Syscience

System Engineering Science

Concept of Operation

Needs capture and operational analysis

System: G01

Pascal Krapf, SÃ©bastien Berthier

Syscience

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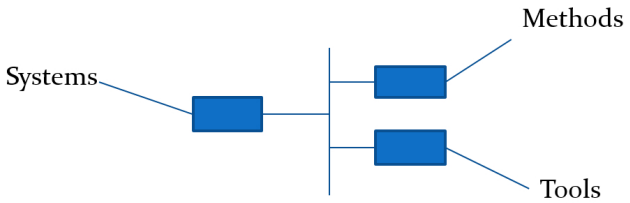

Reference: Syscience R001, V3

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1 Introduction

1.1 Object of the document

The purpose of this document is to establish the operational view of the system. It covers use-case identification, operational scenarios, needs capture and requirements definition.
This document was built using the Syscience Workshop. It was developed by Syscience to support engineers for the deployment of systems engineering.

1.2 References

- IEEE1220 (ISO1220): Standard for Application and Management of the Systems Engineering Process
- IEEE15288 (ISO15288): Systems Engineering - System Life Cycle Processes
- IEEE1471 (ISO1471): Recommended Practice for Architectural Description of Software-Intensive Systems
- EIA 632: Processes for engineering a system
- NASA SEH: NASA Systems Engineering Handbook
- Sys2016: P. Krapf, D. Loise, 2016, MÃ©thode dâ?identification des risques basÃ©e sur les modÃ¨les, 20e congrÃ¨s LambdaMu de maitrise des risques et de sÃ»retÃ© de fonctionnement, Saint-Malo, Octobre 2016.
- Sys2018: P. Krapf, S. Rakotosolofo, S. Berthier, 2018, Use of a system engineering workshop to identify the risks of a connected vehicle, 21e congrÃ¨s LambdaMu de maitrise des risques et de sÃ»retÃ© de fonctionnement, Reims, Octobre 2018.
- Sys2020: S. Berthier, P. Krapf, 2020, Understanding the risks caused by global warming using the System Engineering tool "Lâ?Atelier Syscience", 22e congrÃ¨s LambdaMu de maitrise des risques et de sÃ»retÃ© de fonctionnement, France, Octobre 2020.

1.3 Terminology

1.3.1 Terms

- Diagram: Graphical representation of a view of a system.
- Durability: capacity of the system to keed its desired properties during time.
- The functional needs: what is awaited from the SOI, for which users, and how it should be used.

- Non-functional needs: technical constraints that the SOI must respect (security criteria, number of users, computing power, etc.).
- Lifecycle: Succession of phases characterizing the system evolution, from the elaboration of its concept until its end of life.
- Lifecycle phase: A phase of the lifecycle of a system.
- Regulation: laws, rules or standards, defined by authorities, whose application is mandatory.
- Requirement: Formalized description of some characteristics of a system.
- Scenario: description of what happens to a system in a defined timespan.
- Sequence diagram: diagram representing actors and the succession of actions, events, messages and state changes. Sequence diagrams are used to represent scenarios.
- Stakeholder: Tangible or intangible entity, including persons, organizations, and company departments, likely to express needs, expectations or constraints about the system of interest [IEEE1220] 6.1.1, 6.1.2, 6.1.3.

1.3.2 Acronyms definitions

- COTS: Commercial Off The Shelf
- HMI: Human Machine Interface
- MBSE: Model Based System Engineering
- ppm: part per million
- RBSE: Requirement Based System Engineering
- SaaS: Software as a Service
- SOI: System Of Interest
- SOP: Start of Production
- TGA: Tooling Go Ahead

1.4 Document overview

This document gives an external view of the system of interest as a whole, without details about its internal design, using graphical model views. It defines the requirements that the system of interest shall satisfy.

