



**EUROPEAN
4.0 TRANSFORMATION
CENTER**



E40TC

Unternehmertum im Transformationsprozess Industrie 4.0 am Beispiel der e.GO-Mobile AG

21. Symposium Group-of-Fifteen
Dr. Thomas Gartzon, Zürich, 29. Januar 2020

RWTH Aachen Campus facilitates inter- and interdisciplinary collaboration of scientific community and enterprises



~2.5 km² research area
~2 bn€ total investment
~10.000 new workplaces
~250 research institutes
Over 400 leading tech companies enrolled
31 technology center, many with engineering and production focus



1



© RKW

Cluster Sustainable Energy

E.ON Energy Research Center

2



© LMAG

Cluster Photonics

Finalization Spring 2016

3



© Klass, BLB NRW

Cluster Heavy Duty Drives

Occupation Spring 2015

4



Cluster Smart Logistik

eLab
Summer 2015

5



© WZLforum

Cluster Production Engineering

Autumn 2016

6



© BLB NRW

Cluster Bio-Medical Engineering

Spring 2015



The ability to configure industrial and research competencies already shows its potential

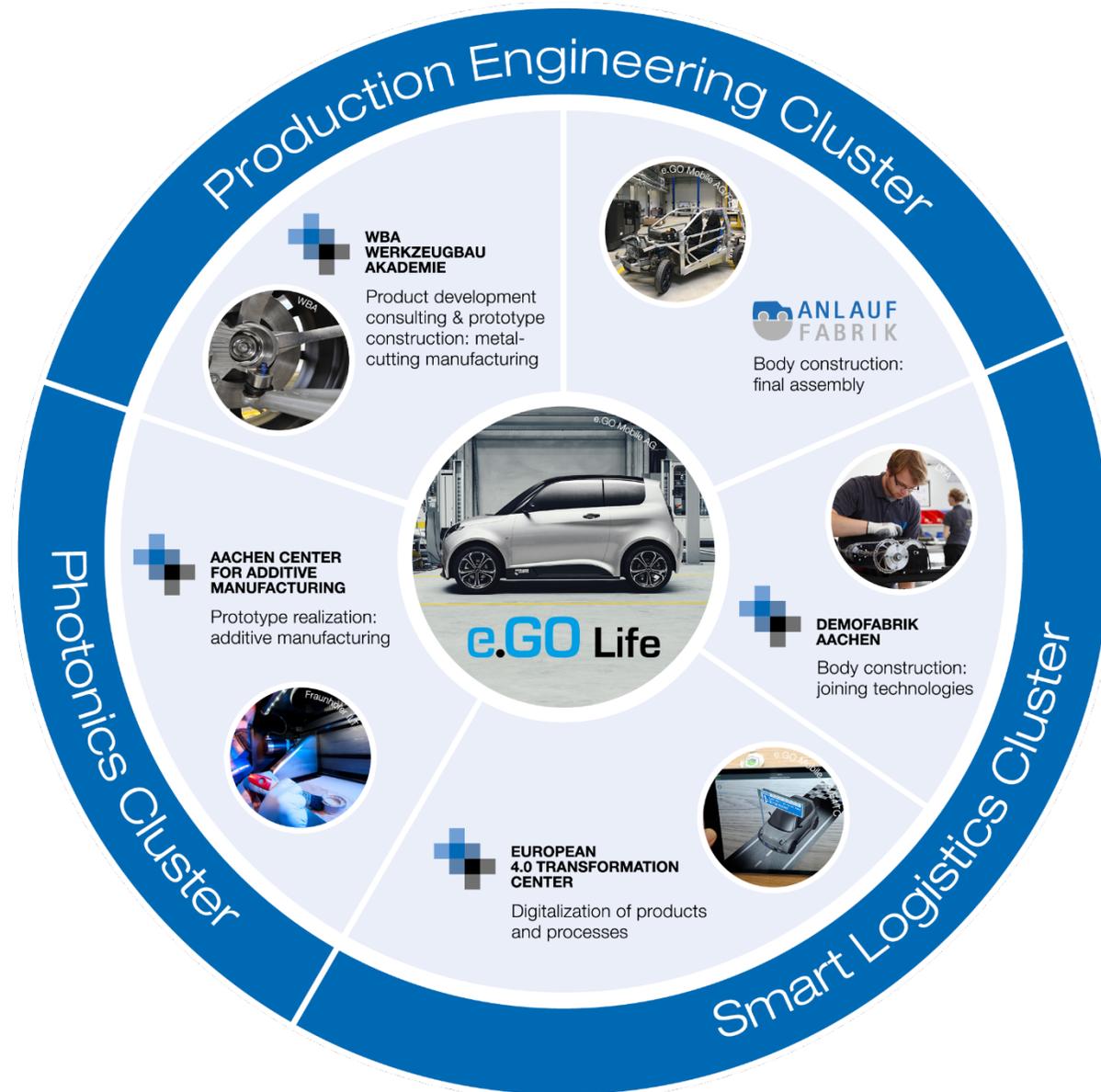


