



# Lufthansa Technik

More mobility for the world



## Lean Maintenance Methods at Lufthansa Technik

by

Björn Kohrs

Lufthansa Technik

# Agenda

**Lufthansa Technik – at a glance**

**Going Lean – a strategic decision**

**Our roadmap to Lean – a story of small steps**

**Lean maintenance – a few examples of how we do it**

**Change management – the challenge in lean transformations**

**Closing question**

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# Lufthansa – excellence in aviation

## Aviation Group

The Lufthansa Aviation Group is one of the world's leading air transport corporations.

It comprises more than 400 subsidiaries and affiliates, active in business segments including passenger business, logistics, repair and overhaul, catering and IT services.



# Key facts about Lufthansa Technik Group



- About 25.000 employees worldwide
- Over 4.7 billion Euros in sales\*
- More than 580 customers worldwide
- More than 450 jetliners entered in its Total Technical Support TTS® program, more than 1,400 aircraft under exclusive contracts

\*Lufthansa Technik and all companies of Lufthansa Technik Group.

# Product Divisions of the Lufthansa Technik Group



**Aircraft  
Maintenance  
Services**



**Aircraft  
Component  
Services**



**Engine  
Services**



**Aircraft Base  
Maintenance**



**Landing Gear  
Services**



**VIP &  
Executive Jet  
Solutions**

Six Product Divisions will offer:

- competent service and support
- around the clock and around the world



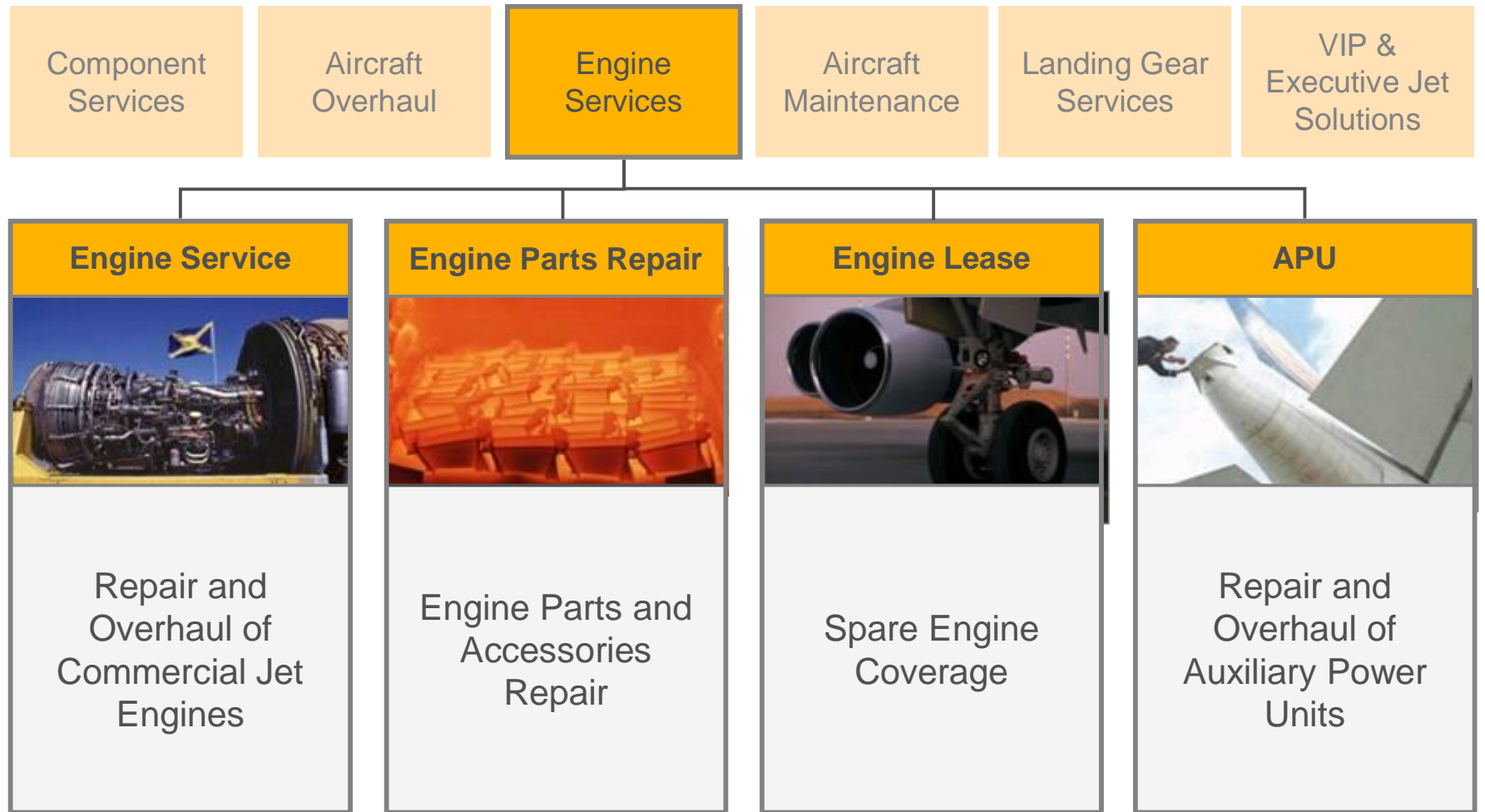
**EASA**



**FAA**

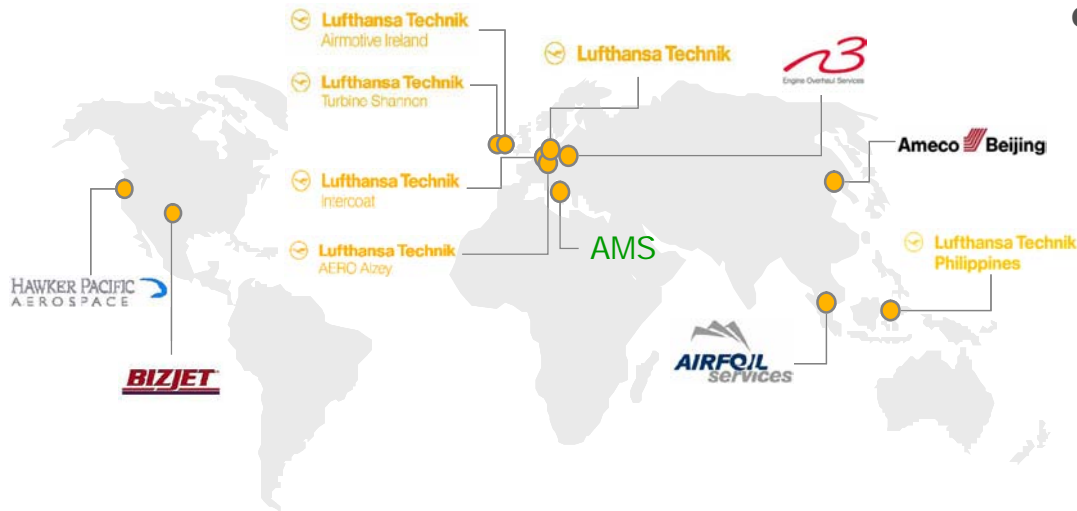


# Lufthansa Technik Engine Services Organization



# Lufthansa Technik Engine Services

## Key facts



We are the leading international independent provider offering engine repair & overhaul.

### Turnover:

- More than 1,4 billion € in 2007

### Workforce:

- More than 4,000 employees worldwide
- approx. 2,000 in Hamburg

### Global network:

- 11 facilities around the world
- 40 % workload from LH Group
- 60 % workload from more than 150 customers worldwide

### Facilities:

- 8 test cells with up to 84,000 lbs thrust capacity
- All facilities meet highest EU environmental standards

### Product range:

- 33 supported engine and APU types



# These customers already benefit from us

Some of more than 150 satisfied engine & APU customers worldwide



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# Chaos ante portas ... ...change before you have to!

„ We always did it this way.....!“



# Chaos ante portas ... ...change before you have to!



Always trying the  
same method and  
to expect different  
results ...

