



# Managing Global Production Networks

Presentation at the Controller Congress 2017

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## **Paul Lemoine**

Vice President Global Manufacturing & Operational Excellence at Inalfa Roof Systems in Venray, NL

42 years in international Business thereof 28 years experience in Lean Manufacturing and Business Excellence

Work History (amongst others):

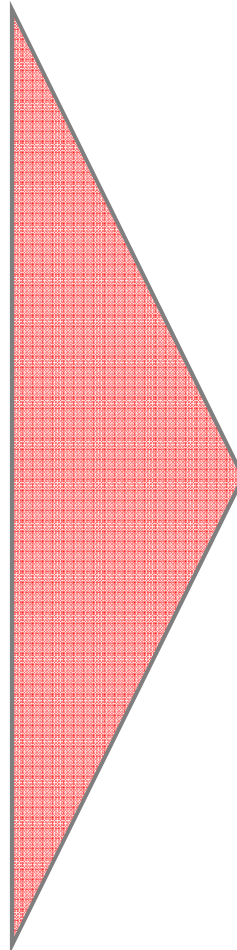
Starting a Lean Plant (GM/ Opel Eisenach, 1992)

Restructuring a Vehicle Operations plant (brownfield) (Ford Cologne, 2002)

Harbour productivity report Europe: Number one and two  
Lean Production Award 2006

## Challenges

- A globalized world requires Global presence and Global Production networks (despite some new nationalistic trends like ‚America first‘).
- The markets undergo permanent changes in high frequency. They are volatile, facing continuous technical innovations and become more complex.
- The process of becoming global to get access to growing markets or to achieve quality, service, and/or cost advantages from the reconfigured Value Chains is one of the most complex processes that companies undertake.
- Designing and implementing global manufacturing and logistics networks require innovative methodological approaches.
- The segmentation of the markets and increasing trends to customization result in smaller volumes per product type and higher variations (complexity).
- New competitors are entering the markets with innovations and new business processes.



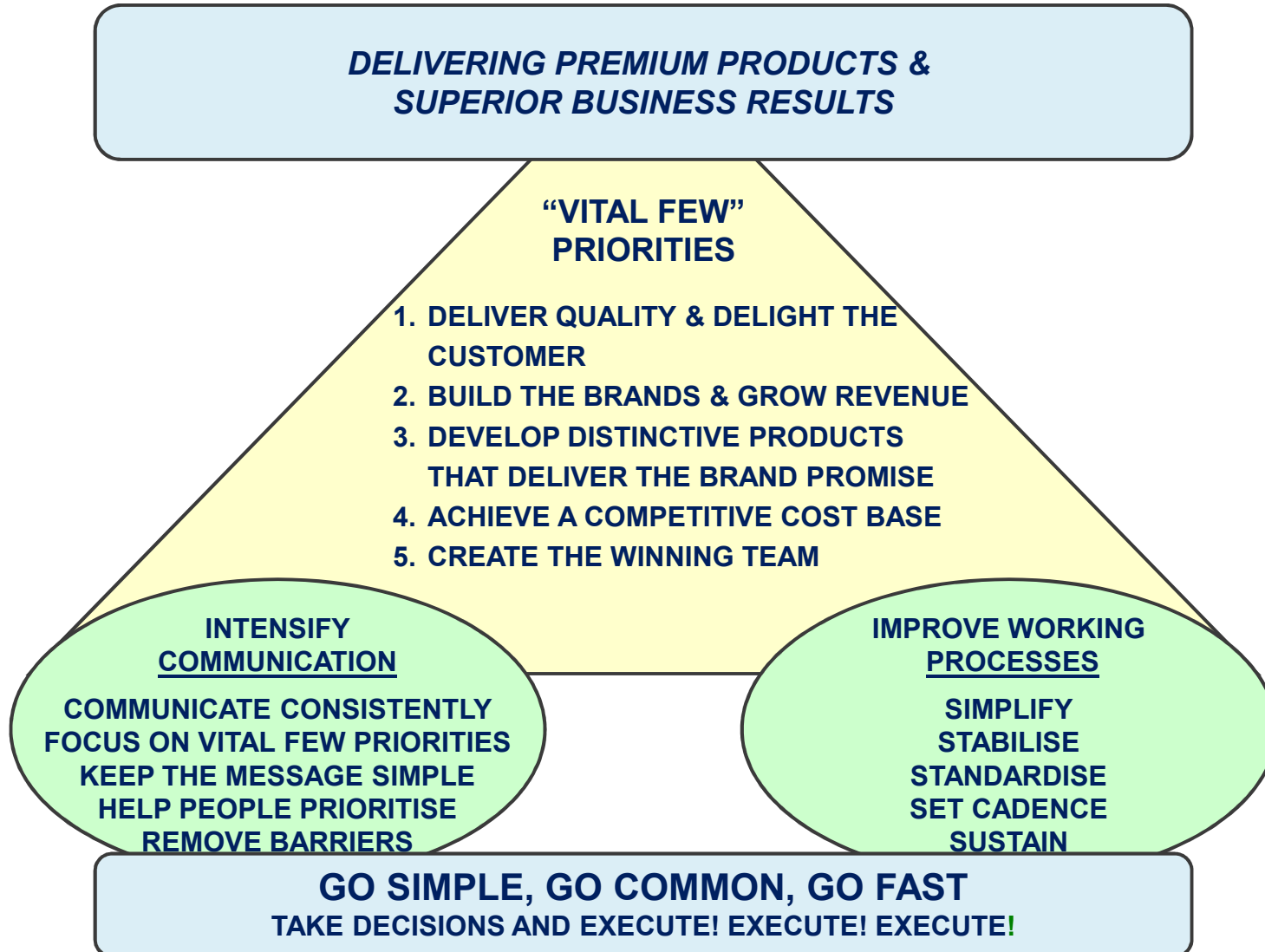
## Consequences

- Most of the companies need to analyse, assess, define, and deploy the operations strategy.
- Complex networks need effective coordination and control of the value chains.
- Flawless and aligned processes in Purchase, Logistics and Production are essential for the success of the company.
- Companies need to stay agile. Changes need to be anticipated and counter measured.
- Value chains will be integrated in global networks.
- Production will be partially localized.
- Higher complexity requires flexible manufacturing with low throughput times.
- Standard products are under high price pressure, innovations are needed for profitability (products and processes)
- Greater focus on total cost along the value chain.
- Industry 4.0 or the ‚internet of things‘ will force the Production network into new conditions.



1. Focus on customer demand, - understand the local markets.
2. Need for a clear mission / strive for World Class
3. Common production philosophy, processes and tools
4. Decentralized Leadership, - central government versus regional and local decision making
5. Strong representation in the region
6. The “**Voice of Manufacturing**” needs to be heard (throughout the value chain).
7. Minimise the input of your resources in order to stay lean/ agile.
8. Strong Supply Chain function to steer the global supply network from raw material to customer. Concentrate on the total value stream (holistic approach). Involve all parties within the value stream.
9. Excellent Controlling System to provide the decision makers with the right input (real time monitoring as much as possible, high level of data integrity)

# The XX- company global *Business Model*:

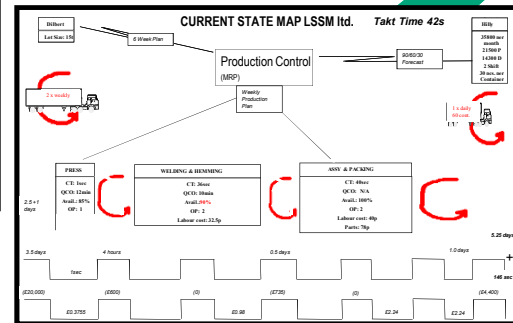


# Policy Deployment over all units and entities globally



| Business Plan Scorecard Structure |                 |                              |           |        |       |
|-----------------------------------|-----------------|------------------------------|-----------|--------|-------|
| Business Process                  | Strategic Focus | Level 1 Performance Measures | Target    | Weight | Score |
| Customer Service                  | High            | Customer Satisfaction        | 95%       | 20%    | 92    |
| Operational Efficiency            | High            | Production Cycle Time        | 42s       | 15%    | 45    |
| Quality Management                | High            | Defect Rate                  | 0.5%      | 15%    | 0.6   |
| Financial Performance             | High            | Cost Reduction               | 5%        | 15%    | 5.2   |
| Human Resources                   | High            | Employee Turnover            | 10%       | 15%    | 10.5  |
| Environmental & Social            | High            | CO2 Emissions                | 1000 tons | 15%    | 1005  |