e.GO Life

- ✓ Fun
- ✓ Practicable
- ✓ Affordable



RWTH Aachen Campus Clusters and Centers supporting e.GO



New vehicle concepts | affordable, emission-free passenger cars



Small Powertrain

Simplicity

Modularity

Value stability

Design-to-cost

Digital product



Platform e.GO Life | The innovative vehicle concept enables new and cost effective production processes for small series production



Small Powertrain

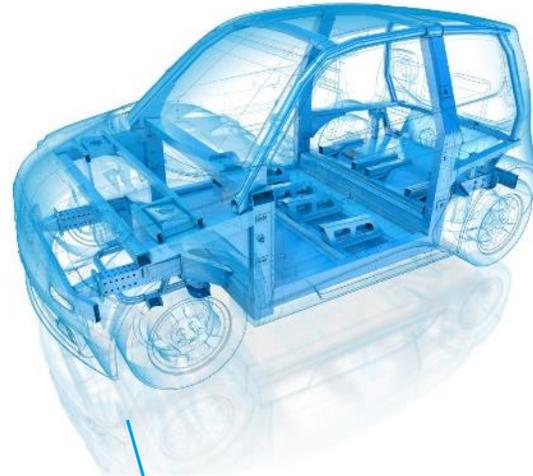
Simplicity

Modularity

Value stability

Design-to-cost

Digital product



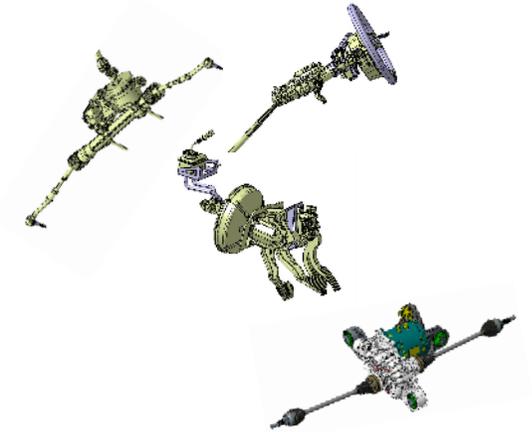
Space Frame
Aluminum

- Innovative space frame vehicle structure leads to reduced tooling costs compared to a self-supporting body structure
- Meets high safety requirements
- No press-shop and no paint-shop required leading to reduced production cost



Exterior
Thermoforming

- Exterior ABS-plastic components for direct mounting to the frame
- Reduced tooling cost for thermoforming tool set
- Quick implementation of design changes