1.5 Key measures of effectiveness

Key measures of effectiveness reflect the overall satisfaction level of stakeholder expectations [IEEE1220] Â§6.1.5.
The project identifies the technical performance measures (TPMs), which are key indicators of system performance. Selection of TPMs are usually limited to critical characteristics that, if not met, put the project at cost, schedule, or performance risk. Specific TPM activities are integrated into the project report to periodically determine achievement to date and to measure progress against a planned value profile [IEEE1220] Â§6.1.13.
List of KPI to monitor:

- Percentage of lifecycle phases without identified stakeholder expectation
- Number of expectations without link to system requirements
- Number of system requirements without link to stakeholder expectation

2 Lifecycle

2.1 Overall lifecycle

Utilization phase is an important phase of the project, but other phases should not be underestimated. A system that is too difficult to produce or too expensive is a waste of time and money. A system that cannot be maintained will not satisfy users for a long period of time. It is thus worth to define the whole lifecycle and to go through all phases to identify stakeholders. The system lifecycle is adapted from the standard [IEEE15288].

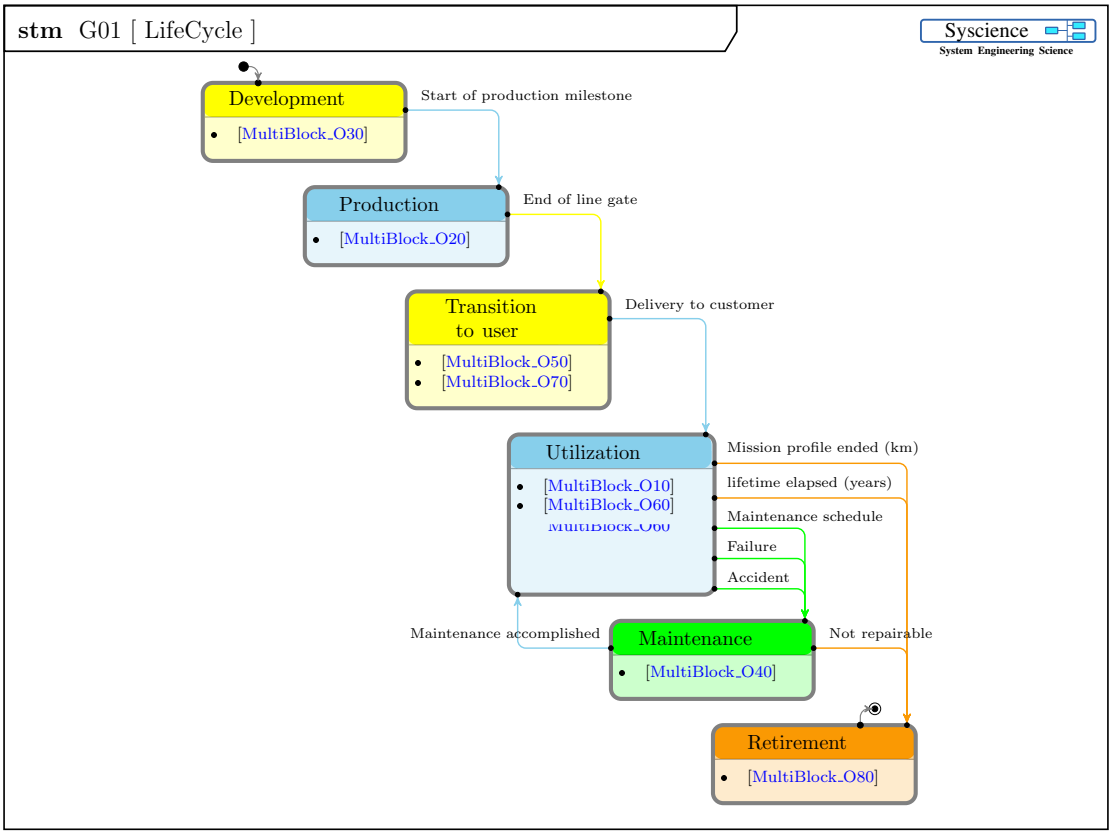

Figure 1: **State_LifeCycle**

3 Stakeholder needs

3.1 Stakeholders

External elements interact with the system of interest and exchange data, energy or matter with it.

Stakeholders express needs and expectations for one or even several lifecycle phases. They can be individuals or organisations (enterprise departments, associations, etc.). The following diagram gives a synthetic view of the system stakeholders and corresponding needs exression. Hyperlinks give connections to the detailed needs.