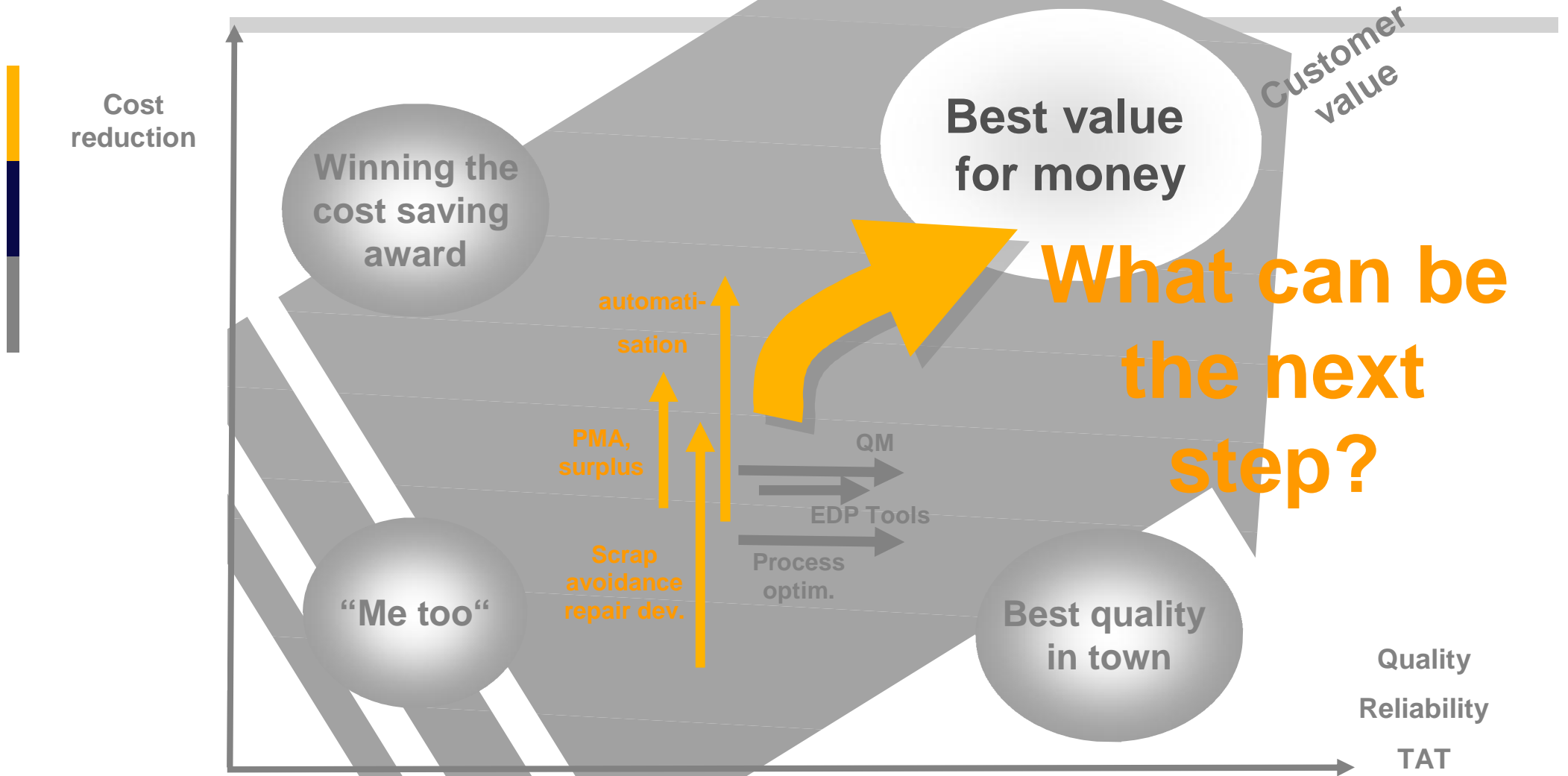
....is probably just a synonym for  
insanity!

# Market conditions for german company's .....stormy weather!

- skepticism concerning the big coalition
- only timid political reforms
- hope for economical growth
- crisis in the finance sector
- high euro / dollar rate
- still high rate of unemployment
- global competition (go east....)



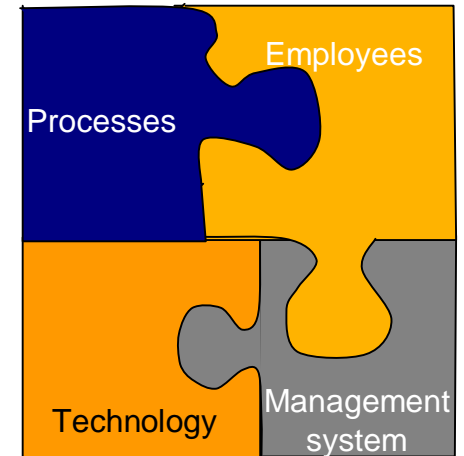
# Taking the next step towards excellence



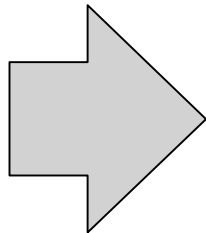
# Upgrade to Industry Leadership!

Reaching the next performance level requires

- a **holistic** approach of
- optimizing the entire **production system**.



Main modules of a Production system



## Implementation of Lean in Production and Administration

- „Create the perfect value stream.“
- with the aim to use resources efficiently,
- to fulfil the customer's expectations and
- to sustainable increase the company's competitiveness.

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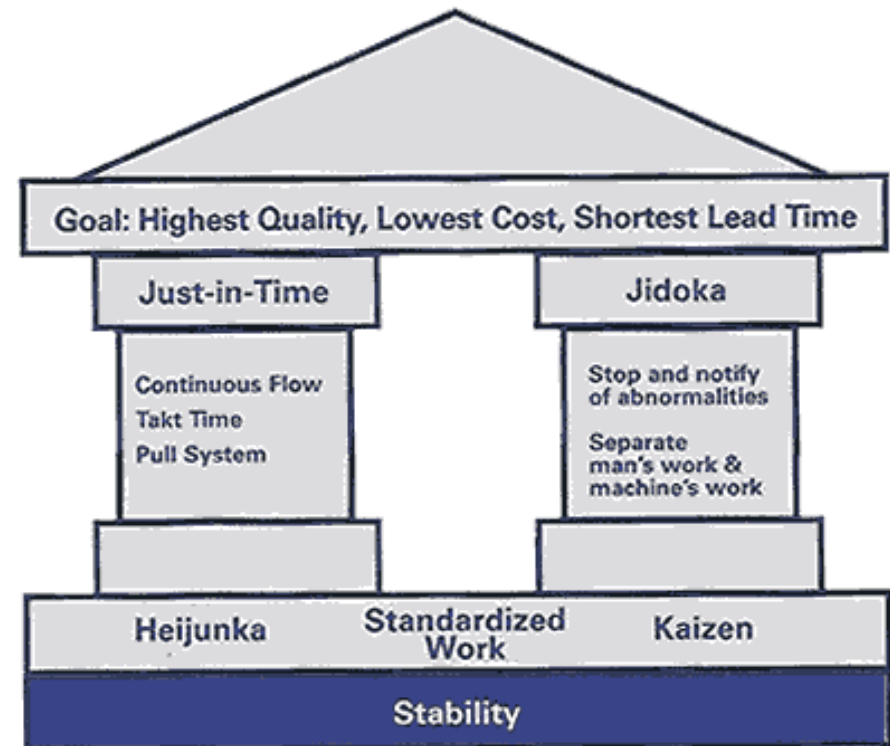
# The genesis of Lean – Toyota Production System

Toyota's Prediction in 1991

*We get brilliant results from average people managing and improving brilliant processes. Our competitors get mediocre results from brilliant people managing around broken processes.*

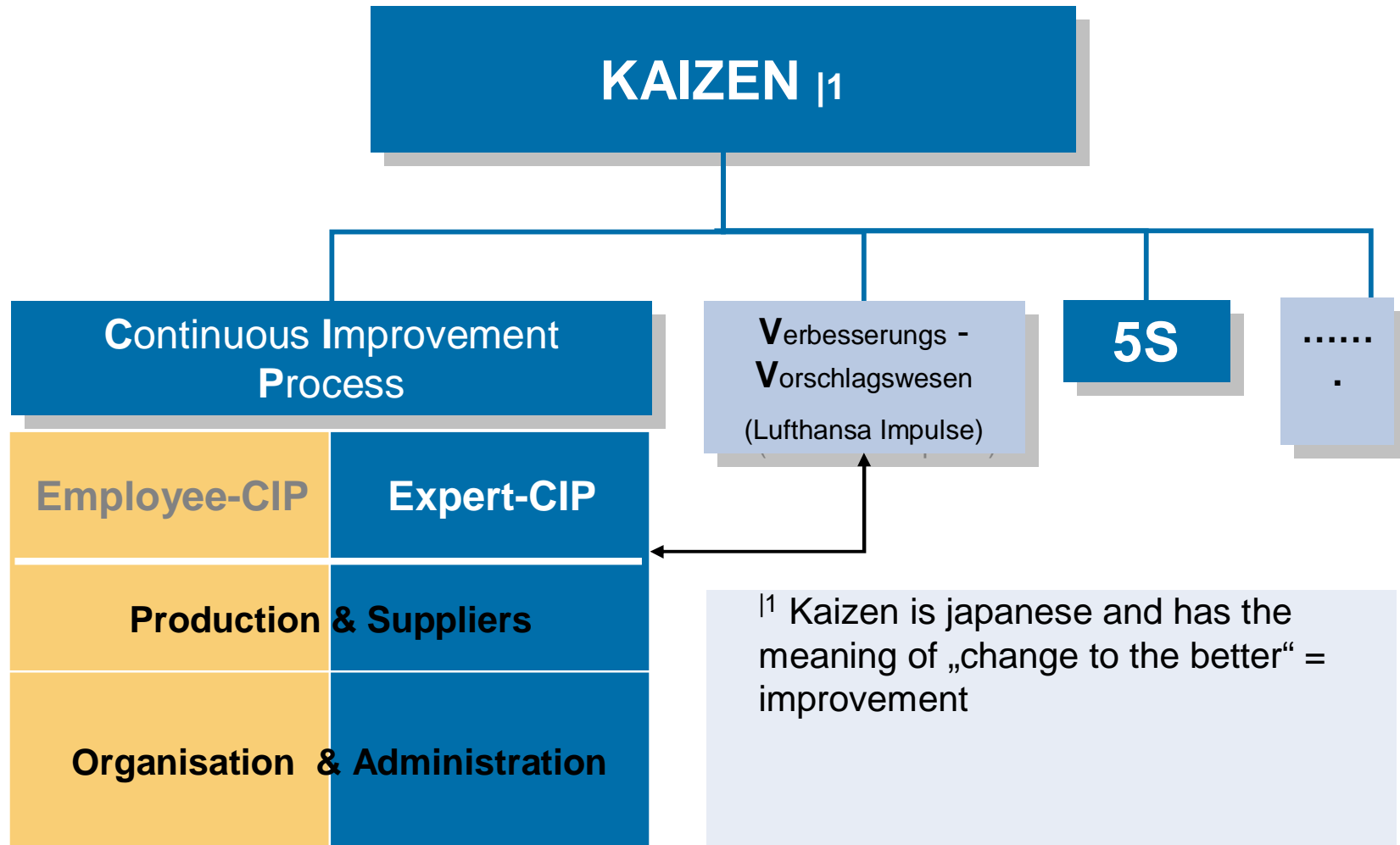
*When they get in trouble, they try to hire even more brilliant people.*

