

# Innovative Consulting Company or Innovator in Production Software

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**„IPS Engineers becomes IPSO Facto“**

Dr.-Ing. Dipl. Wirt.-Ing. Julian Schallow

# IPS Engineers - Introducing the core Team

profound. innovative. operative.



M.A.  
Peter Kenneth Willats

Stakeholder  
Marketing and Sales



Dipl. Wirt.-Ing.  
Julian Schallow

CEO  
Management and Strategy



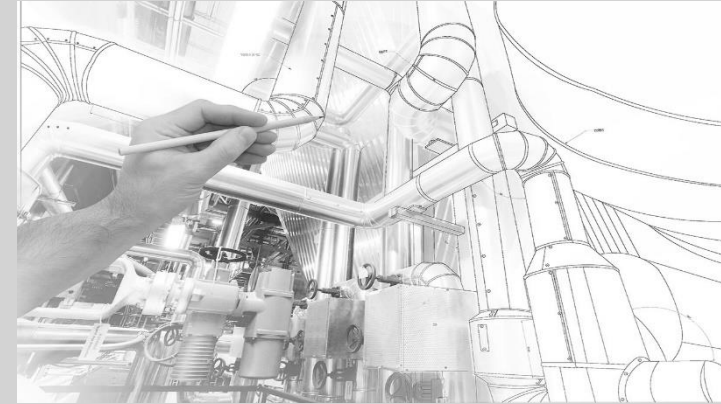
Univ.-Prof. Dr.-Ing.  
Jochen Deuse

Stakeholder  
Innovation and product development

# IPS Engineers – Subject areas and expertise



Industrial Engineering



Advanced Lean Production



Digital Manufacturing



Industrial Data Science

# IPS Engineers – Service Modules and Solutions



Ergonomic  
Workplace Design



Simultaneous  
Engineering



Qualification and  
Competence Development



Time Data  
Management



Technical  
Cleanliness



Line Balancing



Data Analytics



Industrial  
Information Technology



Simulation Studies

# Time Data Management Service Module - detailed view

## Introduction of time data management

- Development and design of roadmaps for the introduction of time data management
- Individual adaptation to corporate goals and general conditions
- Extensive partner network for optimized coordination of activities



## Process studies and mapping

- Performing REFA time and motion studies and MTM analyses
- Development of time data management and competences
- Process analysis as a core element of time studies

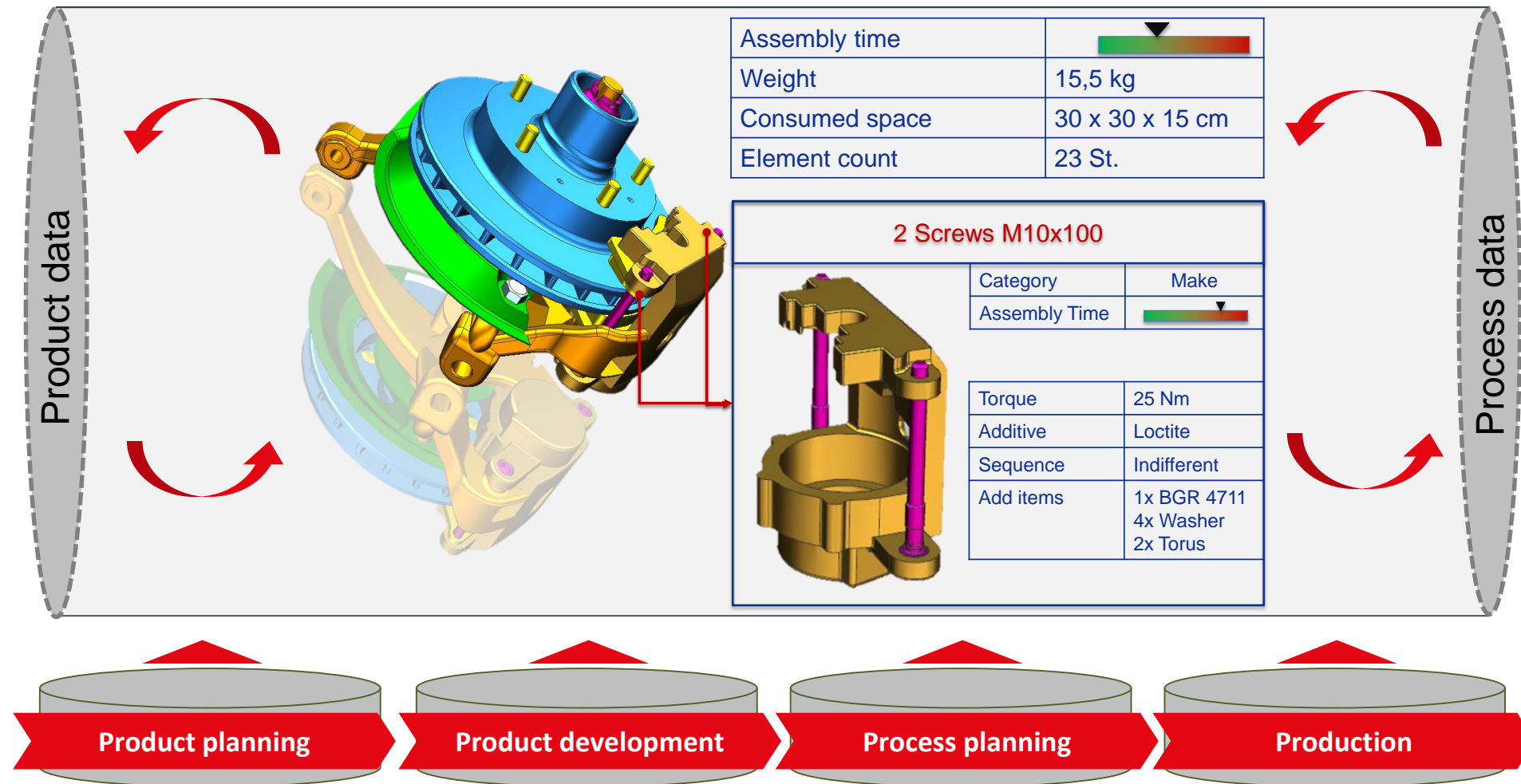
## Digital time management and tool selection

- Digital mapping of processes through modern software
- Application and further development of established system solutions
- Analysis of IT developments in process planning





# CAD-based Determination of Assembly Work Contents



# Integration of CAD and Product Assembly Assistant

Extraction of relevant CAD features  
via Creo - API or XML Import

Model Tree

- 15608706922X.ASM
- 156087020272<156087020271>.ASM
- 156087020272<156087020271>.ASM
- 15608706922X\_P001.PRT
- 301991013270.PRT
- 301991013270.PRT

Instance: GENERIC

15608706922X (Active) - Creo Parametric Academic Edition

File Model Analysis Annotate Render Manikin Tools View Applications

Regenerate Copy User-Defined Feature Paste Copy Geometry Delete Shrinkwrap Operations Get Data

Exploded View Toggle Status Display Style Component Interface Publish Geometry Family Table Parameters Switch Symbols Bill of Materials Reference Viewer Investigate

Model Display Model Intent

VPE Product Assembly Information

Datei Tools

anzufügen Bauteil löschen Nach Oben Nach Unten

Bautel wählen (Creo)

- 15608706922X (Strebe)
- 156087020272<156087020271> (Klemmschelle)
- 156087020272<156087020271> (Klemmschelle)
- 15608706922X\_P001 (Rohr)
- 01991013270 (Verschlussstopfen)
- 01991013270 (Verschlussstopfen)

PAI Details Kommandozeile

Sachnummer	Gewicht	Tiefe(Länge)	Breite	Höhe	Volumen
15608706922X	2,793 kg	504,000 mm	120,000 mm	68,319 mm	391521,065 mm³

ProKon-Werte

Prokon-Index:

TMU:

TICon-Analyse:

Stanzen Schweißen Werkzeugverwendung Schrauben Nieten Kleben Einrasten

Präge-/Klem-/Kant-/Bördel- und/oder Stanzvorgang Anzahl bestaetigen

Smart

156087020271\_P001 regeneration completed successfully.





