How do I bring levels to my requirement chaos?

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PROCESS FELLOWS

What requirement do you have?

I need something to close the door.

A push-button shall be placed at the tear-off edge on the trunk.

The car shall provide both a manual and an automatic closing function.

The power supply voltage of the electrical engine shall have 12V.

The pinch of obstacles in the trunk shall be avoided.

The closing should be fast.

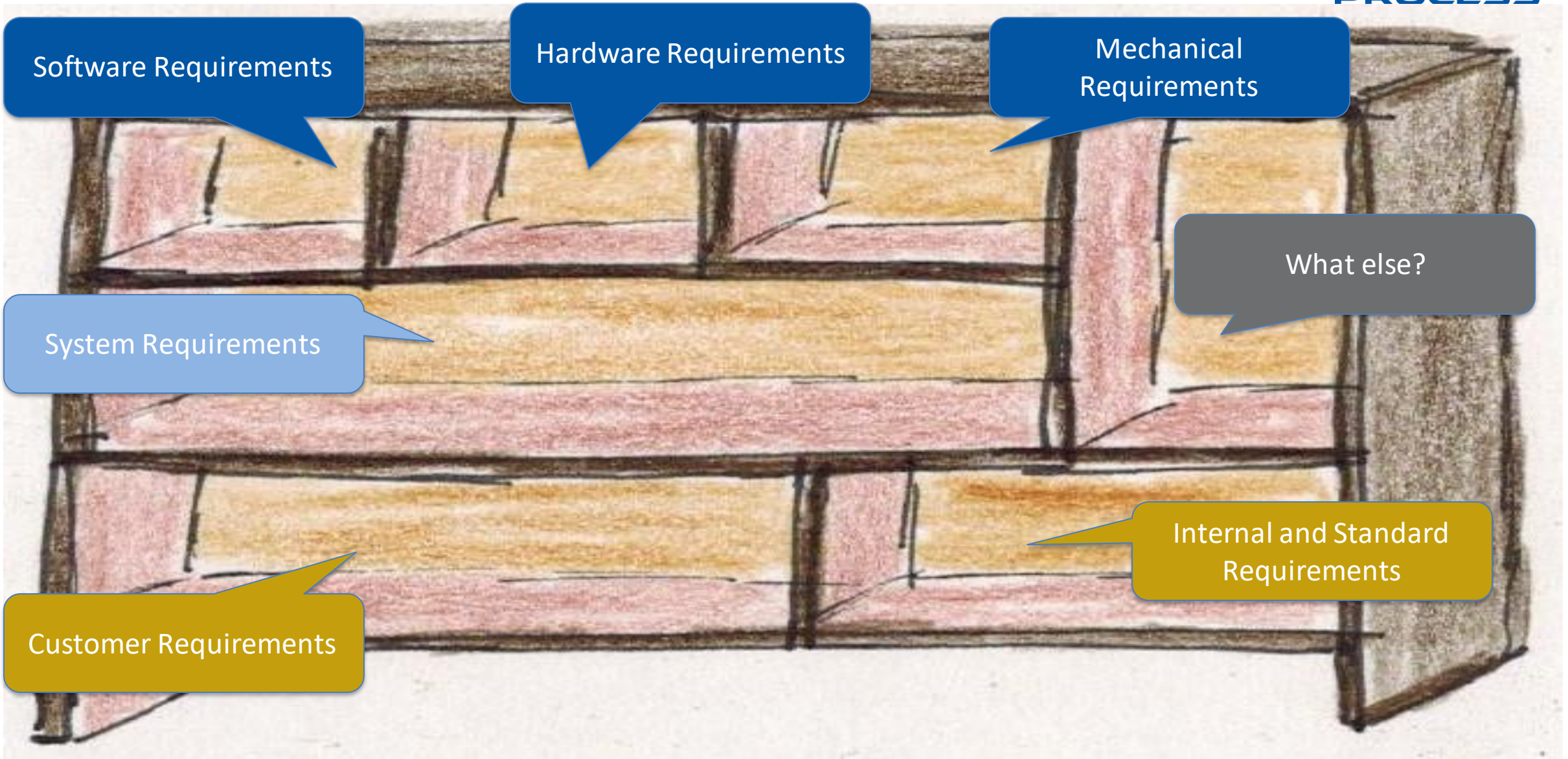
The system shall stop closing if obstacle has been identified.

