Field Failure Analysis Process

Challenges in the implementation and view towards future development

Field Failure Analysis Process

Regeneration and Expansion

The level of quality in Motor vehicles has, considering the challenges of higher complexity, shorter development cycles and increased model variations, very much improved. At the same time warranty periods have been extended, in order to facilitate the increased consumer expectation.

More demanding efforts within the development and production processes in order to hand over mature, robust and fault free products to the consumer, deviations of the expected condition do occur in usage.

The changes in the IATF 16949:2016 and the VDA Band 6.3 demand from the supply industry already within the development process the planning of the warranty concepts for claimed parts which are returned from the field.

This shows clearly the elaborated demands for an effective Field Failure Analysis on returned parts.

To ensure comprehensive handling the VDA Band Field Failure analysis will be regenerated accordingly to the collected experiences

Motivation for the realization of an effective Field Failure Analysis Process

Environment

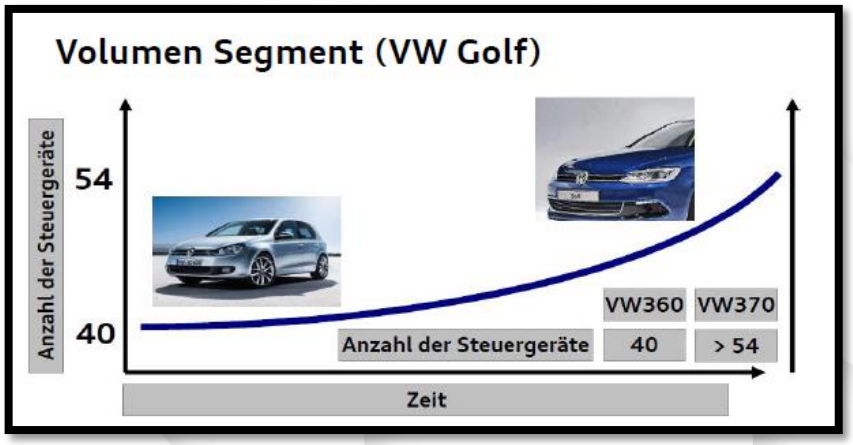
» The annual warranty costs of the automotive industry are between two and four percent of the vehicle costs and therefore exceed the 30 billion US dollars estimated by experts within the industry. «

Source: Automobilwoche – DIE BRANCHEN- UND WIRTSCHAFTSZEITUNG 19th June 2006

» In the face of global cost for warranty which is at a yearly rate of 45 to 50 billion US dollars, the significance of quality and warranty claims should not be underestimated. «

BearingPoint® 26th August 2014

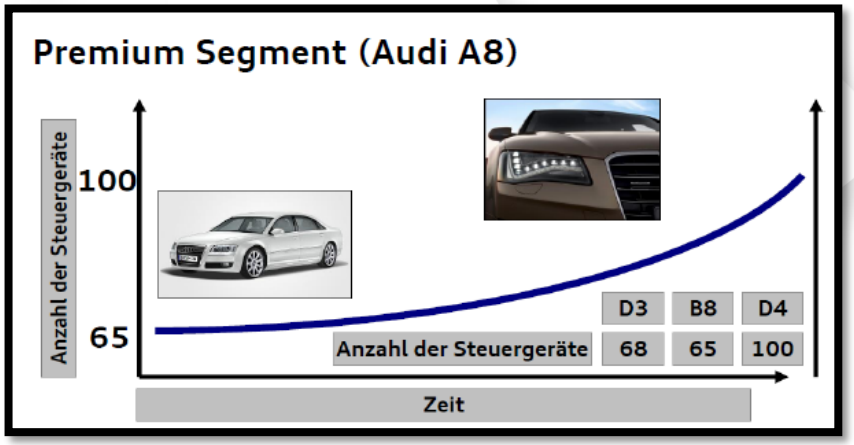
Motivation for the realization of an effective Field Failure Analysis Process



Connection of a global sales organization with "networking" society and individual customer requirement

Reduction of analysis time is due to global same part strategies and therefore resulting high failure cost necessary

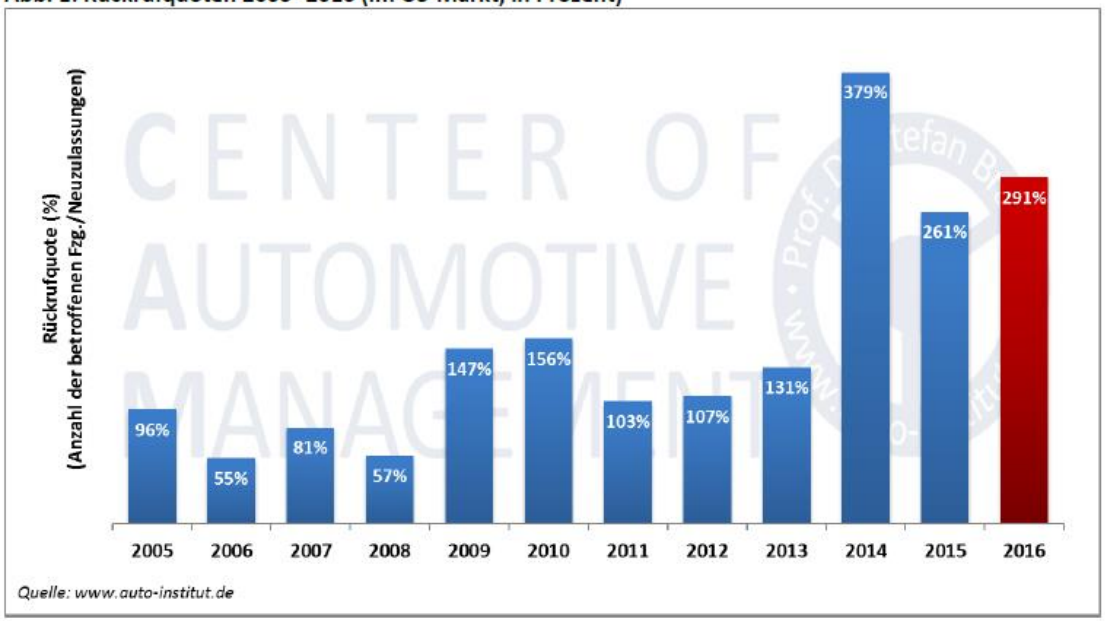
Constantly rising requirements through assistant and infotainment systems are increasing the vehicle complexity in all segments.