# Assembly Evaluation

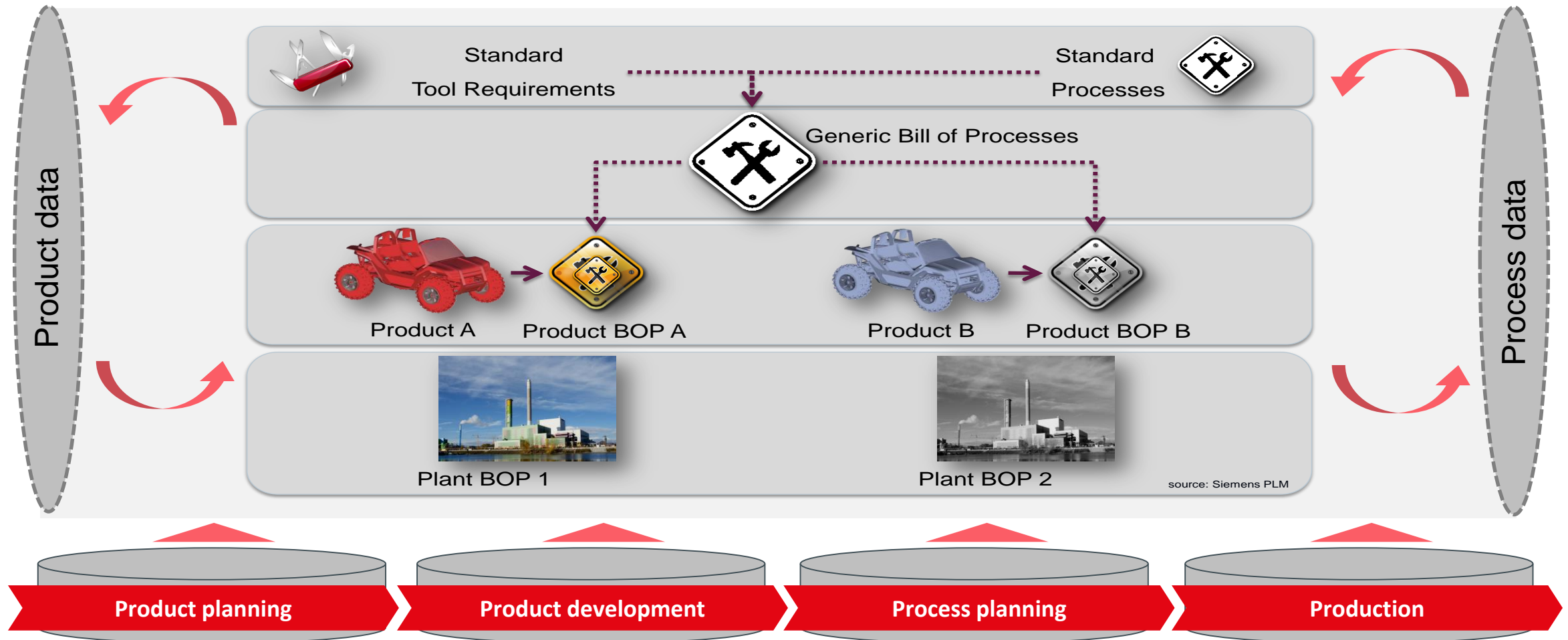
The screenshot displays the VPE Product Assembly Information software interface. The main window is titled "VPE Product Assembly Information" and includes a menu bar with "Datei" and "Tools". Below the menu bar is a toolbar with icons for adding, deleting, and navigating parts. The interface is divided into several panels:

- Bauteil wählen (Creo):** A tree view on the left showing a hierarchy of parts. The selected part is "301132172070\_FAM<300421051\_1\_FAM> (Sechskantschr)".
- PAI Details Kommandozeile:** A panel on the right showing details for the selected part, including "Sachnummer" (301132172070\_FAM...) and "Volumen" (2809,327 mm³).
- Use of company specific process libraries:** A text box with an arrow pointing to the "Maschinenschraube mit Handwerkzeug befestigen" process in the "Werkzeugverwendung" tab.
- Feedback of the assembly evaluation (and if necessary times):** A text box with an arrow pointing to the "Anzahl bestaetigen" input field for the "Maschinenschraube mit Handwerkzeug befestigen" process.
- ProKon-Werte:** A panel on the far right showing evaluation results: "Prokon-Index: 1190", "TMU: 1586.66", and "TiCon-Analyse: ".

The "Werkzeugverwendung" tab is active, showing a list of processes with their corresponding "Anzahl bestaetigen" (Number of confirmations) values. The processes listed are:

- Maschinenschraube mit Schrauber befestigen (0)
- Maschinenschraube mit Handwerkzeug befestigen (0)
- Blechschrabe mit Schrauber befestigen (0)
- Schraube mit Schrauber anfädeln (0)
- Schraube mit Handwerkzeug anfädeln (0)
- Schraube von Hand anfädeln (0)
- Schraube auf Drehmoment anziehen (0)

# Semi-automated Process Planning in Global Networks



# Analysis of Product Data

The screenshot displays the Siemens Teamcenter Manufacturing Process Planner interface. The main window shows a Bill of Materials (BOM) table with columns: BOM Line, Rev Name, Element Identifier, Material, Mass (total), and C - Effective Occ. Config'. The table lists various components, including 'OELWANNE FRONTS...' and 'OELWANNE TYP7'. A red arrow points to the row '000654/A; 1-OELWANNE FRONTSUMPF TYP3 (View)', which is highlighted in blue. A text box labeled 'Selection of data set to analyse' is positioned above the arrow. An 'Analyze BOM' dialog box is open in the foreground, showing the selected BOM line and a progress bar. The status bar at the bottom indicates 'Ready' and '235M of 458M'.

BOM Line	Rev Name	Element Identifier	Material	Mass (total)	C - Effective Occ. Config'
000108/A; 1-Product (View)	Product				
000109/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705002		56.769	
000273/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705003		29.983	
000432/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705006		26.254	
000654/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705007		49.772	True
000846/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705008		92.319	True
001056/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705009		23.628	True
001260/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705010		59.263	True
001439/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705011			True
001625/A; 1-OELWAN...	OELWANNE TYP7	Z53705012			True
001811/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705013			True
001998/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705014			True
002191/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705015			True
002381/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705016			True
002587/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705017			True
002790/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705018			True
002945/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705019			True
003129/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705020		11.788	True
003318/A; 1-OELWAN...	OELWANNE TYP7	Z53705021		45.649	True
003438/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705022		86.274	True
003606/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705024		56.768	True
003801/A; 1-OELWAN...	OELWANNE TYP8	Z53705025		177.403	True
004005/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705026		5.045	True
004153/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705027		13.158	True
004331/A; 1-OELWAN...	OELWANNE TYP7	Z53705028		65.61	True
004511/A; 1-OELWAN...	OELWANNE TYP7	Z53705029		96.937	True
004689/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705030		4.231	True
004839/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705031		53.607	True
005004/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705032		24.235	True
005153/A; 1-OELWAN...	OELWANNE TYP7	Z53705033		34.307	True
005316/A; 1-OELWAN...	OELWANNE FRONTS...	Z53705034		24.768	True