The **Scorecard** identifies the priorities and targets



The **Value Stream Map** identifies the opportunities

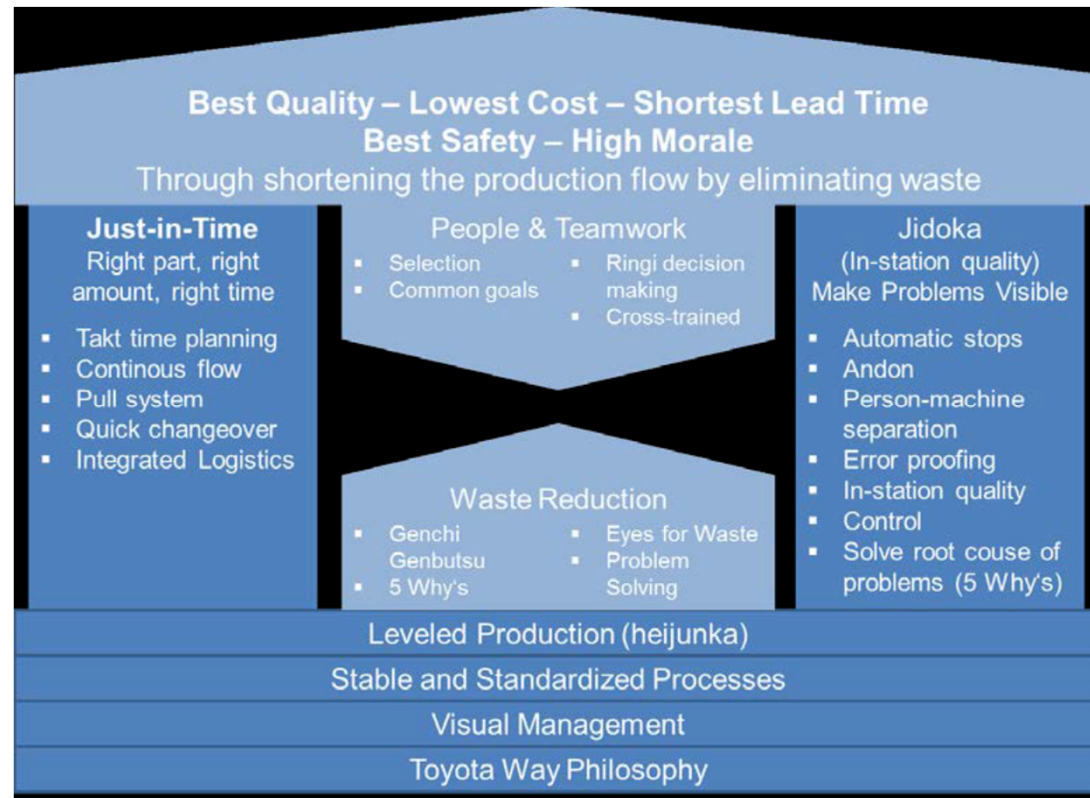
| A3 NUMBER & THEME TITLE Here |                | A3 Owner: Single/Lead/Co-lead/All |
|------------------------------|----------------|-----------------------------------|
| CURRENT SITUATION            |                | TOTAL ASPECT SUCCESSSES           |
| GOAL                         |                | OPPORTUNITIES                     |
| PROPOSAL                     |                | RISKS                             |
| WHAT                         | IMPLEMENTATION | WHO WHEN                          |

The **A3** identifies the actions and the resources required

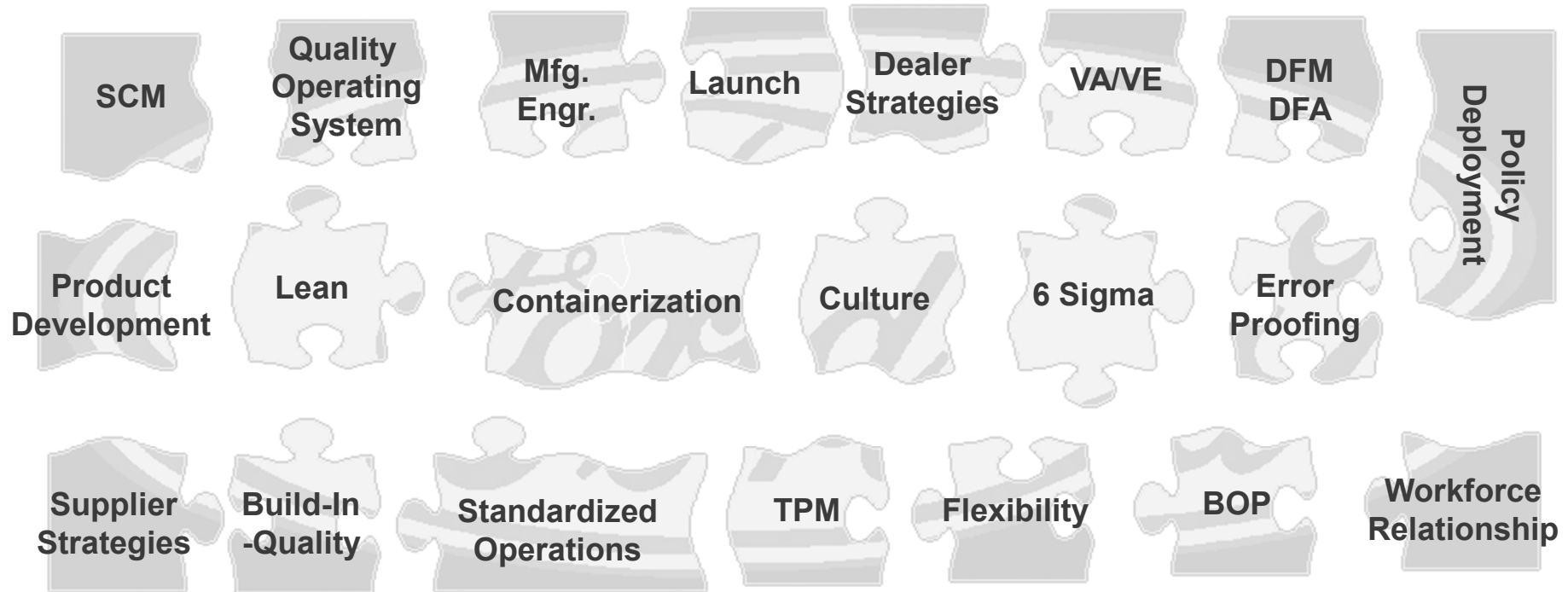
| Area       |                    | 90 Day Master Schedule |     |     |     |     |     |     |     |     |     |     |     |
|------------|--------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Week       | Day                | 1                      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  |
| Production | Production Line 1  | ...                    | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
|            | Production Line 2  | ...                    | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
|            | Production Line 3  | ...                    | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
|            | Production Line 4  | ...                    | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Support    | Support Function 1 | ...                    | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
|            | Support Function 2 | ...                    | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
|            | Support Function 3 | ...                    | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
|            | Support Function 4 | ...                    | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |

The **Master Schedule** identifies the timing and follow up frequency

# Common production philosophy – the Toyota House (e.g.)



# Landscapes look like this: Many Initiatives not linked and not aligned (a typical syndrome)





# Example of a holistic (lean) production system



# World Class Leadership thinks global



Iceberg Model – every department is globally involved and needs to think global



# Quantitative and Subjective Criteria of a Global Lean Business Model



| Stage 1  | Stage 2 | Stage 3  | Stage 4    | Stage 5     |
|----------|---------|----------|------------|-------------|
| Reactive | Formal  | Deployed | Autonomous | Way of Life |



## Processes, procedures & Systems

- **Extent** - Clearly defined processes are found in all or required parts of the business
- **Reach** - The required processes have been deployed through all levels
- **Adherence** - The required processes are effectively being used and are not passed-by

## Individual & Collective Behaviour

- **Engagement** - Leaders and Employees adhere to values and strategic and operational requirements
- **Trust** - There is respect for others with evidence of listening and involvement
- **Focus** - Leaders and Employees display a relentless attention to the requirement for results

Prof. Hines in June 2013

# Global Production Networks need Leaders!



| <b>Manager</b>                  | <b>Leader</b>                |
|---------------------------------|------------------------------|
| Administers                     | Innovates                    |
| Is a copy                       | Is an original               |
| Maintains                       | Develops                     |
| Focuses on system and structure | Focuses on people            |
| Relies on control               | Inspires trust               |
| Has a short-range view          | Has a long-range perspective |
| Asks how and when               | Asks why                     |
| Has his eye on the bottom line  | Has his eye on the horizon   |
| Imitates                        | Originates                   |
| Accepts the status quo          | Challenges the status quo    |
| Classic good soldier            | Is his own person            |
| Does things right               | Does the right thing         |

Prof. Hines in June 2013



## Product development

Meeting customer requirements :