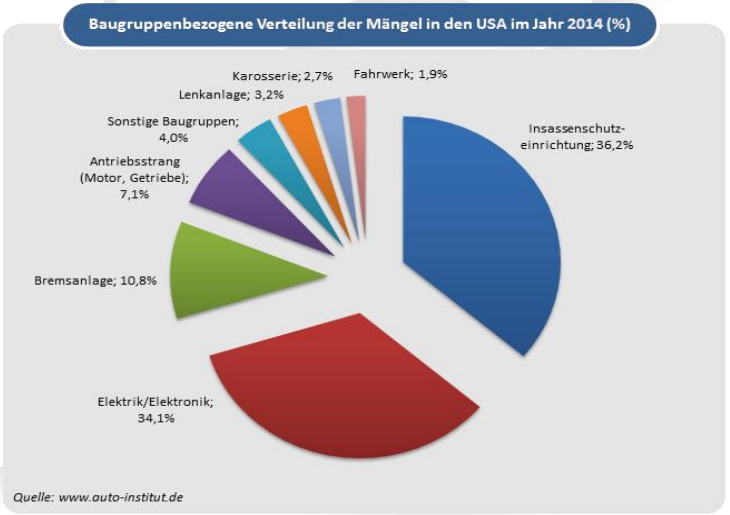


Motivation for the realization of an effective Field Failure Analysis Process

The year 2016 will be the second negative record year in automotive history since 2014 with regard to recalls. According to the Centre of Automotive Management (CAM) in Bergisch Gladbach have been only on the reference market USA a total of 51,1Mio. Pkw (inkl. LCV) recalled out of safety relevant reasons . (2015: 45,8Mio).

Abb. 1: Rückrufquoten 2005 -2016 (im US-Markt, in Prozent)