*We're going to win...*



Toyota Production System "House"

# The Kaizen-Approach

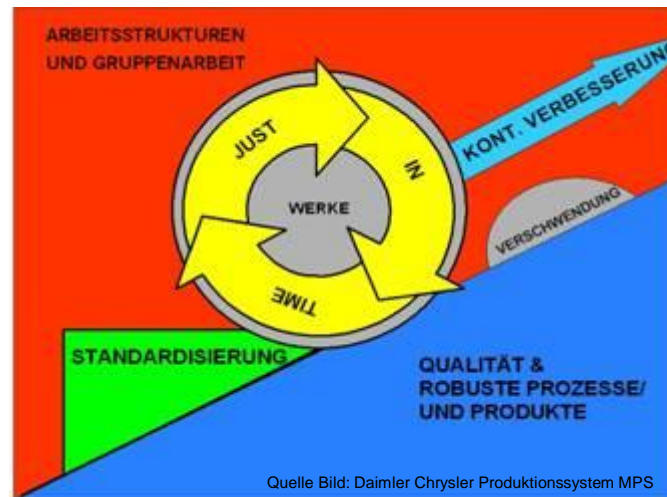


# The CIP Cycle

## 5S - focus

Establish order, tidiness and ensure standards.

- **S**ort
- **S**traighten
- **S**hine
- **S**tandardize
- **S**ustain



## CIP – focus

Accomplish improvements and define new standards for:

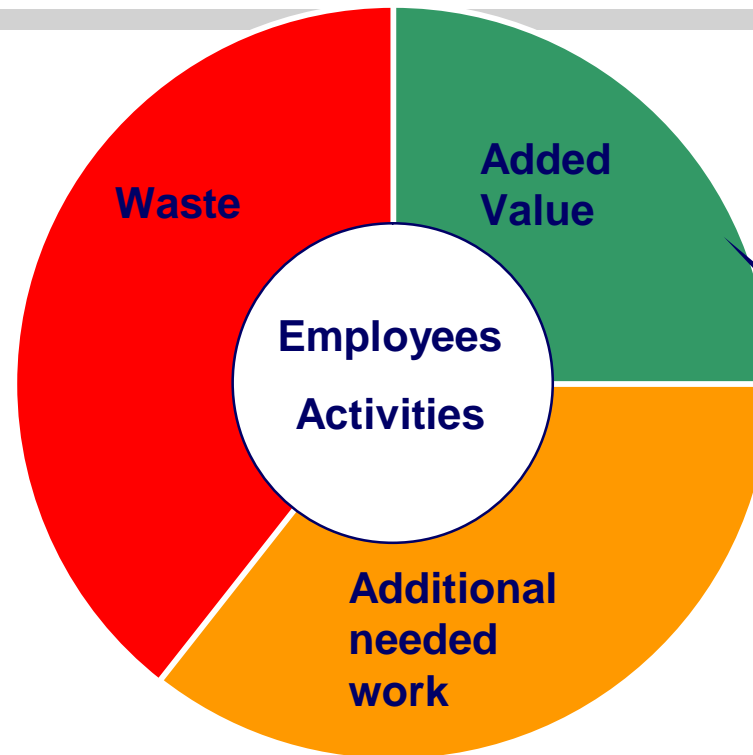
- Working process
- Working system
- Working environment
- Safety

# Lean Production Basics

## Waste

All actions that do not change the product

- Waiting...
- Transportation...
- Searching...
- Moving...
- Unnecessary work on the product
- ...



## Value adding

All actions that increase the products value (the customer is willing to pay more for it after accomplishment)

### Focus:

It is the intention of Lean to increase the share of the value adding activities by continuous improvements and sustainable reduction of waste and non value adding activities.

## Additional needed work

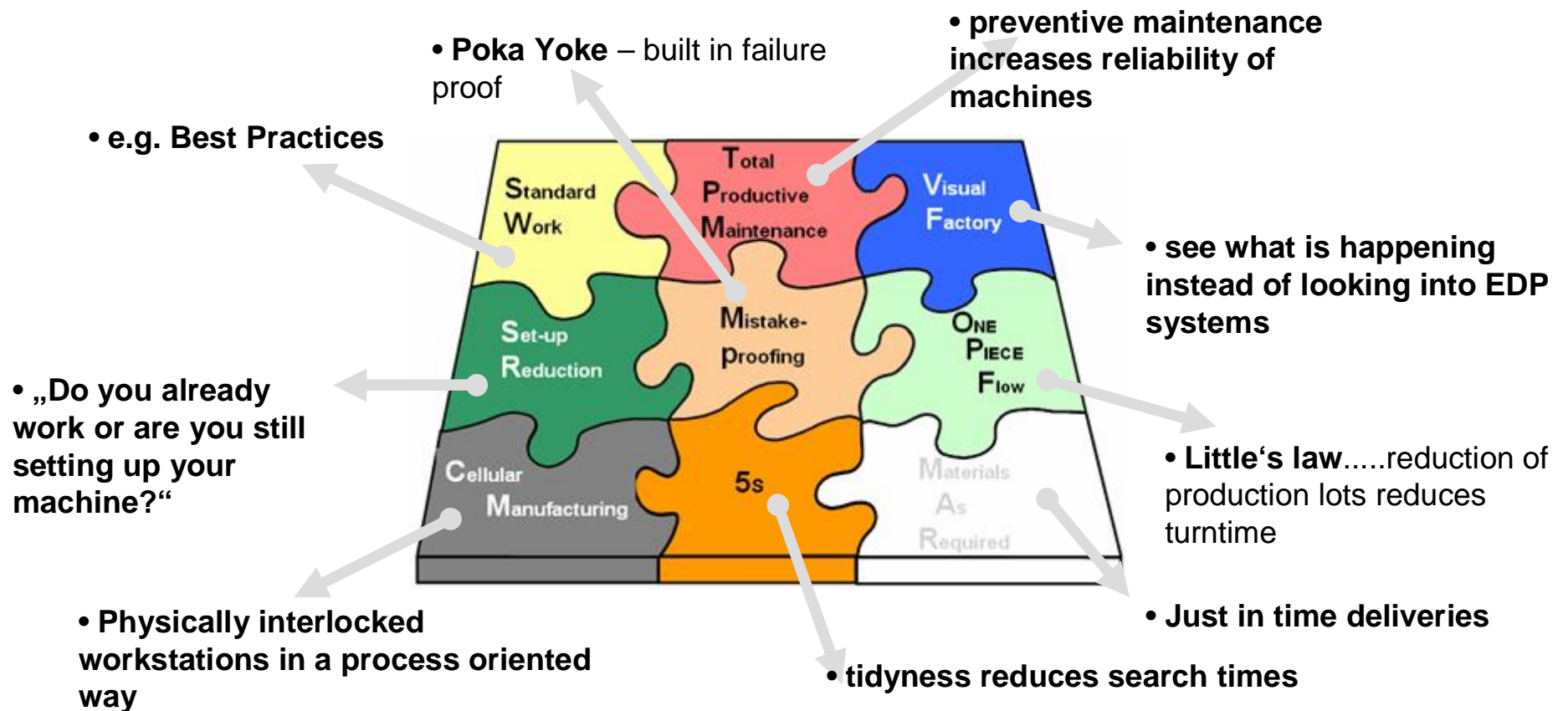
Non value adding but necessary activities (e.g. rigging a tool for machining)

