Vertical Integration:

Basis for Production Boost and new ways of Production tuning

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Dr Jan Schäpers Hegla Hanic GmbH

Vertical Integration

1. Who we are
2. Motivation
3. Industrie 4.0: Asset Administration
4. And what we can do more
5. Summary

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HEGLA key facts
success based on customers trust

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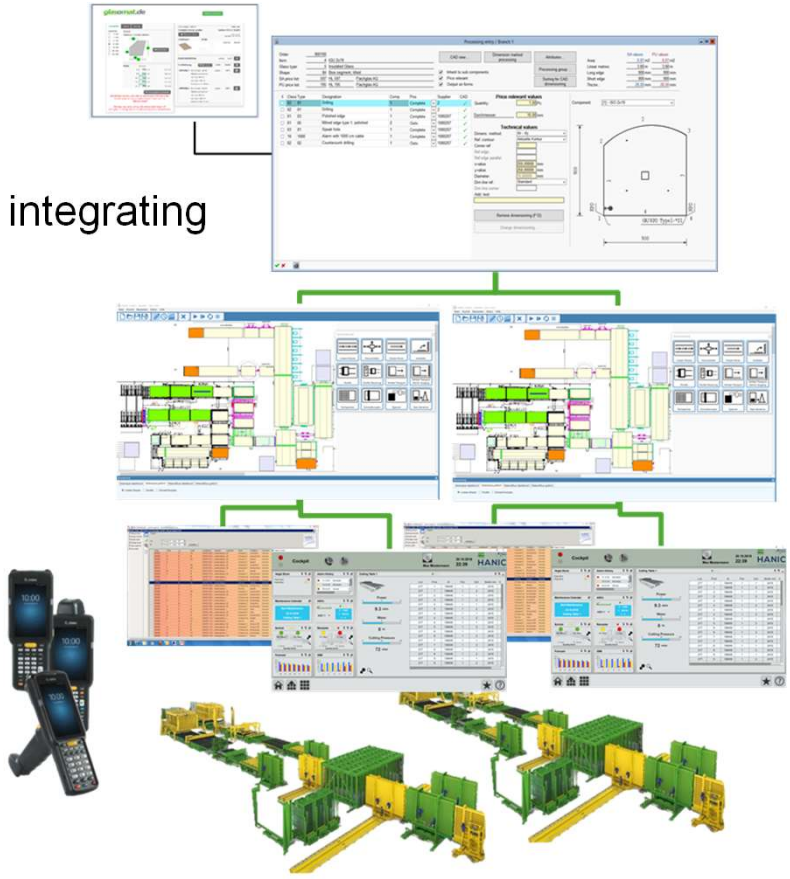
Was syn2tec bietet
Überblick

Hegla Hanic provides

- **ERP**
  - Highly automated order management system integrating external inputs
- **Production Planning**
  - Strategy follows Capacity planning
- **MES**
  - from tracking to monitoring

… creating innovative workflows



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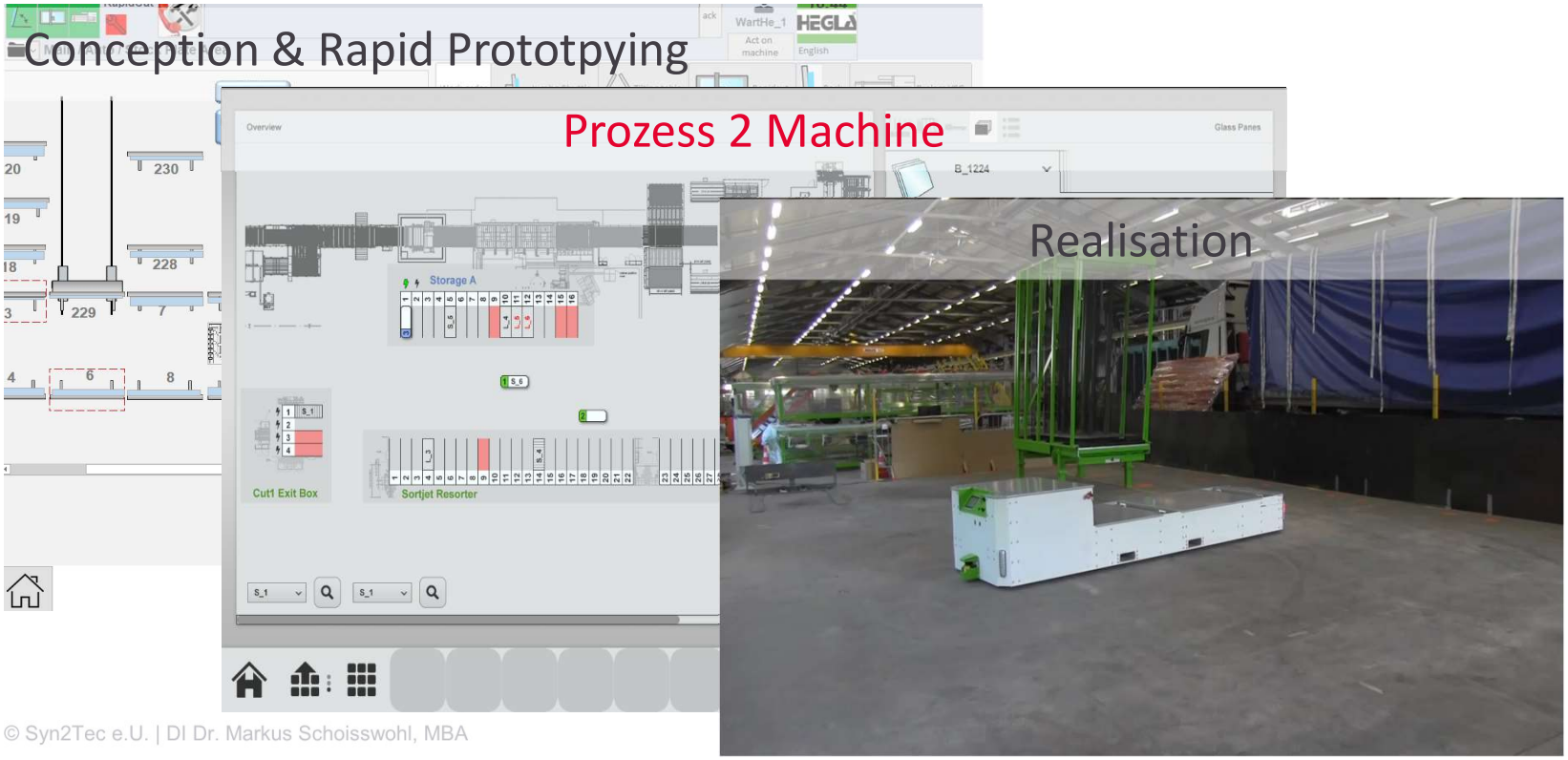
Was syn2tec bietet
Überblick

Syn2tec…. providing value added



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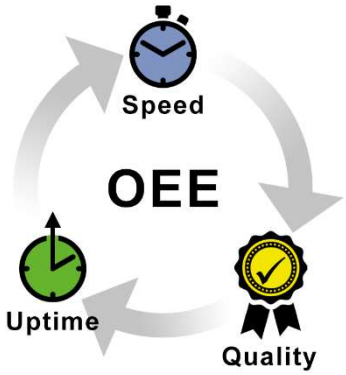
Motivation
Why vertical integration matters

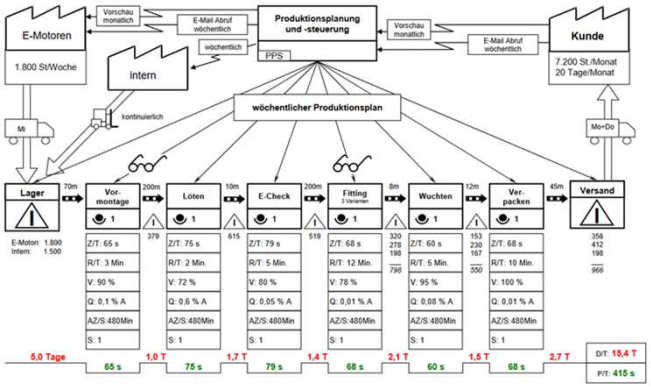
Production target:

- **Max. productivity OEE:**
  - = v(production)
  - * availability
  - * good quality

- **@ lotsize 1**

… achievable?





