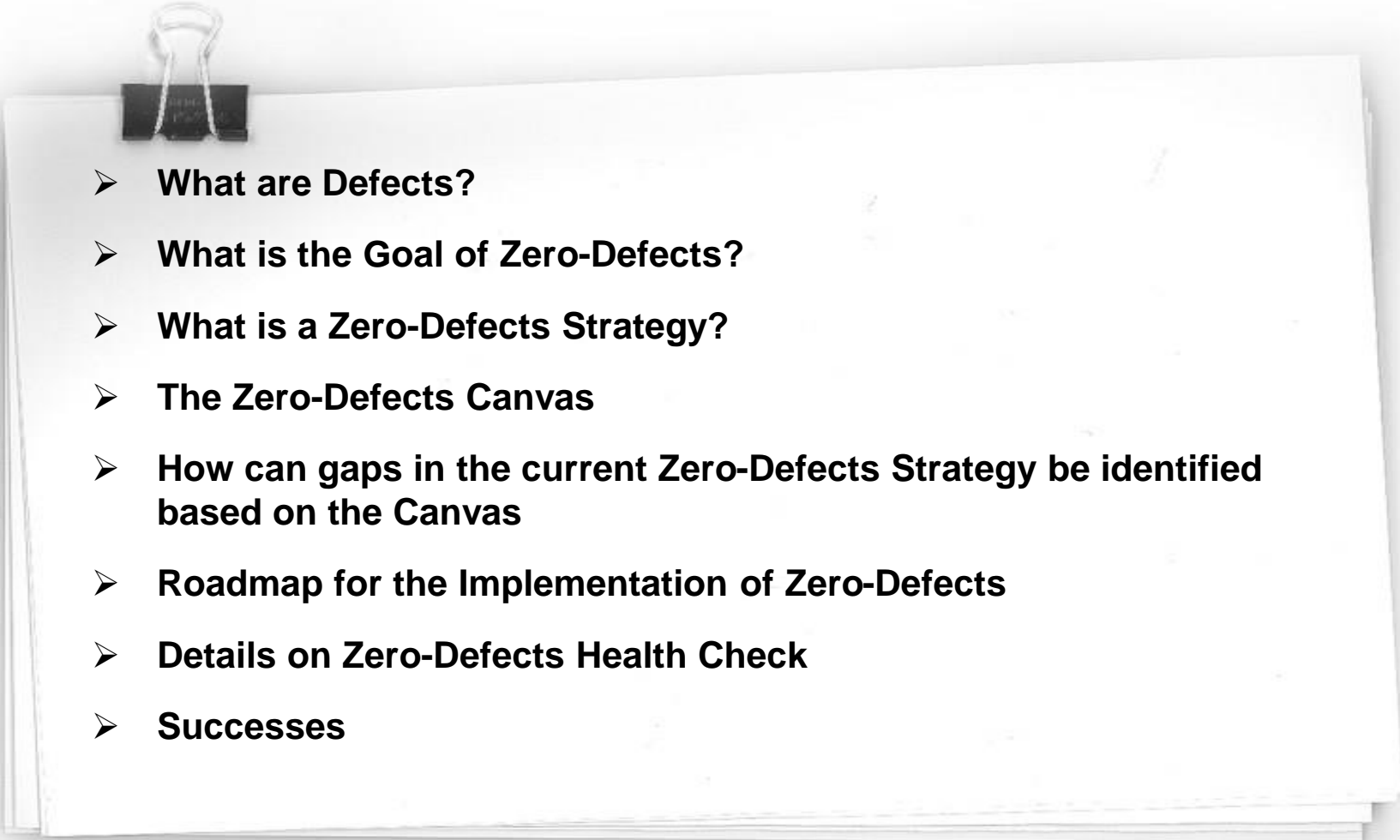




The Zero-Defects Strategy

Zero-Defects Strategy

Content

- 
- **What are Defects?**
 - **What is the Goal of Zero-Defects?**
 - **What is a Zero-Defects Strategy?**
 - **The Zero-Defects Canvas**
 - **How can gaps in the current Zero-Defects Strategy be identified based on the Canvas**
 - **Roadmap for the Implementation of Zero-Defects**
 - **Details on Zero-Defects Health Check**
 - **Successes**

Defects definition

What are Defects? Do we have the same understanding of Defects?

Defects are deviations from requirements!

- To make no, or only a very few mistakes, the requirements must be known and fulfilled!
- Requirements are formulated by external and internal customers.
- The external customer provides requirements for the products as well as for the delivery and service process.
- Internal process customers provide requirements on the upstream process steps.



Goal definition

What is the Goal of Zero Defects? Basis of a strategy definition is the goal setting!

Basically, the goal is Zero Defects! But...

- ...it is enough to fulfill the requirements.
- Requirements are described by specifications.
- The aim is therefore to comply with these specifications.



How we can measure the Goal?

>>> *Price of Non-Conformance* (PONC; quality measure) associated with the requirements

Strategy definition

What is a Zero-Defects Strategy

The strategy describes how a goal should be achieved in the medium or long term

- It has to be described **what** to do
- It has to be described **how** to proceed (in which steps)
- It must be described **who** should take over this task
- It must be described **how long** each step takes and **what effort** is associated with it



What is to be done?