Quelle: McKinsey



# Reduce waste (muda) by....

## “...use of Lean Tools”



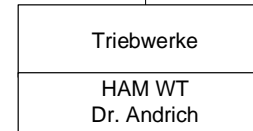
# Implementation phases of Lean

a

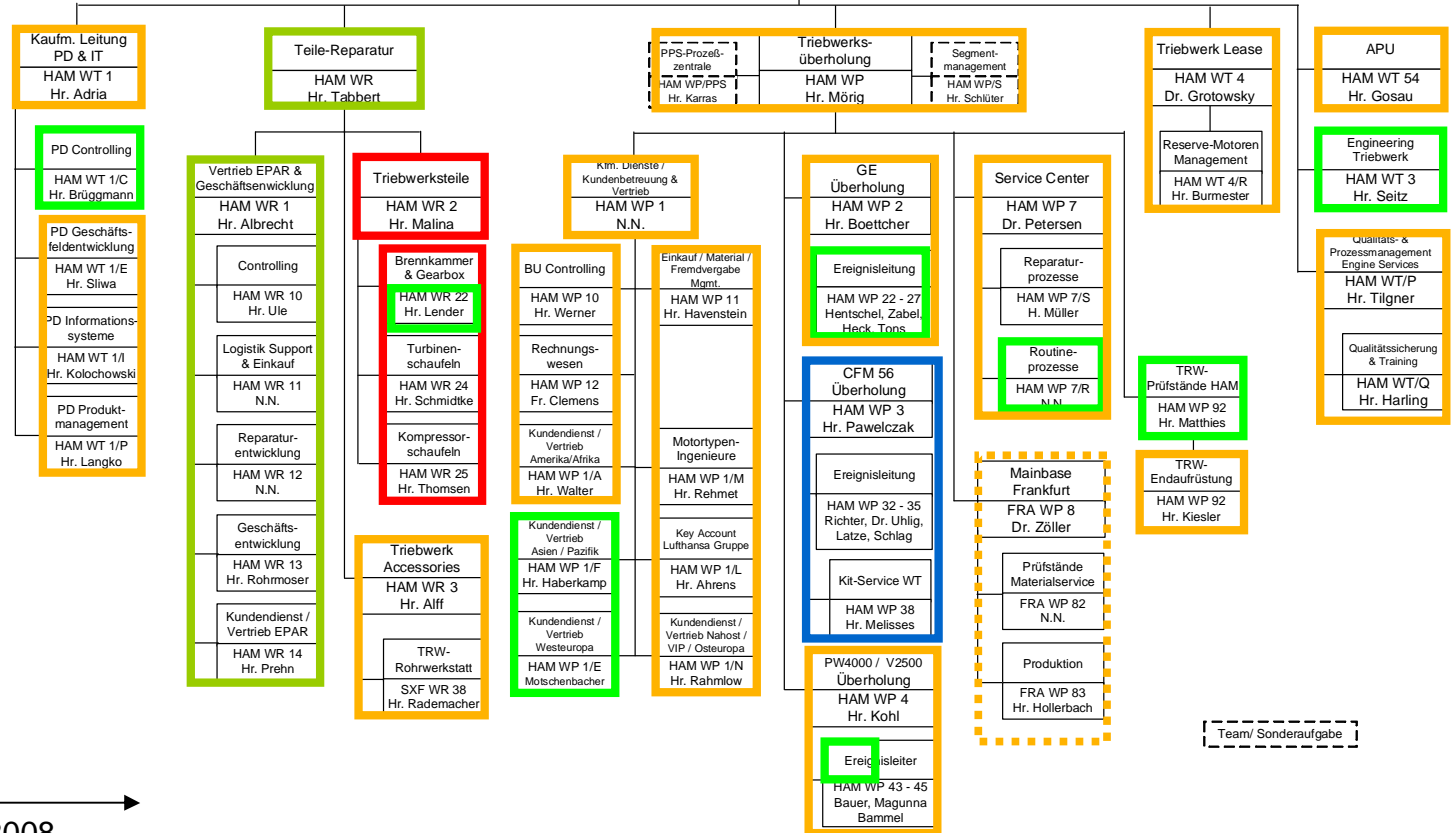
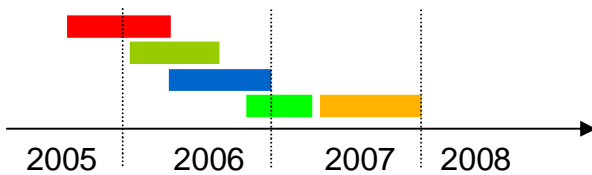
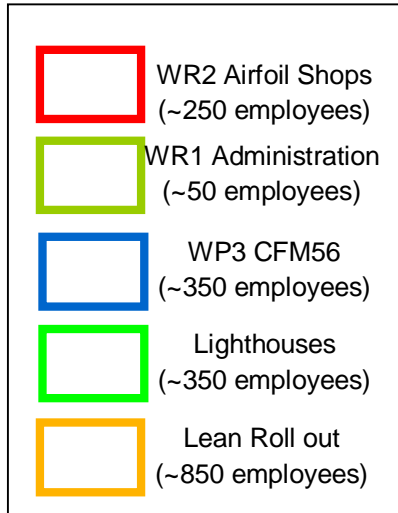
Lufthansa Technik AG (LHT)  
Triebwerke