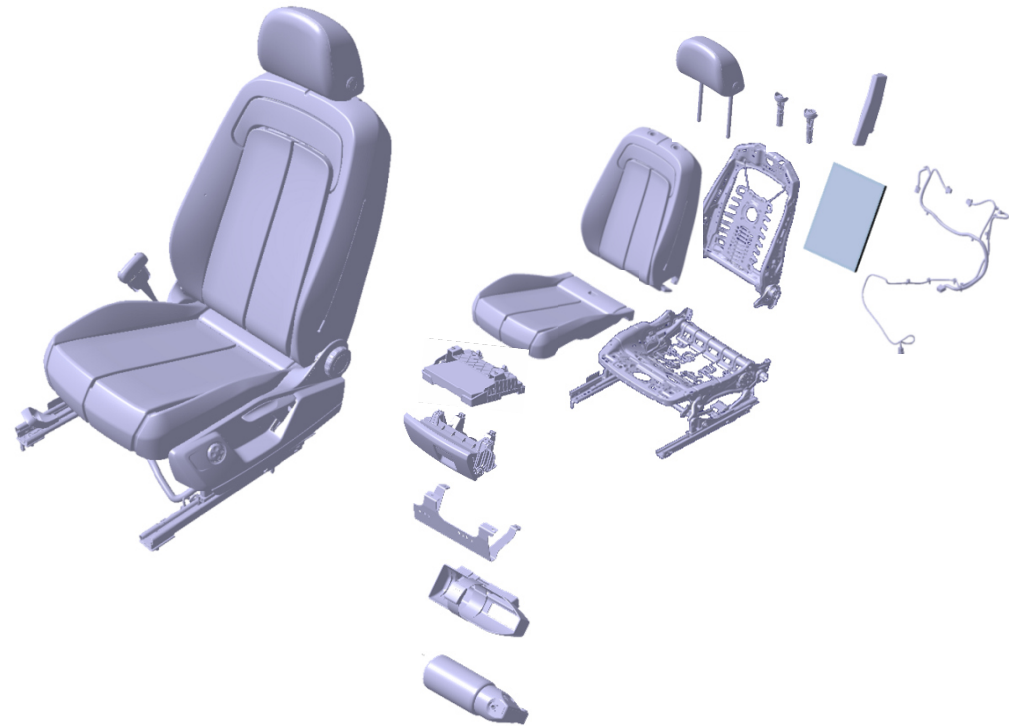
Fulfil specifications  
with minimal efforts

Tools:

Value Analysis (VA)  
Value Engineering (VE)

Definition:

Technical cost reductions  
with VAVE-Methods and tools





## Value Analysis / Value Engineering (VAVE):

### Definition:

Technical cost reductions with VAVE Methods and tools

### Conditions:

Product specifications have to be complied with and may only be changed in agreement with the customer

VAVE is a structured process

The difference between VA and VE:

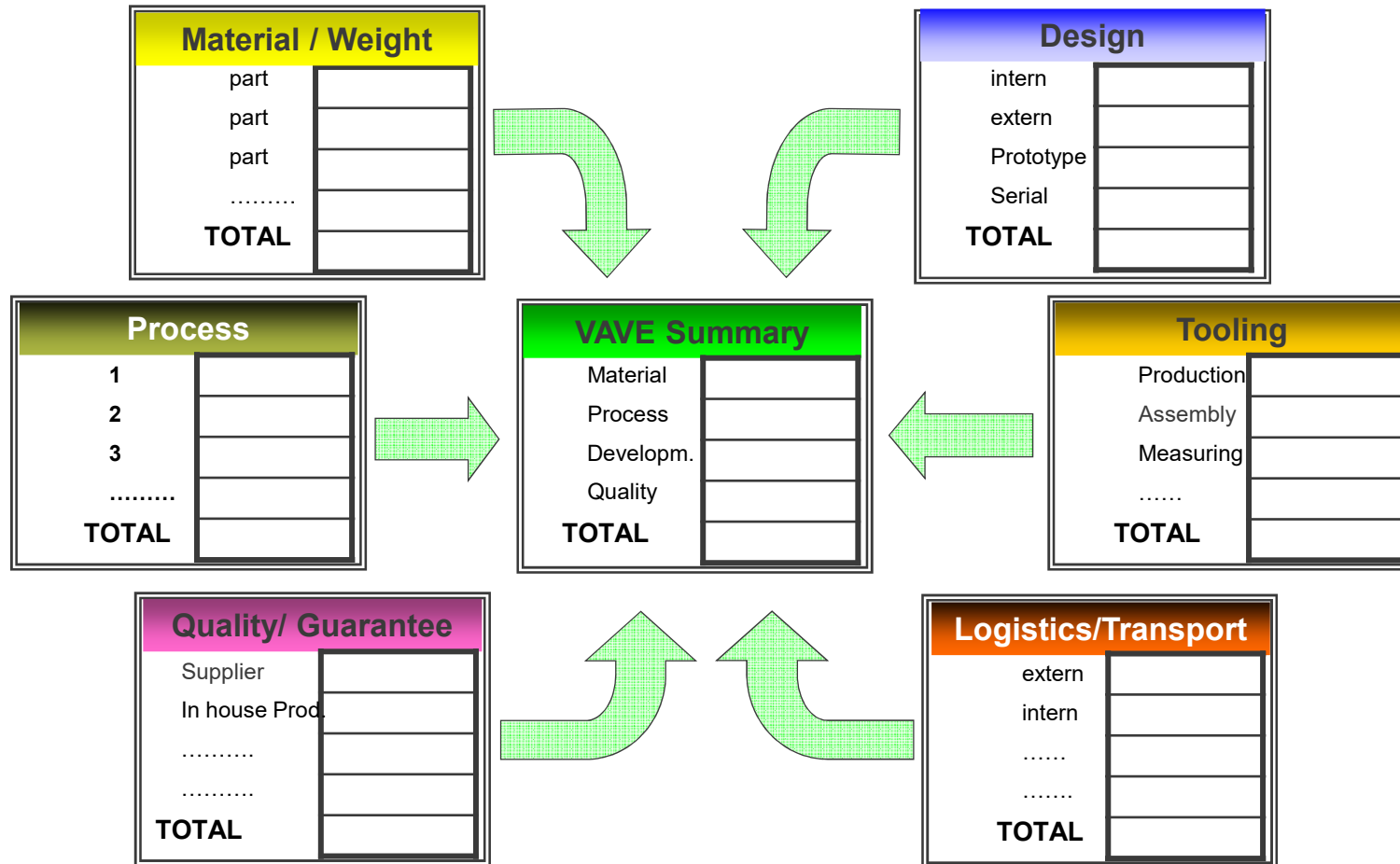
- VA looks at products and services that have already been completed
- VE looks at products and services in the product development phase

# What is VAVE ?



- A structured effort to achieve product **specification** at **lowest costs** without negative implications on the required quality, reliability and marketability of the product.
- A proven **approach** to **increase the value** and / or to **reduce the costs** for products, processes, services, organisational structure and procedures.
- A **comprehensive and structured way of solving problems** considering tasks and requirements of the management as well as human behaviour in an open, complex and dynamic system.
- Is **not only** used to increase the value of **existing products**, however, **for products** which **are still under development** (Value engineering), **also**.

# VAVE - analyzing all the aspects of production costs

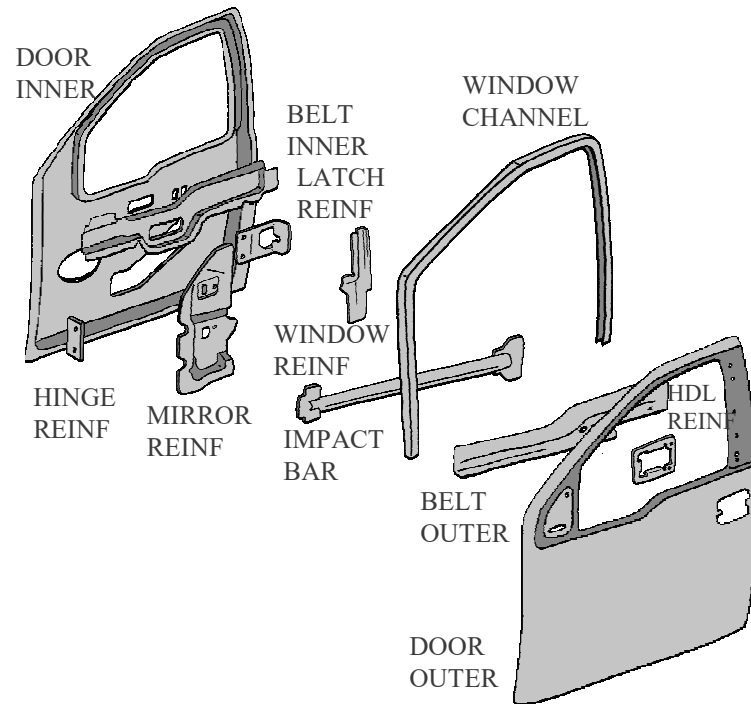




# Benchmarking: Door Design Comparison



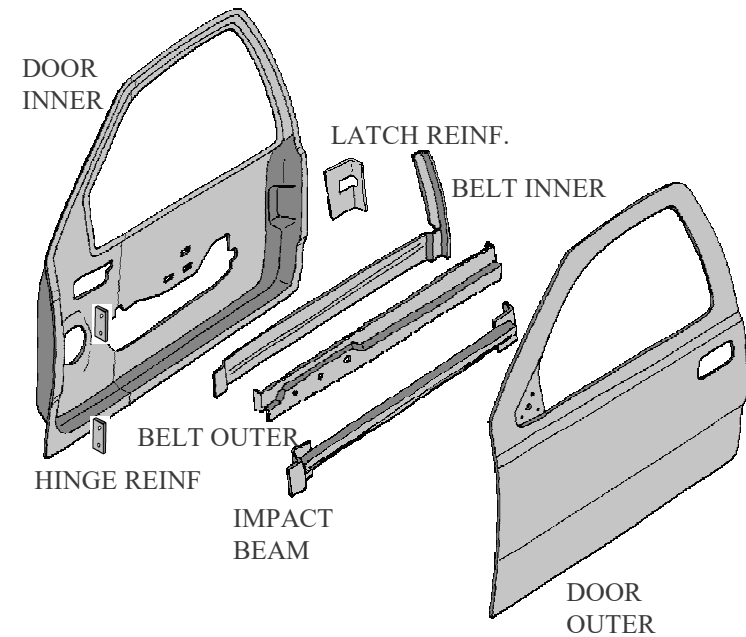
## Door - P xxx



- Tailor Welded Inner
- 11 Parts
- 6 Load Sequences
- 121 Welds
- 3 Metal Forming Operations