Before we address the question of what to do, let's briefly review the situation in practice

Current problems in practice:

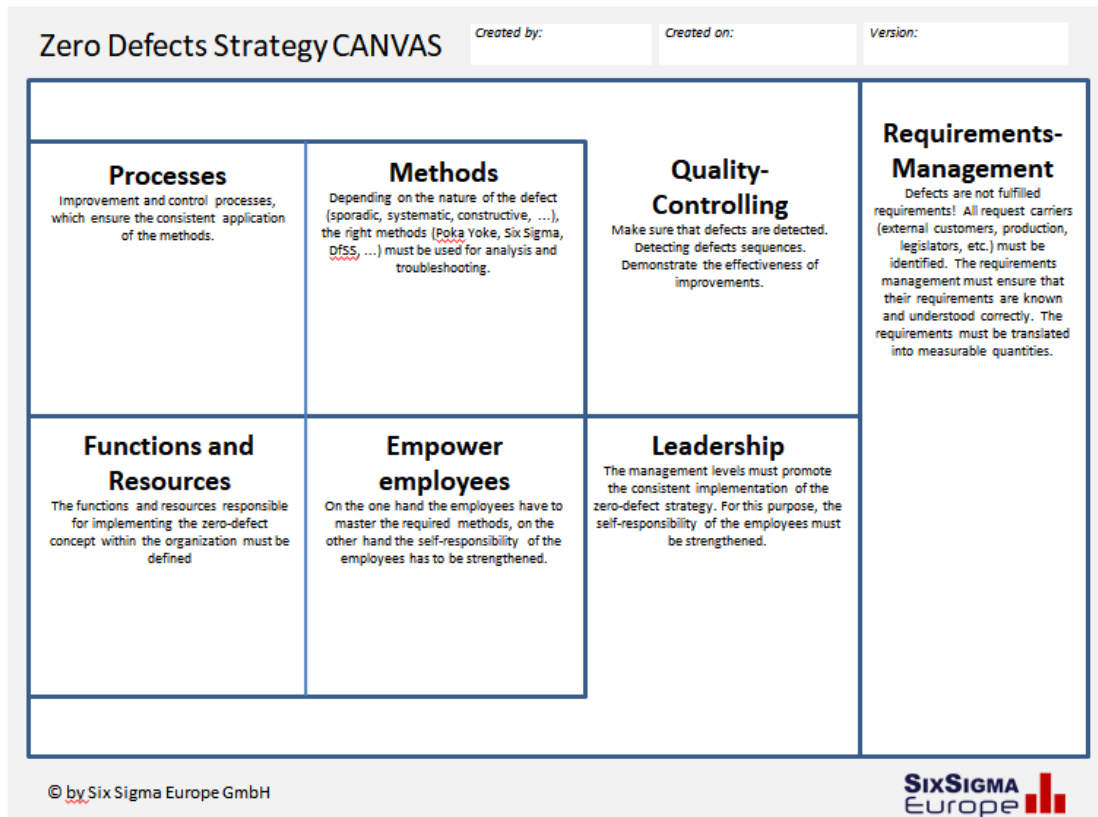
- Requirements incomplete or not known
- Wrong or missing measures
- Wrong or missing methods
- No defined processes to ensure zero defects
- No or not enough resources
- Employees are not aware, lack desire, lack knowledge or don't have the ability
- Not enough management-attention (including change management)



What is to be done?

A complete description of what needs to be done has to consider all these issues

The Zero-Defects CANVAS ensures a complete description of a Zero-Defects Strategy



What is to be done?

How is it derived from the canvas, what to do?

A canvas-based ideal condition description can be compared to the company situation



related to each building block of the CANVAS

Zero Defects Strategy CANVAS			
Created by: _____		Created on: _____	
		Version: _____	
<p>Processes Improvement and control processes, which ensure the consistent application of the methods.</p>	<p>Methods Depending on the nature of the defect (sporadic, systematic, constructive, ...), the right methods (Dogs, Six Sigma, DfSS, ...) must be used for analysis and troubleshooting.</p>	<p>Quality-Controlling Make sure that defects are detected. Detecting defects sequences. Demonstrate the effectiveness of improvements.</p>	<p>Requirements-Management Defects are not fulfilled requirements! All request carriers (external customers, production, legislators, etc.) must be identified. The requirements management must ensure that their requirements are known and understood correctly. The requirements must be translated into measurable quantities.</p>
<p>Functions and Resources The functions and resources responsible for implementing the zero-defect concept within the organization must be defined.</p>	<p>Empower employees On the one hand the employees have to master the required methods, on the other hand the self-responsibility of the employees has to be strengthened.</p>	<p>Leadership The management levels must promote the consistent implementation of the zero-defect strategy. For this purpose, the self-responsibility of the employees must be strengthened.</p>	