HAM TC, 01.01.2007

TVO

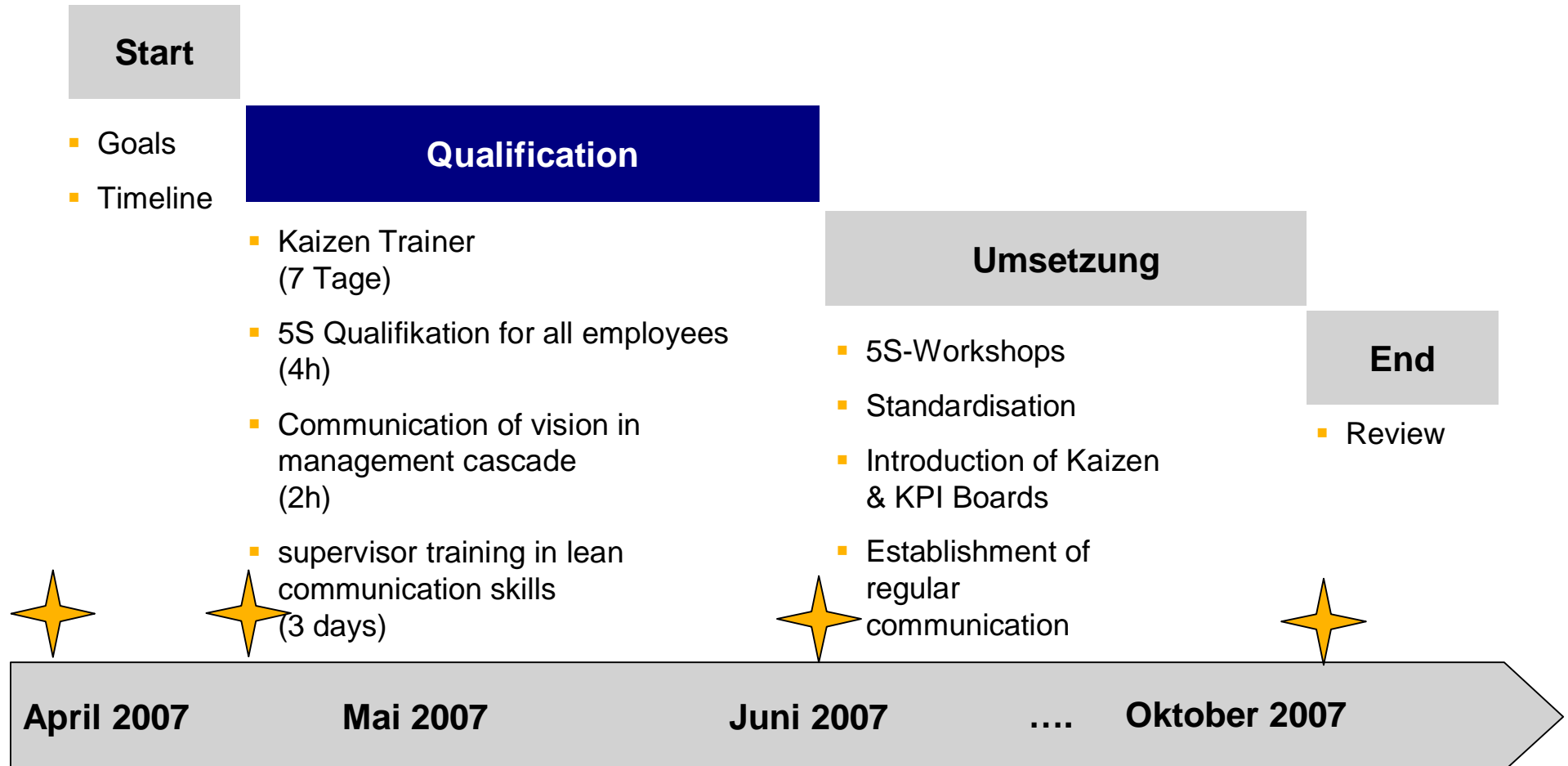


## Description



Team/ Sonderaufgabe

# Typical Milestone-Plan for Implementation of Lean Basics



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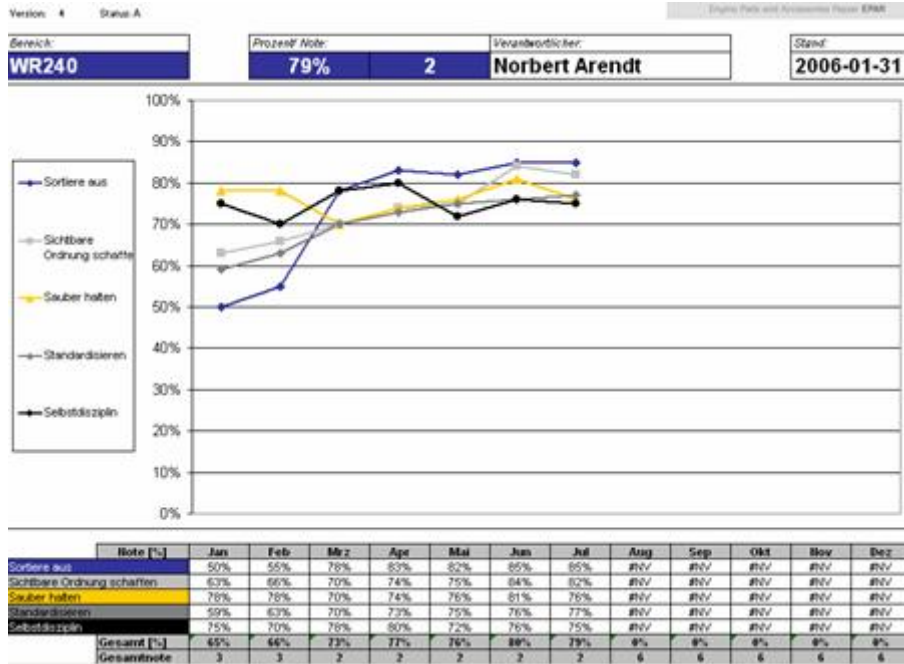


# Dozens of workshops performed



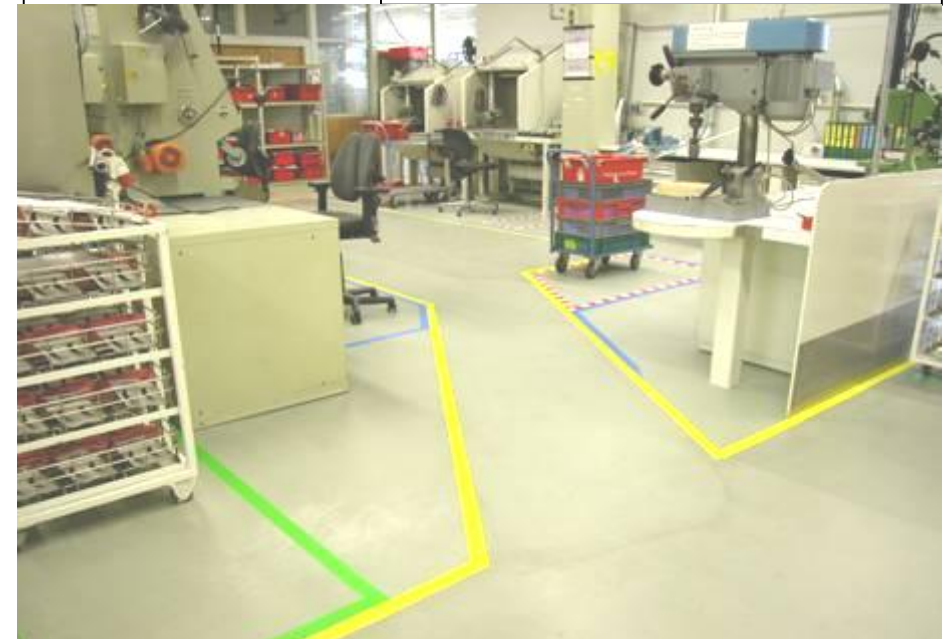
# Make it sustainable

## 5S Audits and Standards



### Visual Marking Standard

- █ Footpath
- █ Workplace
- █ Waste
- █ Delivery zone
- Clarification zone
- Work in process
- Dangerous area





# Kaizen Board WR252

Meister: (responsible supervisor)  
 Vertreter: (responsible foremen)  
 Vormänner: (responsible foremen)



Chancen/Probleme		In Bearbeitung			Erledigt	Kaizen Info

**New cards  
(opportunities  
or problems)**

**Responsibility  
assigned**

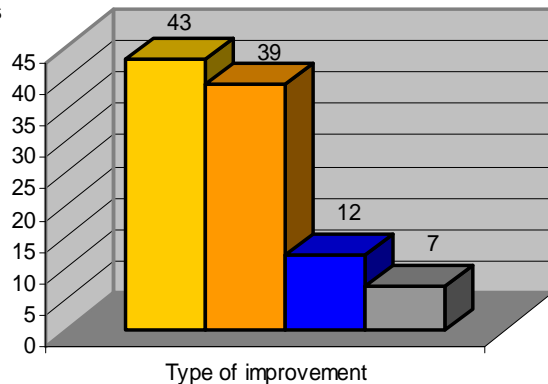
**completed  
(rejected or  
realized)**

**Results of 5S  
audits**

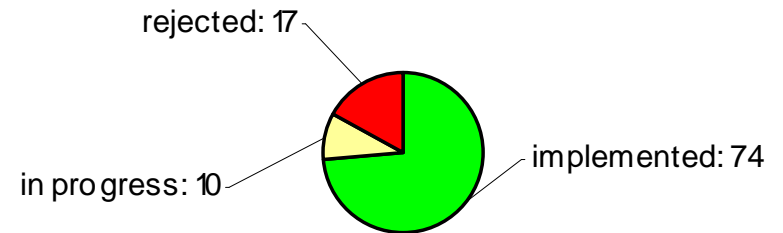
# Kaizen cards: Examples



amount of Kaizen cards



- improvement of workplace
- Elimination of irregularities / production problems
- cost reduction
- TAT



**110 Kaizen cards from staff of 150 within 6 months - 85% worth to be implemented.**

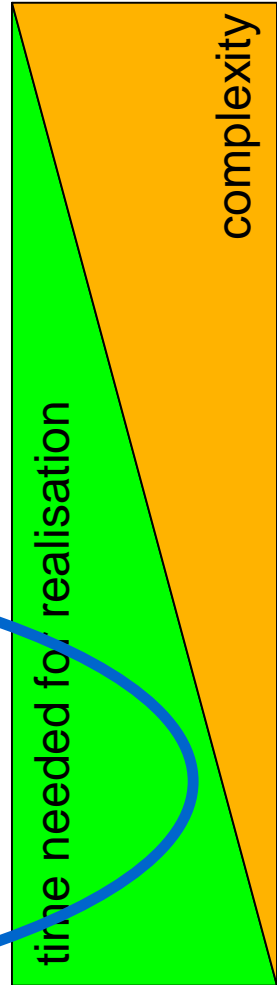
# What problems to adress first?

Few big issues...

...some larger ones...

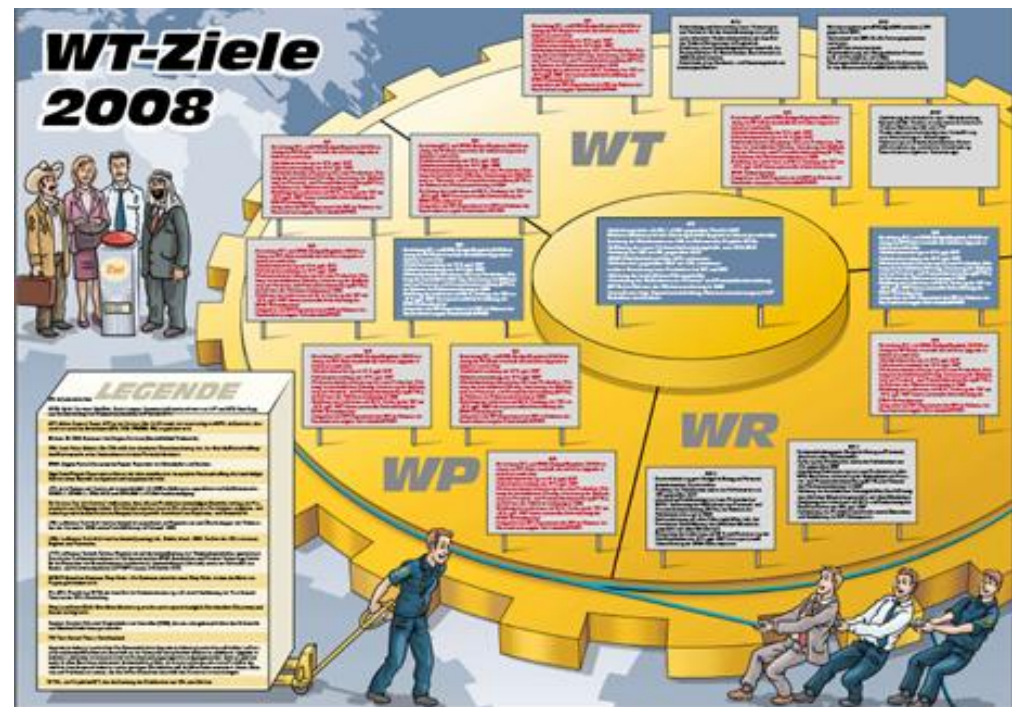
...but very many small issues!