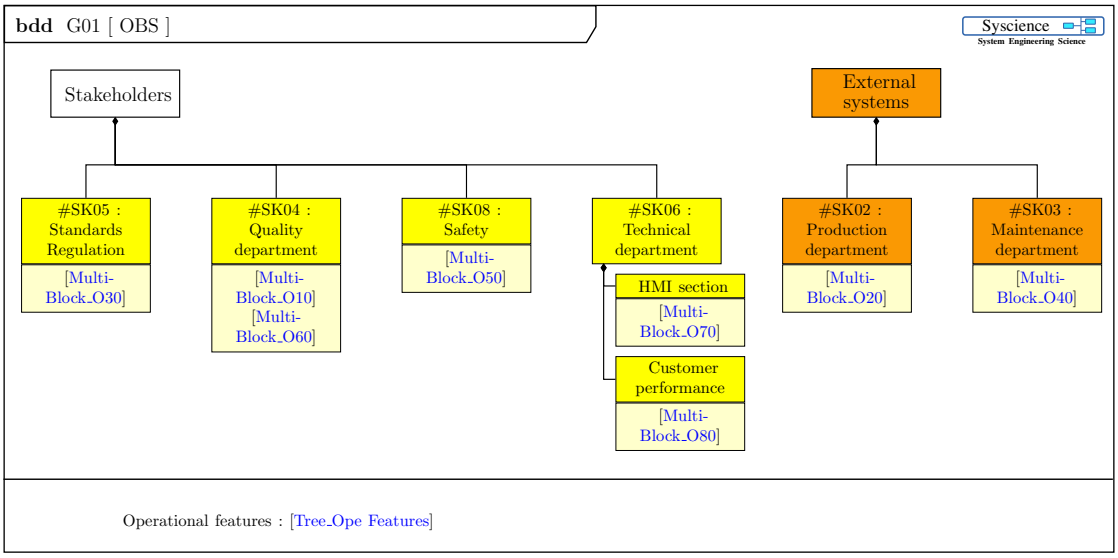

Figure 2: **Tree_OBS**

3.2 Method

Some needs and expectations concerning the SOI are written in specifications or in standards. These documents have to be analyzed in order to identify these needs and to define how the SOI will answer them. Sometimes needs and expectations are not formalized, and thus, it is necessary to capture them by interviewing stakeholders. This activity can be broken down into the following steps:

- Identify the stakeholders that are likely to write formalized documents and the ones that have unformal expectations
- Organize and carry out interviews with each stakeholder
- Collect the documents
- Identify the expectations concerning the SOI
- Review requirements with stakeholders in order to validate them.

3.3 User requirements

User requirements are written from the user point of view. They describe the problem the user is facing and are independant form the solution the system will deploy.
Visual diagrams have been used to capture and represent needs about the system of interest. This approach is referred to as model based system engineering. Requirements based system engineering refers to an approach in which requirements about the system

of interest are managed as textual requirements. These both aprroaches complement each other: while MBSE is useful to check completeness of needs capture, RBSE allows to state clearly the engagement of the system owner. System requirements define unambiguously what has to be tested, while visual diagrams do not always distinguish the system engagement and informative description of the environment.
Each requirement shall be:

- Specific: the requirement is a usefull description of a system feature. Something would be missing if the requirement is not satisfied.
- Measurable: a measurement action (a test or a process check) can be defined to decide wheather a given system satisfies the requirement or not.
- Attainable: the defined target shall not be unreachable. The target is defined to be attained.
- Realistic: requirements are coherent with the state of the art.
- Traceable: it is possible to identify why this requirement has been defined, and which needs it satisfies.

3.3.1 Customer performance

Customer performance requirement define the user expectations about the system. Corresponding system requirements are listed in this paragraph.