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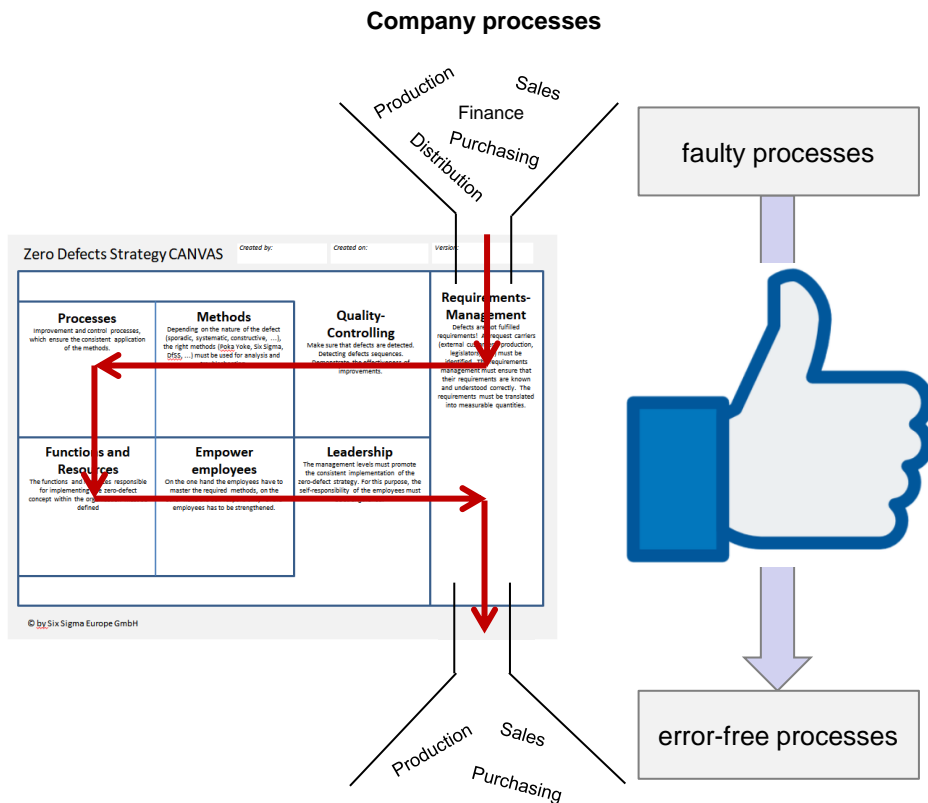


Questionnaire for each building block

What is to be done?

With the help of the canvas logic, defective processes become defect-free processes

Many companies handle process after process in this way



Building block

Key question

Requirements

Who is the customer and what does the customer want?

Quality-Contr.

How can the fulfillment of the customer's request be measured and do we fulfill it?

Methods

What methods are necessary to eliminate the errors?

Processes

What troubleshooting processes need to be established?

Func. & Res.

Which organizational unit is responsible for these processes?

Employees

Are the employees able to apply these methods?

Leadership

How must management support the Zero-Defect Initiative?

Ideal state

What is ideal?

For example in the area of requirements management

Ideal is:

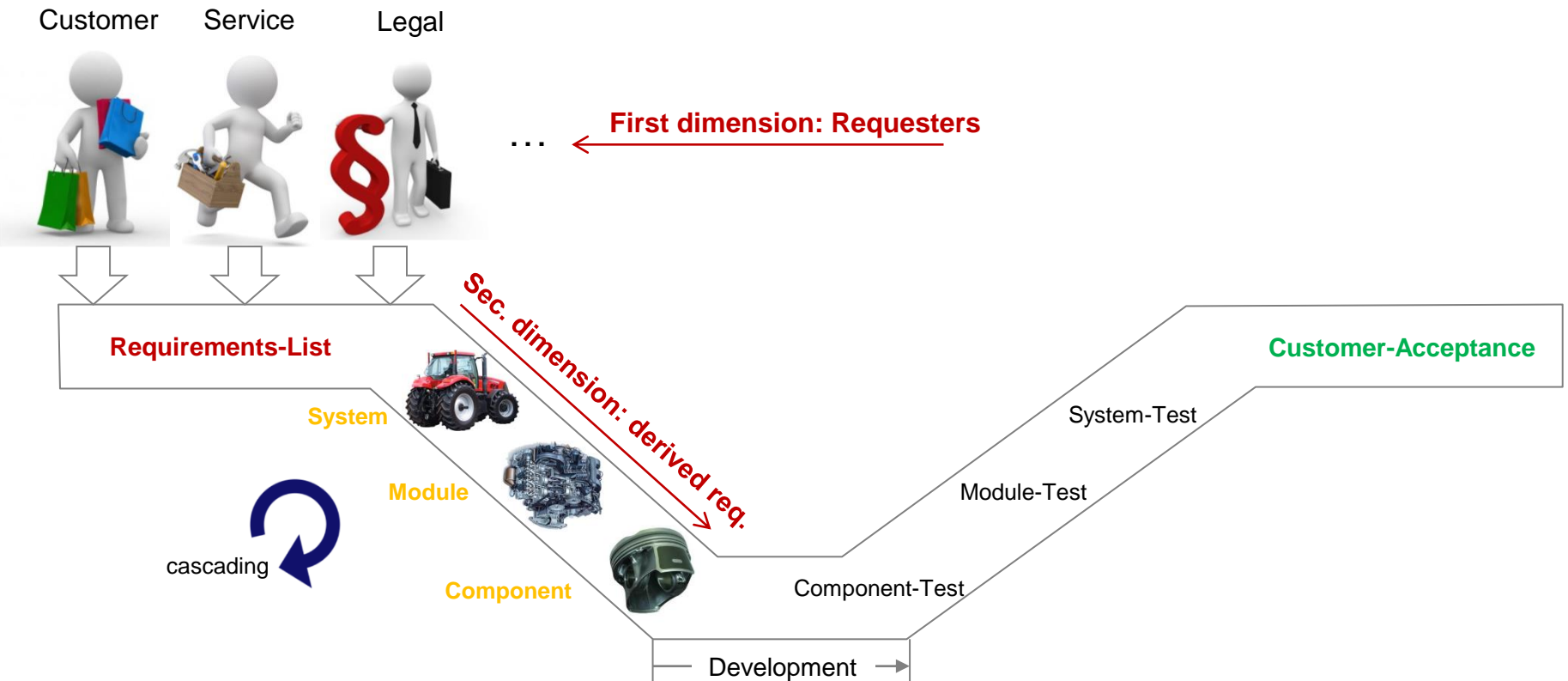
A **full** list of all requirements translated into
measurable or evaluable quantities