**Focus on these topics:**  
-easy to fix  
-allow for quick improvements  
-bring momentum



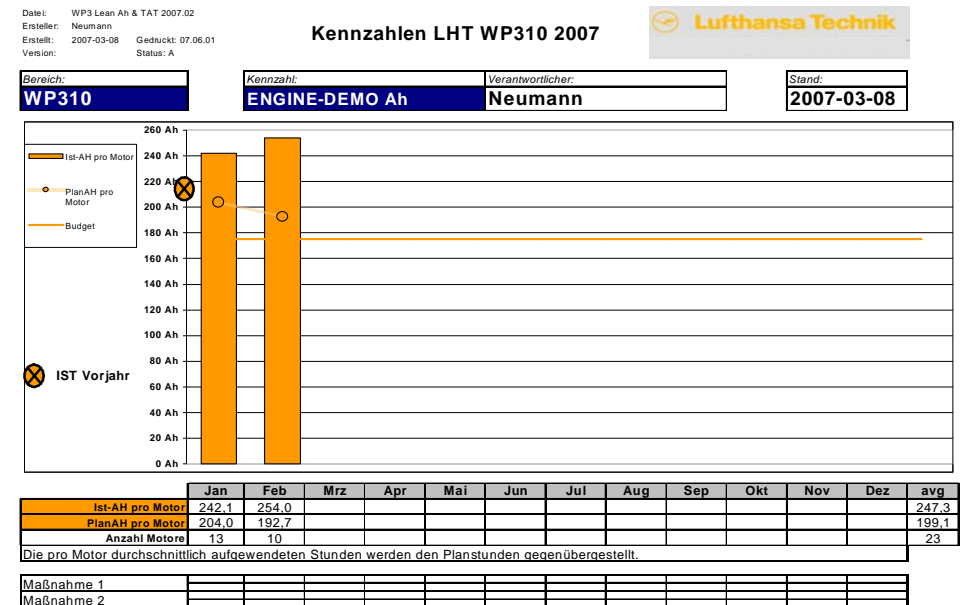
# Visualisation of division targets

- Targets for entire product division are defined and published in every department
- Departments specify these targets for their processes and visualize them in KPIs



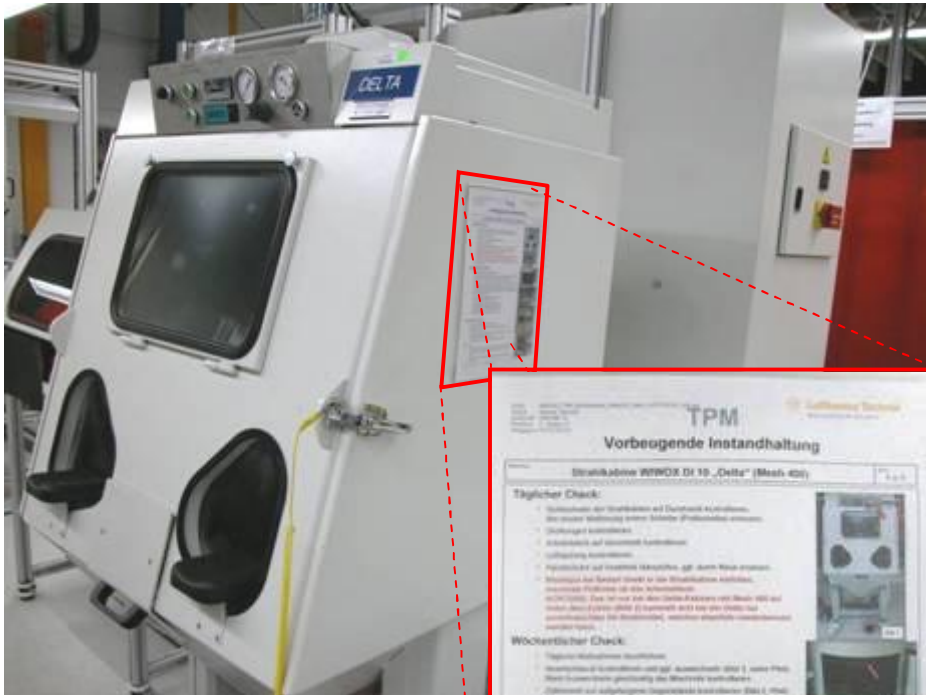
# Key Performance Indicators (KPI) in Lean Production

- KPI-Boards complement the Kaizen Boards
- Relevant processes (turntime, cost, M/H) are shown with actual / planned / target figures
- An index for customer delivery performance and customer satisfaction is always included



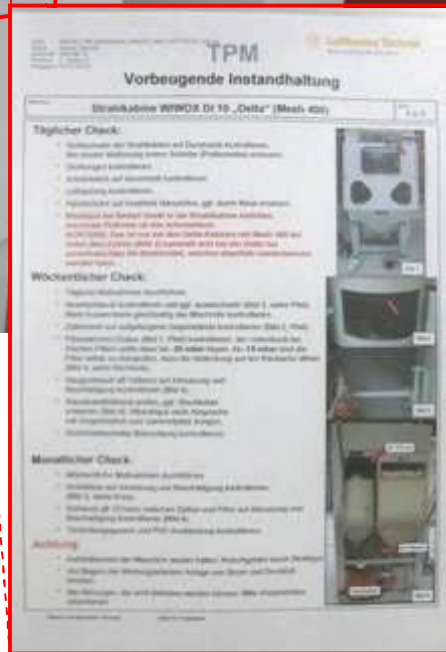
# Total Productive Maintenance

## Availability of machines is essential for OTD & TAT



TPM ensures :

- availability
- reduces TAT variance
- allows cost reduction
- ensures product quality



Strahlkabine UKER (120/220 Mesh) Lehmann	52130	52130	52130	26929	26929	26929	26929	26929	52130
	täglich	täglich	wöchentl.	täglich	täglich	täglich	täglich	wöchentl.	täglich
Nase-Strahlkabine MHG SMG25 Lehmann	52130	52130	52130	26929	26929	26929	26929	26929	52130
	täglich	täglich	wöchentl.	täglich	täglich	täglich	täglich	wöchentl.	täglich
Strahlkabine UKER (220/400 Mesh) Lehmann	52130	52130	52130	26929	26929	26929	26929	26929	52130
	täglich	täglich	wöchentl.	täglich	täglich	täglich	täglich	wöchentl.	täglich
Platinbäder Lührs				26929				26929	
			Nur wöchentlicher Check					Nur wöchentlicher Check	
				wöchentl.					14-tägig
nachrichtigen-Messgerät XRay maXX Schwarz	52130	52130	52130	26929	26929	26929	26929	26929	52130
	täglich	täglich	täglich	täglich	täglich	täglich	täglich	täglich	täglich
Trockenofen BINDER FD240 Lührs				26929				26929	
			Nur wöchentlicher Check					Nur wöchentlicher Check	
				wöchentl.					wöchentl.
Kontrollstempel Wals / Kauldzinski / Reincke				52392				52392	
			Nur wöchentlicher Check					Nur wöchentlicher Check	
				wöchentl.					wöchentl.

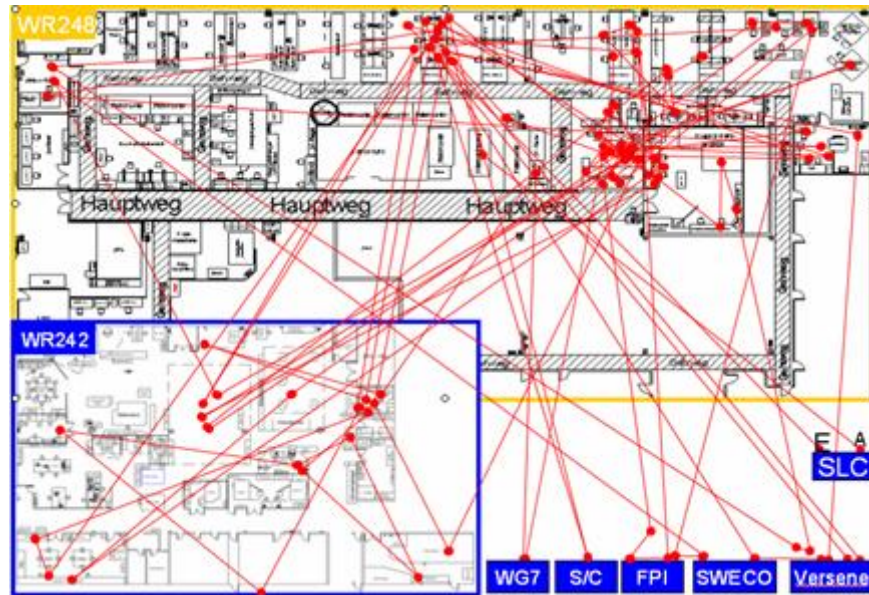
Definition: Um eine vorbeugende Instandhaltung zu gewährleisten, gilt es für jeden Arbeitsbereich ein TPM (Total Productive Maintenance) zu implementieren.