Wertstromdesign Klaus Erlach Springer Verlag

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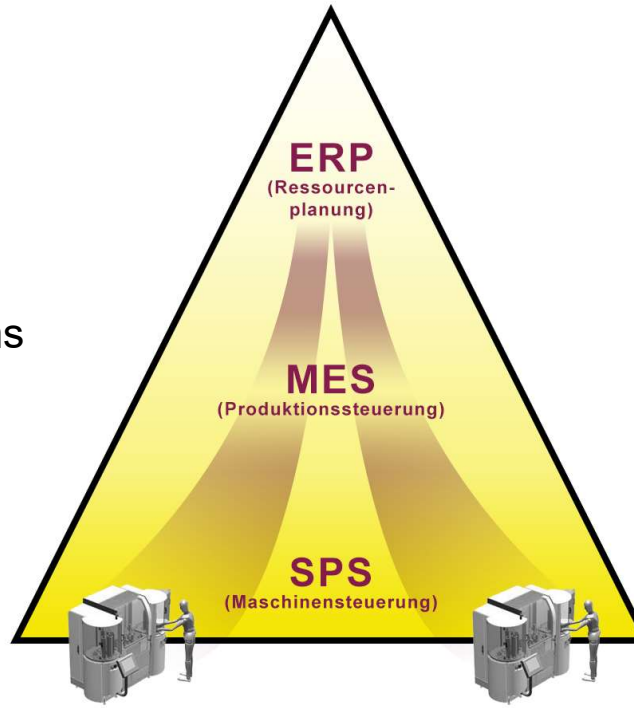
2 Examples for useful vertical integration

- **On the machine level (example steel rolling)**
  - Combining signals (>1000) from
    - different machines control systems
    - Other sources camera
  - Time synchronous and with high resolution down to 1ms

- **On MES level (example IG production)**
  - Monitoring of
    - Complete production lines
    - Focusing on production cycles
    - with aggregation of data



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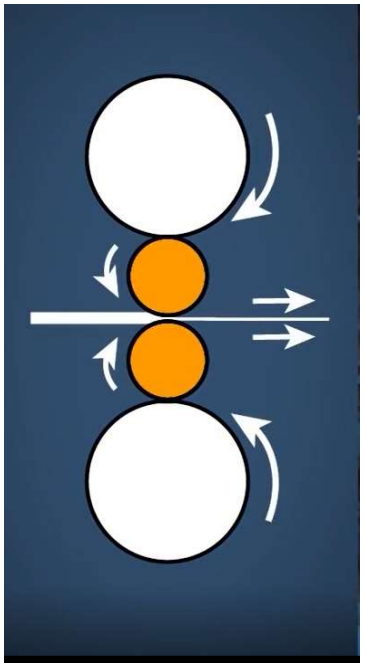
Motivation

Example 1: Steel Rolling: Data % Camera



Typical mill stand parameters:

- Force: 2000 t
- Drive power: 6 MW

Source: https://www.youtube.com/watch?v=AuuP8L-WppI

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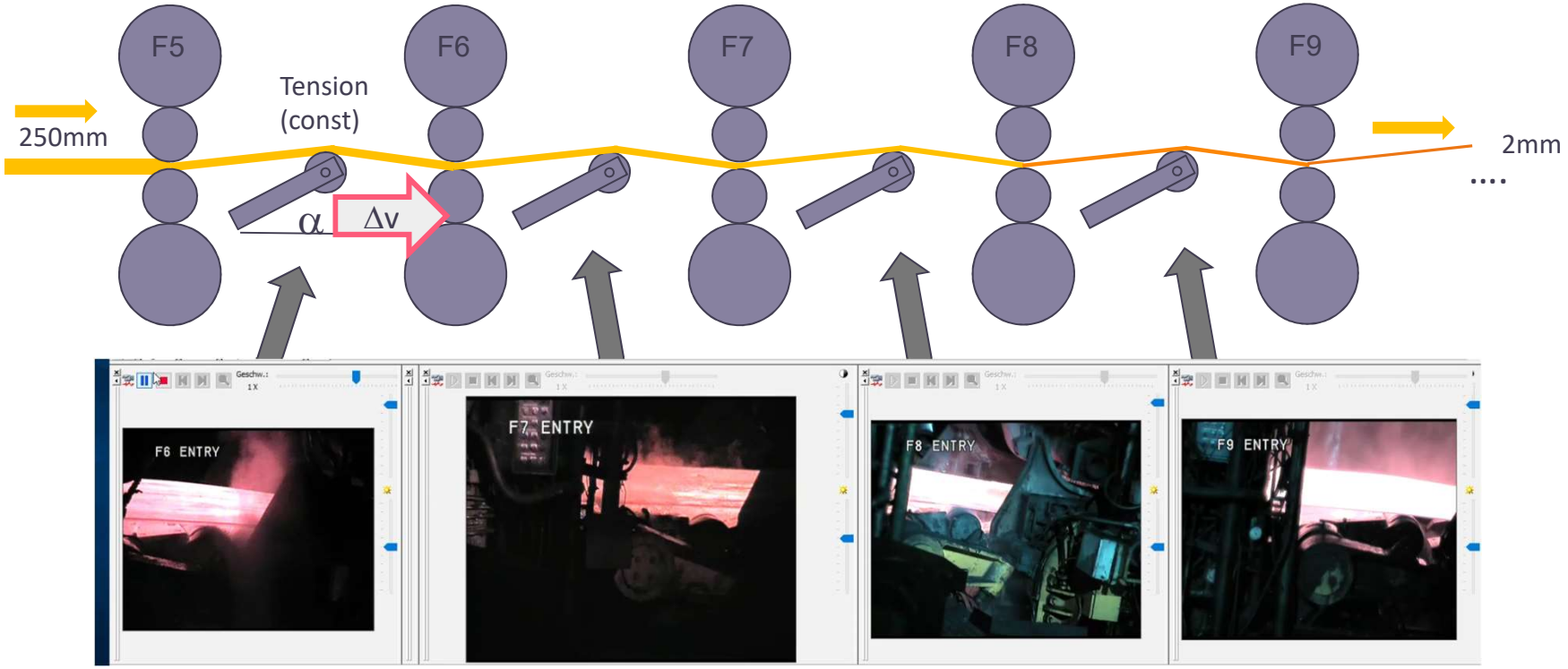
Motivation