CA AKADEMIE

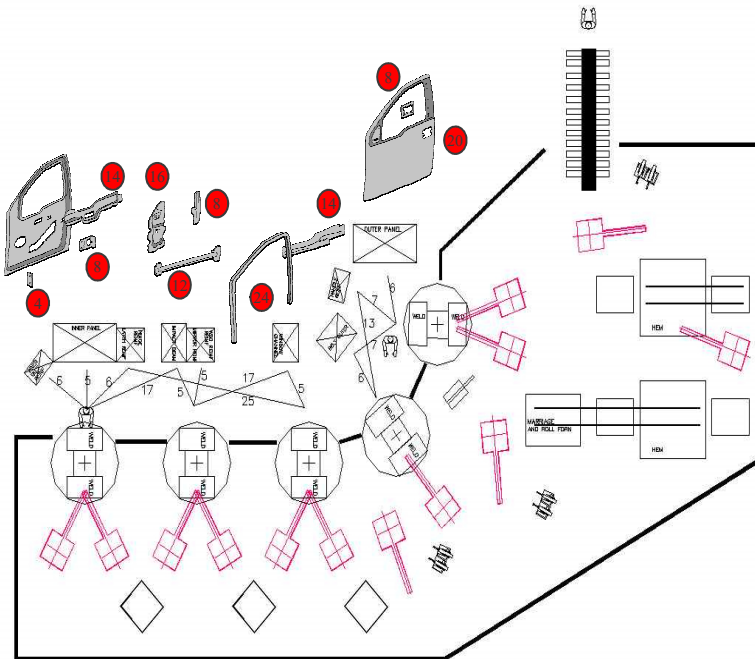
## Benchmark Door



- Tailor Welded Inner
- 8 Parts
- 3 Load Sequences
- 80 Welds
- 1 Metal Forming Operation

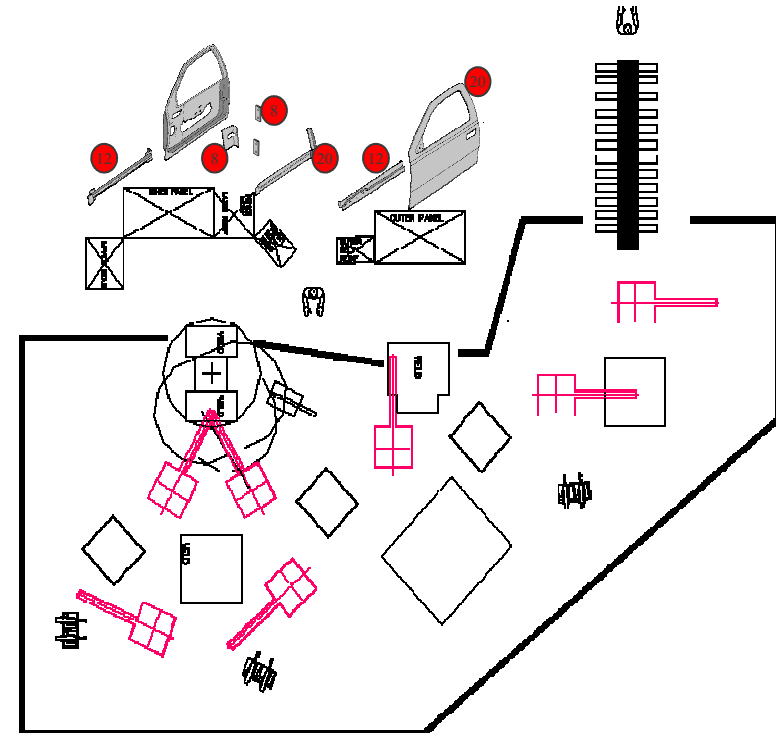


## Ford Door Process - P 221



- 67.5 Cycle Time
- 47.9 JPH Net
- 700 Jobs/Day on 2 Shifts  
(2 styles 70/30 volume swing to support 1000/day)

## Benchmark Door Process



- 61.6 Cycle Time
- 48 JPH Net
- 768 Jobs/Day 2 Shifts



- The **Value Stream Analysis** can be applied to nearly any value chain – from raw material to finished products. It includes production-, material- and information-flow.
- It gives us a representation of the overall picture of a value chain from suppliers to customers. It creates transparency. Potentials are being flagged.
- All kinds of waste are shown for the entire product family and for the complete value chain.
- This results in potentials, which can be adjusted to each other in an optimal way (due to involvement of all related processes).
- Value Stream Mapping is a key element of World Class Manufacturing (WCM).

# World Class Manufacturing - The Value Stream



## How to design an optimal value stream?:

Always consider Total Costs / Total delivered costs

Question the value stream / speak in data

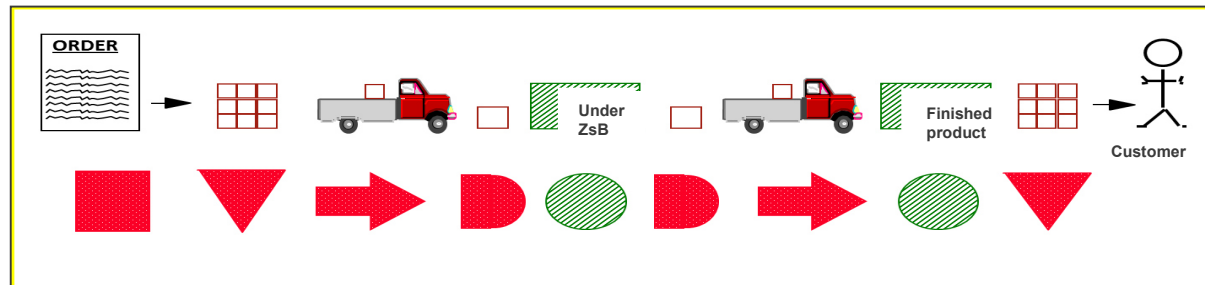
Rationalize the number of suppliers

Optimise logistics flow (information/physics)

Create product variants in the value stream  
process as late as possible

## Tools:

1. Total delivered costs
2. Value Stream Mapping
3. Supplier development
4. Logistics optimisation
5. Design for Manufacturability (DFM) / Design for Assembly (DFA)



What is the customer willing to pay for?

# World Class Manufacturing - Minimize the use of resources



In the area of performance:

Minimise investments

Use World Class Manufacturing techniques and tools

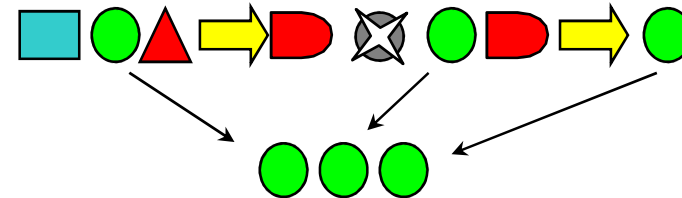
Tool:

Lean Toolbox

Definition:

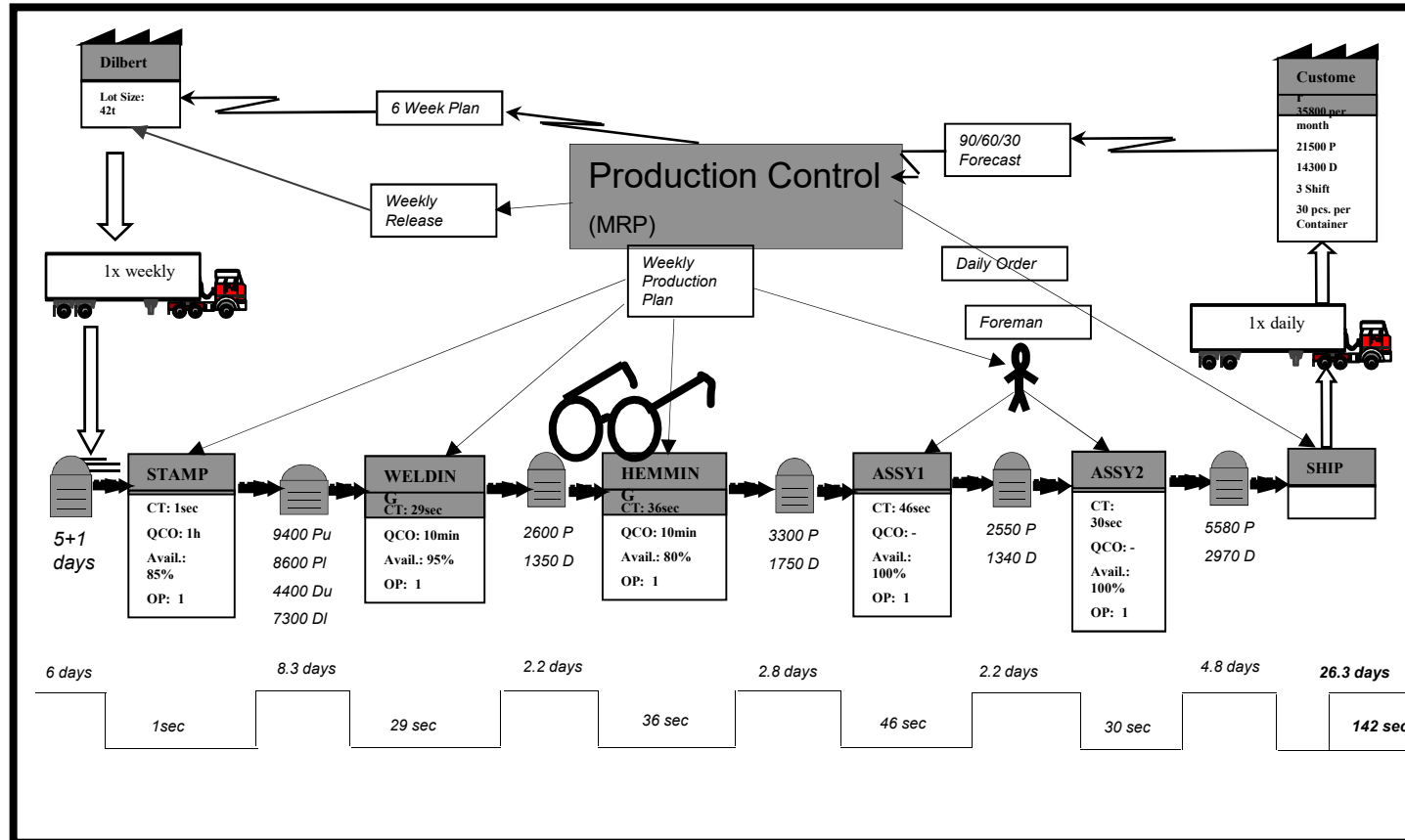
Achieve desired results with minimal resources

Elimination of waste as an on-going task

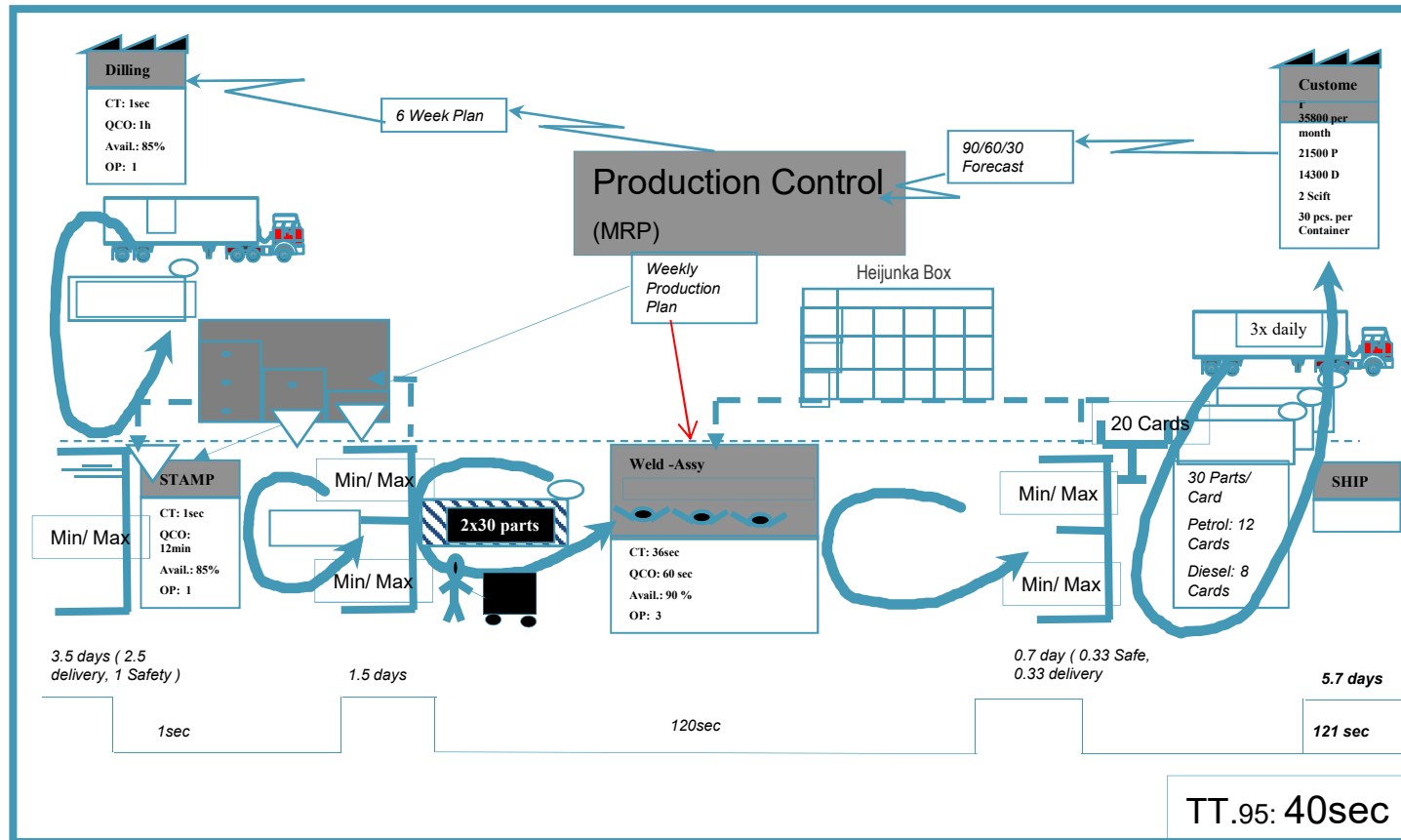


Revise processes –  
Eliminate waste

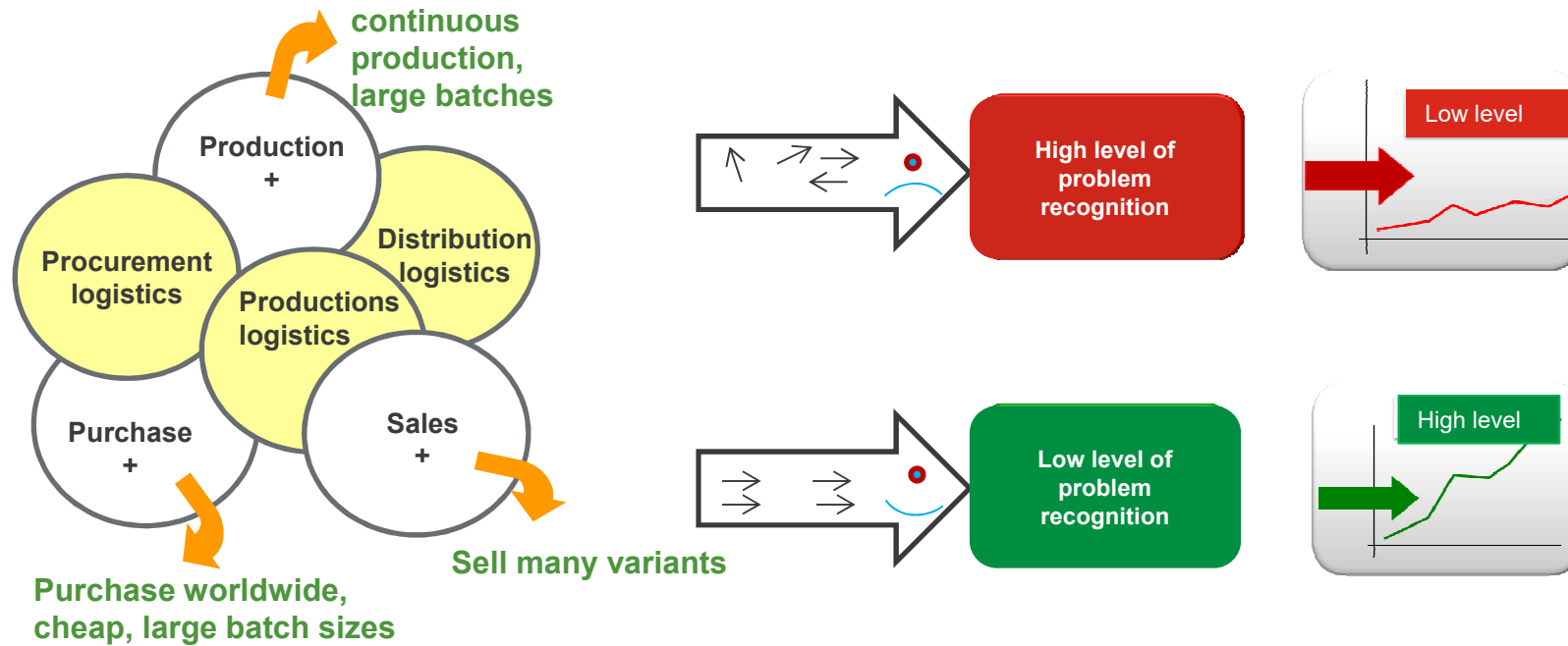
# WCM Value Stream Mapping (VSM): Current State