# Selection of Product Bill of Processes (BOP)

**Selection of the preferred Product BOP**

**Detailed presentation of product BOP templates**

**Component assignment based on automated classification**

**Bill of Material**

Name: OELWANNE FRONTSUMPF TYP3  
Element Id: Z53705007  
Type: Oelwanne

Bill of Process Type	Confidence	Min. Assem...	Max. Asse...
Oelwanne Busse	71.43%	0.481	2.477
Oelwanne Baustellenfahrze...	28.57%	6.043	8.719

**Bill of Process**

Type: Oelwanne Busse

Operation	Code	Se...	Confidence	Assembly H...
<input checked="" type="checkbox"/> Assemble OELWANNE FRONTSUMPF TYP3				
<input checked="" type="checkbox"/> Mit Bereitstellwagen zur Vormontagestation fahren		10		
<input checked="" type="checkbox"/> Mit Bereitstellwagen zur Vormontagestation fahren	87702	10	100.00%	4.317
<input checked="" type="checkbox"/> Oelstandsensor mit Dichtring an Oelwanne montieren		15		
<input checked="" type="checkbox"/> Oelstandsensor mit Dichtring an Oelwanne montier	60815	15	93.75%	2.823
<input checked="" type="checkbox"/> Oelwannendichtung auf Oelwanne legen		20		
<input checked="" type="checkbox"/> Oelwannendichtung auf Oelwanne legen	16188	20	0.00%	0.344
<input checked="" type="checkbox"/> Oelwannendichtung auf Oelwanne legen	29845	20	100.00%	1.103

**Part Assignment**

Operation: Oelstandsensor mit Dichtring an Oelwanne montieren

Assigned Part	Designator	Available Part	Designator
OELWANNE ALLRAD	OELWANNE	DICHTRING	DICHTRING
		DICHTRING	DICHTRING
		DICHTRING DIN 7603-A ...	DICHTRING

# Generation of an initial Assembly Plan

The screenshot displays the Siemens Teamcenter Manufacturing Process Planner interface. The left pane shows a BOM tree for '008944/A; 1-Assemble OELWANNE FRONTSUMPF TYP3'. The right pane shows the 'Bill of Process' for 'Oelwanne Busse'. A red box highlights the 'Bill of Process' table, and a red arrow points to it from the text 'Refinement of the product BOP templates'. Another red box highlights the BOM tree, and a red arrow points to it from the text 'Allocation and visualisation of an initial assembly plan'.

**Bill of Material**

Name: OELWANNE FRONTSUMPF TYP3  
Element Id: Z53705007  
Type: Oelwanne

Bill of Process Type	Confidence
Oelwanne Busse	71.43%
Oelwanne Baustellenfahrze...	28.57%

**Bill of Process**

Type: Oelwanne Busse

Operation	Code	Se...	Confidence	Assembly Ti...
<input checked="" type="checkbox"/> Assemble OELWANNE FRONTSUMPF TYP3				
<input checked="" type="checkbox"/> Mit Bereitstellwagen zur Vormontagestation fahren	87702	10	100.00%	4.317
<input checked="" type="checkbox"/> Oelstandsensor mit Dichtring an Oelwanne montieren	60815	15	93.75%	2.823
<input checked="" type="checkbox"/> Oelwannendichtung auf Oelwanne legen	16188	20	0.00%	0.344
<input checked="" type="checkbox"/> Oelwannendichtung auf Oelwanne legen	29845	20	100.00%	1.103
<input checked="" type="checkbox"/> Oelwannendichtung in Oelwanne montieren	53619	20	0.00%	2.423
<input checked="" type="checkbox"/> Bundschrauben in Oelwanne montieren	26420	30	0.00%	0.912
<input checked="" type="checkbox"/> Bundschrauben in Oelwanne montieren	97164	30	100.00%	4.842
<input checked="" type="checkbox"/> Schrauben fuer Oelwanne bereitlegen	60586	30	0.00%	2.810
<input type="checkbox"/> Verschlusskappen montieren	94297	35	0.00%	4.683
<input type="checkbox"/> Zwei Verschlusskappen montieren	15544	35	0.00%	0.308
<input type="checkbox"/> Zwei Verschlusskappen montieren	72332	35	56.25%	3.463
<input type="checkbox"/> Oeleinfuellrohr mit Flachdichtring montieren	31646	40	6.25%	1.203

**Allocation and visualisation of an initial assembly plan**

**Refinement of the product BOP templates**





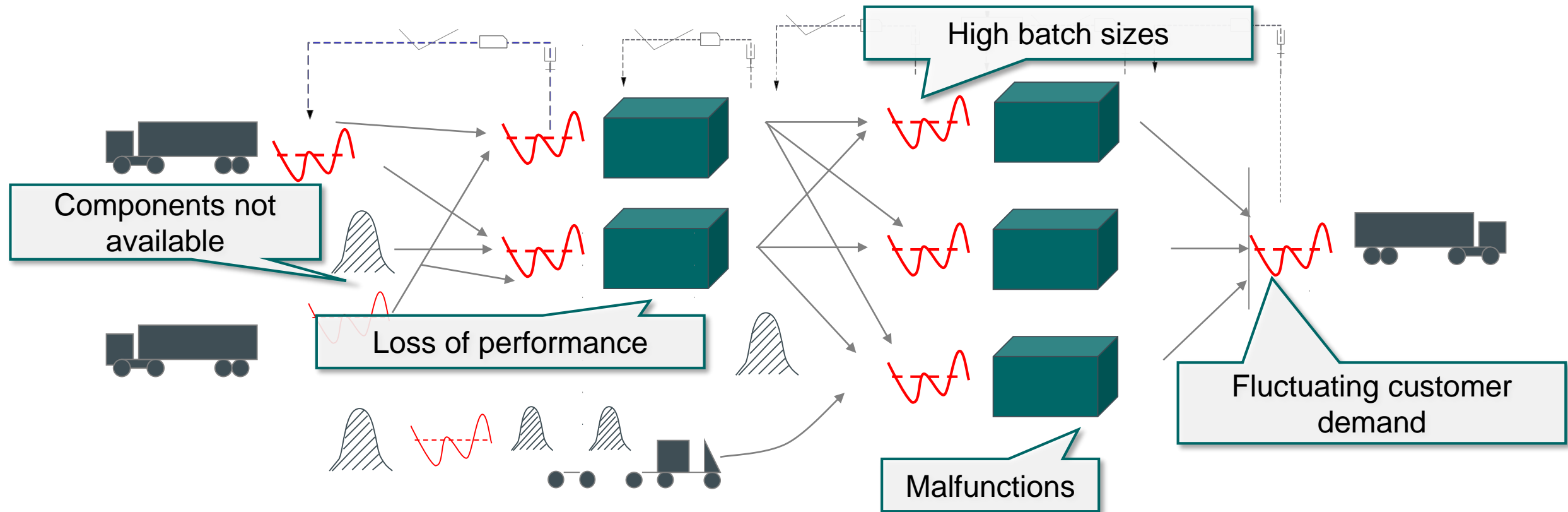
# Dynamic Value Stream Analysis - Advanced Lean Functions