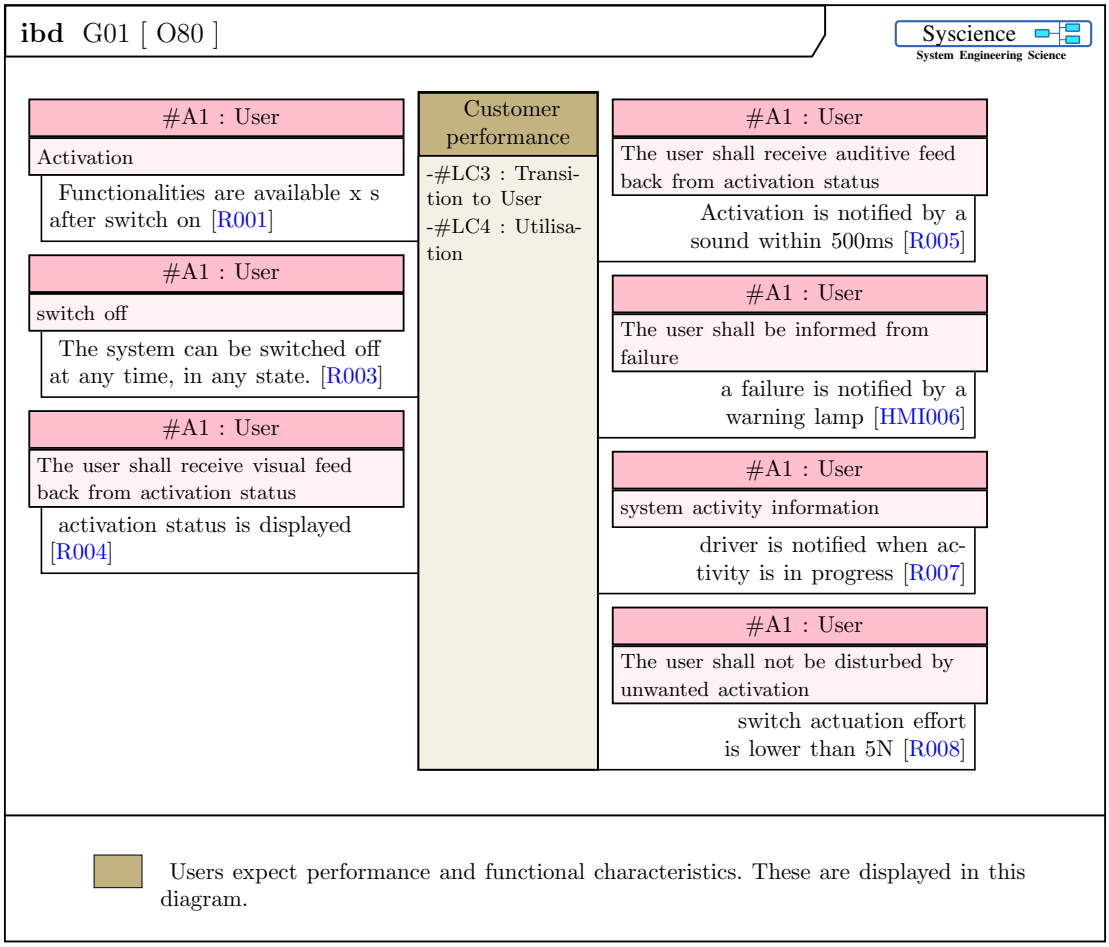

Figure 3: **MultiBlock_O80**

This figure was cited in State_LifeCycle, Tree_OBS.

Requirement identifier	MultiBlock_O80 R001
Requirement Text	#A1 : User expects that Functionalities are available x s after switch on
Diagram	MultiBlock_O80
Id	R001
Link	[G03:MultiBlock_F80 R001]
Type	User Need

Table 1: **MultiBlock_O80 R001**, cited in the figure MultiBlock_O80

Requirement identifier	MultiBlock_O80 R003
Requirement Text	#A1 : User expects that The system can be switched off at any time, in any state.
Diagram	MultiBlock_O80
Id	R003
Link	[G03:MultiBlock_F80 R003]
Type	User Need

Table 2: **MultiBlock_O80 R003**, cited in the figure MultiBlock_O80

Requirement identifier	MultiBlock_O80 R004
Requirement Text	#A1 : User expects that activation status is displayed
Diagram	MultiBlock_O80
Id	R004
Link	[G03:MultiBlock_F80 R004]
Type	User Need

Table 3: **MultiBlock_O80 R004**, cited in the figure MultiBlock_O80

Requirement identifier	MultiBlock_O80 R005
Requirement Text	#A1 : User expects that Activation is notified by a sound within 500ms
Diagram	MultiBlock_O80
Id	R005
Link	[G03:MultiBlock_F80 R005]
Type	User Need

Table 4: **MultiBlock_O80 R005**, cited in the figure MultiBlock_O80

Requirement identifier	MultiBlock_O80 HMI006
Requirement Text	#A1 : User expects that a failure is notified by a warning lamp
Diagram	MultiBlock_O80
Id	HMI006
Link	[G03:MultiBlock_F80 R006]
Type	User Need