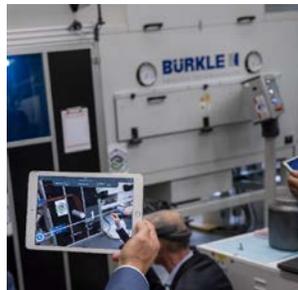
Components
Off-the-Shelf

- Using Off-the-Shelf components
- Reduction of development costs

3 years ago – e.GO's first rolling chasis prototype in 2016



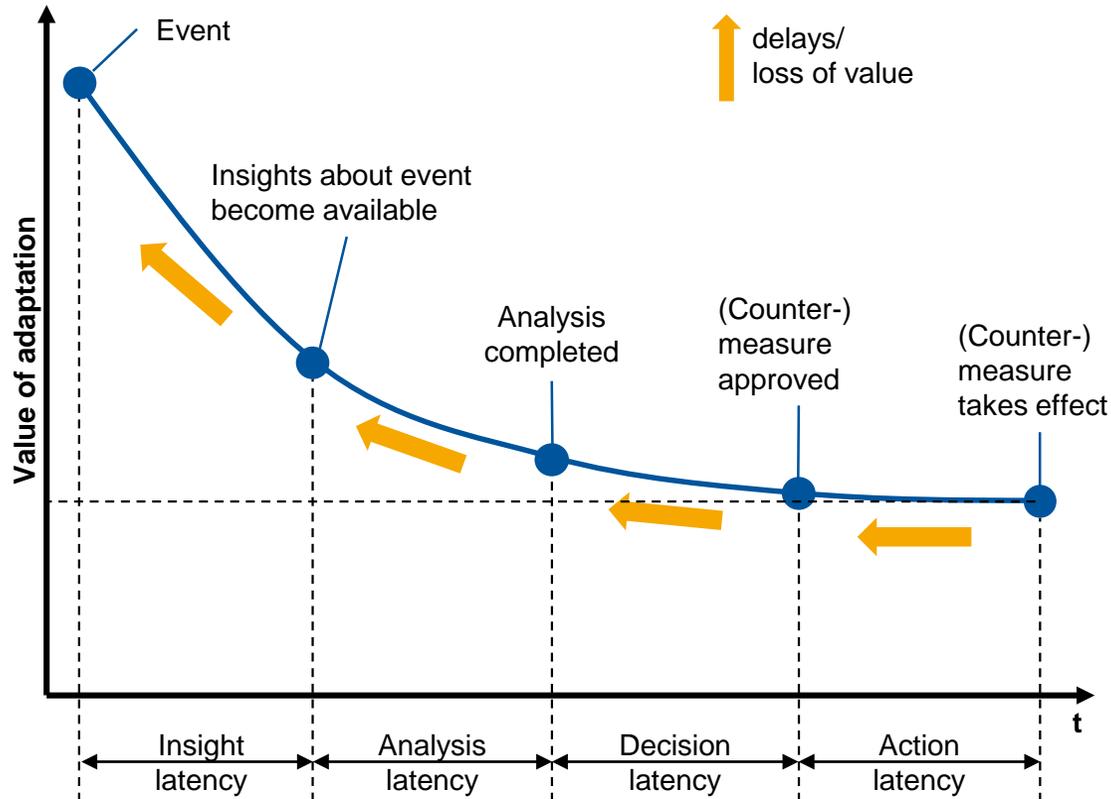
e.GO Mobile AG in 2019 – A digital native enterprise realizes affordable electric cars through Industrie 4.0