The system shall give the user the possibility to execute the closing function manually.

Closing must start when input-button reaches downsite position, signal of endposition is not „reached“ and status of variable „power“ is „on“ and ending when input-button leaves downsite position or input signal is „reached“, while variable „power = off“ should represent a malfunction of the system.

When end-position is reached the variable “isEndposition” shall be set to “true”.

What are useful levels?



How to collect stakeholder requirements?

- ✓ Identify your **stakeholders**!
  - Who is your customer?
  - And what do internal departments, standard, and the law expect?
- ✓ Define your **goals**!
  - In your own word: What is this product all about?
- ✓ Identify the **characteristics**!
  - The Kano Model is a good way to identify them!
- ✓ Use **methods**!
  - Creative, observation and questioning methods will help you to collect all important requirements and requests!

How to negotiate customer requirements?

Read and try to understand the requirements

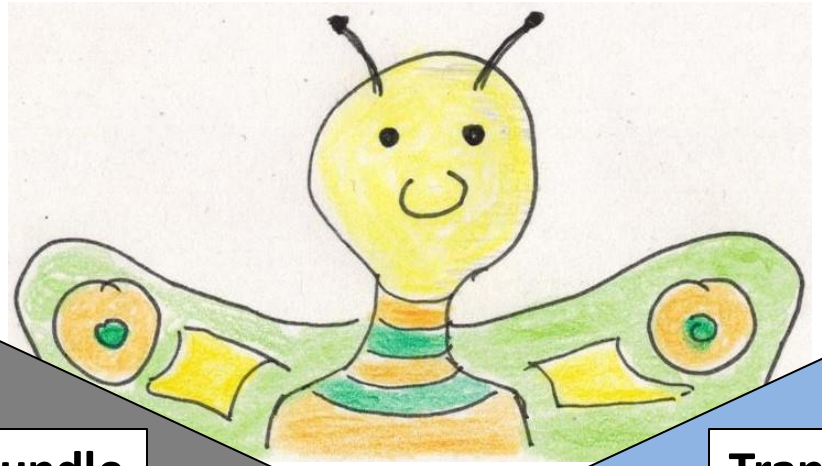
Set the status and write your comment to the requirements

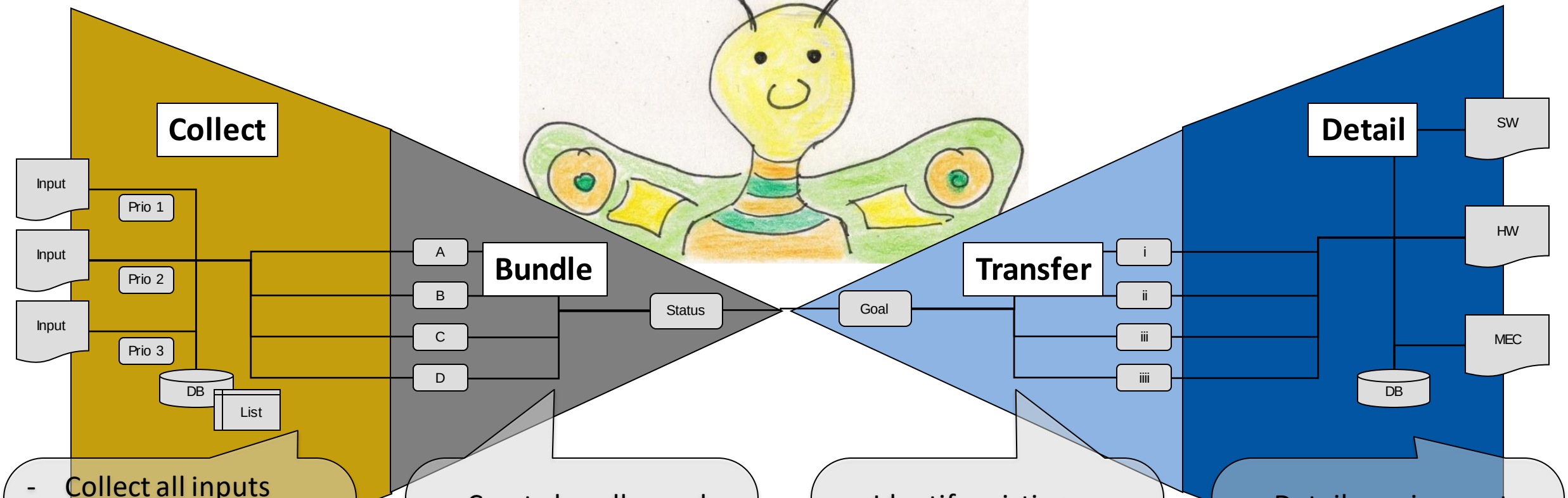
- You accept?
- You reject? Why?
- You need more information? You have an alternative?