Table 5: **MultiBlock_O80 HMI006**, cited in the figure MultiBlock_O80

Requirement identifier	MultiBlock_O80 R007
Requirement Text	#A1 : User expects that driver is notified when activity is in progress
Diagram	MultiBlock_O80
Id	R007
Link	[G03:MultiBlock_F80 R007]
Type	User Need

Table 6: **MultiBlock_O80 R007**, cited in the figure MultiBlock_O80

Requirement identifier	MultiBlock_O80 R008
Requirement Text	#A1 : User expects that switch actuation effort is lower than 5N
Diagram	MultiBlock_O80
Id	R008
Link	[G03:MultiBlock_F80 R008]
Type	User Need

Table 7: **MultiBlock_O80 R008**, cited in the figure MultiBlock_O80

3.3.2 Durability

Durability requirement define the system mission profile and the ability of the system to maintain its characteristics during the lifecycle depending on mission profile. Corresponding system requirements are listed in this paragraph.

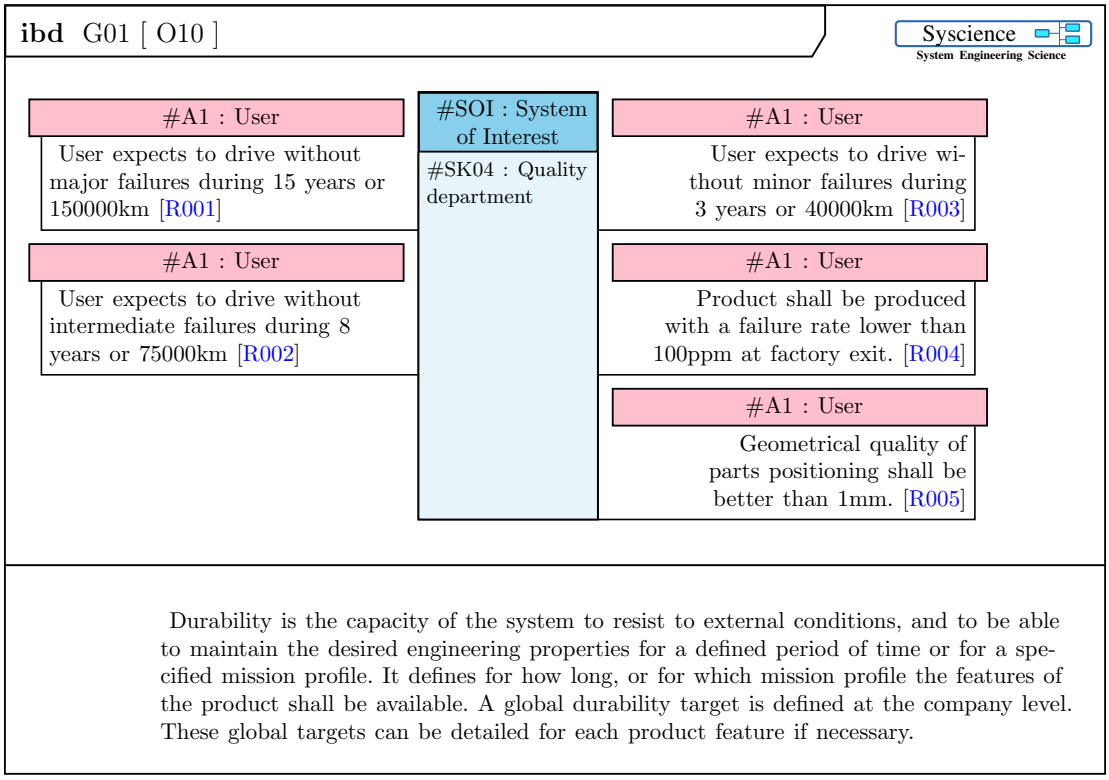

Figure 4: **MultiBlock_O10**

This figure was cited in State_LifeCycle, Tree_OBS.