Example 1: Steel Rolling: Integration of Data and Camera



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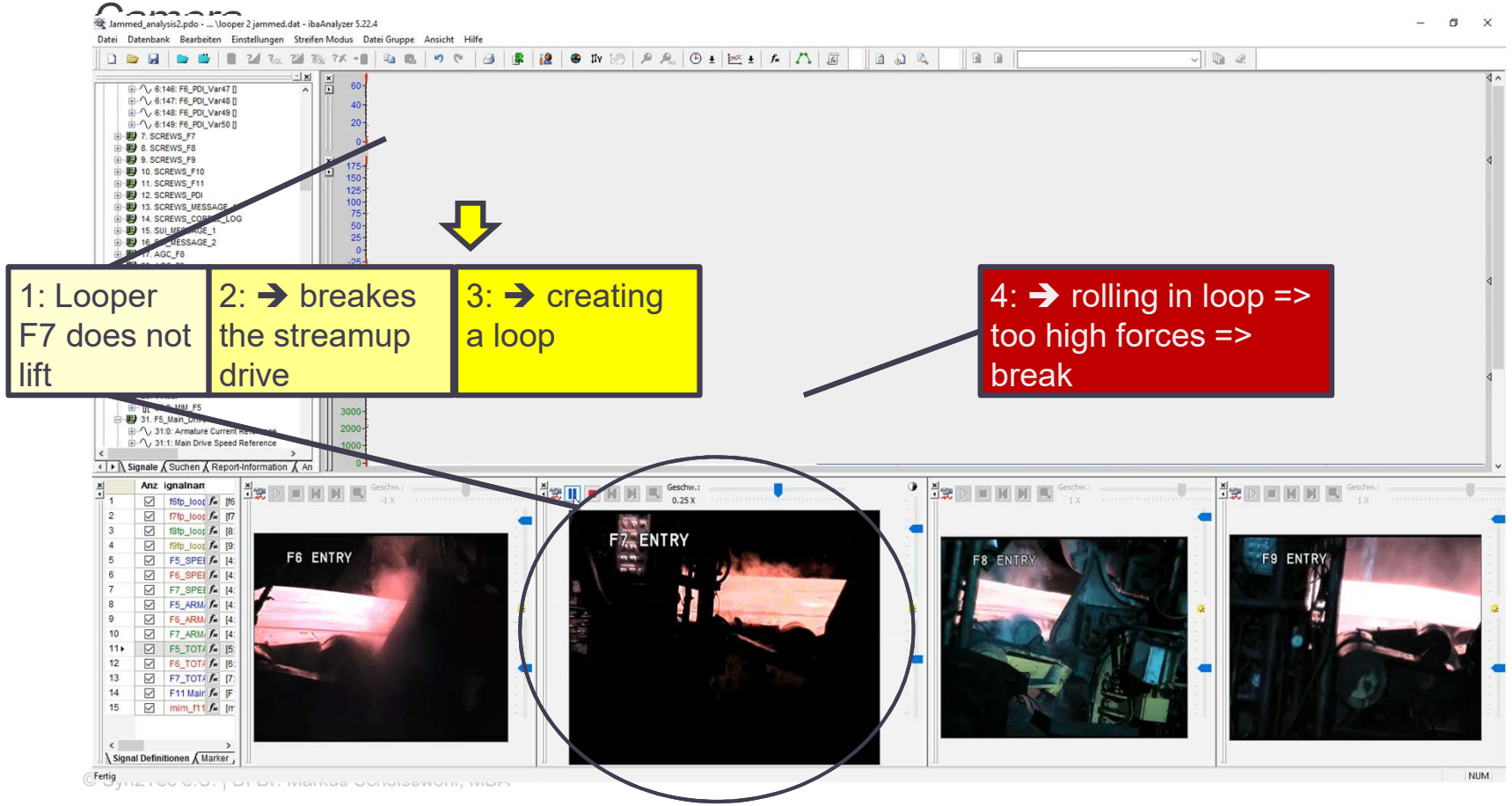

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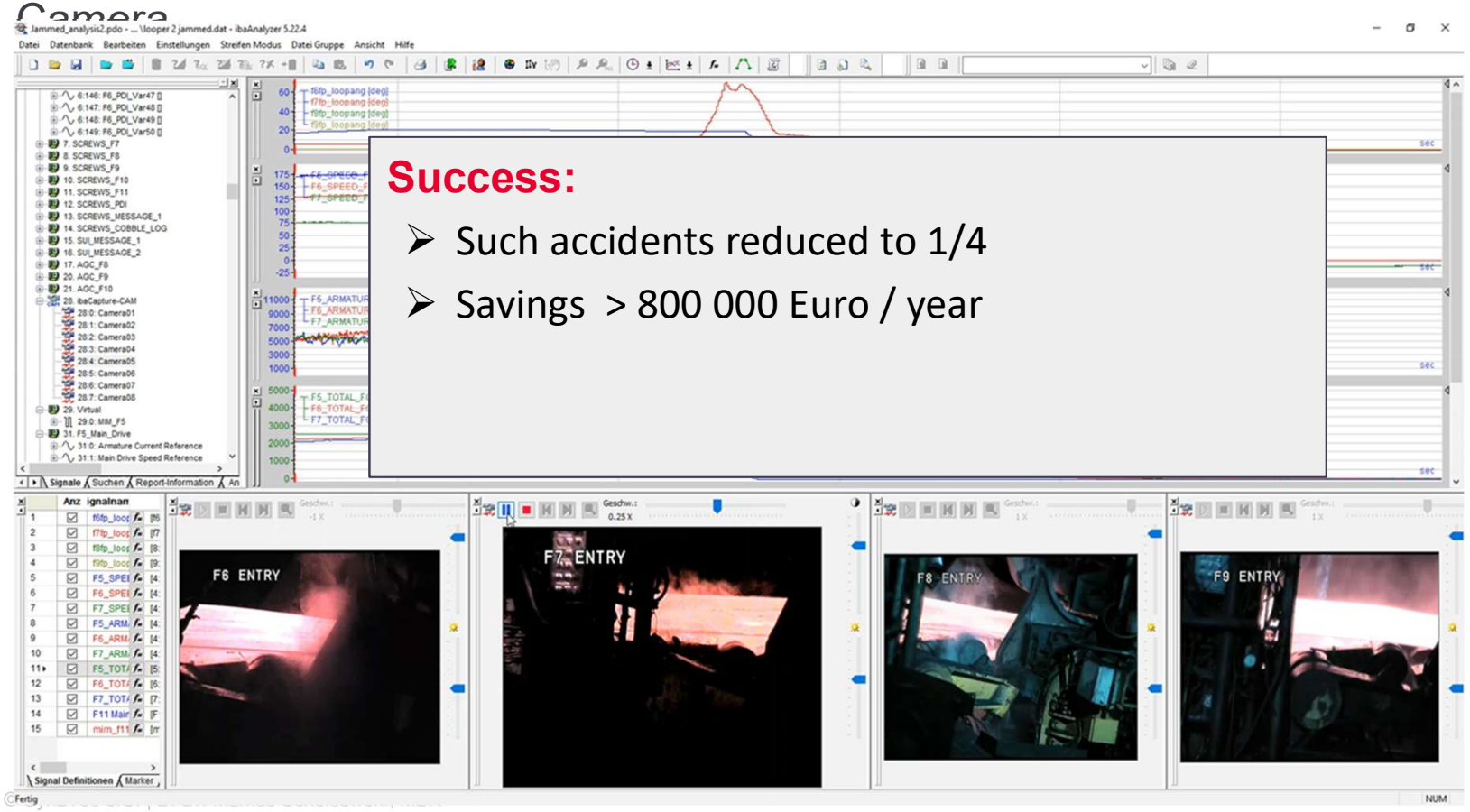
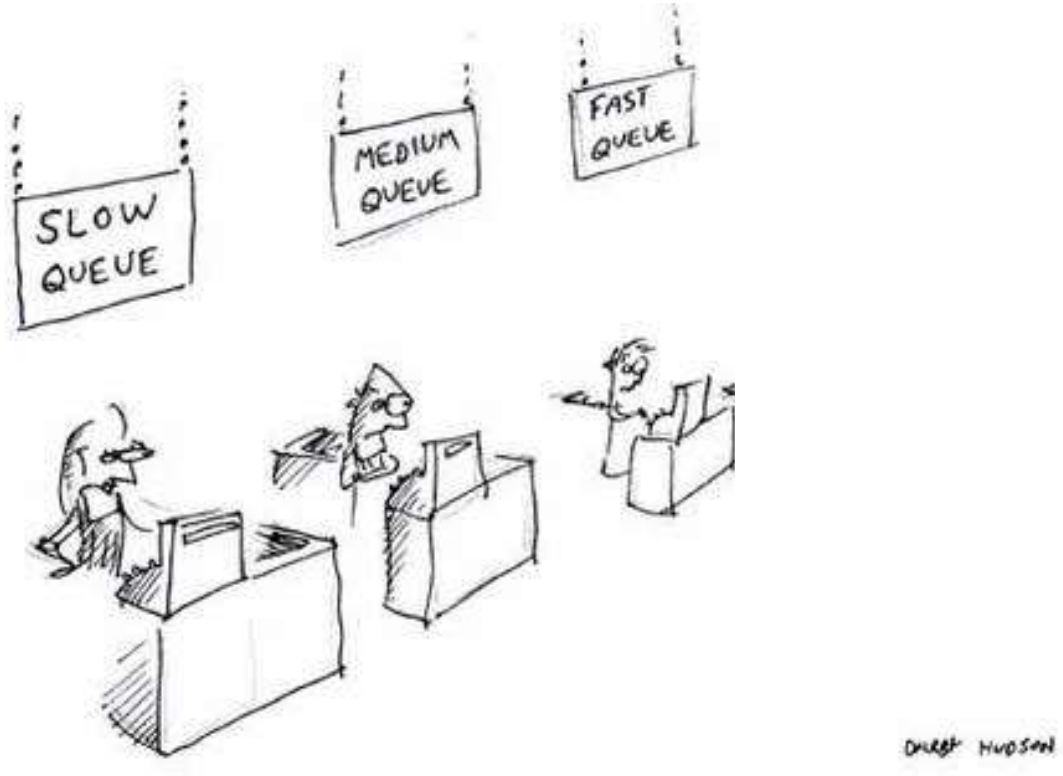