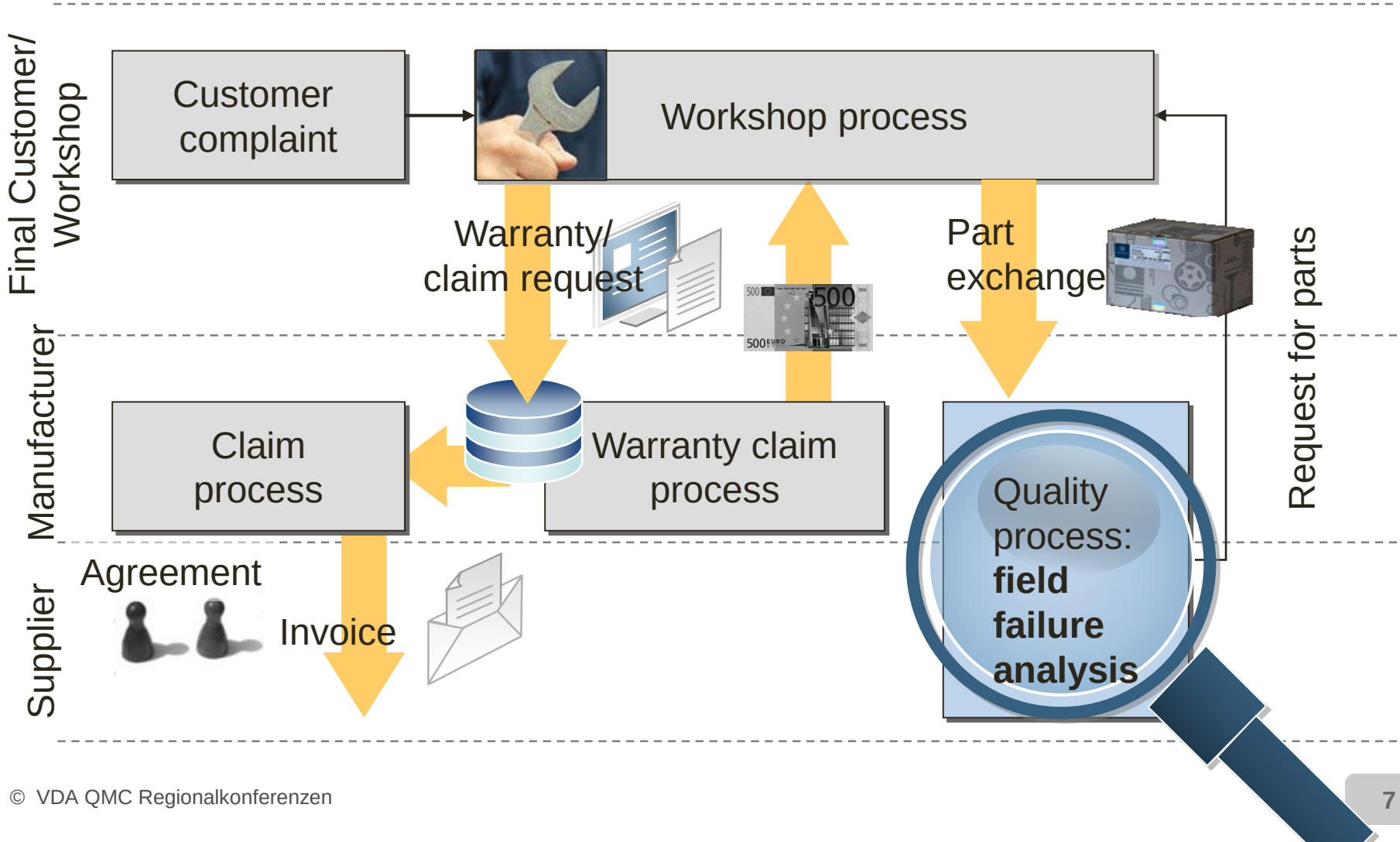




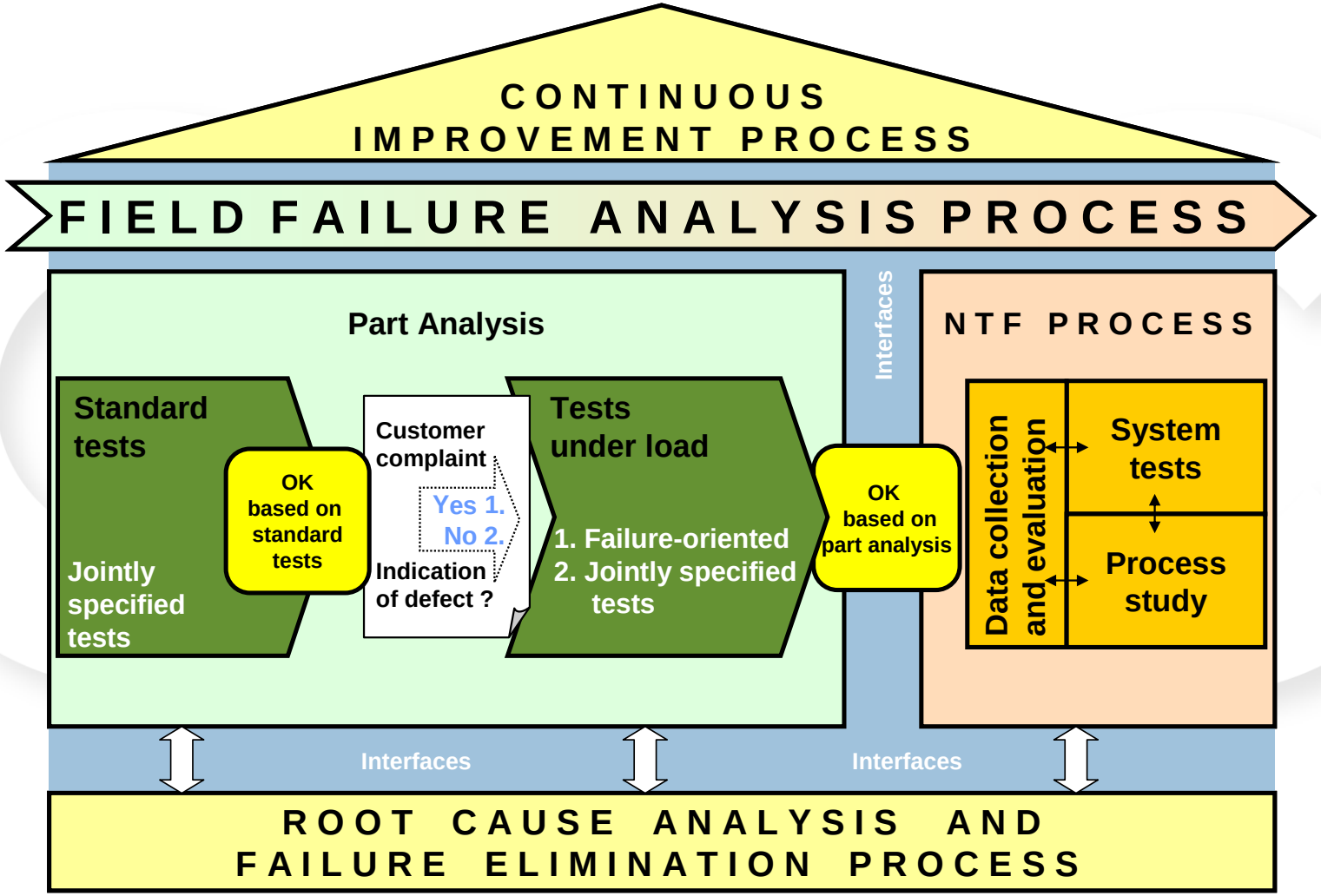
Product liability (Samples)

Design fault side airbag activates when vehicle drives over pot holes		Airbag-Judgment BGH, Urteil vom 16.06.2009, (VI ZR 107/08) System was at point of public release not according to state of the art
Production fault timing chain engine tears (engine write-off)		The die for the chain links had been used over and above the wear limitations
Instruction fault bonnet/hood Opening while vehicle is moving		Consumer buys used vehicle at an authorized dealer and is not informed regarding a recall of the manufacturer regarding corrosion at the Bonnet/hood locking device.
Faulty product observation accessory part Resulted in fatal accident		A manufacturer of motorcycles was aware that due to an accessory part wind deflector the vehicle became unstable at high speeds. However, the installation had not been prohibited.