Wait for the customer answer to your feedback

Document the results of discussion

You need an example to get an overview?





- Collect all inputs sources and documents
- Manage them in a list / database
- Prioritize them

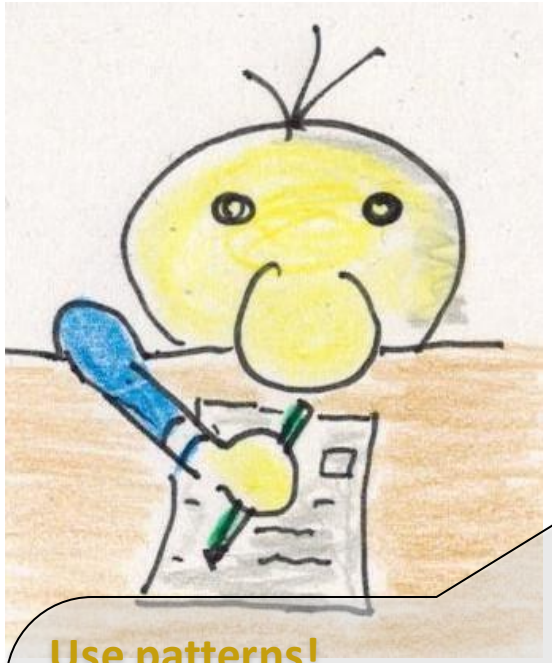
- Create bundles and assign them to domains
- Analyze these bundles

- Identify existing solutions
- Map bundles to these solutions
- Address the domains

- Detail requirements based on solution ideas
- Ensure reuse and adapt where possible

What are useful levels?

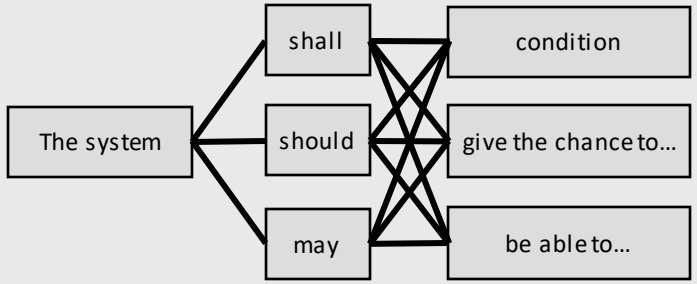
How to specify system requirements?



Use attributes!
For example:

ID	Type	Requirement	Origin	Class	Release	Domain	Func.	ASIL	Verify	Comment
01	Req.	The system shall give …	Customer	functional	F02-10	HW	Control	A	Board test	2 < x < 5

Use patterns!
For example:



Use styles!
For example:
- Natural
- Semi-formal
- Formal

Use Quality criteria and rules!
Internal for example:
- Identifiable
- Consistent
- Realizable

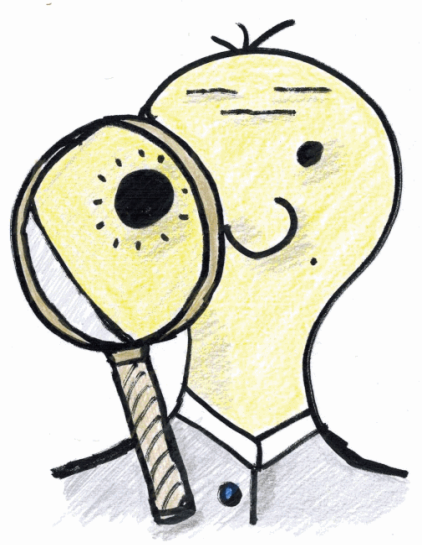
External for example:
- Complete
- Understandable

How to analyze system requirements?