# Overcoming challenges in discrete production systems



# Production dynamics and characteristic losses

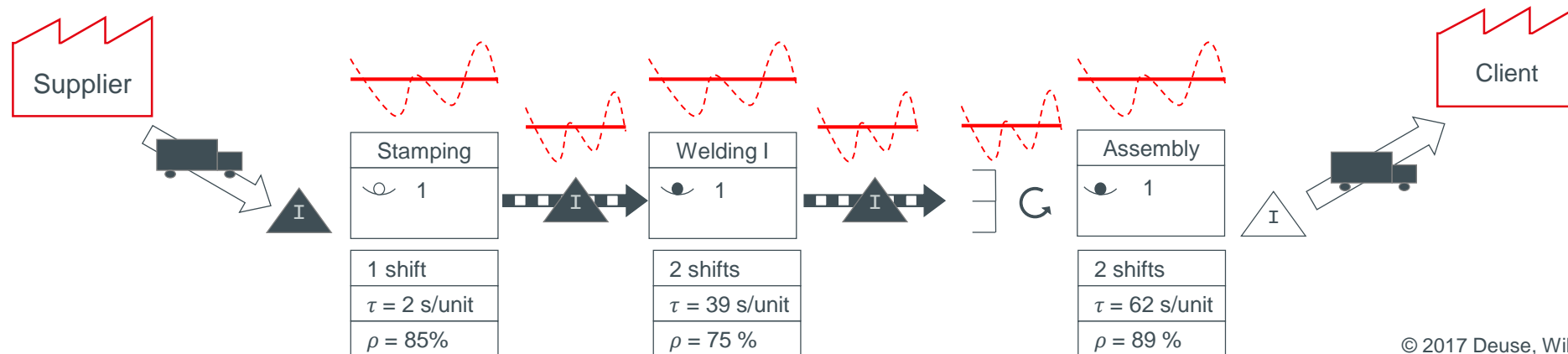


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# Shortcomings of Value Stream Analysis (VSA)

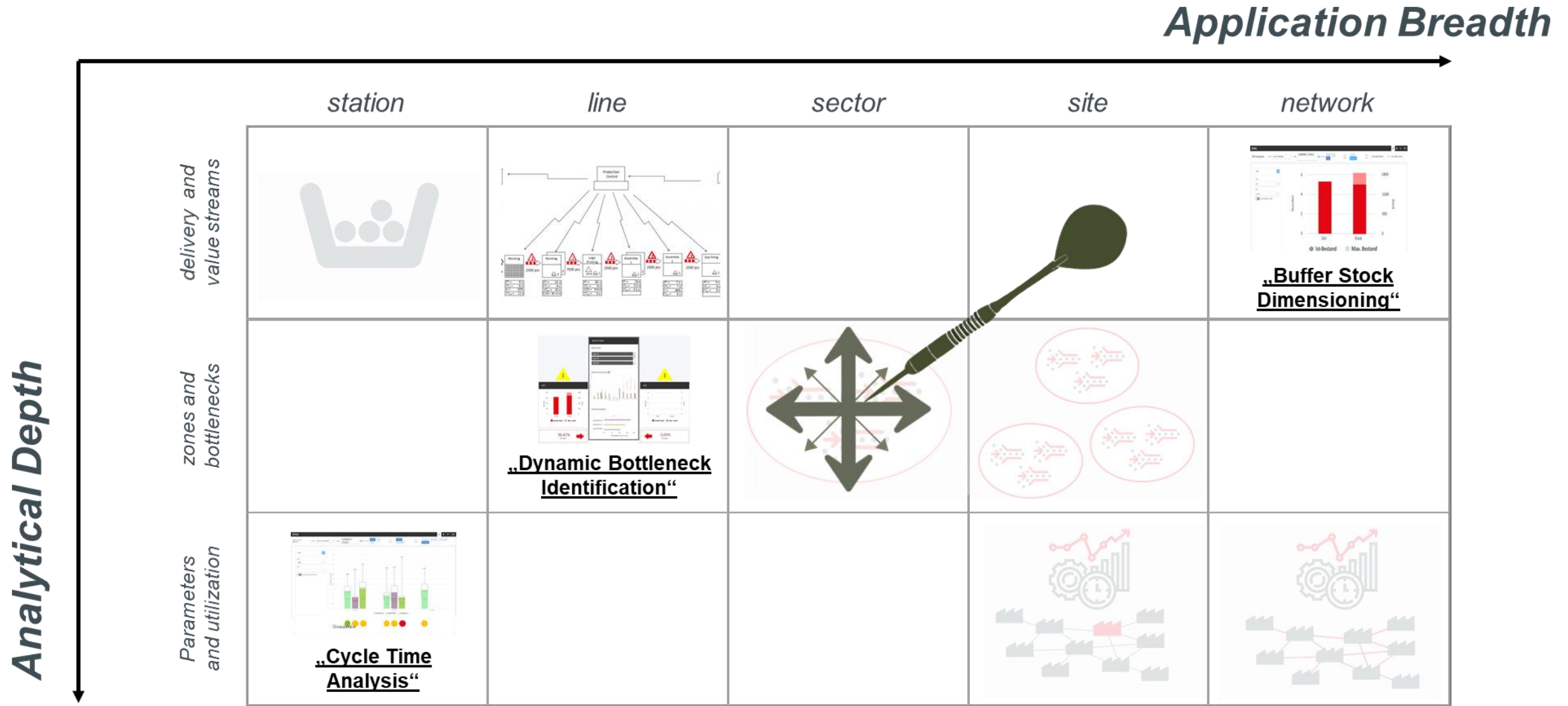
- Isolated investigation of one product group
  - Working with averages (e.g. takt)
  - Time-intensive, therefore only snapshots (e.g. safety stocks)
  - Consequently, no sufficient data basis for:
    - Recording of variability
    - Identification of changing bottlenecks
    - Consideration of value stream dynamics
- **Lack of opportunity for effective improvement and lean stock design**



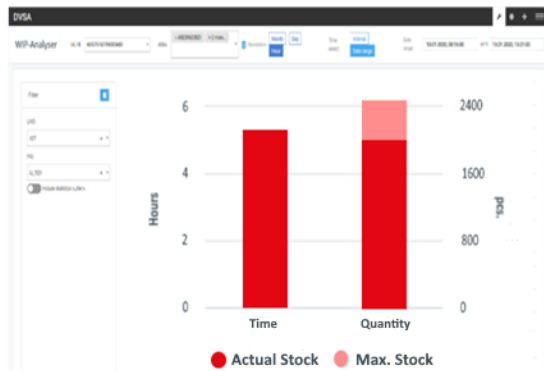
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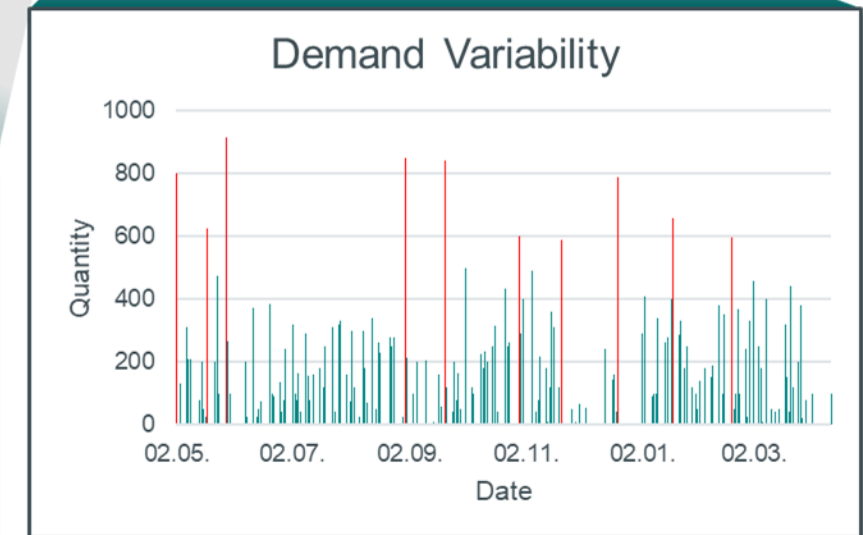
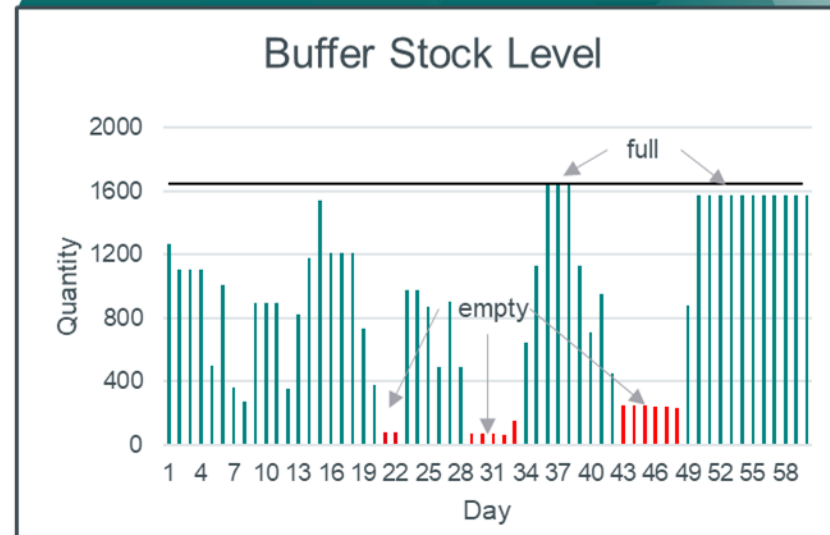
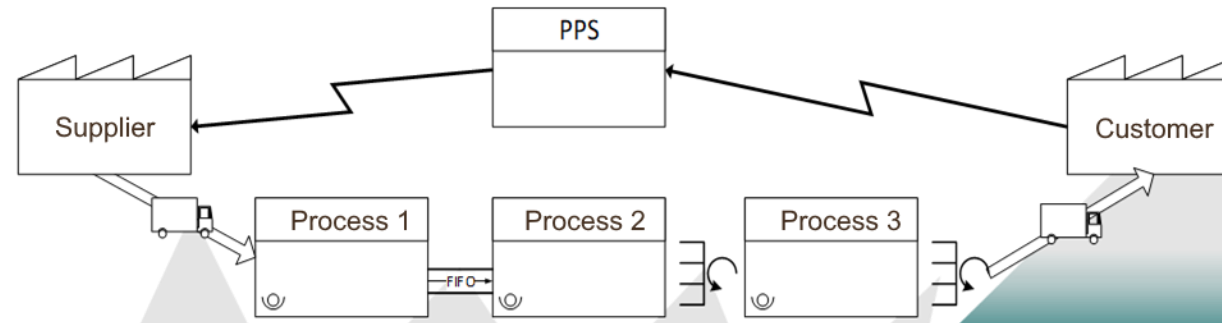