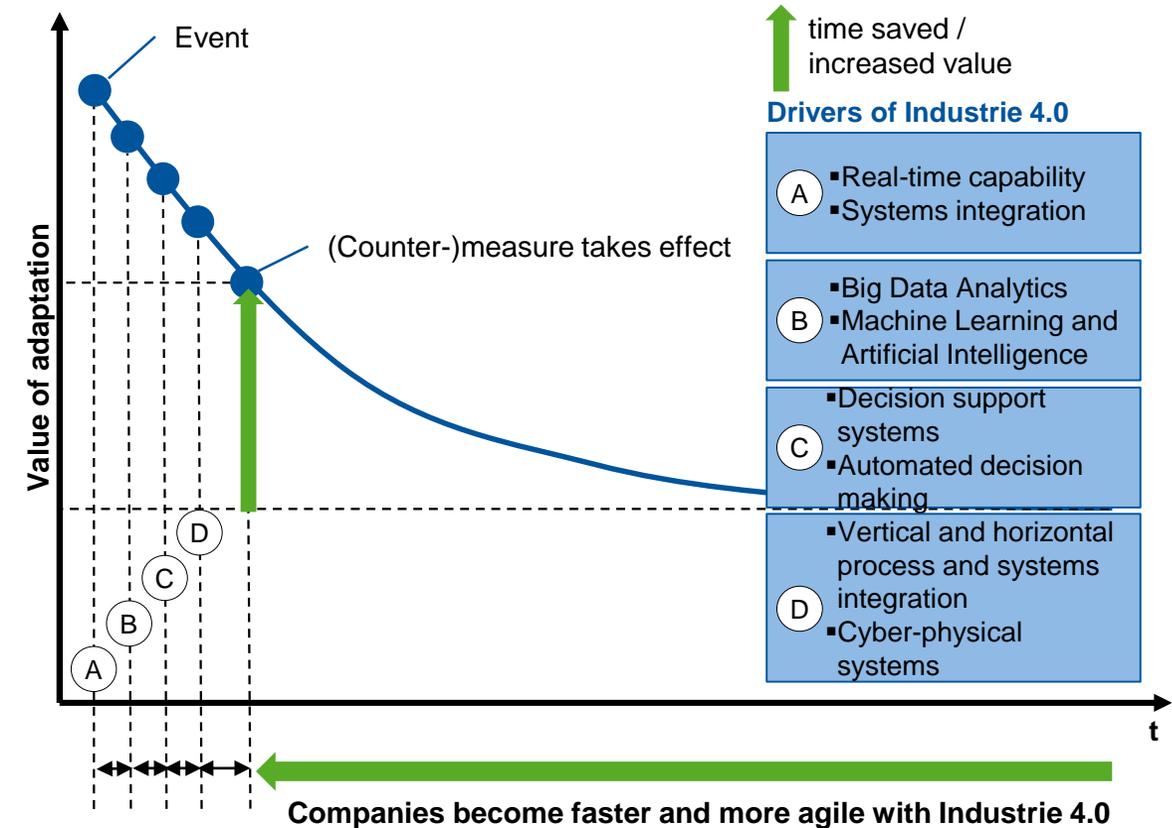
Digital, agile businesses outperform traditional businesses because of lower latencies in the entire reaction chain