Scope of observation by the standard



Concept



Field Failure Analysis

2009

Field Failure Analysis

Standard-test → Test under load → NTF-Process

To emphasize the Problem-Solving-Process

2017

Field Failure Analysis

Analysis → NTF-Process → Problem Solving Process

Changes VDA Field Failure Analysis FFA 2009 to 2017/18

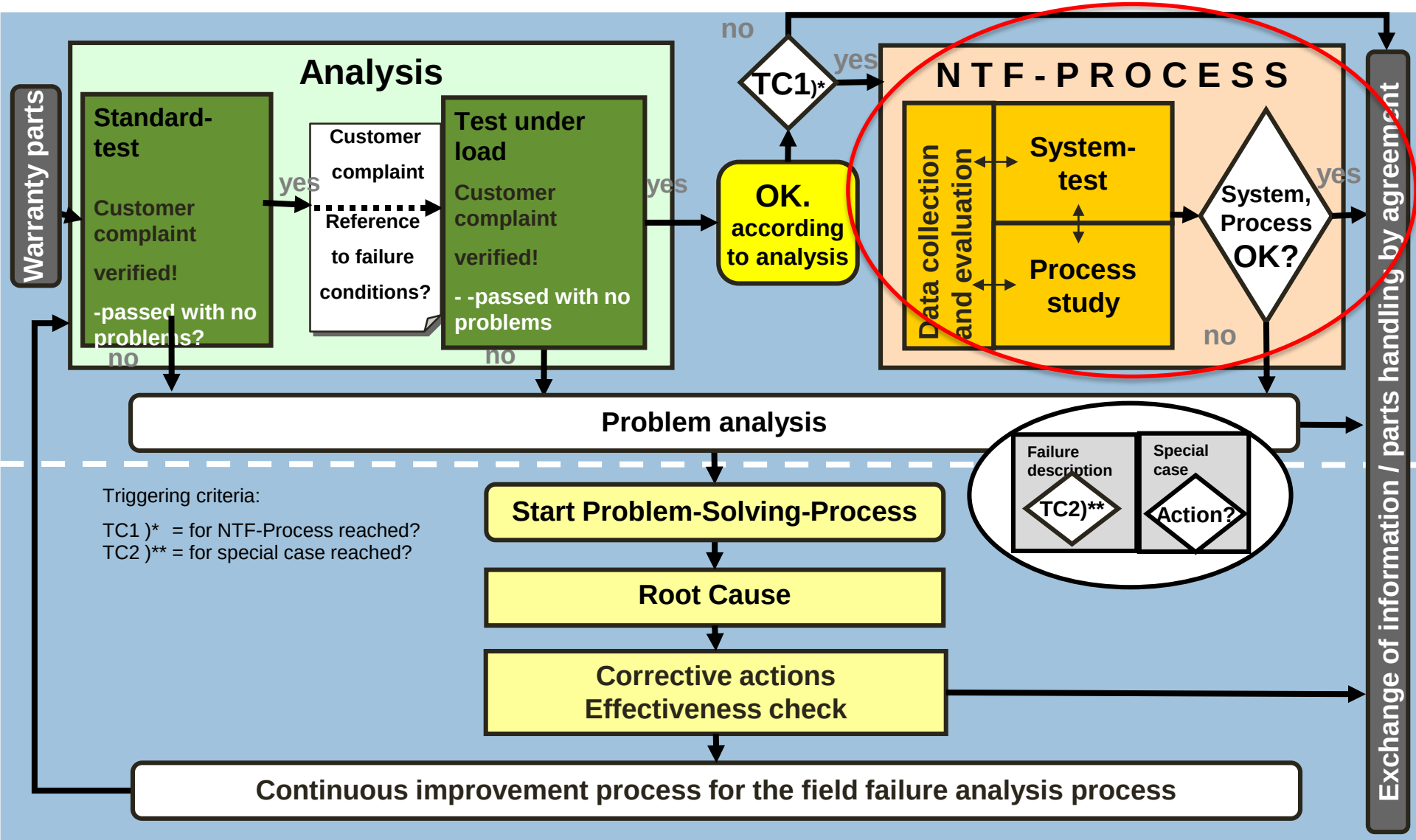
New in 2017/18

FFA 2009

With new relevance

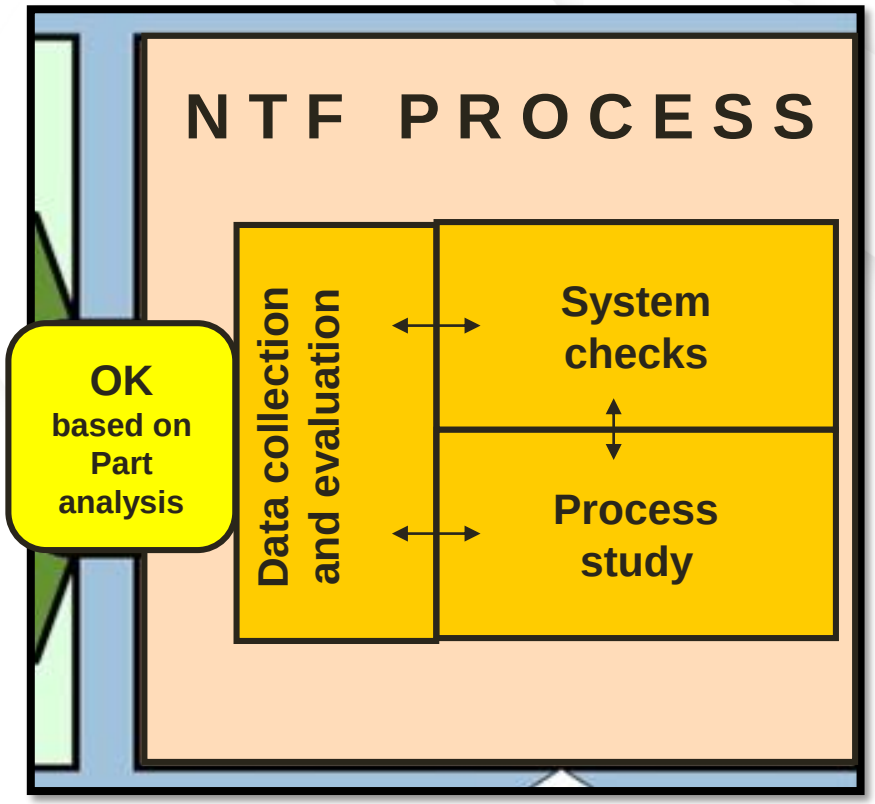
FFA 2009

Challenges in FFA 2009: NTF - Prozess



Challenges in the implementation of the NTF Process

Due to the complexity of reasons, every NTF process has to be structured like a project.