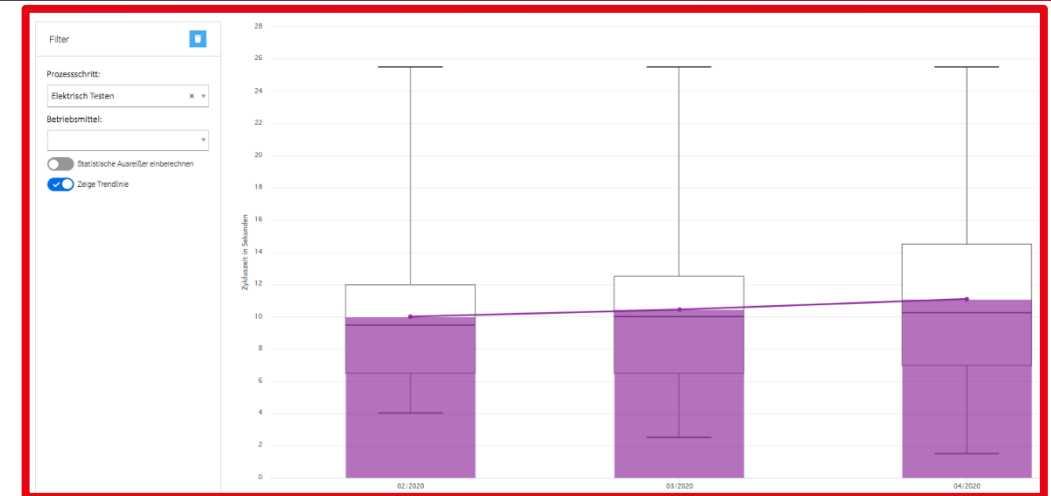
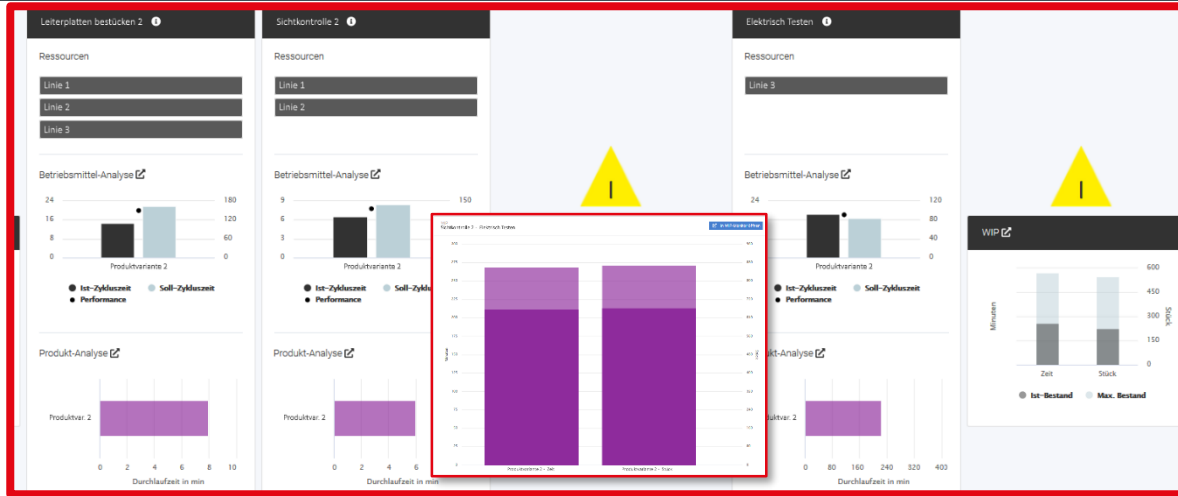
## Dynamic buffer stock analysis for product groups and types



### Design approaches:

- Analysis of historical data for buffer stock design
- Selection of continuous improvement areas
- ...

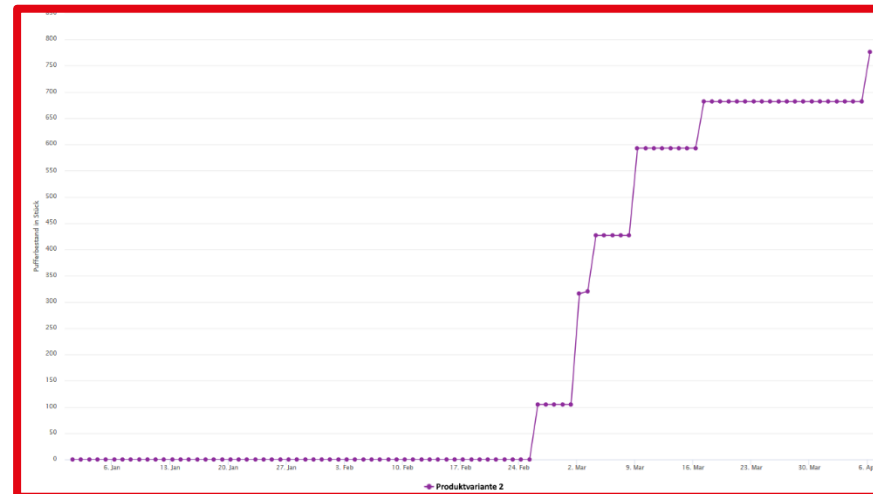




Material accumulates in front of the electrical tester.