Motivation
Example 2: IG Production: Smart Cockpit



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MES Data Collection

- **Philosophy:**
  - Sum up small effects
  - Uncover the invisible
- **Optimization**
  - Production process
  - Supply process (Shopfloor logistics)
- **based on solid ground**
  - Coordination issues
  - Production “bottle necks”
  - …

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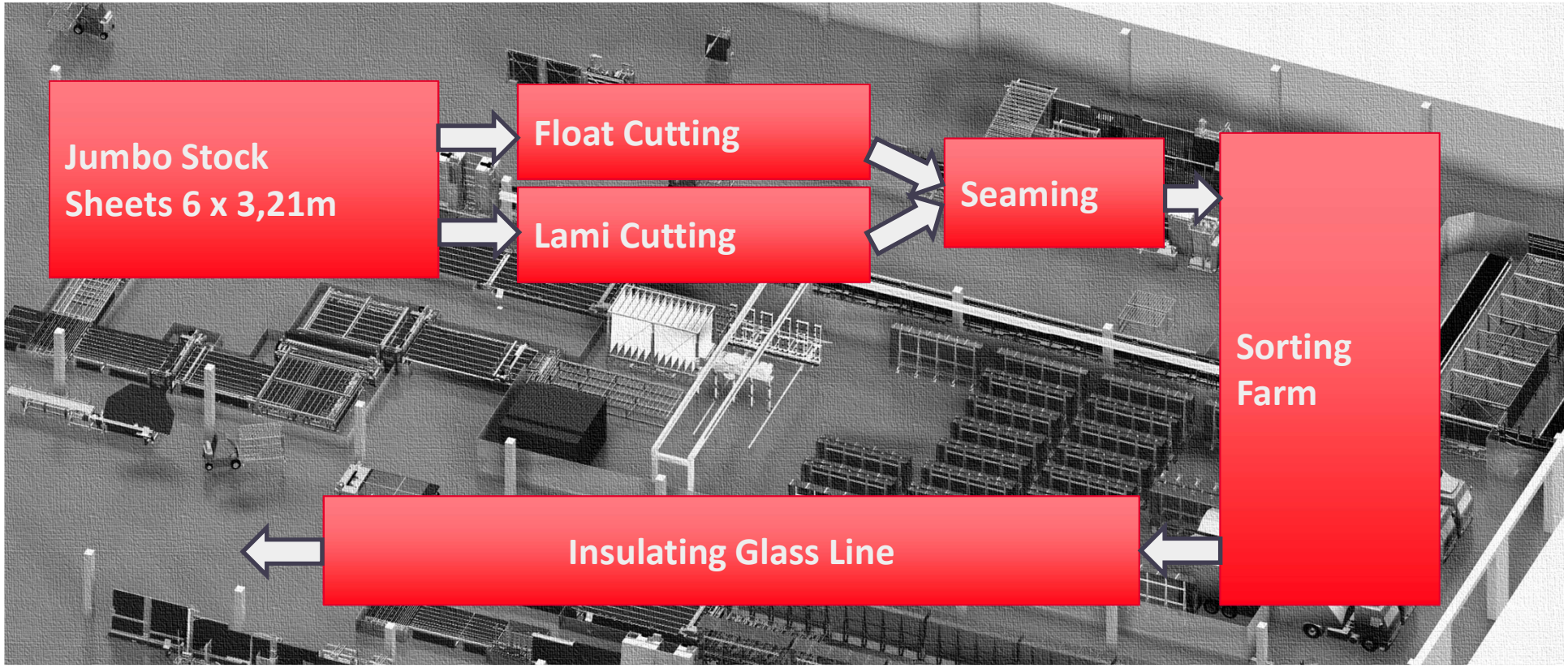
Motivation
Example 2: IG Production: Flow



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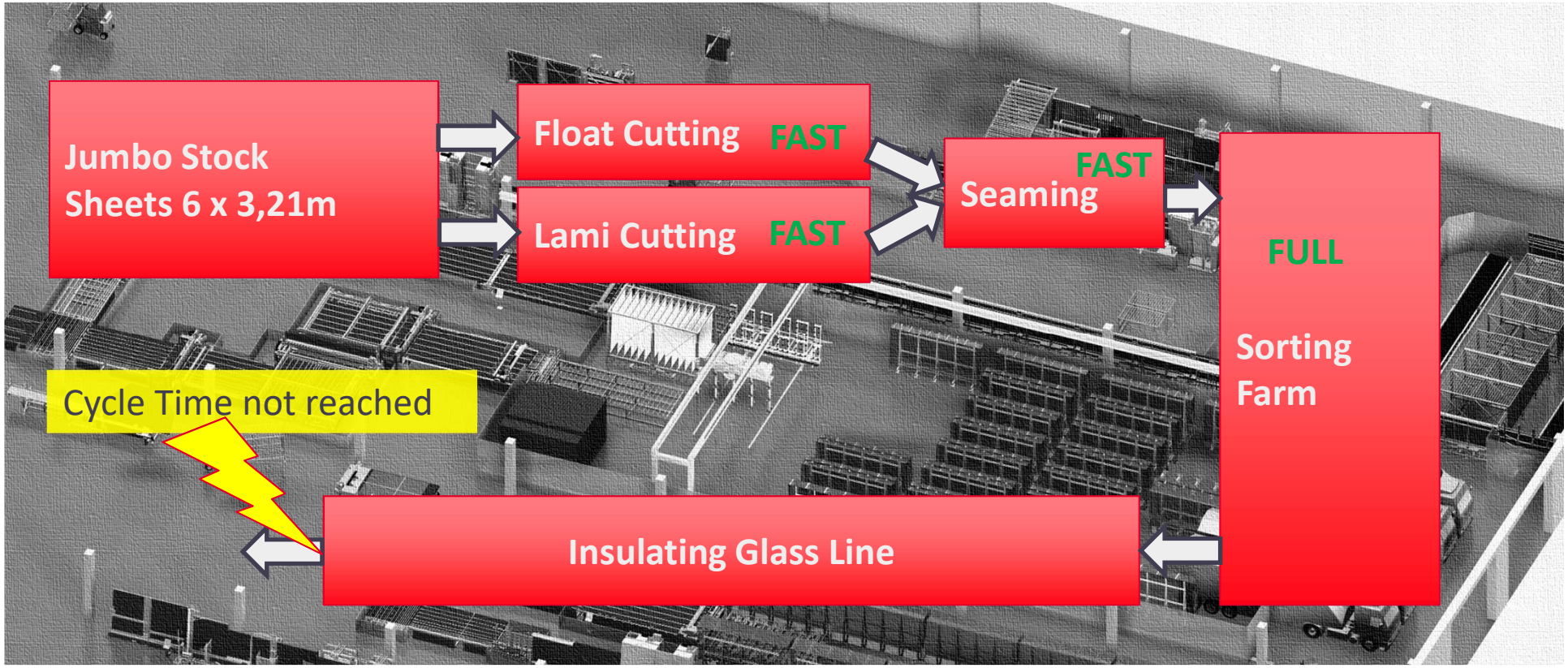
Motivation