Behind every claimed part with NTF analysis "OK based on part analysis" lies a system or process failure (… lies a reason)

Reasons for NTF

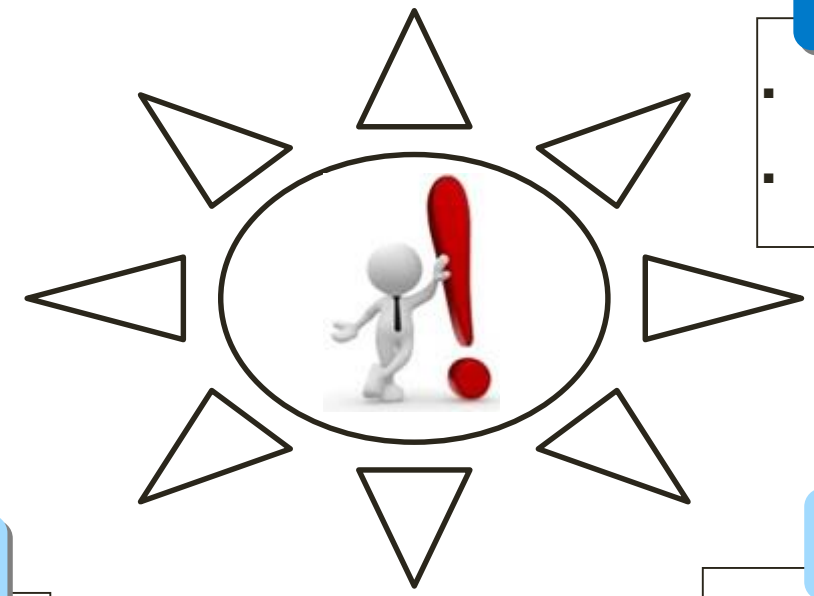
Process

System

Assembly
- Wrongly assembled

Workshop
- Wrong service
- Faulty test equipment
- Inadequate communication customer/dealer
- Gaps in diagnosis directions

Analysis
- Test equipment inadequate/inefficient
- Incomplete analysis method



Design / Concept
- Unspecified usage conditions
- Uncoordinated changes

State of the Art
- Wrong Customer expectation

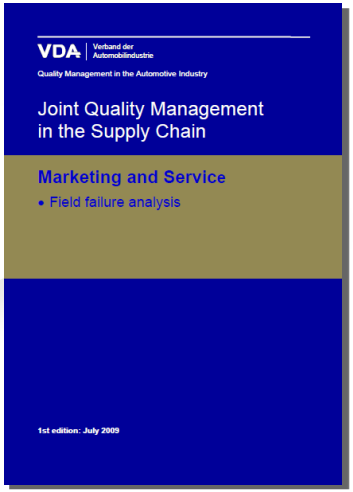
Interconnection
- Not specified usage conditions
- Faulty programming
- Faulty peripheral components