# WCM Value Stream Mapping (VSM): Future State



# Holistic approach as a MUST





# WCM Strategies and Methods – Part 3: Continuous Improvements / KAIZEN



## Organise continuous improvements (CIP)

### 1. Reduce material costs

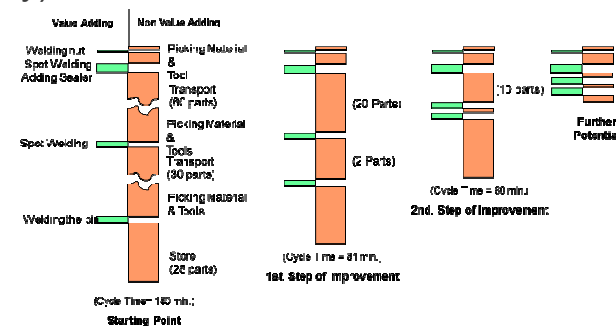
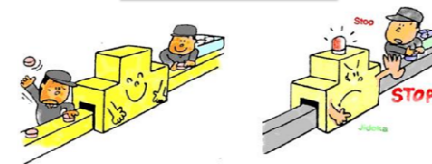
- Reduce unit costs
- Reduce weight
- Reduce scrap
- Use recycled materials
- Avoid cuttings

### 2. KAIZEN activities (from raw material until delivery)

- Own production
- Administrative areas
- Suppliers

Focus: small but continual improvements

- Do not receive defects
- Do not produce defects
- Do not ship defects



# WCM Strategies and Methods – Part 3: Continuous Improvements / KAIZEN



## Organise continuous improvements (CIP)

### 3. Quality Leadership

- Objectives:
- Quality at the source / in the station
  - Minimise scrap and rework

Process improvements

Reduce variabilities (6-Sigma)



... at the station... ... during inspection... ... at the customer...

### 4. Logistics

- Objectives :
- Improve performance
  - Minimise logistics costs

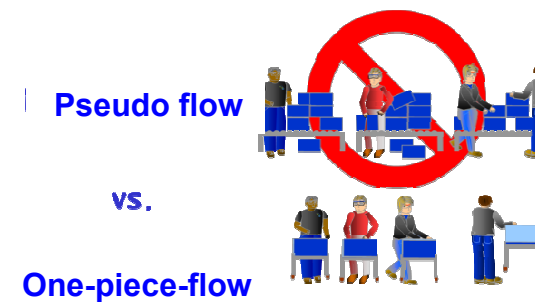
Level Schedule

„Lean Logistics“ will lean out the value chain

Optimise packaging density

Improve utilization of transport capacities

Optimise total costs



# WCM Strategies and Methods: Part Production Assessment Process



## Quality assurance mapping

### Process flow



| Buy off              | Drive Test              | Dynamic Checks           |
|----------------------|-------------------------|--------------------------|
| Inspect              | Static Checks           | Inspect                  |
| VIN NUMBER           | V83 - HORN              | V21 - BRAKES             |
| BUILD BOOK           | V15 - WINDSCREEN WIPERS | V82 - CRUISE CONTROL     |
| Current Drive STAMPS | V16 - HEADLAMP WASHERS  | V48 - NICK DOWN          |
| REPAIR STAMPS        | V19 - HEADLAMP WASHERS  | V49 - GATE               |
| DESPATCH LABEL       | V21 - HANDBRAKE         | V80 - STEERING ALIGHT    |
| DATA INPUT           | V48 - GATE              | V30 - BRAKE AND RATTLE   |
|                      | V81 - RADIO             | V49 - ENGINE NOISE       |
|                      | V82 - DSC BUTTON        | V49 - TRANSMISSION NOISE |
|                      | V89 - MOONROOF          | V49 - REAR OP. NOISE     |
|                      | V87 - KEY FOBBS         |                          |
|                      | V75 - REAR PARKING AID  |                          |
|                      | V87 - STEERING LOCK     |                          |
|                      | V71 - GLOVEBOX LOCK     |                          |

Process map for quality assurance of key customer concerns

In Process and inspection assurance proposals for customer concern items

| Buy off & OP CON      | Functional Interior            | Functional Exterior     | CALL line Spec & option & interior | Exterior cosmetic               | EXTERIOR             |
|-----------------------|--------------------------------|-------------------------|------------------------------------|---------------------------------|----------------------|
| Inspect               | Inspect                        | Inspect                 | Inspect                            | Inspect                         | STAC V               |
| VIN NUMBER            | V81 - POWER CHECK              | V31 - DOORS HANDLES     | V75 - LEAPER                       | V75 - FRONT BUMPER              | INSIGNIA             |
| Repair Stamps         | V31 - TOOLS CHECK STRAP REAR   | V81 - BONNET            | V75 - CROWLER                      | V33 - BONNET (DRG)              | HOOD BEMOD MOR       |
| REPAIR STAMPS         | V19 - IGHSTON ON               | V87 - FUEL FLAP         | V75 - FRONT TOE EYE                | V75 - RAD GRILLE                | 3D OFE RW            |
| PASSED TO SALES LABEL | V71 - GLOVEBOX LID             | V31 - BOOTLID           | V75 - TYRE VALVE CAPS              | V89 - WINDSCREEN                | YERAB CAR RIA        |
| DATA INPUT            | V72 - CENTRE CONSOLE LIGHTS    | V13 - POWER MIRRORS (L) | V74 - TRAP PLATES (DRIVE)          | V75 - LEAFSCREEN                | HEAFL MDR - EFB      |
|                       | V74 - GRAB HANDLES (R)         | V89 - DOOR GLASS        | V75 - CHROME TRIM                  | V33 - FRONT FENDERS             | SDOT RABR TVV        |
|                       | V74 - GRAB HANDLES (L)         | V87 - DOOR LOCKS        | V75 - SPORTS TRIM                  | V33 - FRONT ROOF                | TEAR REINQ DQASH TVV |
|                       | V74 - H/L HANDLES              | V87 - DOOR LOCKS        | V89 - MOONROOF                     | V33 - REAR ROOF                 | HEAL KYE TV V        |
|                       | V77 - MOONROOF (MEMORY SET)    | V77 FRT LIGHTS          | A POST DECALS                      | V33 - FRONT DOOR                | TERRUS               |
|                       | V89 - DOOR GLASS (FRT R)       | V77 REAR LIGHTS         | B POST DECALS                      | V13 - DOOR MIRROR               | MABR RW TV V         |
|                       | V89 - DOOR GLASS (FRT L)       | V77 FRT FOGS            | V89 - ISO FIX BRKS UPPER           | V75 - FRONT DOOR WEATHER STRIPS | MAIR HAM TVV         |
|                       | V89 - DOOR GLASS (R. R)        | V77 REAR FOGS           | V89 - ISO FIX BRKS LOWER           | V75 - FRONT DOOR BRIGHT WORK    | RABR DQASH TV V      |
|                       | V89 - DOOR GLASS (R. L)        |                         | V75 - REAR DOOR                    | V33 - REAR DOOR                 | HAT MDR RIA - BV     |
|                       | V83 - FRONT SEATS (L)          |                         | V75 - NUMBER PLATE BRKT            | V75 - REAR DOOR WEATHER STRIPS  | SHAL NOTAGAR BVV     |
|                       | V83 - FRONT SEATS (R)          |                         | V87 - CHILS ENTRAPMENT HANDLE      | V75 - REAR DOOR BRIGHT WORK     | J.C.D. FBV           |
|                       | V87 - STEERING WHEEL           |                         | V74 - FOOTWELL MATS                | V33 - QUARTER PANELS            | DRGA BV V            |
|                       | V83 - REAR CHLD LOCKS (L)      |                         | V71 DOOR CASING LHE                | V33 - BOOTLID                   | MBR FB V             |
|                       | V83 - REAR CHLD LOCKS (R)      |                         | V71 DOOR CASING RHE                | V89 - REAR WINDSCREEN           | MBR TVV              |
|                       | V83 - REAR CHLD LOCK DECATS    |                         | V71 DOOR CASING LHE                | V87 - STEERING WHEEL            | 34E BV V             |
|                       | V83 - REAR CURTAIN FIT         |                         | V74 - RAYS WALK                    | V87 - STEERING WHEEL            | D7AD BV V            |
|                       | V74 - FRONT ASHTRAY            |                         | V75 - LOCK AND WHEEL NUTS          | V75 - REAR PARKING AID          | SDOV FB V            |
|                       | V74 - SUNVISORS (L)            |                         | V81 - RADIO KEY CODE CARD          |                                 | OH TV V              |
|                       | V74 - SUNVISORS (R)            |                         |                                    |                                 | MOO BVV              |
|                       | V74 - GRAB HANDLES (FRT)       |                         |                                    |                                 | 89B FBV              |
|                       | V74 - GRAB HANDLES (REAR)      |                         |                                    |                                 | 84A TV V             |
|                       |                                |                         |                                    |                                 | DDA TV V             |
|                       | V83 - REAR SEAT CUSHION        |                         |                                    |                                 | MBR BV V             |
|                       | V74 - REAR ASHTRAY             |                         |                                    |                                 | MDR EFB              |
|                       | V85 - SEAT BELTS (FRT L)       |                         |                                    |                                 | THORT DQASH TV V     |
|                       | V85 - SEAT BELTS (FRT R)       |                         |                                    |                                 | F BTVV               |
|                       | V85 - SEAT BELTS (REAR L)      |                         |                                    |                                 | S BTVV               |
|                       | V85 - SEAT BELTS (REAR CENTRE) |                         |                                    |                                 | E BTVV               |
|                       | V85 - SEAT BELTS (REAR R)      |                         |                                    |                                 |                      |
|                       | V88 - REAR MANUAL              |                         |                                    |                                 |                      |
|                       | V88 - REAR MANUAL WINDOWS (R)  |                         |                                    |                                 |                      |
|                       | V83 - REAR CHLD LOCK DECATS    |                         |                                    |                                 |                      |
|                       | V83 - REAR CHLD LOCKS (R)      |                         |                                    |                                 |                      |
|                       | V83 - REAR CHLD LOCKS (L)      |                         |                                    |                                 |                      |
|                       | V74 CENTRE CONSOLE             |                         |                                    |                                 |                      |
|                       | V74 INSTR LIGHTS               |                         |                                    |                                 |                      |
|                       | V85 HEAD RESTRAINTS            |                         |                                    |                                 |                      |
|                       | V85 HEAD RESTRAINTS (R)        |                         |                                    |                                 |                      |
|                       | V85 HEAD RESTRAINTS (L)        |                         |                                    |                                 |                      |
|                       | V85 HEAD RESTRAINTS REAR       |                         |                                    |                                 |                      |
|                       | V85 HEAD RESTRAINTS REAR       |                         |                                    |                                 |                      |

