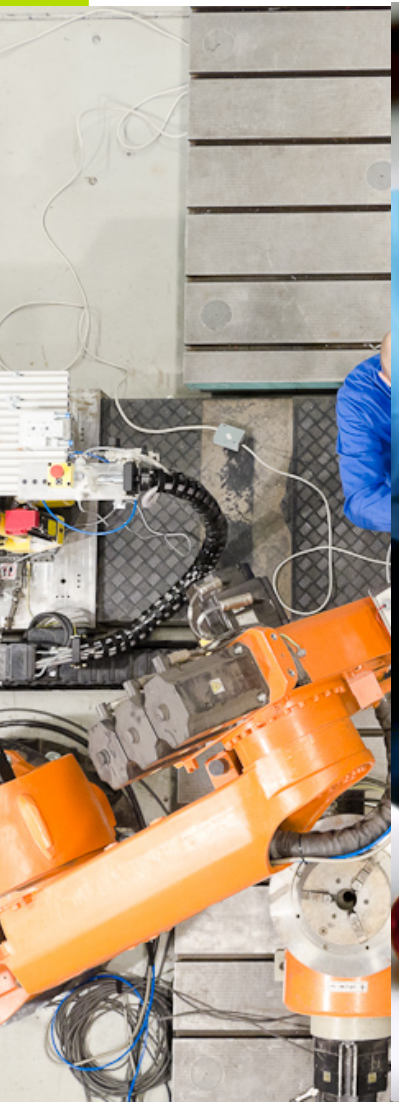
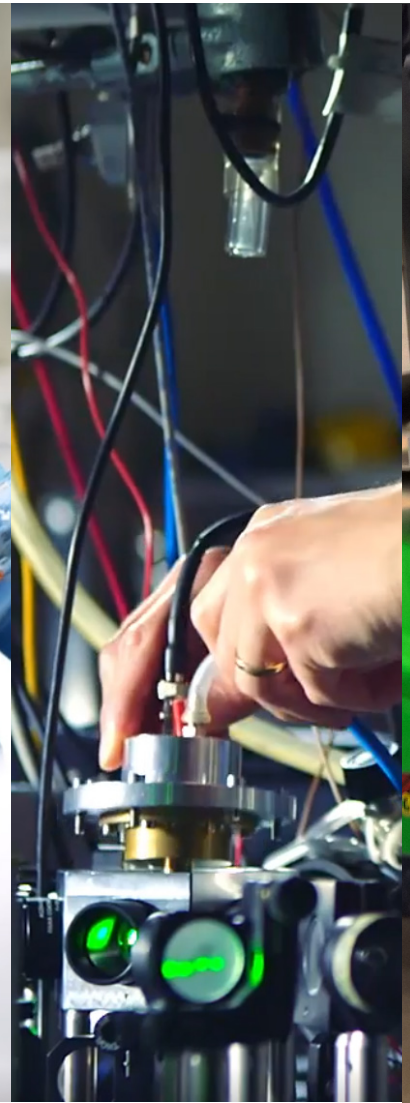
Robotic Village