Example 2: IG Production: Issue



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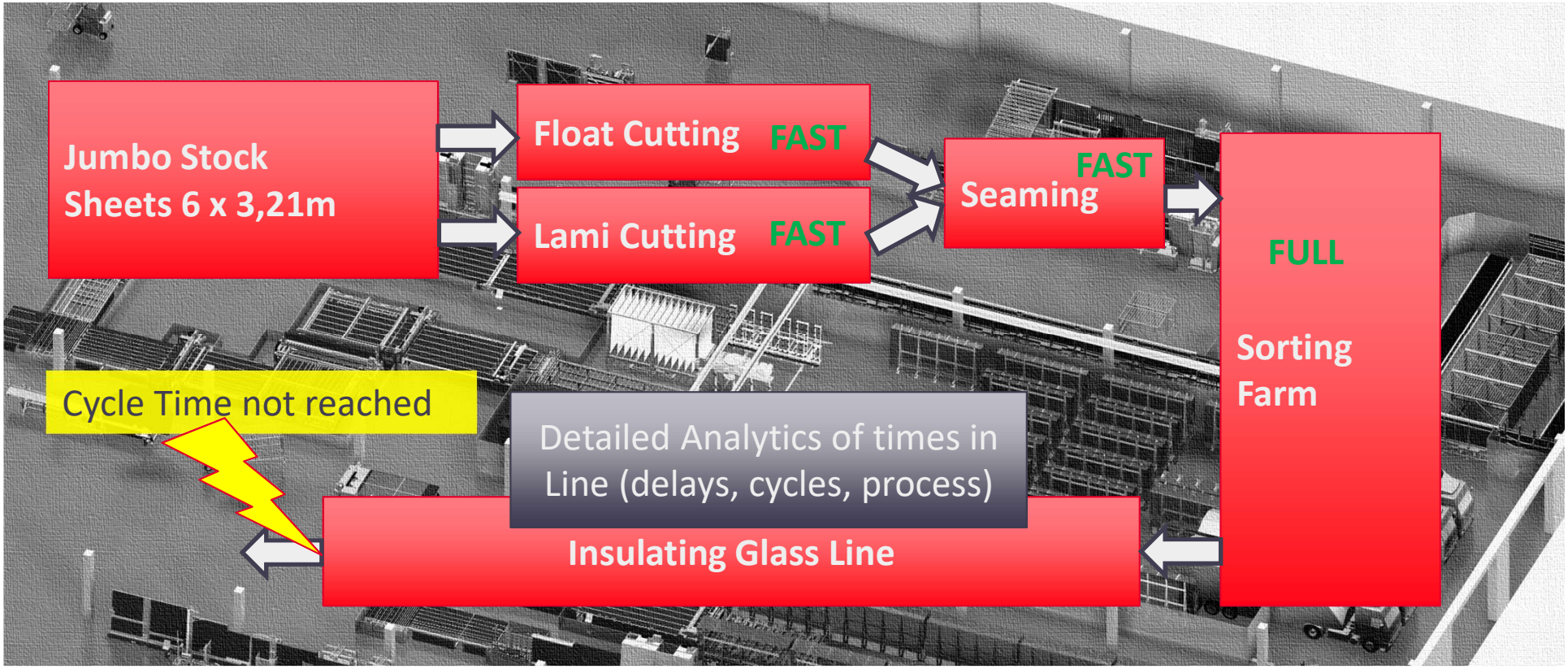
Motivation

Example 2: IG Production: Analytics



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Motivation
Example 2: IG Production: Solution

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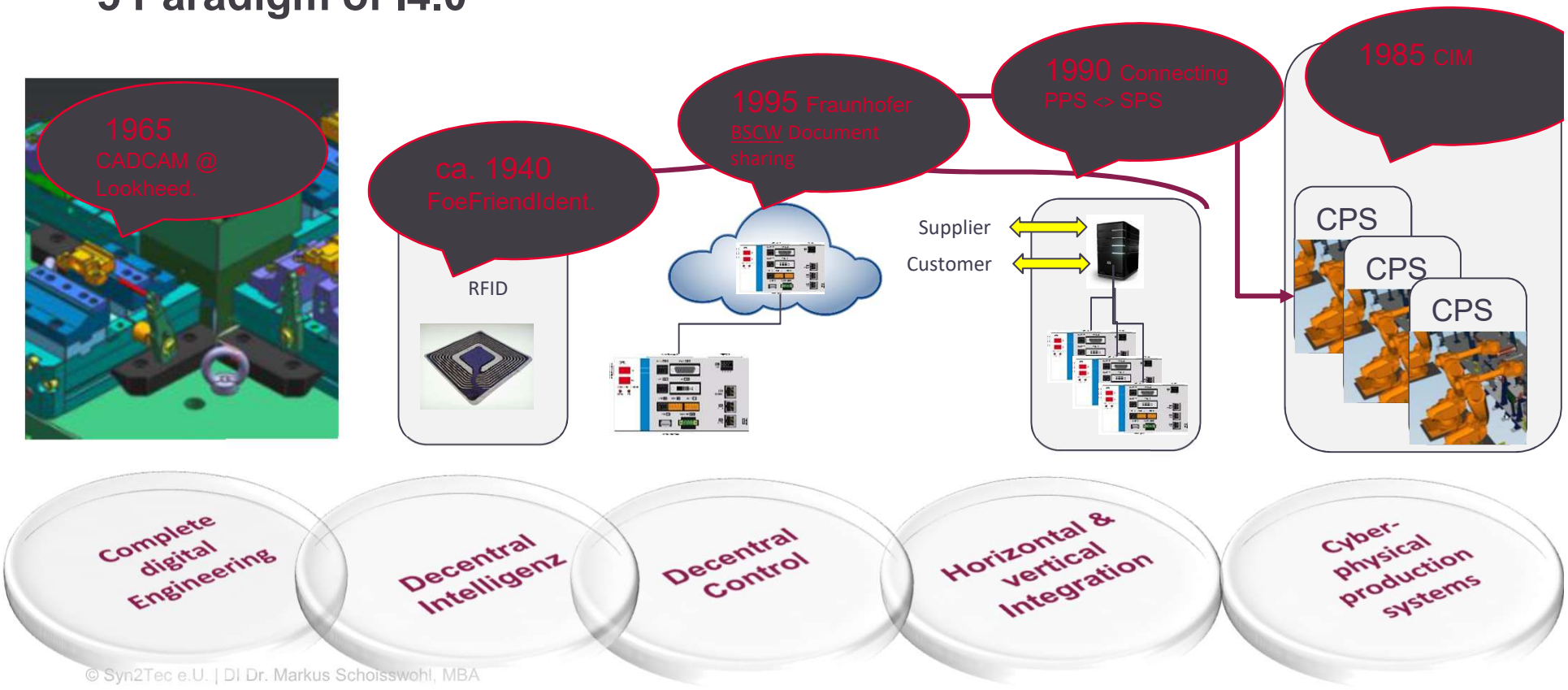
Industrie 4.0
nach Dr Roth