# World Class Manufacturing At Work / Best practice Sharing

## VAVE – case

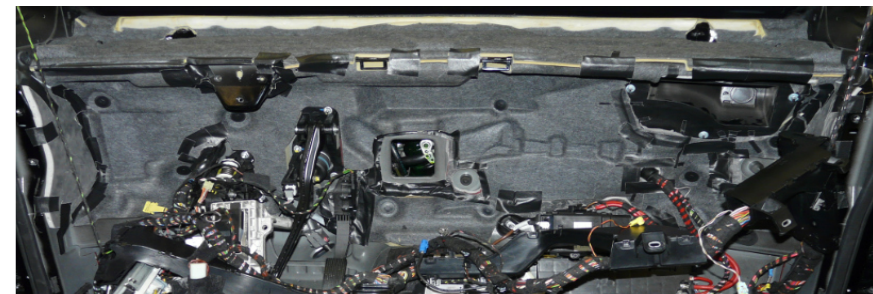
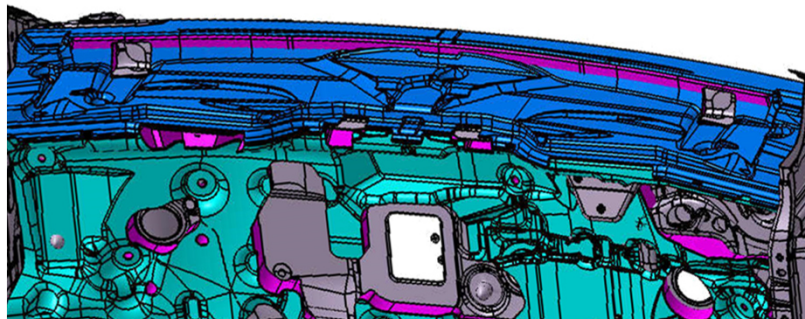


### Actions taken

- Train VAVE Coordinator for the division
- Run VAVE workshop with intradivisional participation / close follow up
- Reduce rework in accordance with the customer
- Reduce material usage (cut-out holes)
- Optimize material, scrap and rework thermoforming holes
- Change recipe of heavy layer (extrusion line) to lower costs
- Recycling of heavy layer material

### Results

- 152.000 € /year - less worker (3 shifts), less glue, reduction of scrap
- 45.000 €/year - thermoforming holes avoided, no scrap and rework
- 150.000 €/year (only 2013)
- 90.000 €/year – accomplished optimization, improved material usage



# World Class Manufacturing At Work/ Best practice Sharing

## KAIZEN in Logistics

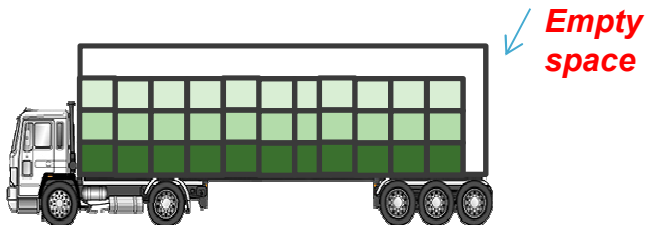


### Actions taken

Truck utilization significantly increased matching trucks and packaging dimensions

increased use of mega-trailers (100cbm, 20% more compared to Euro-trailer) as standard equipment by combining shipments from several suppliers or split shipments for better transport utilization

Previous State



### Results

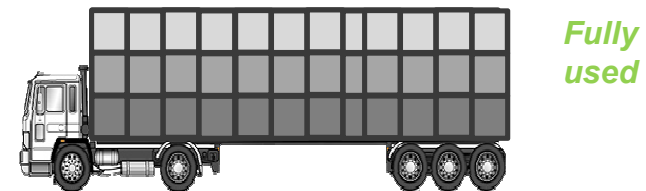
Use of ~ 80% megatrailers, smaller Euro-trailers only if required due to part and packaging dimensions

Improvement of packaging to ensure stack ability and quality (no damage)

Truck utilization increased from 79% to 91%.

**Annualized transport cost savings > 1 mio €**

Current State



# World Class Manufacturing At Work/ Best practice Sharing

## Value Stream Mapping



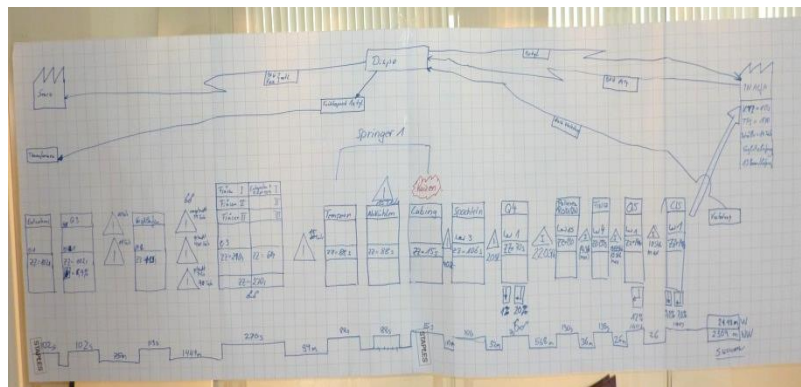
### Actions taken

Utilize practical VSM approach to visualize the value stream and understand the key improvement items

Use 5-day workshop with skilled trainer

Use tacttime control, Yamazumi and "Spaghetti"-diagram

### Previous State



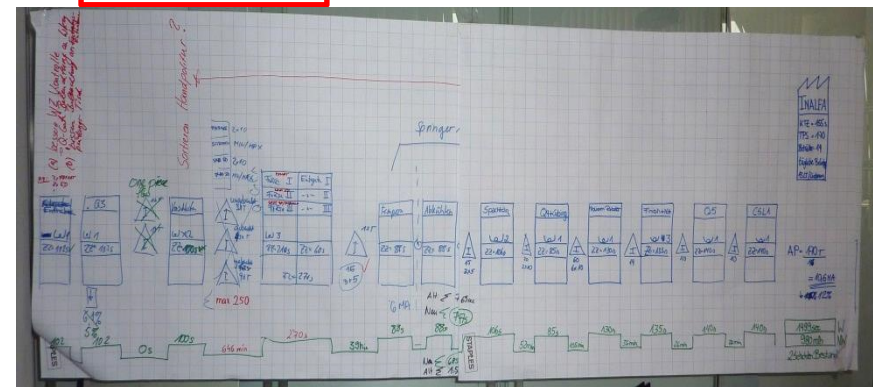
### Results

Reduction of throughput time from 2369 min. to 980 min. (=50%)