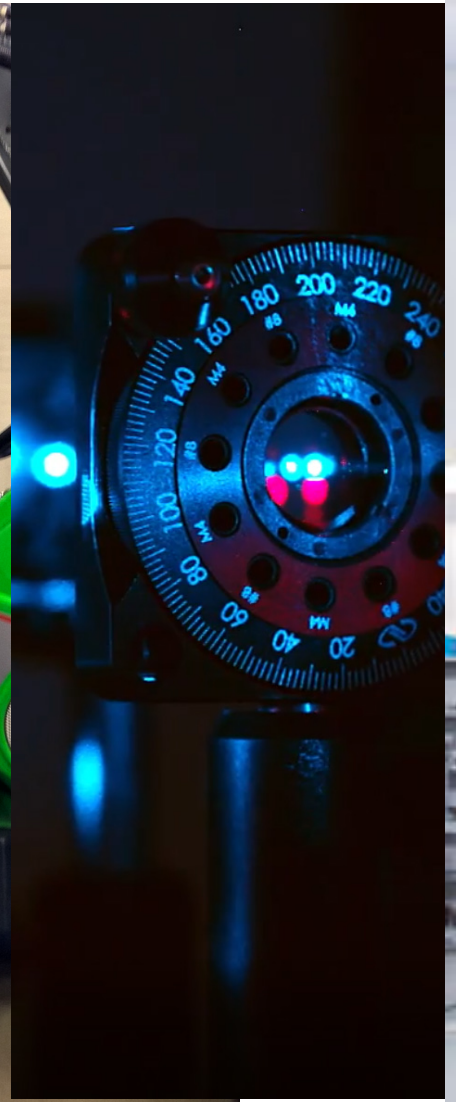
Material Insight

Digital Factory



Smart Machines

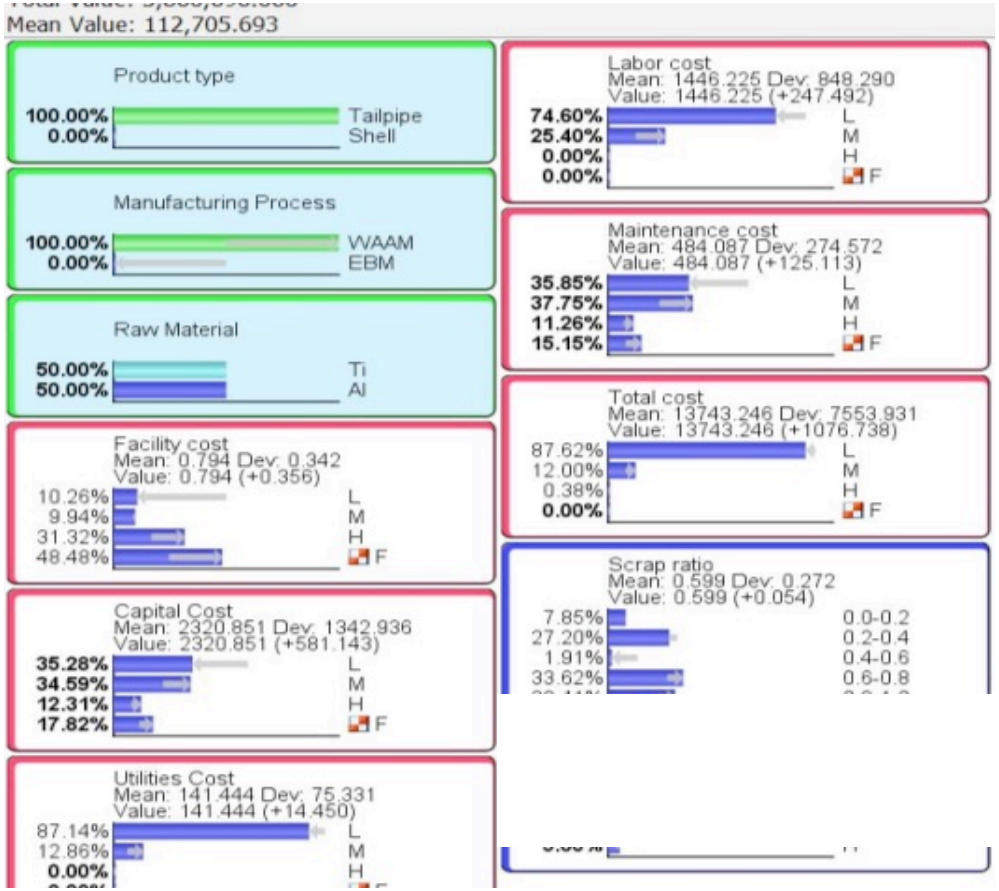
Digital Systems



Metrology

Cost Modeling Methodology

- *Goal*:
  - i. To develop an analytical manufacturing cost model for 16T FCC magnet
  - ii. Selection of KPI (Key performance Indicator) for cost and their value estimation
- *Methodology*:
  - *i. Bayesian Network-based* cost model is developed
- *Results*:
  - The method is tested on multiple cases