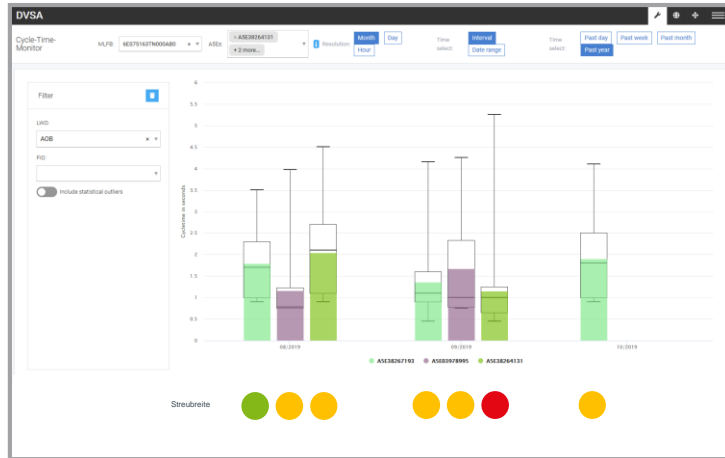
Jim (Process Engineer)



## Savings

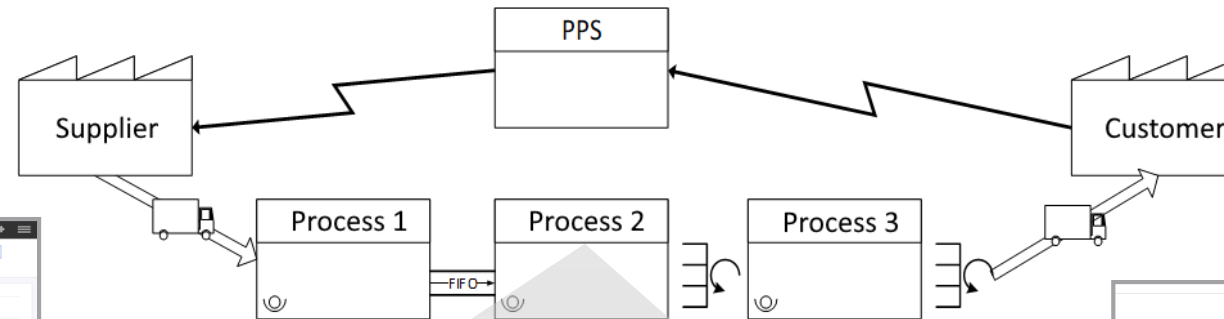
- Reduced stocks
- Reduced cycle times
- Increased Output
- Less overload

## Cycle Time Analysis Process 1

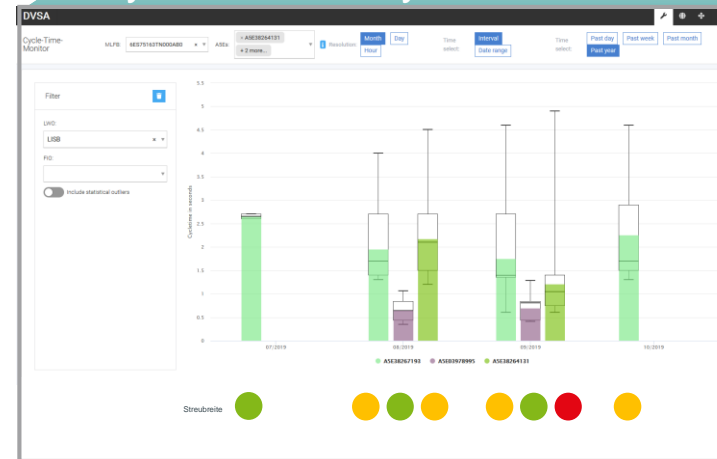


### Design approaches:

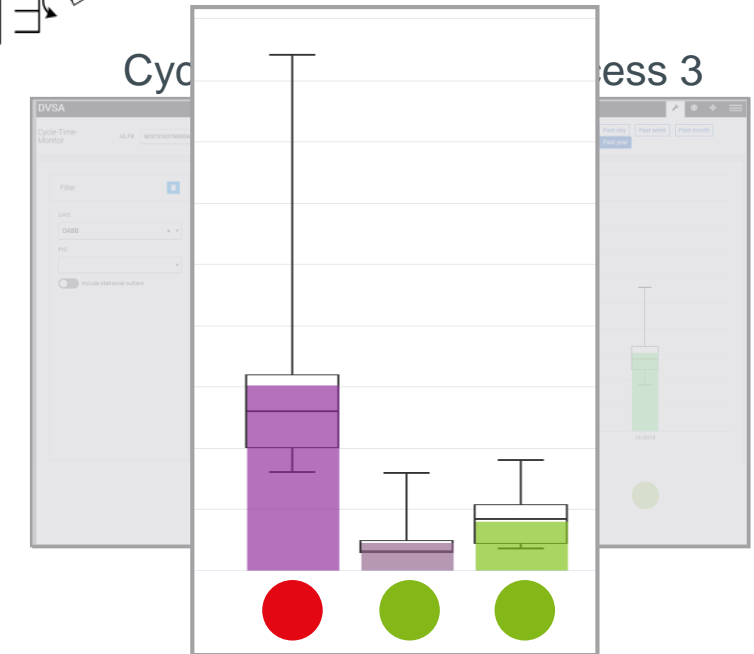
- Standardization of individual processes
- Stability improvement of value streams
- Product mix design
- ...



## Cycle Time Analysis Process 2

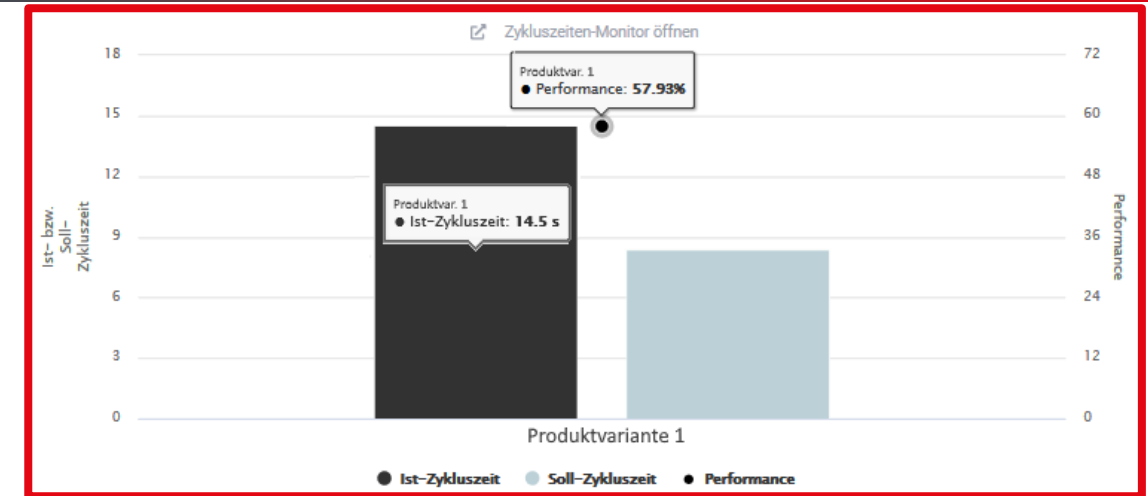
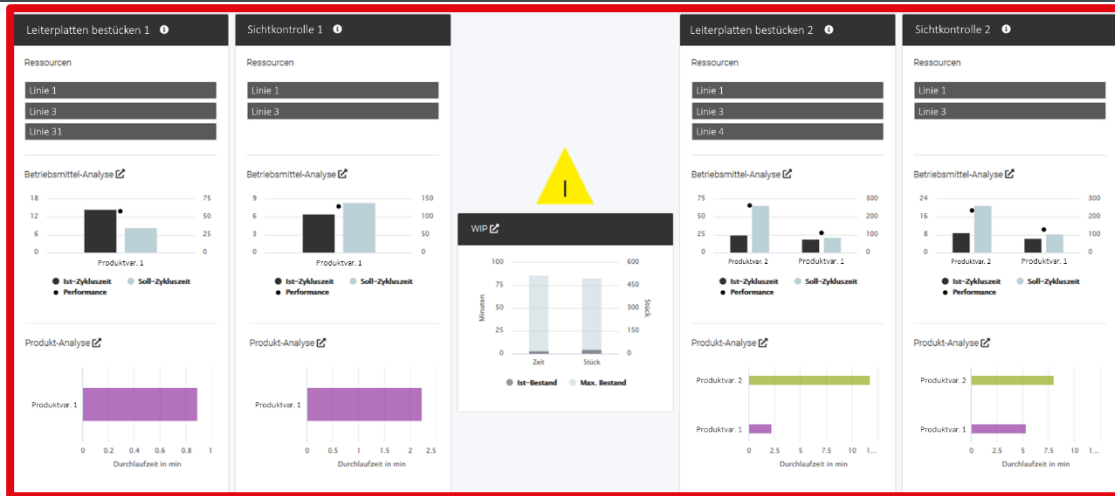