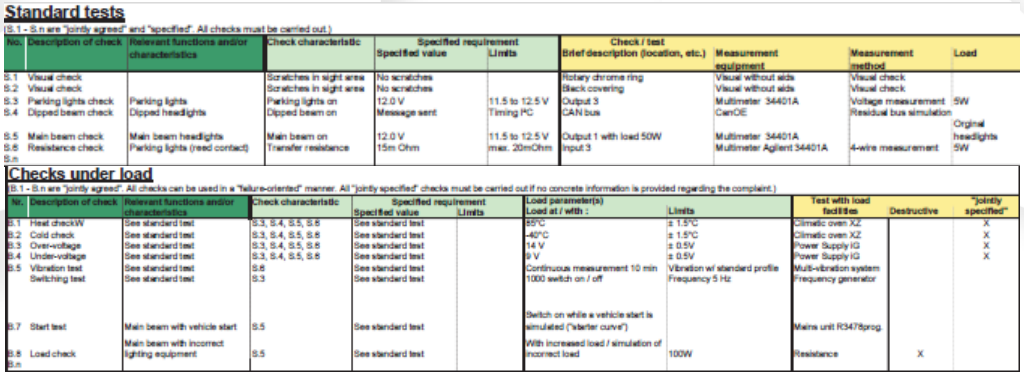
Example NTF Process

Failure can not be found, customer complaint not plausible.

Implementation of target-oriented communication for all components through the release program as per VDA 2

For products which are suitable for an PPA process and if agreed with the specific customer, the use of the VDA publication „Field failure analysis“ must be demonstrated in appropriate form. Details must be agreed specifically with the customer, for example as part of the planning and agreement of the PPA process.





Standard tests

(S.1 - S.n are "jointly agreed" and "specified". All checks must be carried out.)

No.	Description of check	Relevant functions and/or characteristics	Check characteristic	Specified requirement: Specified value	Specified requirement: Limits	Check / test: Brief description (location, etc.)	Measurement equipment	Measurement method	Load
S.1	Visual check		Scratches in sight area	No scratches		Rotary chrome ring	Visual without aids	Visual check	
S.2	Visual check		Scratches in sight area	No scratches		Black covering	Visual without aids	Visual check	
S.3	Parking lights check	Parking lights	Parking lights on	12.0 V	11.5 to 12.5 V	Output 3	Multimeter 34401A	Voltage measurement	5W
S.4	Dipped beam check	Dipped headlights	Dipped beam on	Message sent		Timing PC	CANoE	Residual bus simulation	
S.5	Main beam check	Main beam headlights	Main beam on	12.0 V	11.5 to 12.5 V	Output 1 with load 50W	Multimeter 34401A		Orginal headlights
S.6	Resistance check	Parking lights (reed contact)	Transfer resistance	15m Ohm	max. 20mOhm	Input 3	Multimeter Agilent 34401A	4-wire measurement	5W
S.n									

Checks under load

(S.1 - S.n are "jointly agreed". All checks can be used in a "failure-oriented" manner. All "jointly specified" checks must be carried out if no concrete information is provided regarding the complaint.)

No.	Description of check	Relevant functions and/or characteristics	Check characteristic	Specified requirement: Specified value	Specified requirement: Limits	Load parameter(s): Load at / with :	Load parameter(s): Limits	Test with load facilities	Destructive	"jointly specified"
S.1	Heat check/W	See standard test	S.3, S.4, S.5, S.6	See standard test		85°C	± 1.5°C	Climatic oven XZ		X
S.2	Cold check	See standard test	S.3, S.4, S.5, S.6	See standard test		-40°C	± 1.5°C	Climatic oven XZ		X
S.3	Over-voltage	See standard test	S.3, S.4, S.5, S.6	See standard test		14 V	± 0.5V	Power Supply IG		X
S.4	Under-voltage	See standard test	S.3, S.4, S.5, S.6	See standard test		9 V	± 0.5V	Power Supply IG		X
S.5	Vibration test	See standard test	S.6	See standard test		Continuous measurement 10 min	Vibration w/ standard profile	Multi-vibration system		
	Switching test	See standard test	S.3	See standard test		1000 switch on / off	Frequency 5 Hz	Frequency generator		
S.7	Start test	Main beam with vehicle start	S.5	See standard test		Switch on while a vehicle start is simulated ("starter curve")		Mains unit R3478prog.		
S.8	Load check	Main beam with incorrect lighting equipment	S.5	See standard test		With increased load / simulation of incorrect load	100W	Resistance	X	
S.n										