Ideal state

What means “full” or “completeness”?

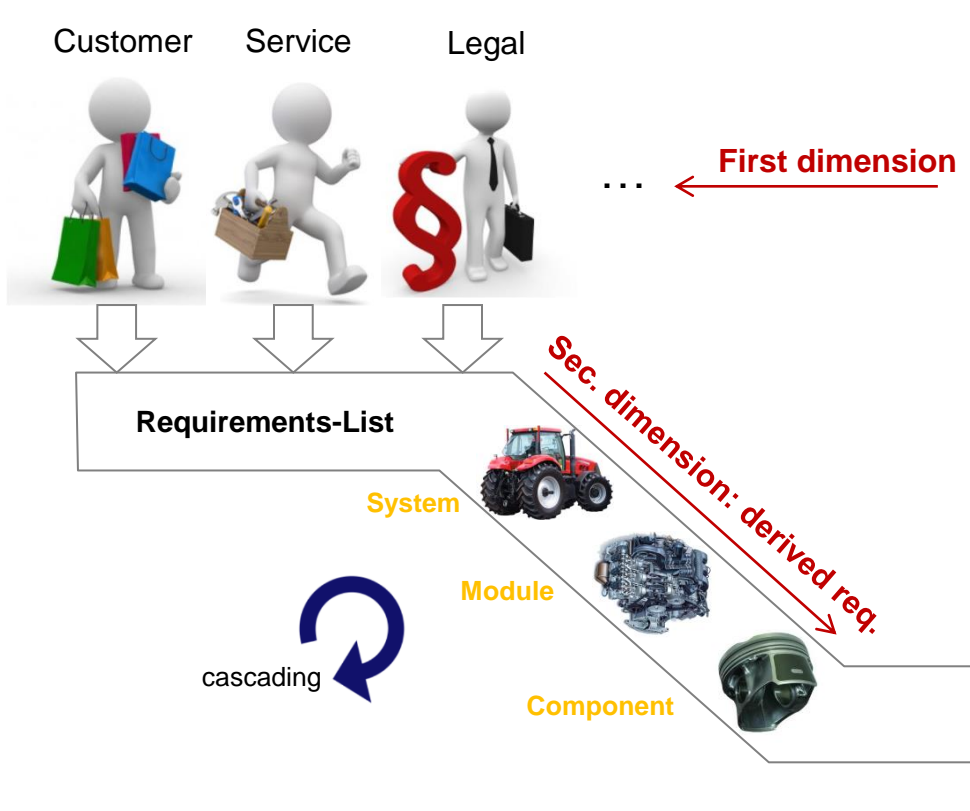
Completeness exists in two dimensions!



Ideal state vs. company situation

How can the gap between ideal condition and company situation be determined?

Via a questionnaire developed from years of experience from such projects



Questionnaire

	don't agree	totally agree
All request bearer are always determined at the beginning of the development!	X	
All requirements of all request bearer are known!	X	
All requirements are clearly and unambiguously formulated!	X	
All requirements are translated into measurable or evaluable quantities!	X	
At the end of the development phase, it is systematically ensured that all requirements are met!	X	
The recorded request list is always confirmed by all request bearer!	X	

Ideal state vs. company situation

Requirement at system level was passed on at component level. The specification here meets the requirement at the system level.

Example cascaded request.

At the end of the development phase, it is systematically ensured that all requirements are met!

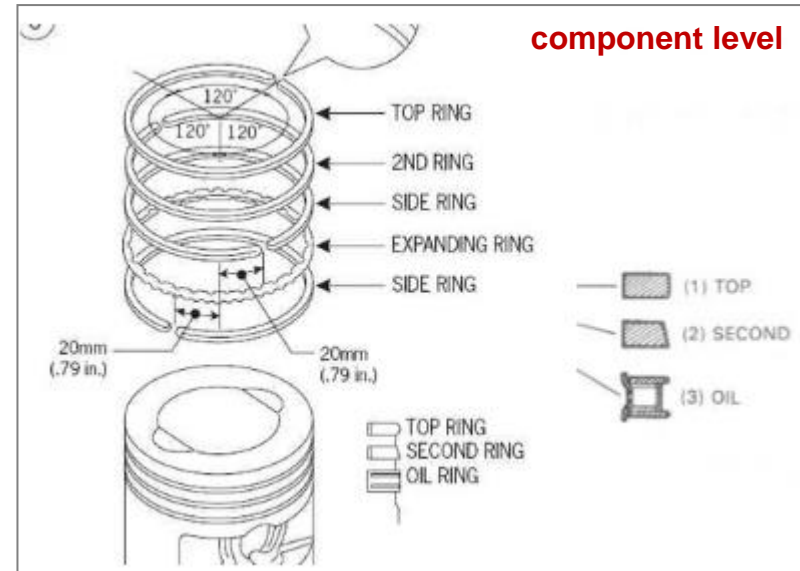
Requirement on system level: Oil consumption below 0.1% diesel fuel consumption