# Process Improvements

## WR248 Turbine Blade Repair continuous flow production

Before



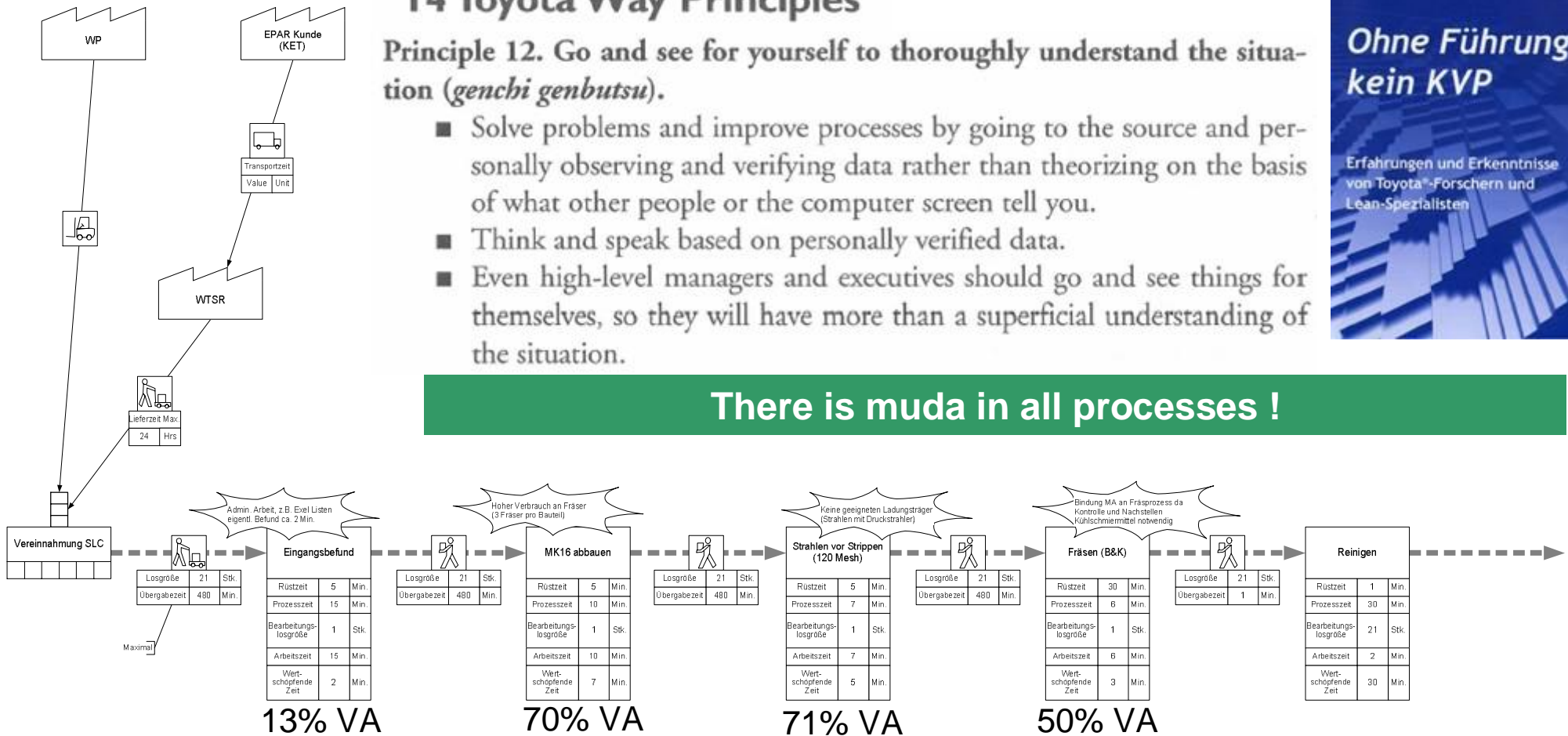
After



# Leadership

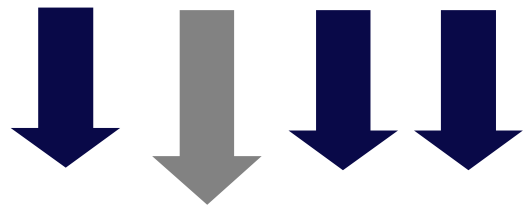
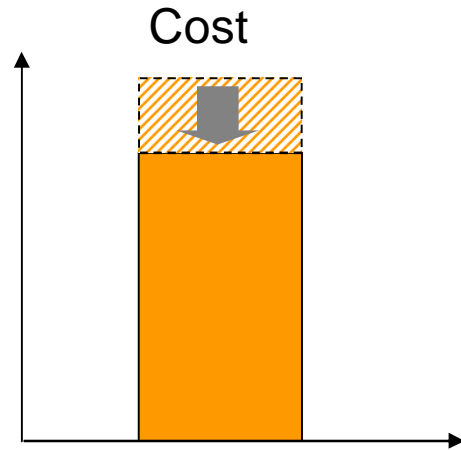
VSM + §12 as prerequisites for success

## eVSM



# Engine Flow Line CFM56

## Growing market ahead



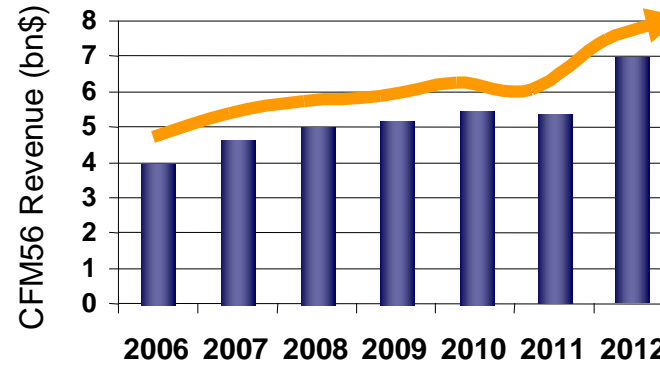
MH per SLE & capital finance



Lean Production

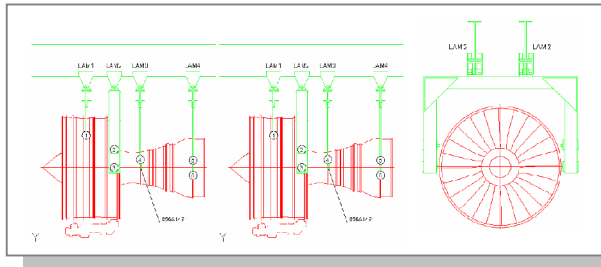


### Market Potential CFM56



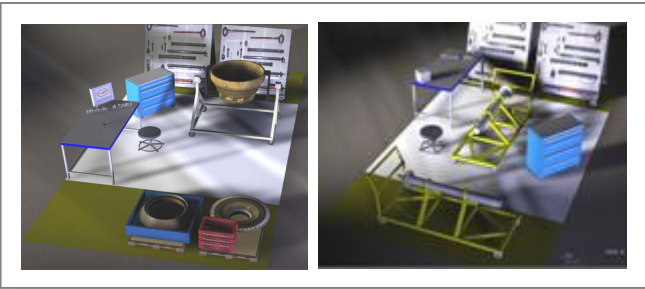
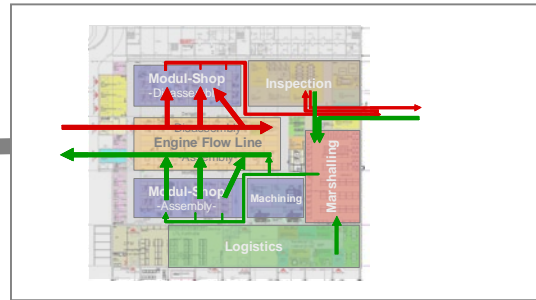
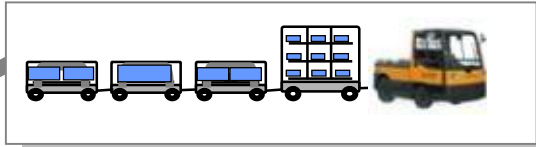
# Engine Flow Line CFM56

## Advantage for the customer



### Advantage for the customer

- Considerable shortening of turntime
- Excellent compliance with delivery dates
- Significant improvement in productivity gives lead over competitors



# Engine Flow Line CFM56

## View on office building and final assembly



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## One important factor of success in a change project....