Models

To ensure the realizability of requirements and validation of described solutions you use models for visualization and analysis!
For example:

- Scenarios
- Use cases



Analysis

To ensure the completeness of specification and to derive further requirements
You perform analysis methods! For example:

- Interface analysis
- Failure analysis

Reviews

To ensure the fulfilment of quality criteria and consistency you perform a check using checklists!
For example:

- Walkthrough
- Inspection

Verification criteria

To ensure the verifiability of each requirement you define criteria to be analyzed by tester and used as input for test case creation! For example:

- Definition of measurements, values or ranges
- Definition of test level and method

You need an example to connect with architecture?

Assign component or function in requirement attribute

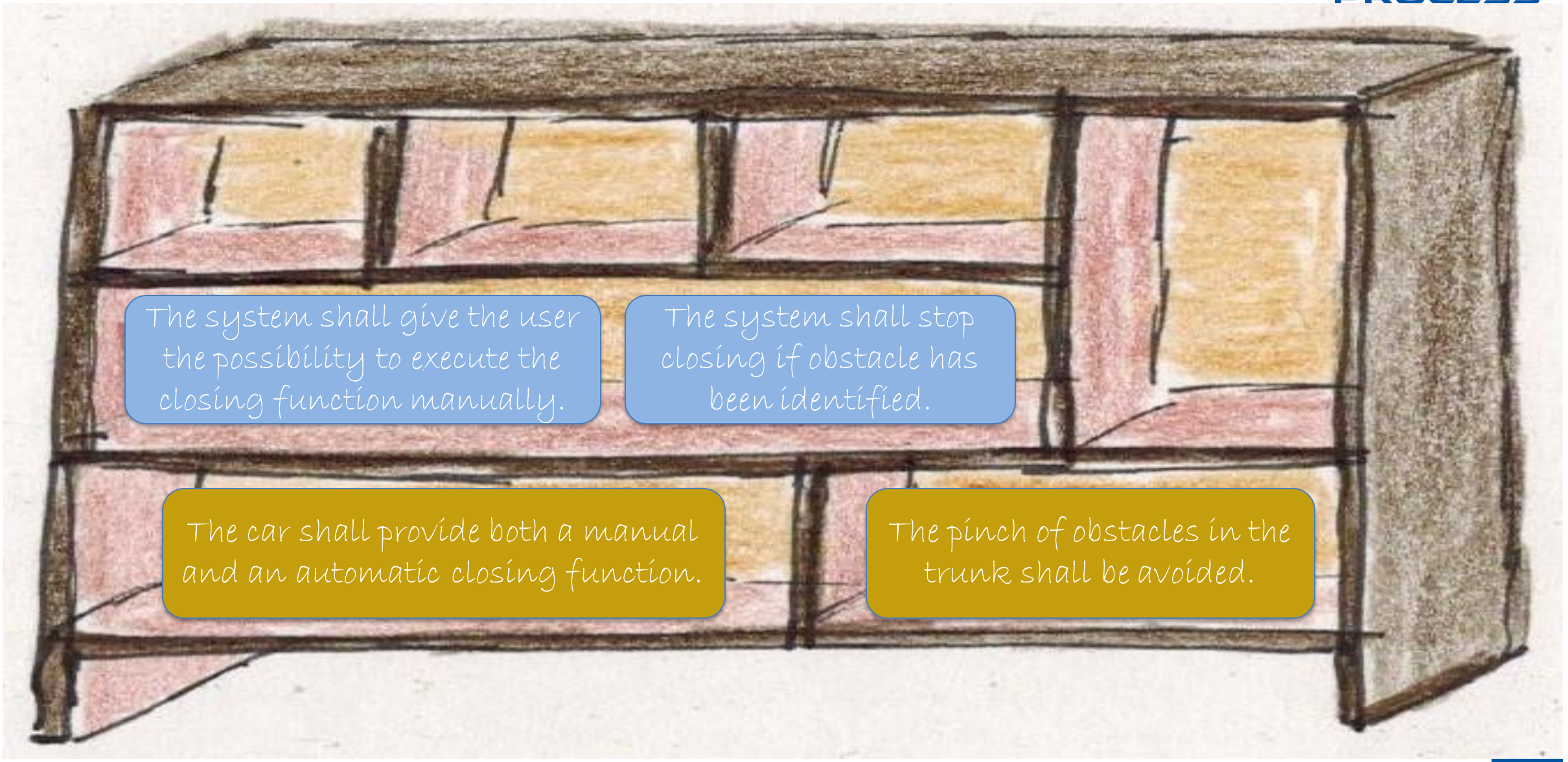
Derive further requirements for these functions