Technical specifications of Oil Ring (**component level**):
for example

Spring rate results from:

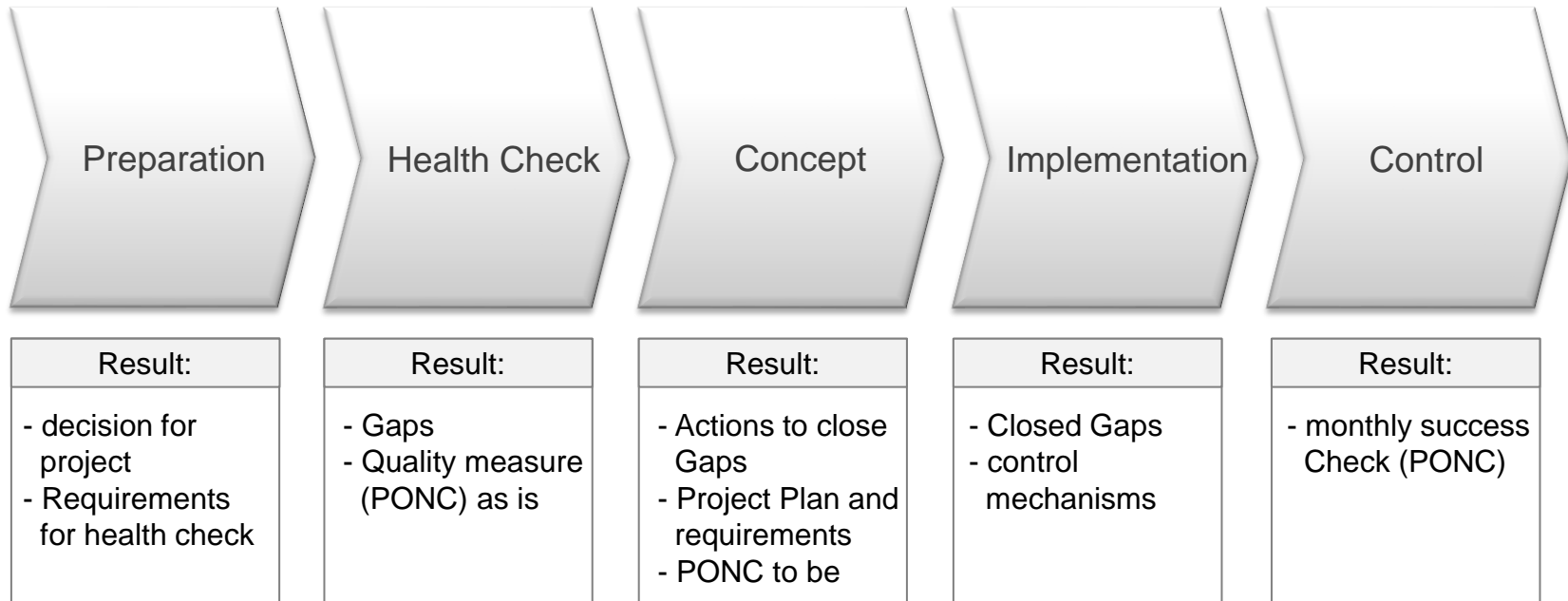
- Geometry (Diameter, cross section, etc.)
- Material (E-Modulus, etc.)



How is to proceed?

What does the procedure look like to approach the Zero-Defects target?

The roadmap consists of five steps



PONC = Price of non-conformance

How is to proceed?

What does the procedure look like to approach the Zero-Defects target?

Content and requirements of the Preparation Phase



Result:
<ul style="list-style-type: none"> - decision for project - Requirements for health check

Requirements for Health Check:

- Data bases for: Warranty / Recall / Repair / Scrap / Rework / cost (price) of non-conformance
- Management support: to support and enable Resources for project
- Resources (Quality department, Controlling, e.g.)

How is to proceed?

What does the procedure look like to approach the Zero-Defects target?

Content of Health Check



Result:
- Gaps - Quality measure (PONC)

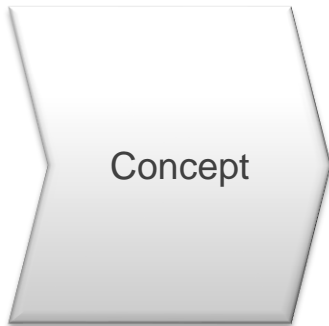
Gaps and quality measure:

- Reflection of current conditions on all 7 Building Blocks of the CANVAS based on the building block specific questionnaire
- Gap description and valuation
- Actual status for Price of Non-Conformance (PONC) as baseline

How is to proceed?