Typical reaction of traditional companies to unplanned event

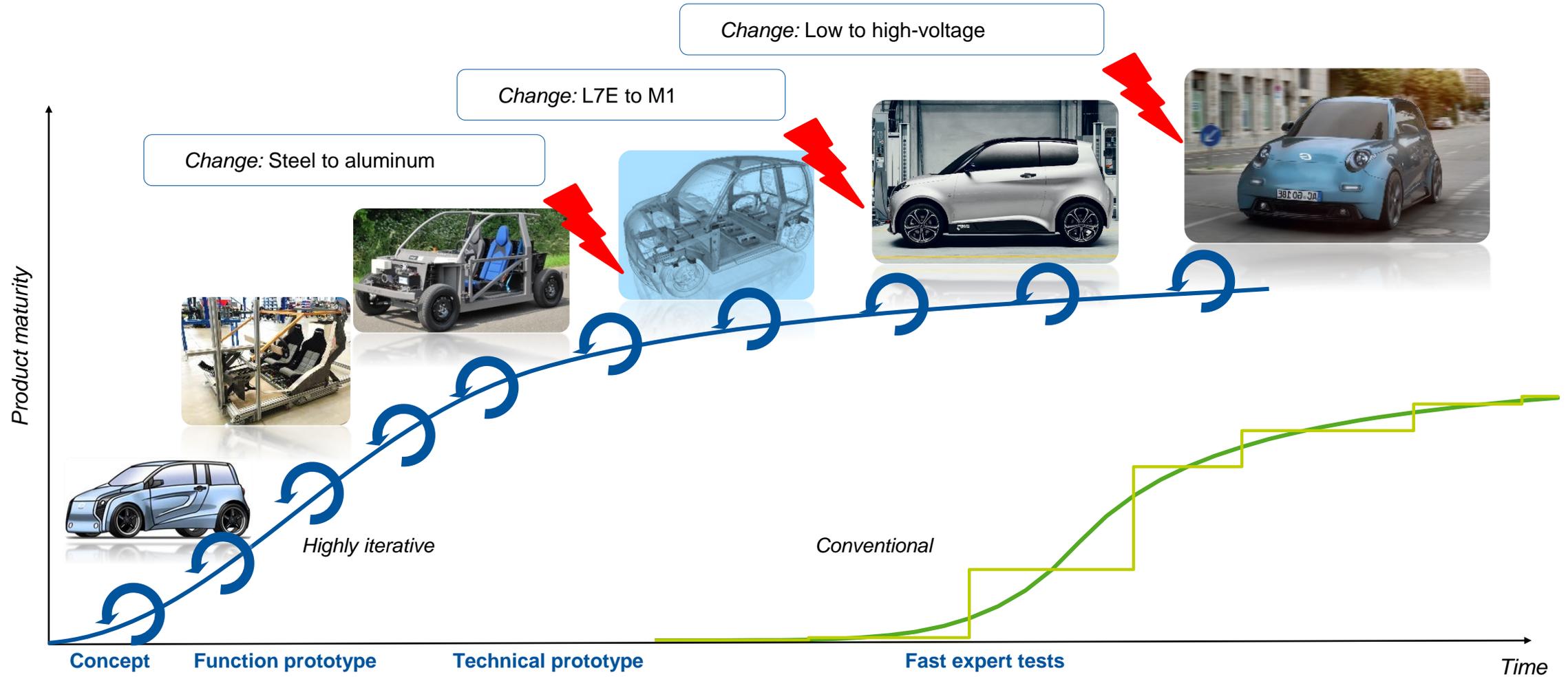


Typical reaction of agile companies to unplanned event

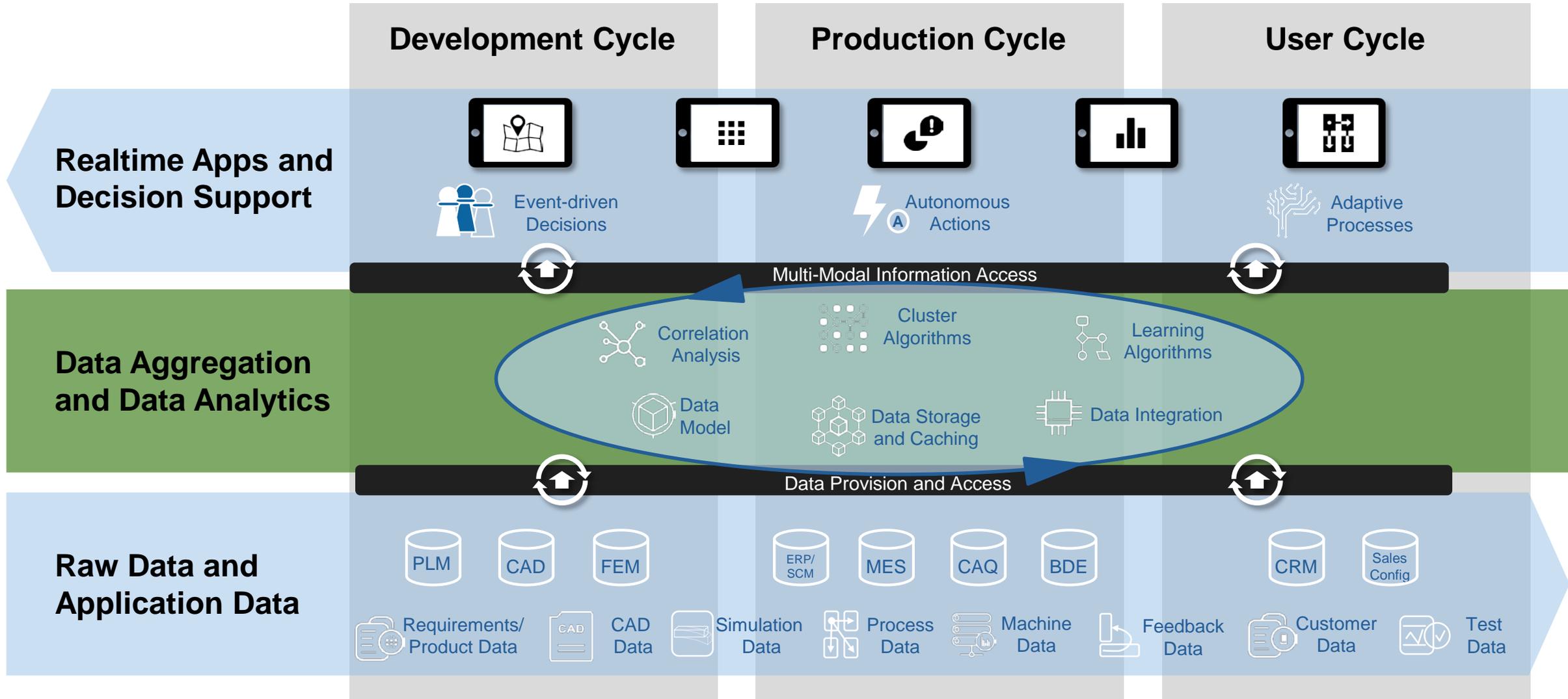


Less time per improvement yields more improvements over time

Industrie 4.0 enables highly iterative processes that allow an early orientation on customer requirements and reduce development time