Requirement identifier	MultiBlock_O10 R001
Requirement Text	User expects to drive without major failures during 15 years or 150000km
Diagram	MultiBlock_O10
Id	R001
Link	Root Requirement
Type	Stakeholder Need

Table 8: **MultiBlock_O10 R001**, cited in the figure MultiBlock_O10

Requirement identifier	MultiBlock_O10 R002
Requirement Text	User expects to drive without intermediate failures during 8 years or 75000km
Diagram	MultiBlock_O10
Id	R002
Link	Root Requirement
Type	Stakeholder Need

Table 9: **MultiBlock_O10 R002**, cited in the figure MultiBlock_O10

Requirement identifier	MultiBlock_O10 R003
Requirement Text	User expects to drive without minor failures during 3 years or 40000km
Diagram	MultiBlock_O10
Id	R003
Link	Root Requirement
Type	Stakeholder Need

Table 10: **MultiBlock_O10 R003**, cited in the figure MultiBlock_O10

Requirement identifier	MultiBlock_O10 R004
Requirement Text	Product shall be produced with a failure rate lower than 100ppm at factory exit.
Diagram	MultiBlock_O10
Id	R004
Link	Root Requirement
Type	Stakeholder Need

Table 11: **MultiBlock_O10 R004**, cited in the figure MultiBlock_O10

Requirement identifier	MultiBlock_O10 R005
Requirement Text	Geometrical quality of parts positioning shall be better than 1mm.
Diagram	MultiBlock_O10
Id	R005
Link	Root Requirement
Type	Stakeholder Need

Table 12: **MultiBlock_O10 R005**, cited in the figure MultiBlock_O10

3.3.3 Assembling constraints

Assembling contraints requirements describe the system engagement concerning assembling needs and expectations. Corresponding system requirements are listed in this paragraph.