## Boxplot



Visualization of variability through boxplots and color codes





Are our planned times up-to-date?

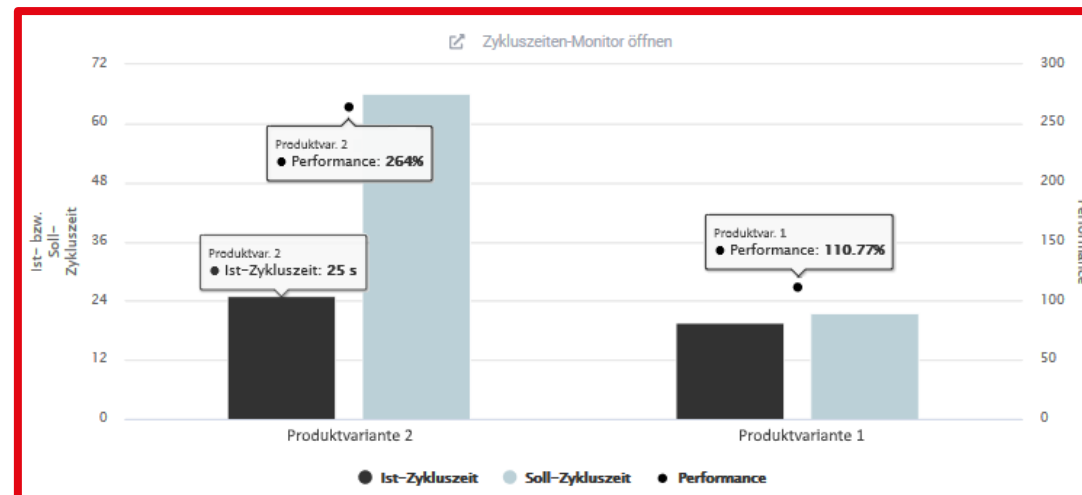


Kelly (Production Planner)

Circuit board assembly 2  
Performance  $\geq 100\%$

Circuit board assembly 1  
Performance  $< 60\%$

Adaptation of work plans necessary



## Savings

- More accurate cost calculation
- Reduced throughput times

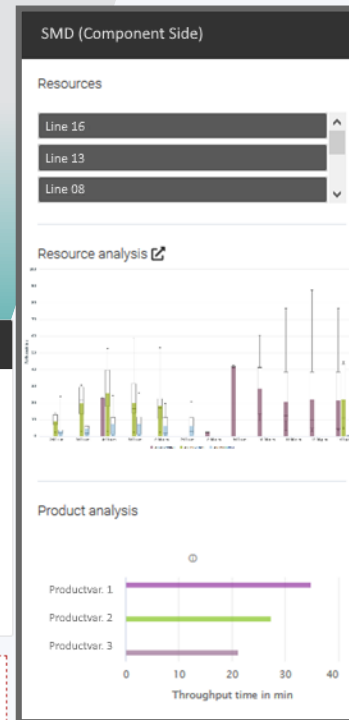
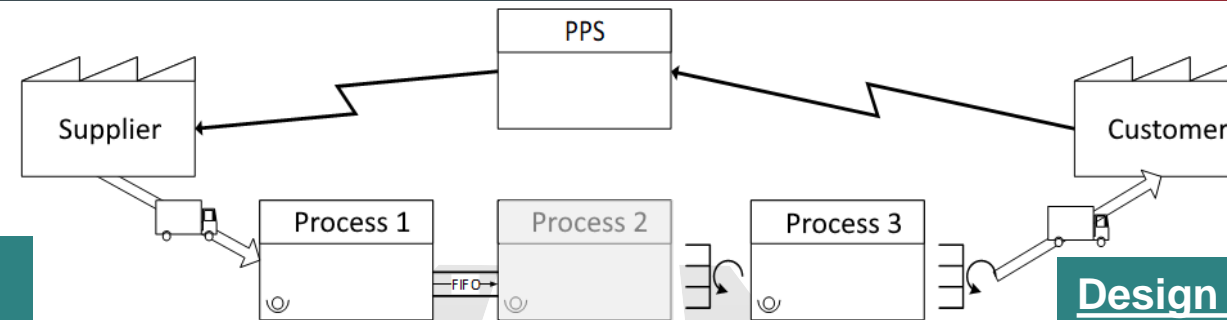


## Design approaches (reactive):

- Identification of current bottlenecks
- Focus on troubleshooting and maintenance
- Product mix control
- ...

## Design approaches (predictive):

- Prediction of future bottlenecks
- Focus on standardization and improvement
- Technology design
- ...



Blocked processes



Stock range exceeded

96,47%

Fill level



0,00%

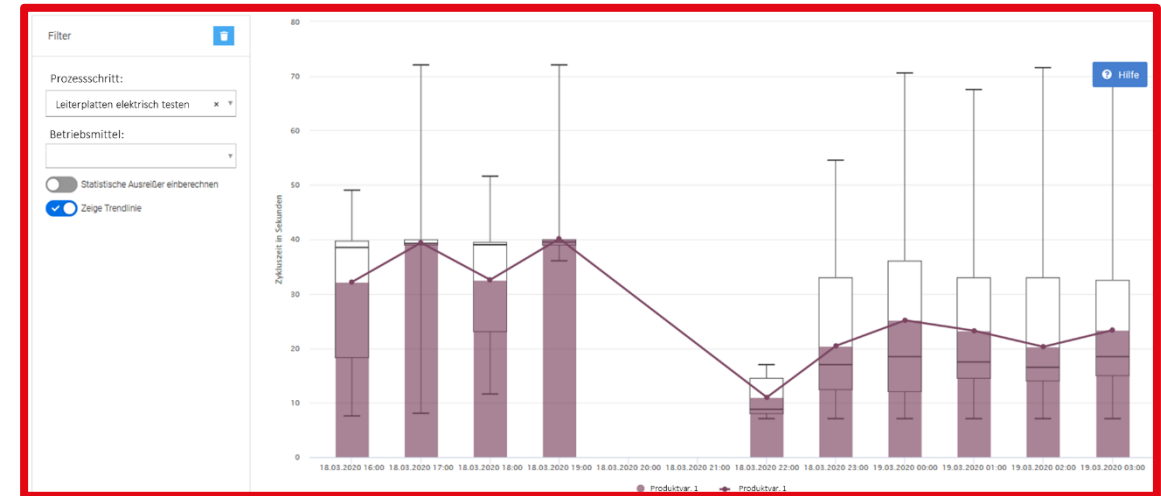
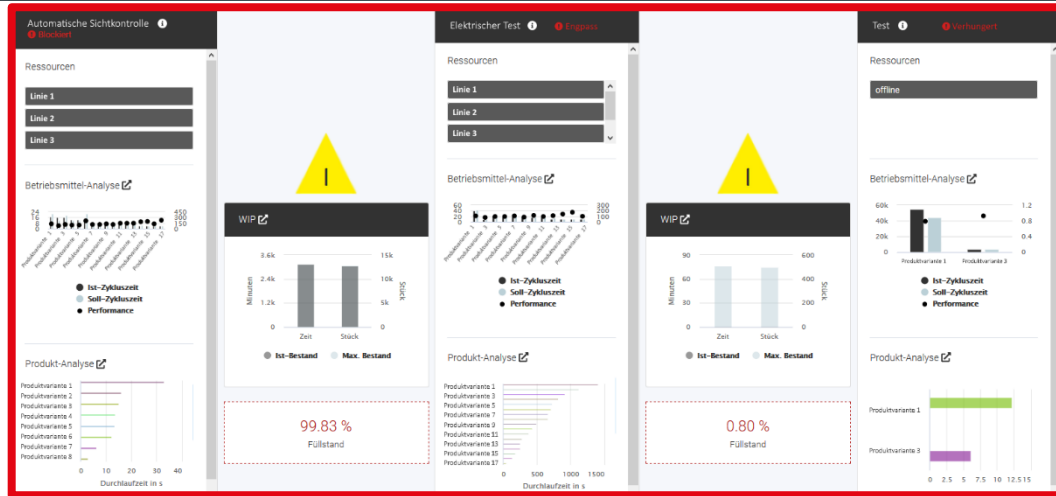
Fill level