- Iterations!

Describe all components or functions in architecture

Analyze interfaces to identify all dependencies

What are useful levels?

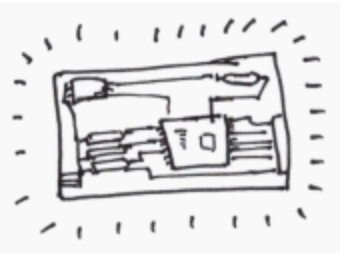


How to specify domain requirements?

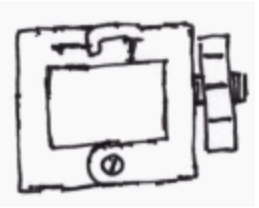
The recommendations for domain requirements are the same than for system!

- Define the software
  - Purpose and structure
  - Functions and elements
  - Constraints (e.g. performance)

- Define the hardware
  - Purpose
  - Functions and capabilities
  - Characteristics (e.g. robustness)

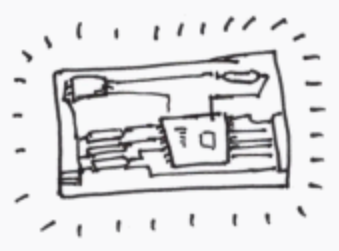


- Define the mechanical
  - Purpose and structure
  - Elements and capabilities
  - Characteristics (e.g. criticality)

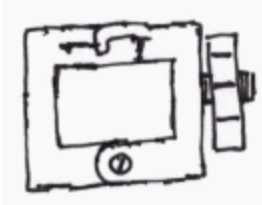


How to analyze domain requirements?

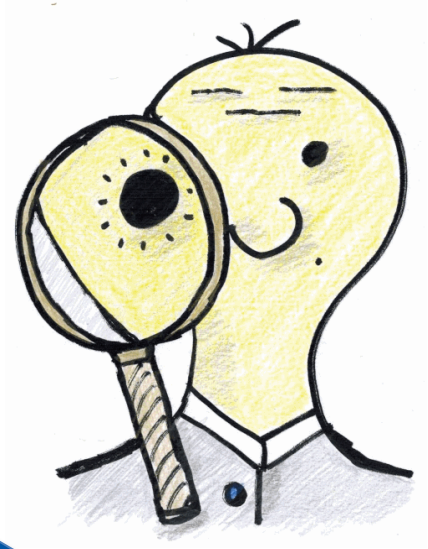
- Analyze the software to check e.g.
  - (Re)usability of standard components
  - Interfaces to the hardware
  - Verifiability by automated tests



- Analyze the hardware to check e.g.
  - Impact of position, temperature, etc.
  - Interfaces to the software and mechanics
  - Verifiability by simulation or calculation



- Analyze the mechanical to check e.g.
  - Impact of position, vibrations, etc.
  - Interfaces to the hardware
  - Verifiability by simulation or calculation