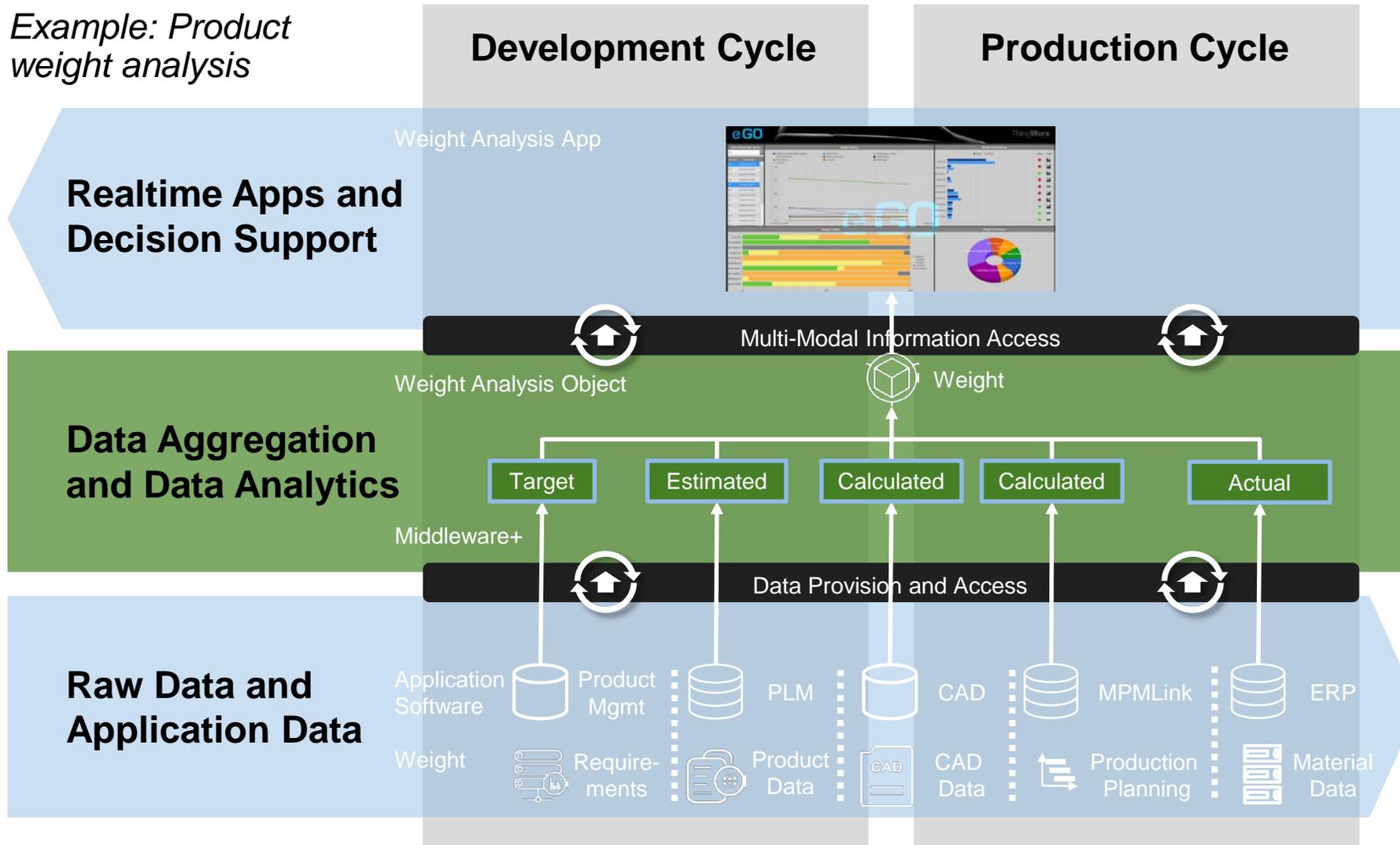
The Internet-of-Production approach is a strategic IT architecture framework that helps companies to implement new digital connected business processes



Development Cycle: Real time weight analysis supports decision processes in highly iterative product development processes



Example: Product weight analysis



- Multi-disciplinary weight analysis
- Accurate weight forecasting
- Fast and effective weight impact evaluation of design options

Production Cycle: The 3D-factory cockpit enables real-time production monitoring with data from heterogenous sources



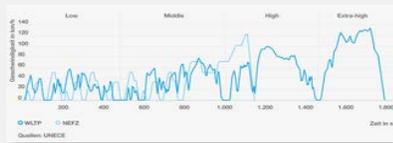
User Cycle: Car-to-cloud communication connects the user cycle with the development and production cycle



Example: Braking system

Predictive maintenance estimates replacement needs for brake disks

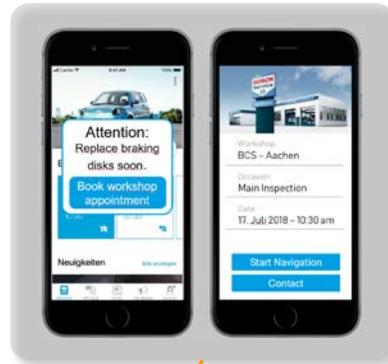
Personal driving profile...