Stock range undercut



Starved processes



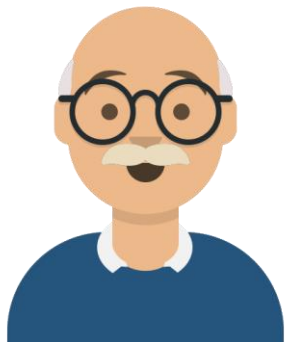
Our production stopped

Bottleneck identified

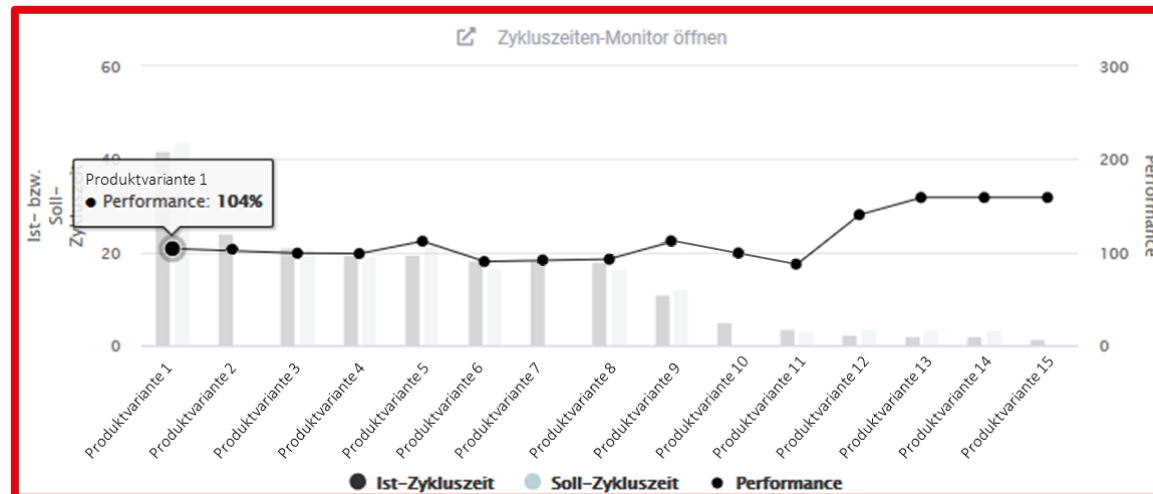
High process performance

High process fluctuation

Stabilize cycle times



Michael (Production Manager)

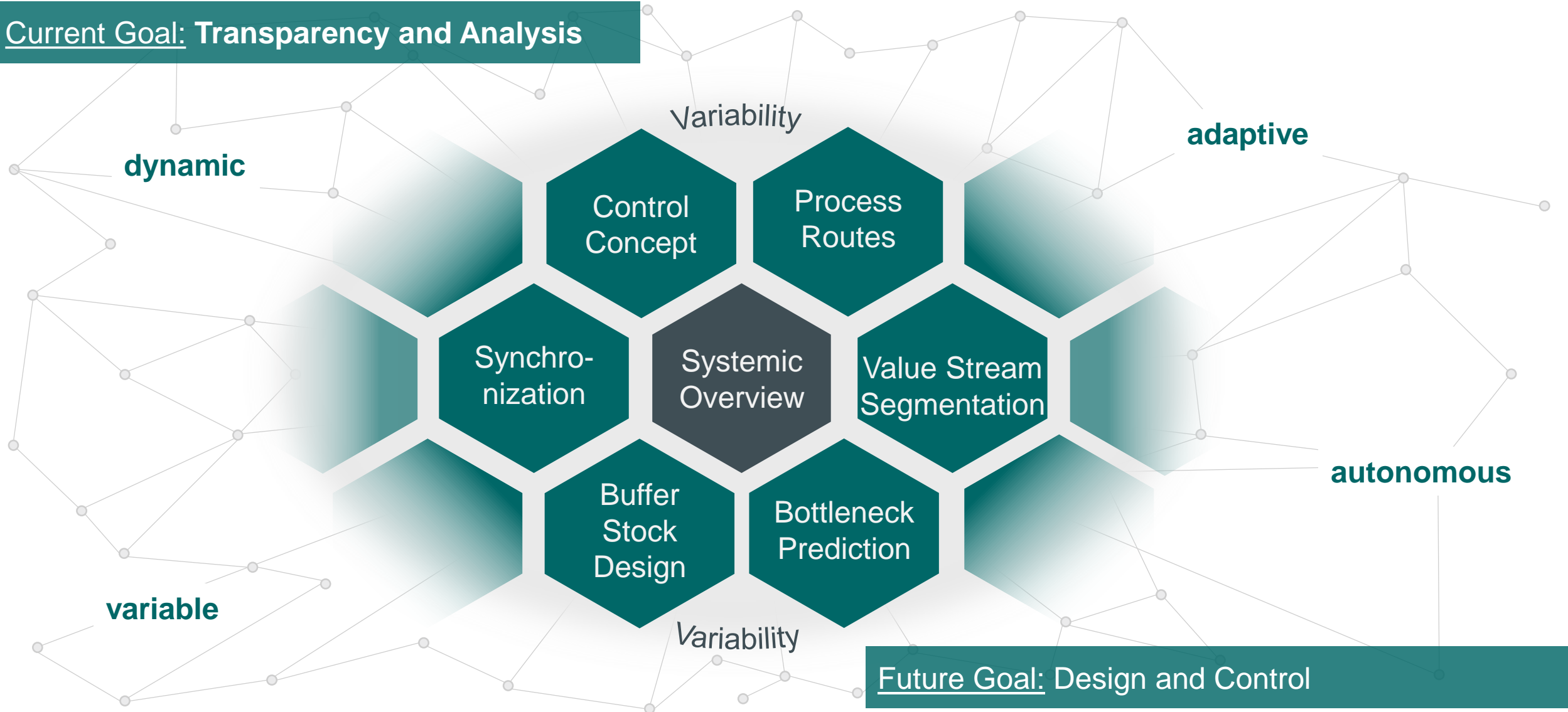


## Savings

- Improved process stability
- Reduced throughput time
- Increased output
- Improved OEE

# Functions for the Future Value Stream Design

Current Goal: Transparency and Analysis



# Contact



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