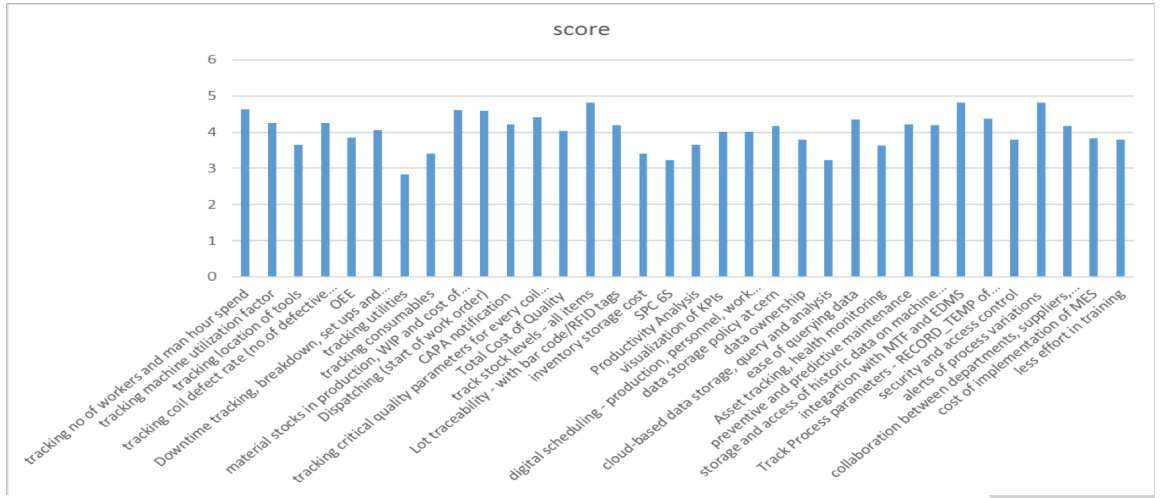


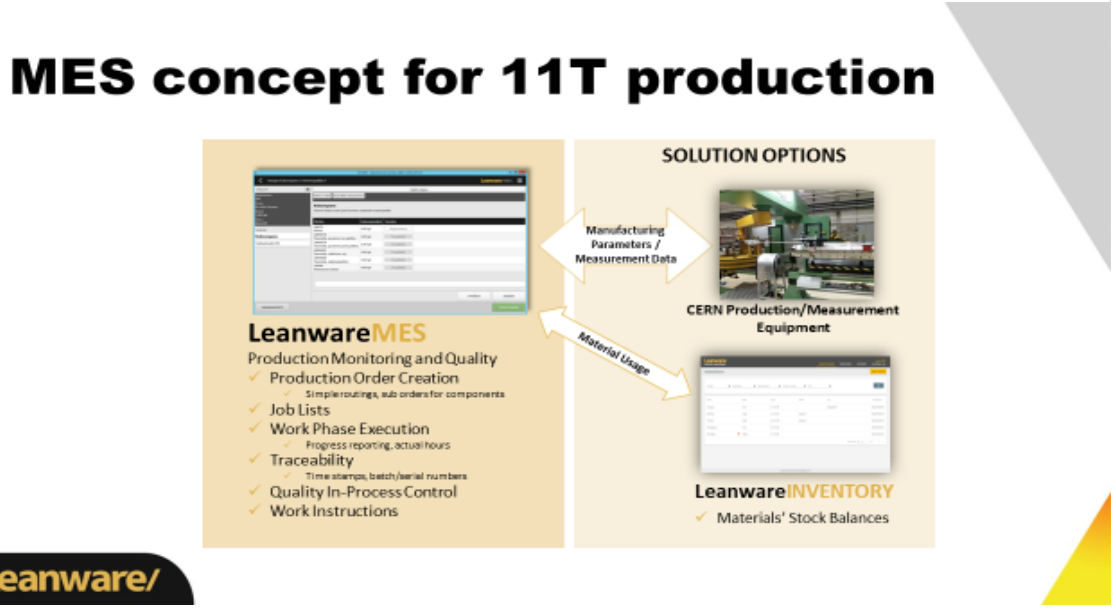
Dimension Reduction Methodology

- *Goal*:
  - To develop a Dimension Reduction method for cheaper and faster cost requirement estimation and optimization
- *Methodology*:
  - *Dimensional Analysis Conceptual Modeling (DACM)* and *Network Analysis Theory* is used for DR process
- *Results:*
  - First optimization result is obtained based on reduced set of dimensions

Production monitoring system (e-MIP)

- *Goal*:
  - To monitor 11T production for accurate cost estimation per magnet
  - Digitalized QMS for new magnets
- *Methodology*:
  - MES/MOM
- *Result:*
  - MES concept demonstration with Leanware Oy
  - decision/discussion stage for pilot (demonstrator)





Ref: Leanware presentation

Leanware/

Conclusion

1. A Bayesian Network-based cost model is developed and tested case study and same technique is used to build the 16T manufacturing cost model
2. A Dimension Reduction methodology is developed for cheaper and faster cost estimation and optimization
3. MES/MOM concept is developed for 11T magnet production with Leanware Oy. There is a requirement of various other industrial expertise in manufacturing the superconducting magnets.
4. To know more please contact:

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