What does the procedure look like to approach the Zero-Defects target?

Content of Concept



Result:
- Actions to close Gaps
- Project Plan and requirements
- PONC to be

- Conceptual design per building block based on the gaps
- Estimated impact of each action on PONC
- Project planning for implementation (steps, schedule, ressources, controlling)
- Release of the implementation
- Define actions to close individual gaps w. r. t. change management

How is to proceed?

What does the procedure look like to approach the Zero-Defects target?

Content of Implementation



Result:
- Closed Gaps - control mechanisms

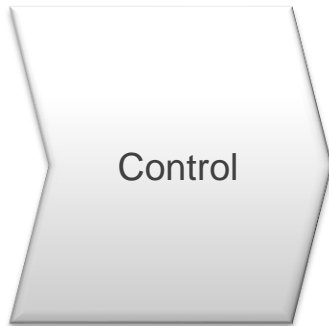
Depends on the Gaps, e. g.:

- Methods and processes for requirements engineering
- Adapted quality controlling (PONC and others)
- Selected methodologies
- Improved quality processes
- Activities to increase company wide awareness for Zero-Defects
- Enabled people to use the methods (training, project coaching)
- Achieve critical mass for continuous improvement

How is to proceed?

What does the procedure look like to approach the Zero-Defects target?

Content of Control



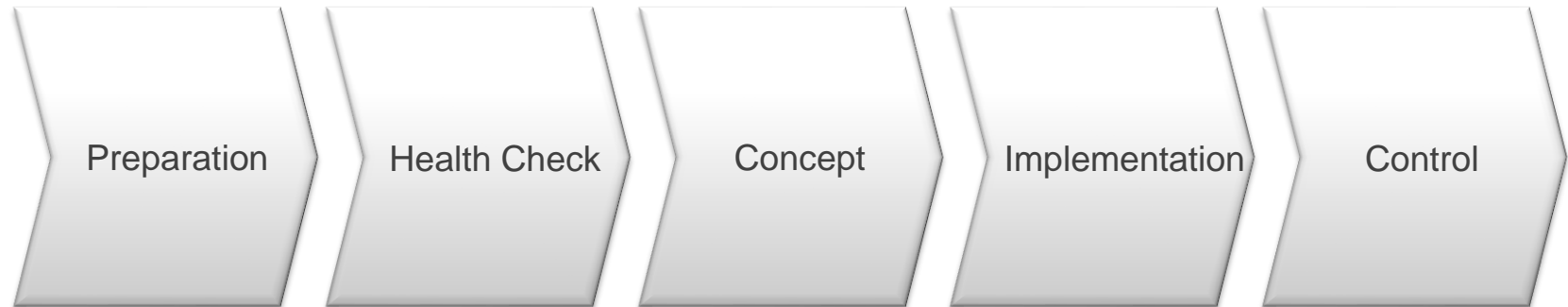
Result:
- monthly success Check (PONC)

- define actions to ensure sustainability and reinforcement
- standard operation procedures
- establish processes for continuous improvements
- Continuous monetary control (PONC)
- Project check out

Duration & effort – total Project?

What does the process look like to approach the Zero-Defects target?