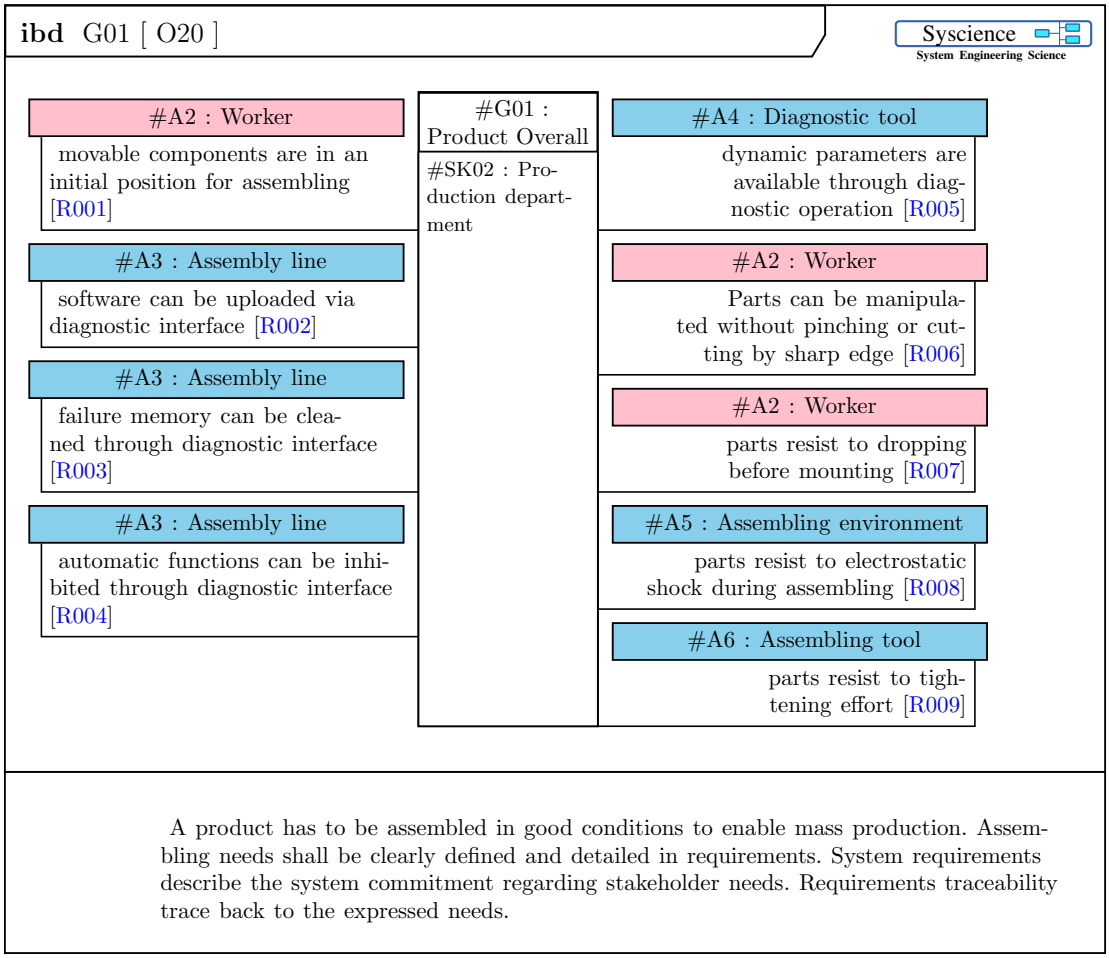

Figure 5: **MultiBlock_O20**

This figure was cited in State_LifeCycle, Tree_OBS.

Requirement identifier	MultiBlock_O20 R001
Requirement Text	The #G01 : Product Overall shall ensure that movable components are in an initial position for assembling.
Diagram	MultiBlock_O20
Id	R001
Link	[G02:MultiBlock_C20 R001]
Type	Assembly Needs

Table 13: **MultiBlock_O20 R001**, cited in the figure MultiBlock_O20

Requirement identifier	MultiBlock_O20 R002
Requirement Text	The #G01 : Product Overall shall ensure that software can be uploaded via diagnostic interface.
Diagram	MultiBlock_O20
Id	R002
Link	[G02:MultiBlock_C20 R002]
Type	Assembly Needs

Table 14: **MultiBlock_O20 R002**, cited in the figure MultiBlock_O20

Requirement identifier	MultiBlock_O20 R003
Requirement Text	The #G01 : Product Overall shall ensure that failure memory can be cleaned through diagnostic interface.
Diagram	MultiBlock_O20
Id	R003
Link	[G02:MultiBlock_C20 R003]
Type	Assembly Needs

Table 15: **MultiBlock_O20 R003**, cited in the figure MultiBlock_O20

Requirement identifier	MultiBlock_O20 R004
Requirement Text	The #G01 : Product Overall shall ensure that automatic functions can be inhibited through diagnostic interface.
Diagram	MultiBlock_O20
Id	R004
Link	[G02:MultiBlock_C20 R004]
Type	Assembly Needs

Table 16: **MultiBlock_O20 R004**, cited in the figure MultiBlock_O20

Requirement identifier	MultiBlock_O20 R005
Requirement Text	The #G01 : Product Overall shall ensure that dynamic parameters are available through diagnostic operation.
Diagram	MultiBlock_O20
Id	R005
Link	[G02:MultiBlock_C20 R006]
Type	Assembly Needs

Table 17: **MultiBlock_O20 R005**, cited in the figure MultiBlock_O20

Requirement identifier	MultiBlock_O20 R006
Requirement Text	The #G01 : Product Overall shall ensure that Parts can be manipulated without pinching or cutting by sharp edge.
Diagram	MultiBlock_O20
Id	R006
Link	[G02:MultiBlock_C20 R006]
Type	Assembly Needs

Table 18: **MultiBlock_O20 R006**, cited in the figure MultiBlock_O20

Requirement identifier	MultiBlock_O20 R007
Requirement Text	The #G01 : Product Overall shall ensure that parts resist to dropping before mounting.
Diagram	MultiBlock_O20
Id	R007
Link	[G02:MultiBlock_C20 R007]
Type	Assembly Needs

Table 19: **MultiBlock_O20 R007**, cited in the figure MultiBlock_O20

Requirement identifier	MultiBlock_O20 R008
Requirement Text	The #G01 : Product Overall shall ensure that parts resist to electrostatic shock during assembling.
Diagram	MultiBlock_O20
Id	R008
Link	[G02:MultiBlock_C20 R008]
Type	Assembly Needs

Table 20: **MultiBlock_O20 R008**, cited in the figure MultiBlock_O20

Requirement identifier	MultiBlock_O20 R009
Requirement Text	The #G01 : Product Overall shall ensure that parts resist to tightening effort.
Diagram	MultiBlock_O20
Id	R009
Link	[G02:MultiBlock_C20 R009]
Type	Assembly Needs

Table 21: **MultiBlock_O20 R009**, cited in the figure MultiBlock_O20

3.3.4 Regulation requirements

Regulation requirements describe system engagement concerning the compliance with regulations and standards. Corresponding system requirements are listed in this paragraph.