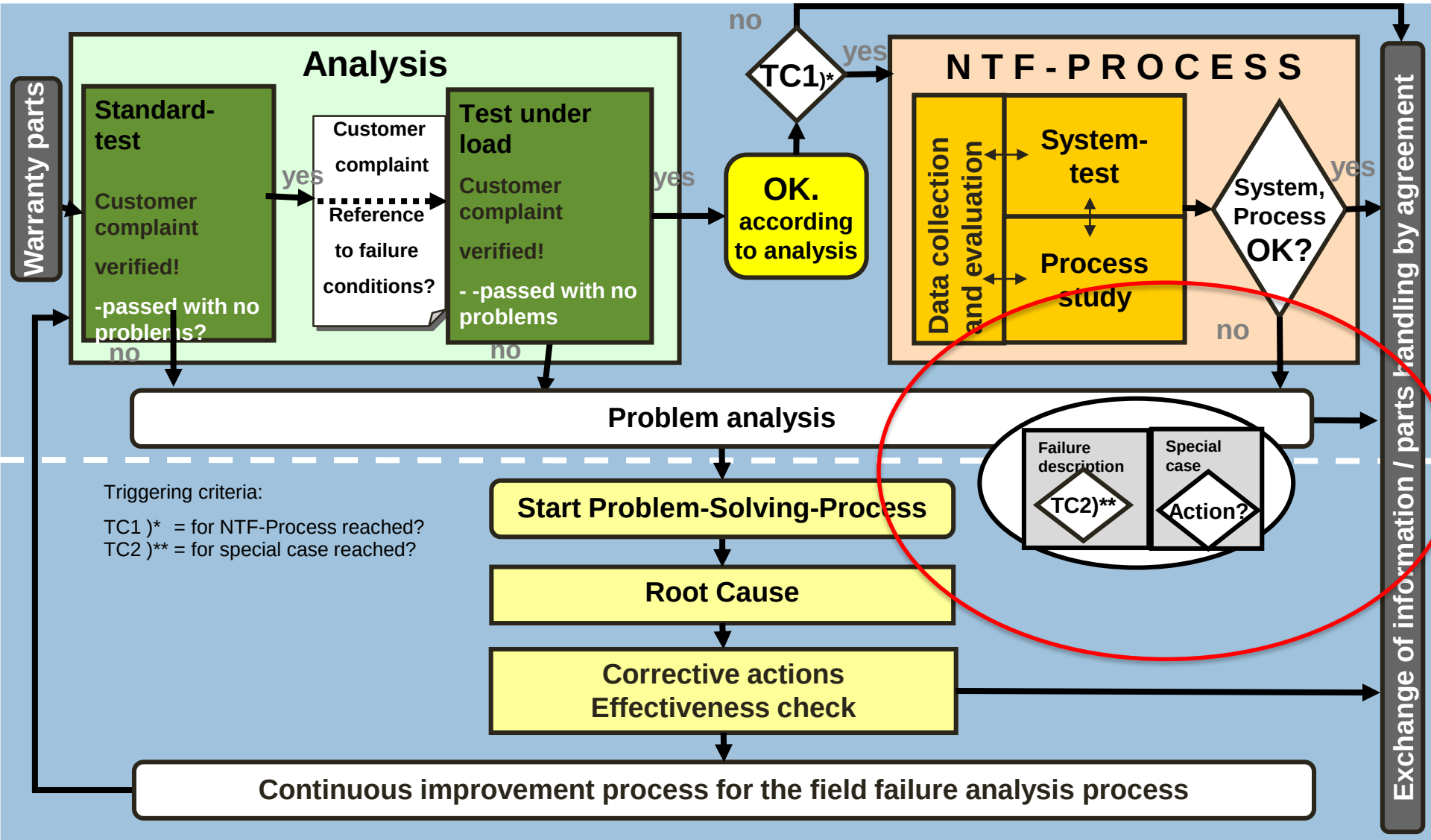
VDA 6.3

Reference only in P7.5

New reference in P3.4,P4.7, P7.4

Advantage:

- Clear reference to the project
- Field Failure Analysis in all stages of the project