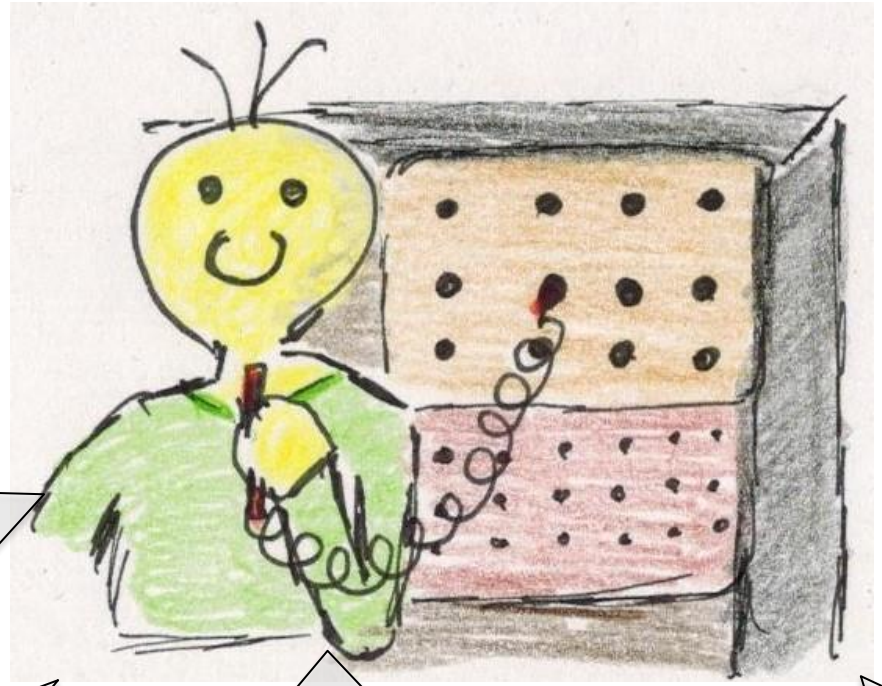


The recommendations for domain requirements are the same than for system!

You need an idea to ensure traceability?

Purpose
For what do you need it?

Consistency
How to use traceability for consistency check?



Rules and granularity
How deep does it need to be for which elements?

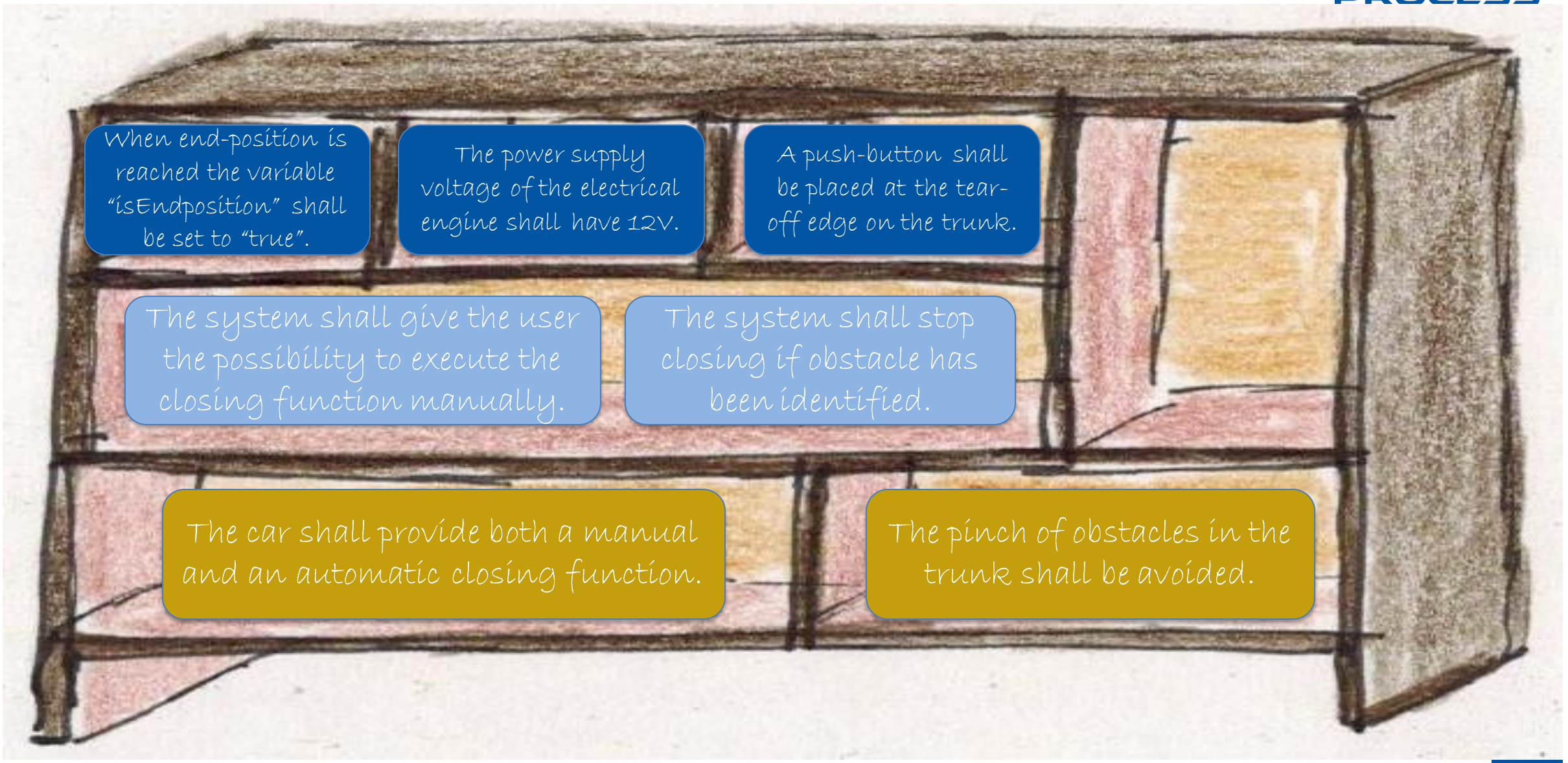
Tooling
What tools will be used on what level?