5 Paradigm of I4.0



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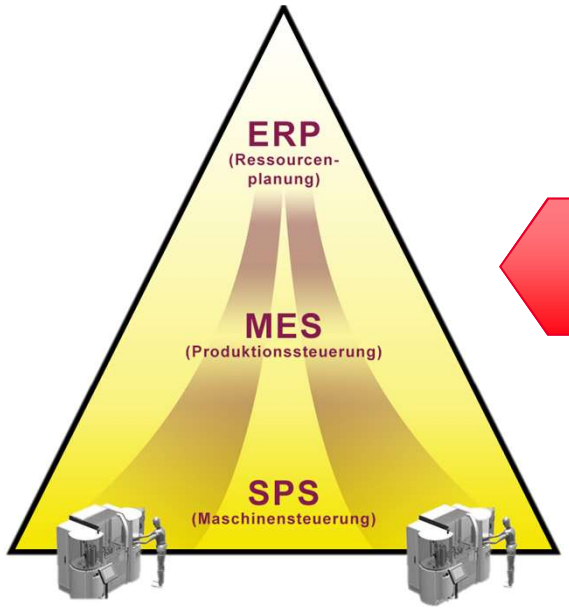
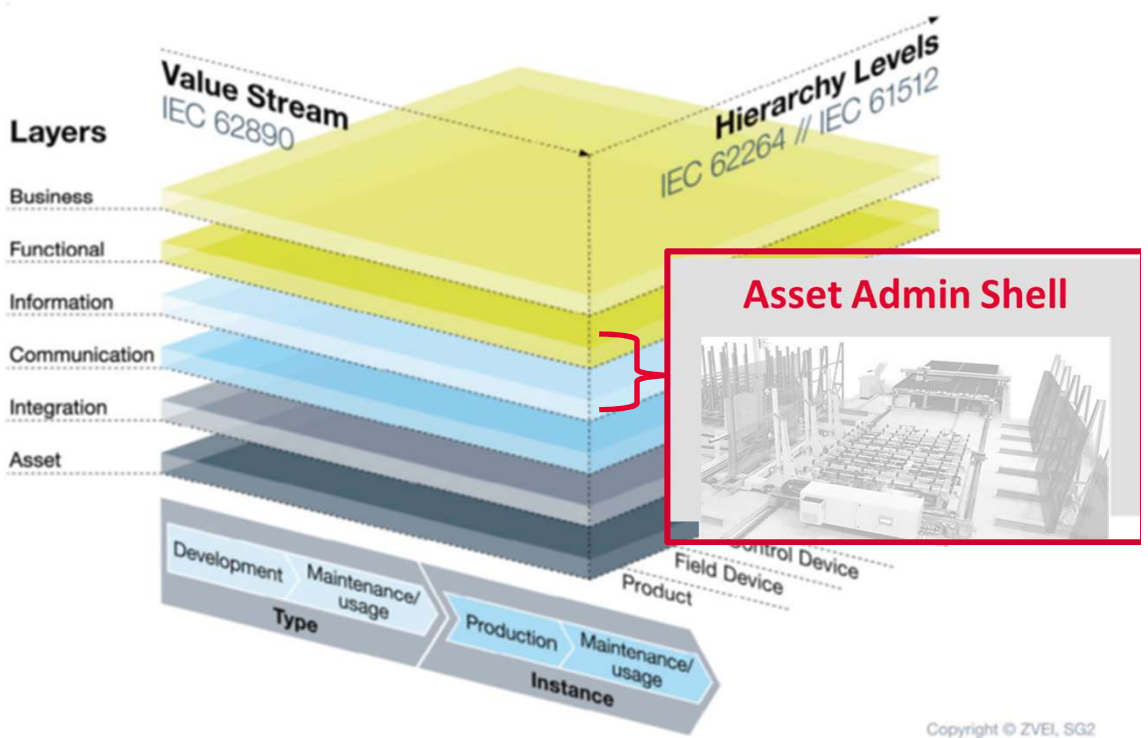
Automation hierarchy versus Rami Model:





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The asset adminstration shell

- **Essential but why?**
  - Standardized models including
    - Production parameters
    - Technical documentation
    - spares
    - Health condition
  - for all devices
  - …integrating them to machines

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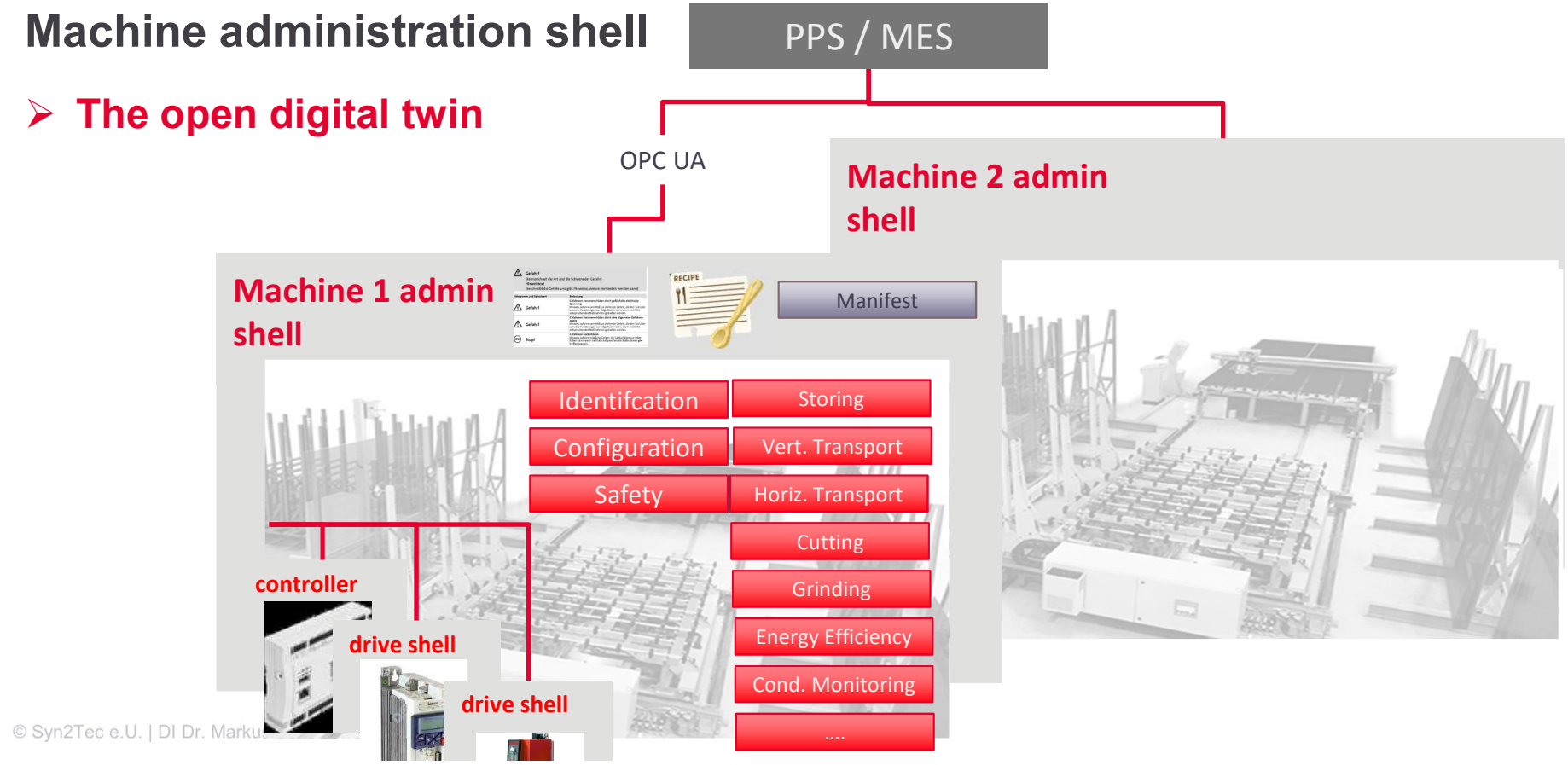
Based on VDE, Industrie 4.0: Verwaltungsschale in der Praxis