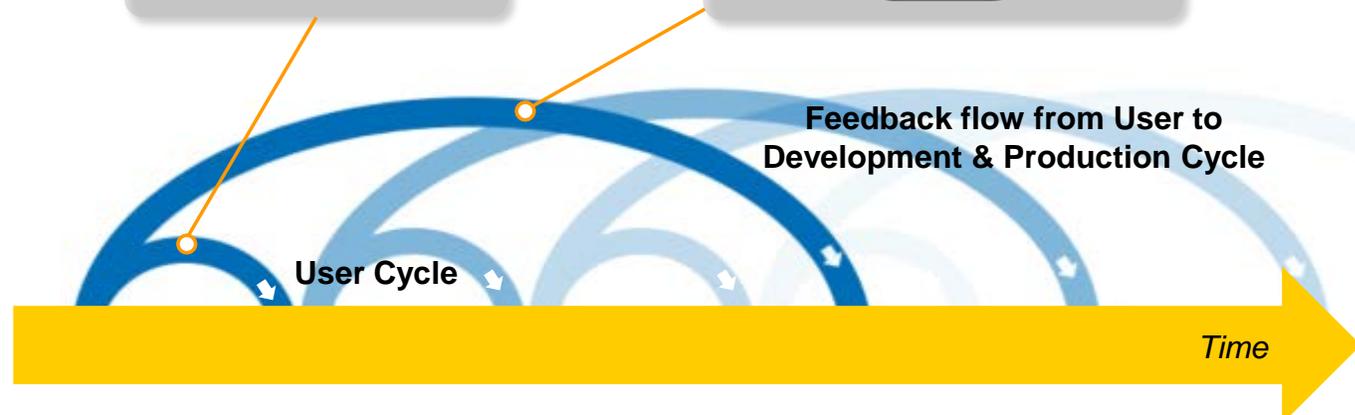
... leads to consumer specific wear & tear on brake disks



User Cycle: Customers are notified, workshop sessions suggested

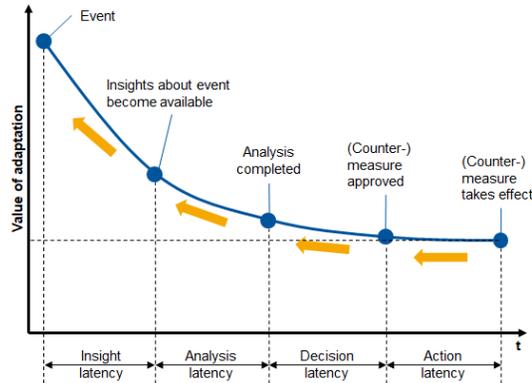


Development & Production Cycle: Optimized recuperation & braking system

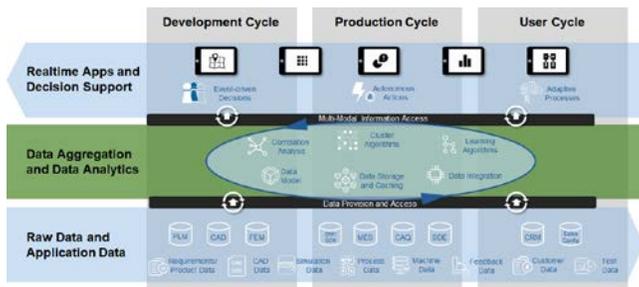


Customer benefits include increased reliability, reduced wear & tear and customer tailored service offerings.

Summary and key takeaways



- Innovation requires an **ecosystem** of knowledge and competencies
- New digital technologies (e.g. cloud, Internet-of-Things platform, app deployment) enable **fast and iterative** business processes
- Strategic IT architecture framework like the **Internet-of-Production** provides
 - real-time access to **business data of different departments** by individual apps
 - transparency of **value-added processes and current situations** in real-time
 - usage of customer data for **additional services** and **continuous product improvement**



Thank you for your attention



Dr.-Ing. Thomas Gartzten, MBA

Geschäftsführer / Managing Director
European 4.0 Transformation Center GmbH
Campus Boulevard 57
D-52074 Aachen
✉ thomas.gartzten@e4tc.de