Reduction of WIP by 50%

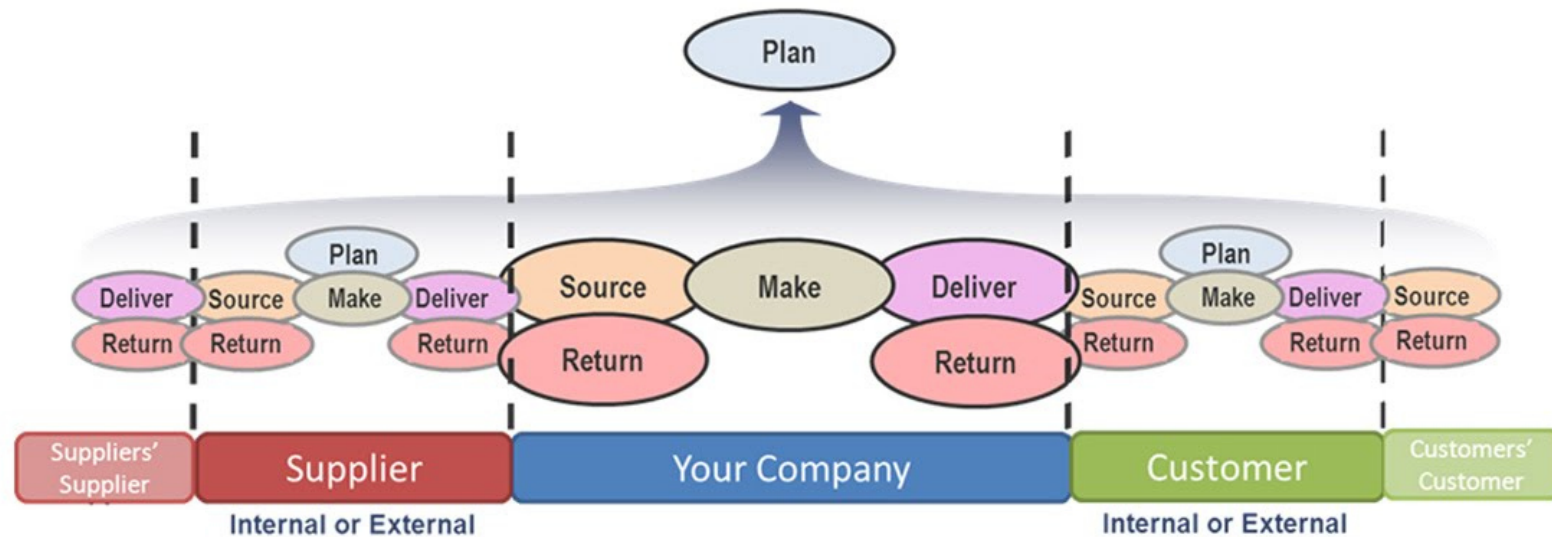
Productivity improvement: 12%

### Current State





## SUPPLY CHAIN OPERATIONS REFERENCE (SCOR) MODEL

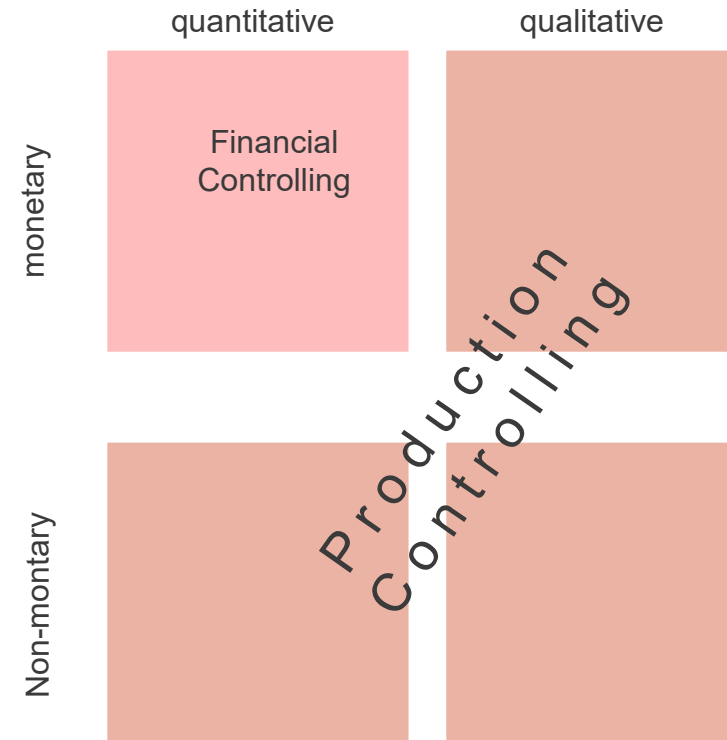


Supply Chain Controlling  
supports the optimization of the  
value chain amongst multiple  
companies

# Production-Controlling in a global network

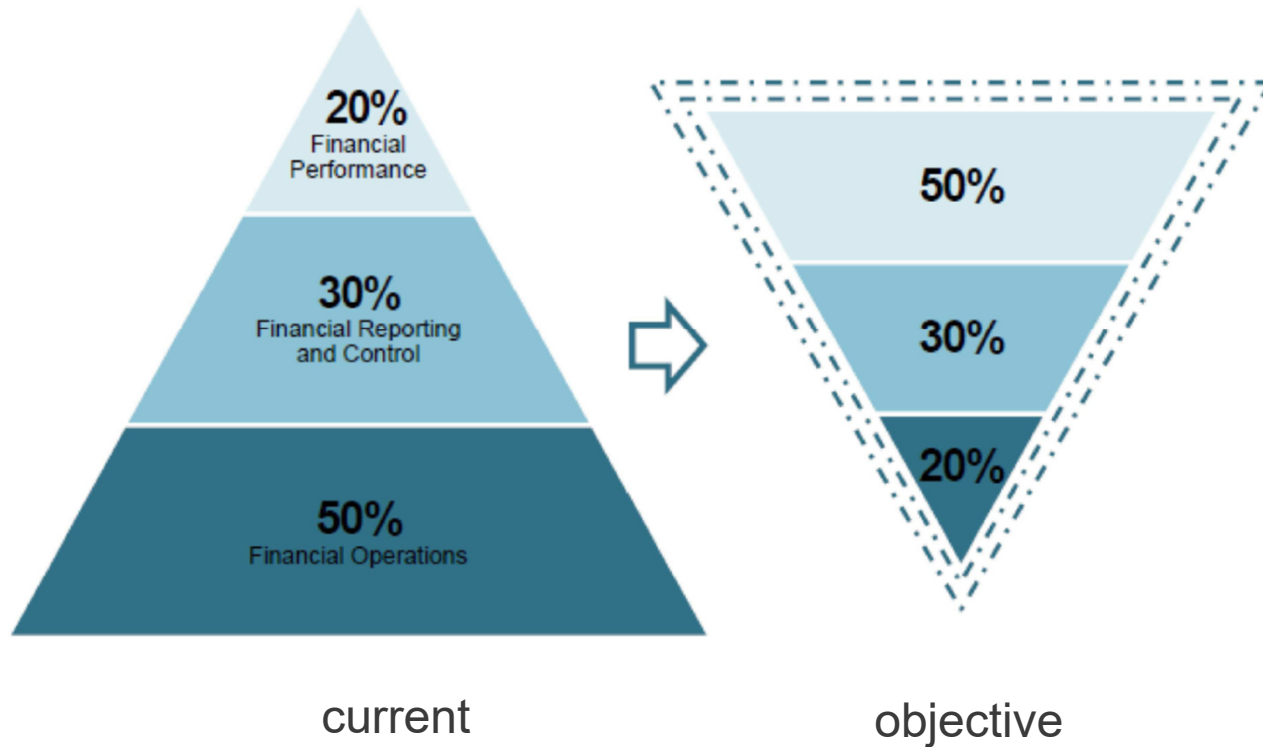


Production Controlling supports and controls the value adding processes globally with high standards and a common process / system.





# Global Finance – Turning the pyramid to spend more time for strategy (= financial performance)



# Common global Performance Measurement System



| Differentiation    | Traditional KPI system         | Performance Measurement System      |
|--------------------|--------------------------------|-------------------------------------|
| Time horizon       | Past                           | Future                              |
| Primary            | Financials                     | Monetary and Non-monetary           |
| Interrelationship  | Isolated metrics of single KPI | Cause-effect chain / reference      |
| Targeted Direction | Finance                        | Customer                            |
| Leverage           | Steer financial data           | Control the strategy of the company |
| Reporting          | Functionally                   | Process                             |
| Focus              | Internal                       | Internal <b>and</b> external        |
| Cost-performance   | Costs down                     | Performance up                      |
| Learning           | Individually                   | Companywide qualification           |



- The challenges in a globalized world need a global production network, generally.
- A global Production network needs a common vision and strategies reflecting world class standards
- Standardized processes and tools are success factors ( the 'lean' toolbox)
- Organisational questions need to be clarified: Central government versus regional and local decision making
- Continuous improvements of processes and costs - Best practise sharing
- The consideration of the total value stream will avoid isolated solutions and will favour holistic improvements. This will provide sustainable results.
- Governance of the value stream, - strong Supply Chain Management
- Lessons learnt / best practice sharing will help to improve the results
- Total costs consideration and optimization along the value stream - an efficient Production-Controlling process will steer and control the production process and the value stream.