Creation of traces
How to create links, traces and references?

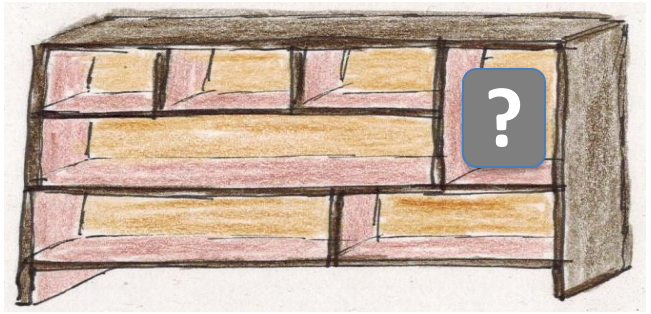
Usage of traces and metrics
How to read data for statistics and impact analysis?

Overview
What does the complete picture look like?

What are useful levels?



Isn’t there one part missing in our picture?



- Testing requirements

  The system shall be tested according to VW80000.

- Quality requirements

  The entire product […] must be developed with processes, which achieve at least a capability level "level 2" in an Automotive SPICE® Assessment […].

- Project requirements

  The supplier shall report the project status and progress at least every two weeks in a meeting.

- Process requirements

  Only qualified tools shall be used for software development.

Now we have a complete picture!

When end-position is reached the variable "isEndposition" shall be set to "true".

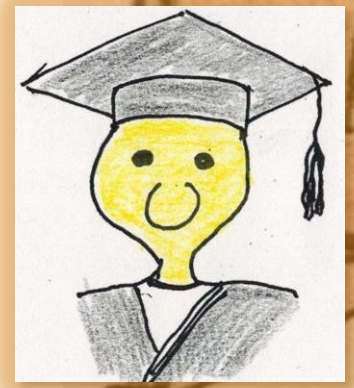
The power supply voltage of the electrical engine shall have 12V.

A push-button shall be placed at the tear-off edge on the trunk.

The system shall be tested according to VW80000.

The system shall give the user the possibility to execute the closing function manually.

The system shall stop closing if obstacle has been identified.



The car shall provide both a manual and an automatic closing function.

The pinch of obstacles in the trunk shall be avoided.

Thank you !

DO YOU HAVE ANY ~~REQUIREMENTS~~? QUESTIONS

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