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# ...communication!

Success of mergers was threatened, because

- integration of employees too late 87%
- not enough transparency 86%
- late, poor, imperfect and incomplete communication of objectives and contents 81%

Source: Emnid-Survey year 2000

# Information & integration of employees

- Change exhibition – info prior to start for all affected employees, gives room for questions
- Info-Market e.g. in entrance to canteen
- Newsletter – also by E-Mail, but better printed
- Internal Newspaper
- Courses and Trainings for key players
- Workshops in production und office – conviction at the very own working places



Project  
Experience

**The depth of information required has to be defined individually for each level!**



# Clear definition of the vision.....

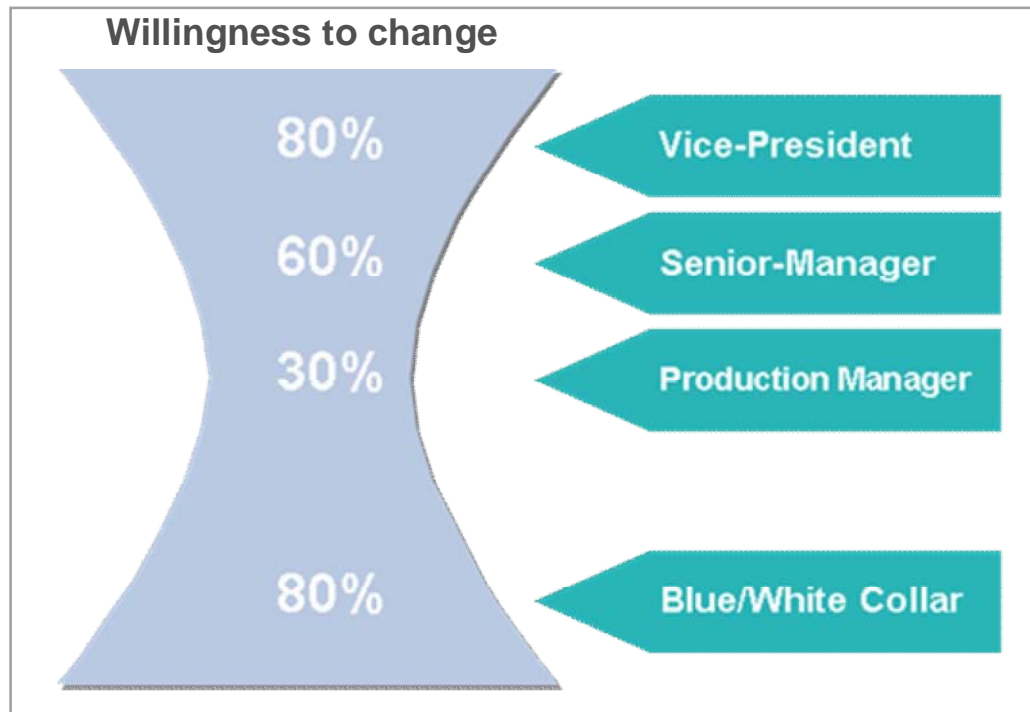


- Guiding principles are understood as pictures of an achievable and desirable future state
- A guiding principle is a clearly structured vision and shows the strategy how to achieve the company's goals
- It also comprises relevant company culture aspects.

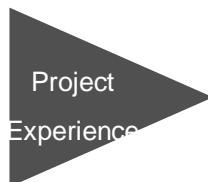


# Create consciousness for the necessity to change

## Your middle management is the main driver....



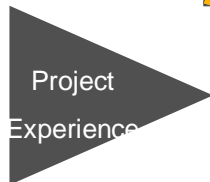
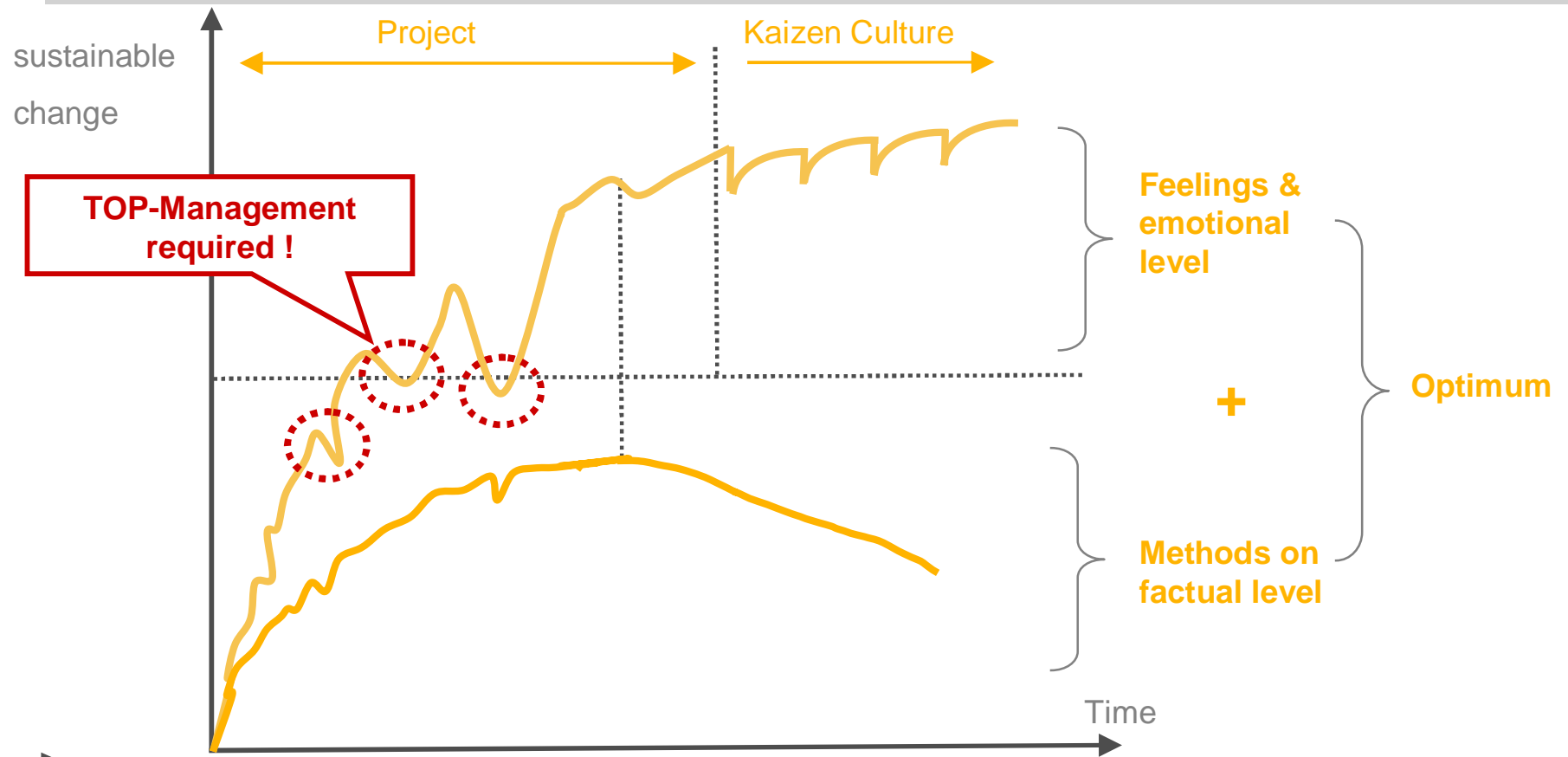
Source: Ingenics AG, Interviews with managers in different organisations



**Sustainable success is only achievable by amplification of the involvement of the middle and lower management levels!**

# Change (the) management

## Aspects of feelings and emotions



**Reaching the emotional level will boost the change project and make achievements sustainable. This will be the selflearning organisation continuously practising kaizen!**

# Change (the) management

## Bonding by successful relationships!



**Human beings  
are designed  
for successful relationships!**

**The nucleus of all human motivation is to find  
and give,**

**interpersonal recognition,  
valuation and thoughtfulness.**

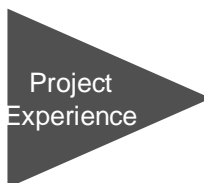
*Source: Joachim Bauer:  
Prinzip Menschlichkeit – 2006*

# Another factor of success – corporate culture

## Lufthansa Technik „Wertekanon“



Lufthansa Technik Wertekanon defined in 2001 by Steering Board and managing directors.



**The corporate culture has direct influence on the duration of a change project and the requirement for training and information!**

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## Closing question.....

**Can Lean Maintenance Methods work in  
the MRO industry?**

**Yes, but.....**

- requires strong management down to the working level
- requires managers to ask questions in continuous improvement cycles rather than giving instructions „do it my way“
- requires managers providing help and asking the right questions

**Thank you for your attention!**

**Your open questions please!**

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