Machine administration shell

- **The open digital twin**



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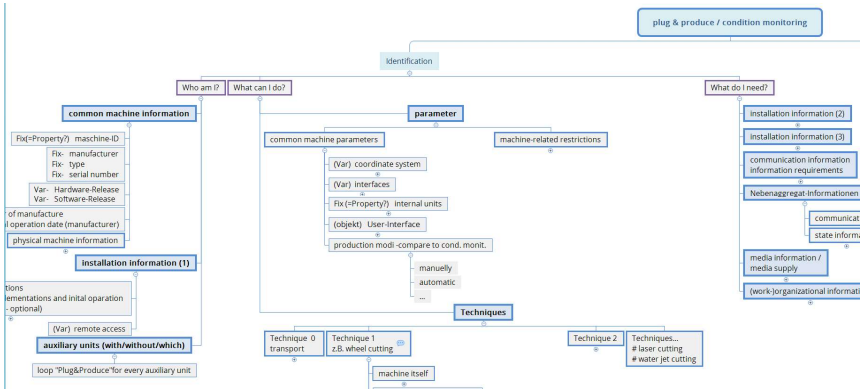
The communication of the assets:

- **Typical I4.0 communication: OPC-UA**
  - Has a broad basis
  - But requires further detailing



=> Initiative for Companion Specification for the Glass Industry started 2018 aiming release candidate in 2020

Forum Glass Technology

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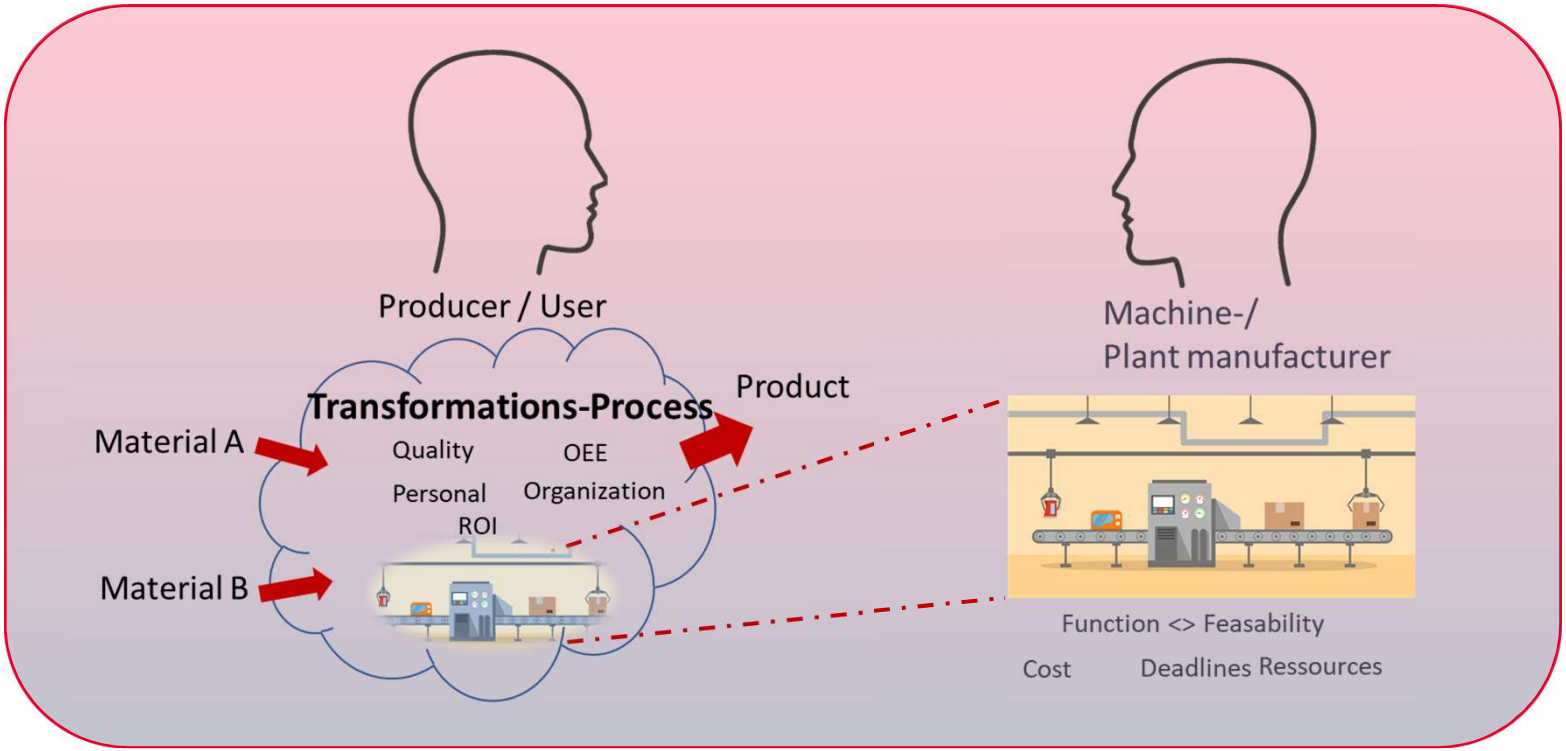
What makes the difference … is skin flip



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Industrie 4.0
….empowers creativity

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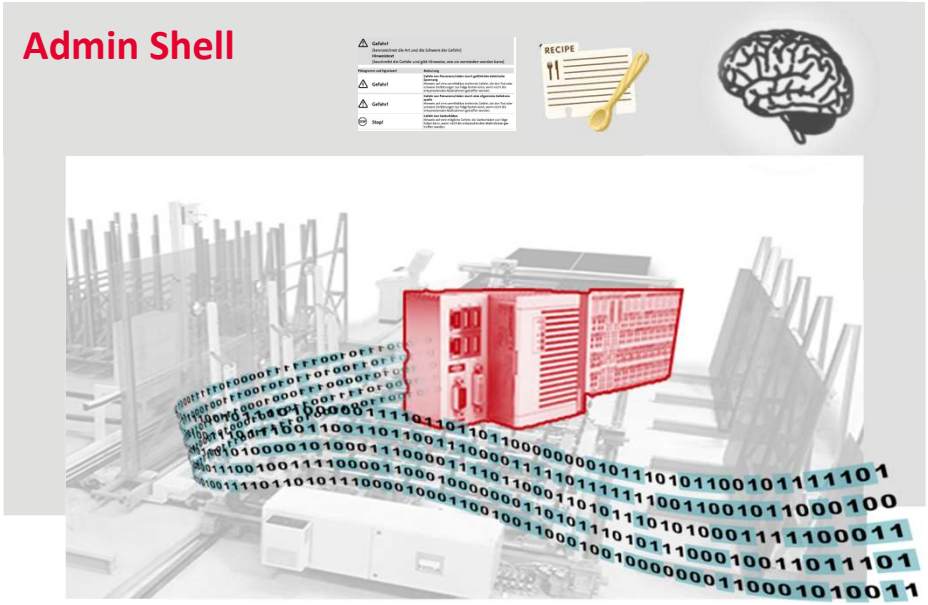
Syn2tec & die bewusste Maschine