New Challenge in 2017/18: special cases

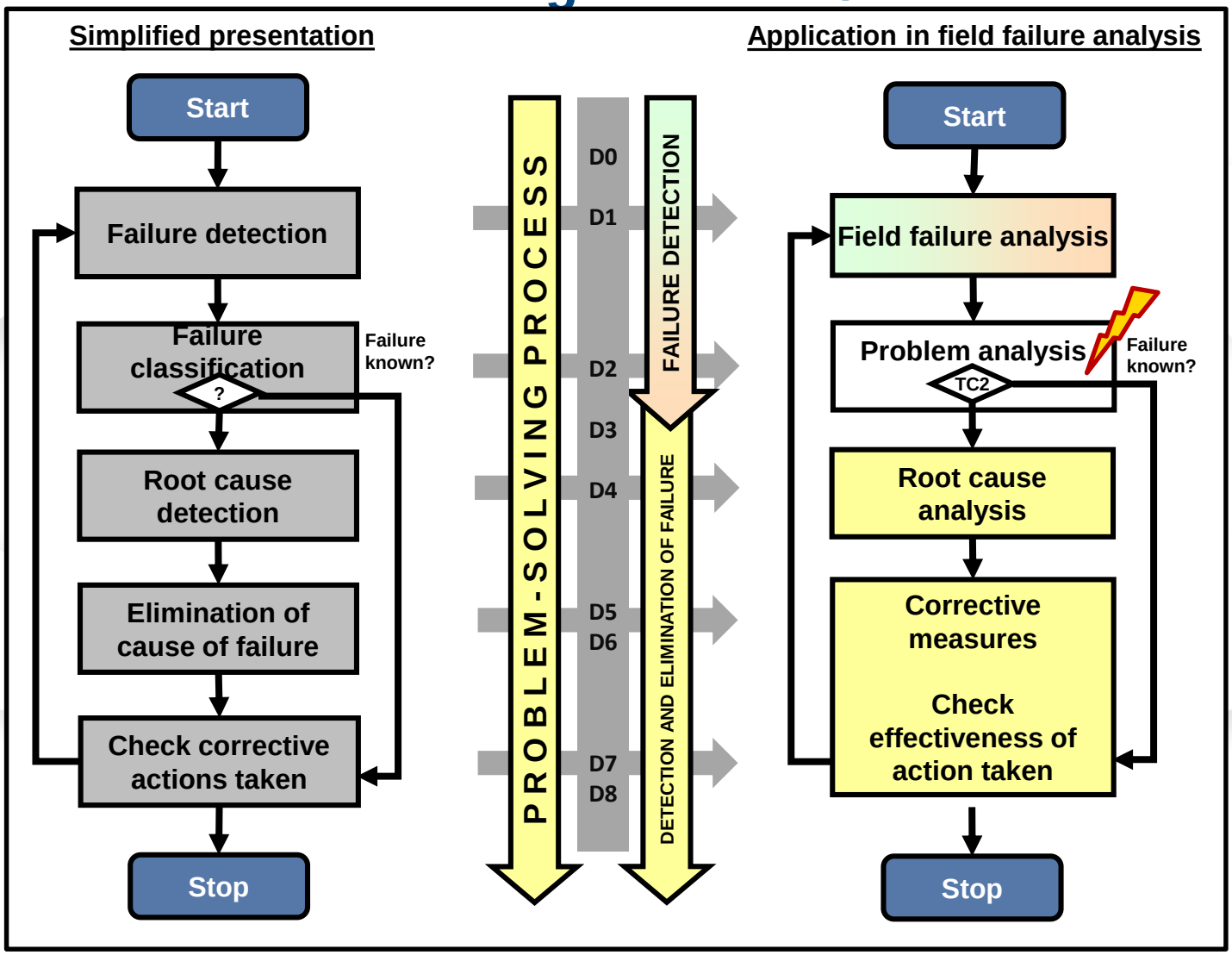
Reason for failure
customer habit

Samples
of
special cases

Design not according to
customer usage

Interaction
of all parts

New Challenges in 2017/18:



New in 2017/18: Audit standard Field Failure Analysis, expanded

The question catalogue of the audit standard will be incorporated into the booklet „Field Failure Analysis
The structure and the assessment logic will be made to suit the new VDA 6.3
To enable a more precise overall result the questions have been increased from 4 to 7 Chapters

Chapters today:

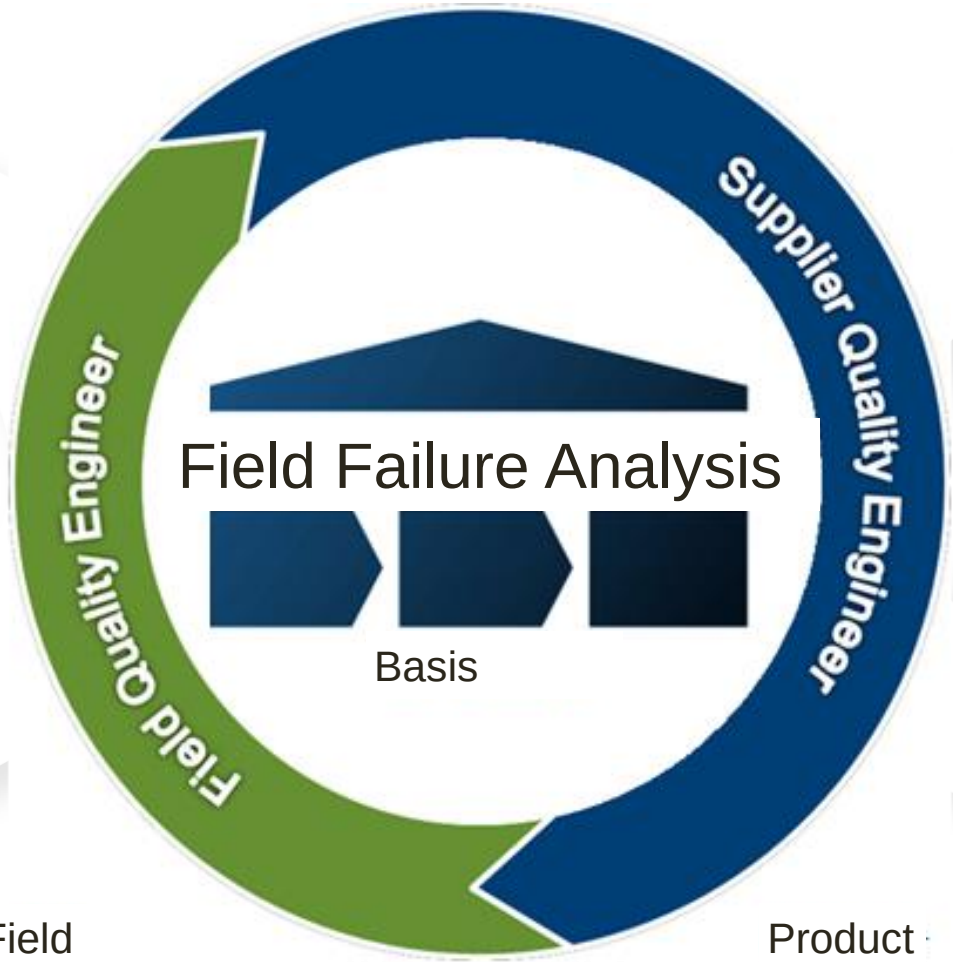
1. Planning
2. Analysis (Standard and Under Load)
3. NTF-Process
4. Problem analyse

Chapters future:

1. Organisation
2. Planning
3. Execution of the Field Failure Analysis
4. Analysis (Standard and Under Load)
5. NTF-Process
6. Problem analyse
7. Problem-Solving-Process

Therefore the question catalogue of the field Failure Analysis is covering the complete 8D-Process

Boundaries to the Field Quality Engineer and the Supplier Quality Engineer.



Field

Product life circle