Duration and effort

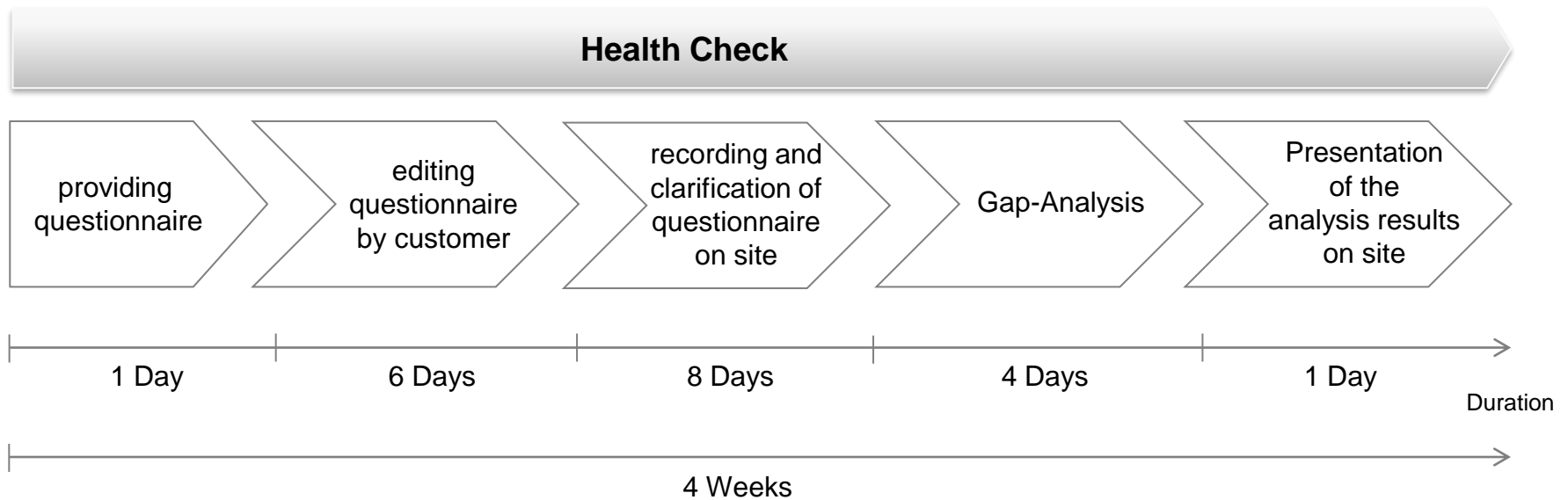


duration	2 days	4 weeks	8 weeks	Depending on Gaps	Depending on Gaps
internal effort	1 employee (2 days)	2-3 employee (3-5 days each)	2-3 employee (2-3 days per week)	depending on external support	depending on external support
external effort	1 employee (2 days)	1-2 employee (15 consulting days total)	1-2 employee (30 consulting days total)	depending on external support	depending on external support

Details of Zero-Defects Health Check?

The purpose of the health check is to find the gaps in the companies Zero-Defects concept

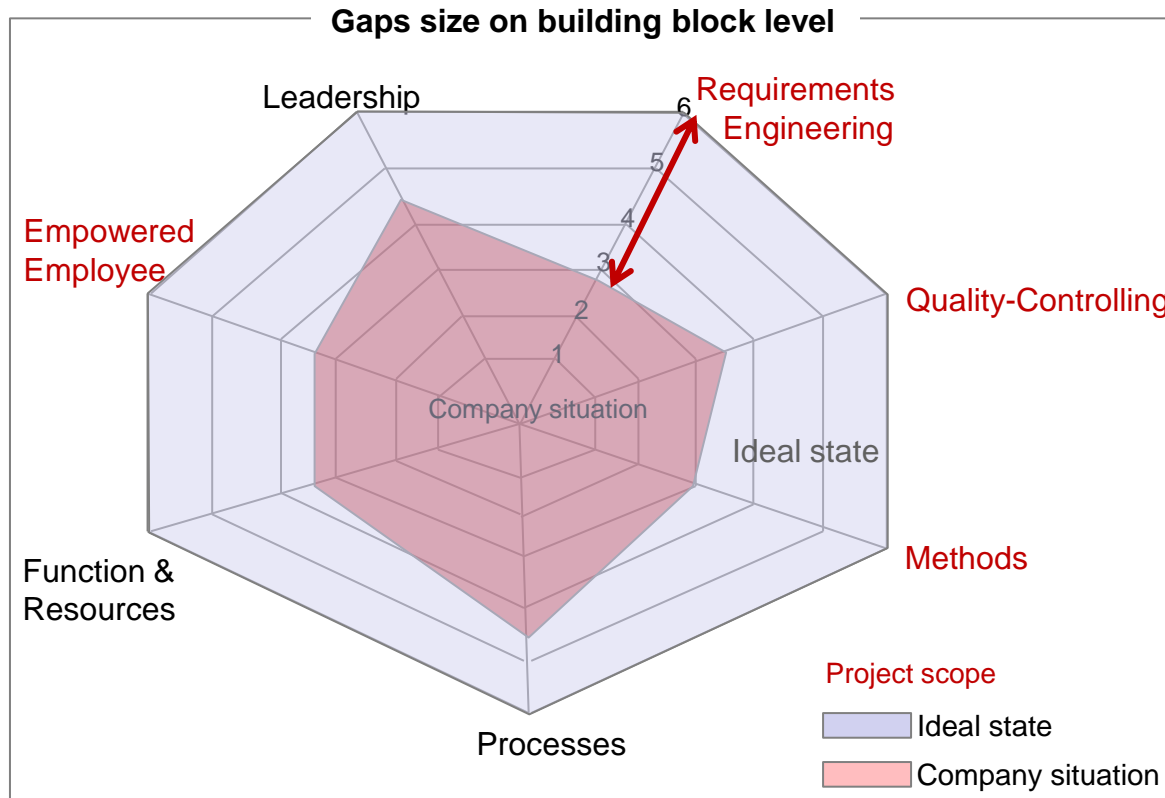
Procedure of health check



Details of Zero-Defects Health Check?

Practical example of gap analysis on building block level

Example of Gap-Analysis result (anonymized)