Referenzarchitekturmodell Industrie 4.0 (RAMI4.0)

Product
➔predictive Quality Control

Production
➔ Bottleneck-Ident. & Optimization

Machine & Tools
➔ Health condition

Operator
➔ Personal assistant

OEE ↑ Cost ↓

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The merit of vertical integration
a: the cockpit

The glass cockpit

➢ **Assets in focus …. Wherever you are**

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The merit of vertical integration
b: accurate simulations

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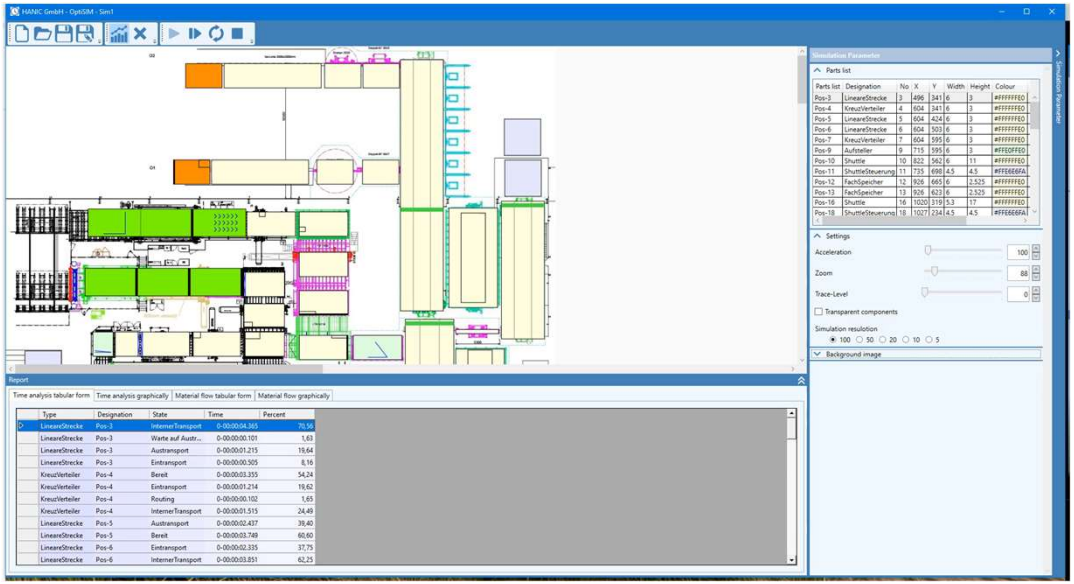
Tuning what will happen:

- **Based on production data**
  - Real cycle times
  - Respecting real OEE
- **Enabling comprehensive simulation pushing**
  - production strategies
  - proper scheduling
  - ressource optimization



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The merit of vertical integration
c: closed loop production control

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Production Control .. the ordonance way

Orders

Production planning

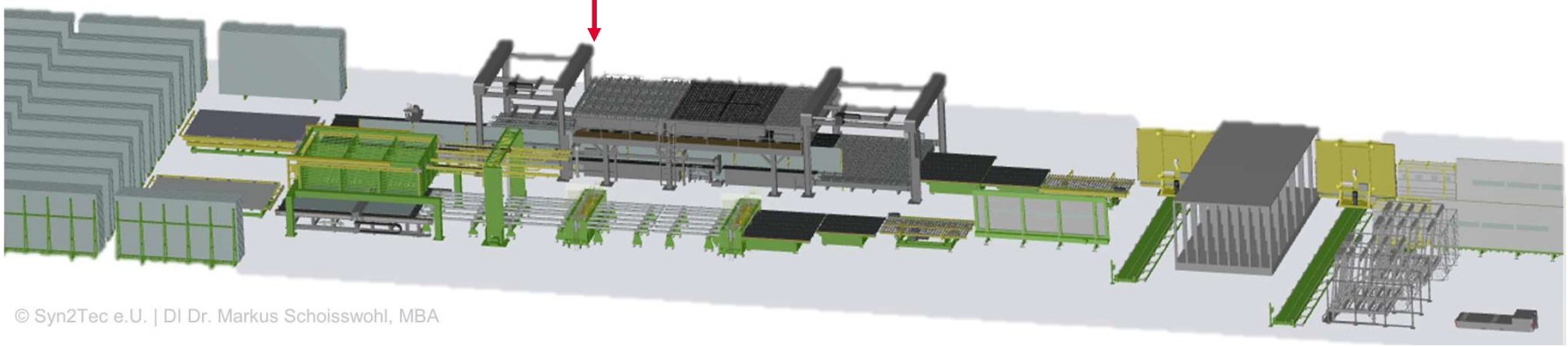
Day planning

Planning based on fixed parameters

- Available time
- Processing times
- Cycle times

limits itself

- to avoid overexploitation



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The merit of vertical integration
c: closed loop production control

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Production Control .. the agile way

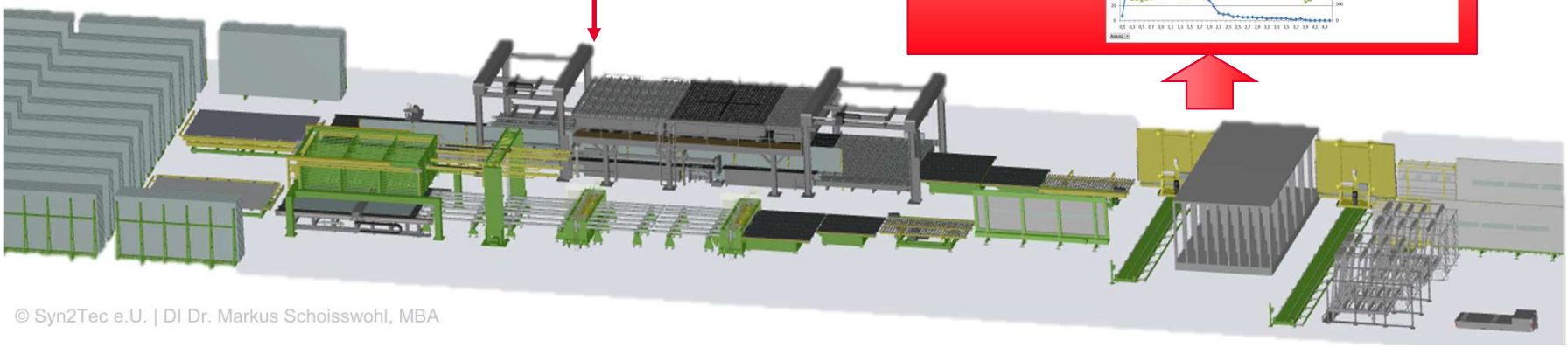
Orders

Production planning

Day planning

Parameter tuning

Learning
- Uptime
- cycletime



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Vertical Integration

- **is bases**
  - to provide solid decision base
  - allowing you to improve productivity
  - for providing assistance
  - will change the functioning of production control

…and standardization (I4.0) will boost the development!

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Applied identfiying to create

synthesis & synergies technologies

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