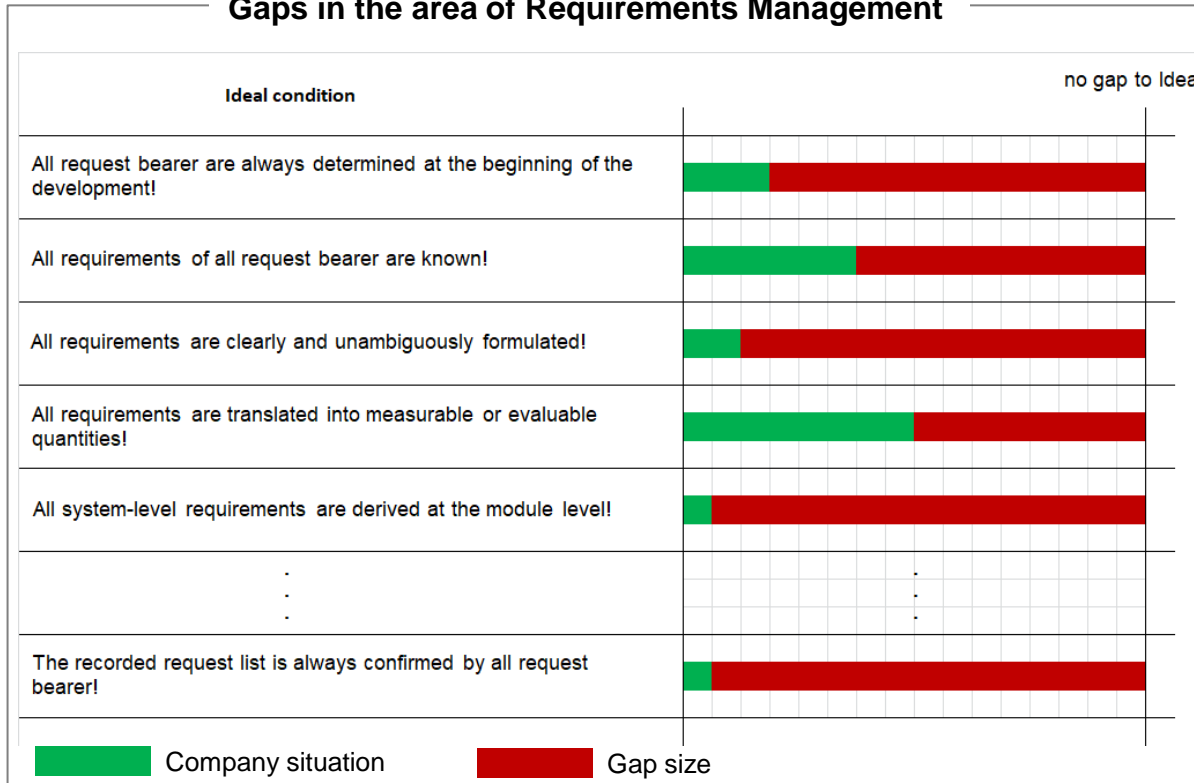
Results
<ul style="list-style-type: none"> ➤ Main problems in the area of ➤ Requirements Engineering, ➤ Quality Controlling, ➤ Methods and ➤ Empowered Employee

Details of Zero-Defects Health Check?

Practical example of gap analysis in the area of requirements engineering

Example of Gap-Analysis result (anonymized)

Gaps in the area of Requirements Management



Results

- In the future, it will be ensured that all requestors are known at the beginning of the development project
- We must ensure that all requirements are formulated clearly and unambiguously
- We need to make sure that all system level requirements are systematically derived at the module level (mechanical, electrical, hydraulic, etc.)

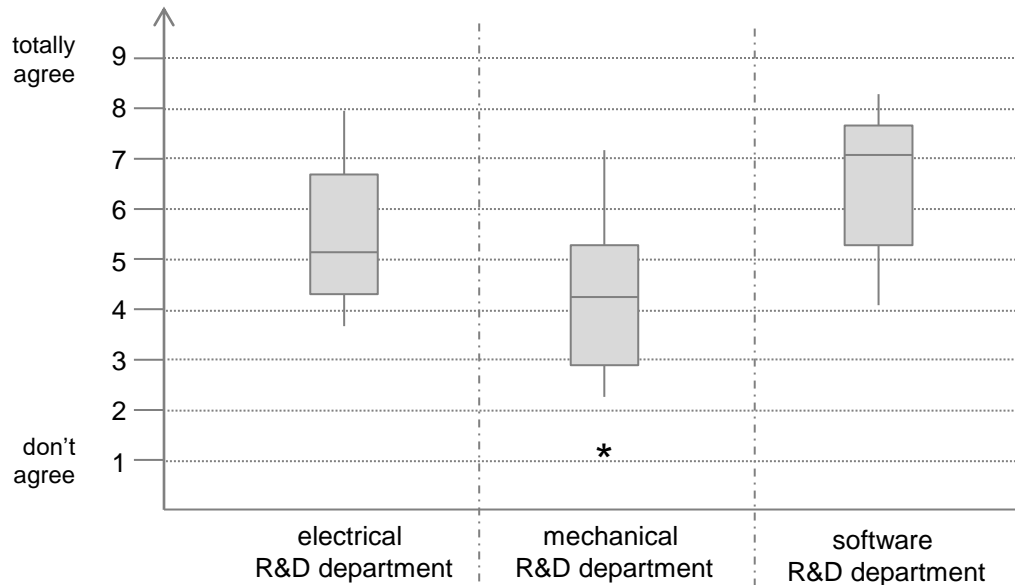
Details of Zero-Defects Health Check?

Practical example of gap analysis in the area of requirements engineering

Example of Gap-Analysis result (anonymized)

Gaps in the area of Requirements Management

Question: All system-level requirements are derived at the module level!



Results

- In mechanical development, the requirements at the system level do not seem to be systematically transferred to the module level

Project benefit?

What benefit can such a project generate?

Conclusion – Project Benefit

Based on experience:

- If not better known assume industry range of external non-conformance cost = 2 – 5% of sales (internal 15 – 40%)
- at least 25% reduction of external & internal non-conformance costs (estimated in Health check Phase)
- external project effort for phase 1 - 3 approximately 47 consulting days (total)
- implementation / control phase depending on gaps and necessary external support