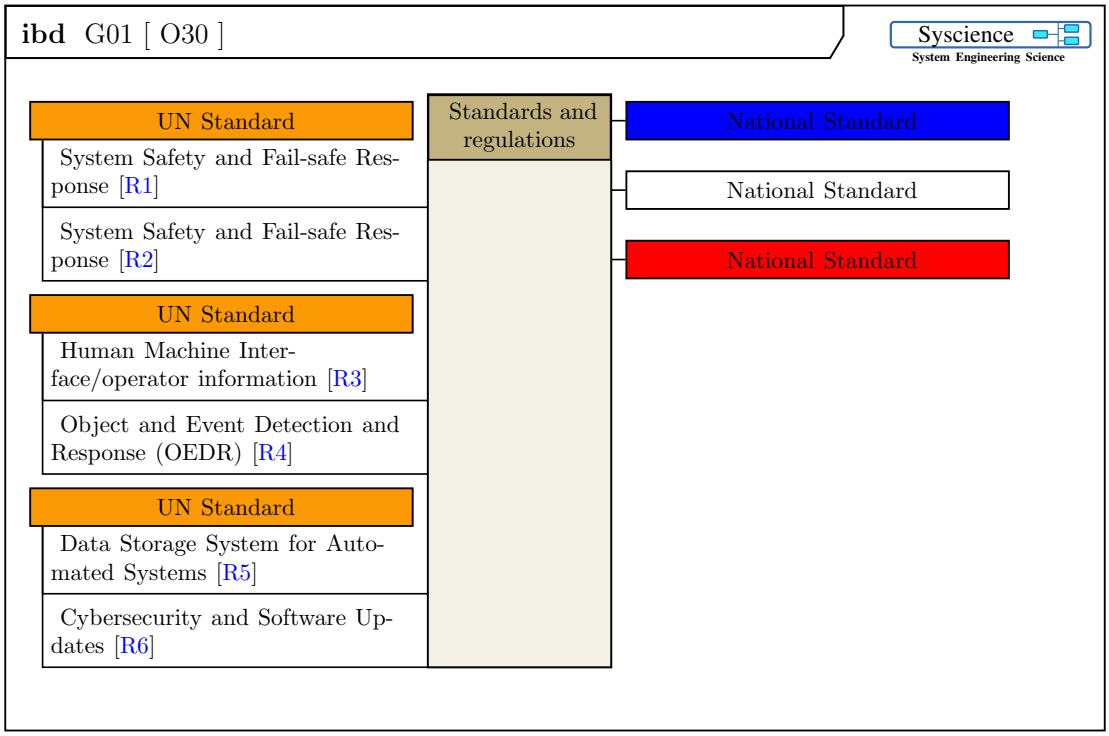

Figure 6: **MultiBlock_O30**

This figure was cited in State_LifeCycle, Tree_OBS.

Requirement identifier	MultiBlock_O30 R1
Requirement Text	Compliance shall be esured to System Safety and Fail-safe Response clauses of UN Standard
Diagram	MultiBlock_O30
Id	R1
Link	Company policy
Type	Stakeholder Need

Table 22: **MultiBlock_O30 R1**, cited in the figure MultiBlock_O30

Requirement identifier	MultiBlock_O30 R2
Requirement Text	Compliance shall be esured to System Safety and Fail-safe Response clauses of UN Standard
Diagram	MultiBlock_O30
Id	R2
Link	Company policy
Type	Stakeholder Need

Table 23: **MultiBlock_O30 R2**, cited in the figure MultiBlock_O30

Requirement identifier	MultiBlock_O30 R3
Requirement Text	Compliance shall be esured to Human Machine Interface/operator information clauses of UN Standard
Diagram	MultiBlock_O30
Id	R3
Link	Company policy
Type	Stakeholder Need

Table 24: **MultiBlock_O30 R3**, cited in the figure MultiBlock_O30

Requirement identifier	MultiBlock_O30 R4
Requirement Text	Compliance shall be esured to Object and Event Detection and Response (OEDR) clauses of UN Standard
Diagram	MultiBlock_O30
Id	R4
Link	Company policy
Type	Stakeholder Need

Table 25: **MultiBlock_O30 R4**, cited in the figure MultiBlock_O30

Requirement identifier	MultiBlock_O30 R5
Requirement Text	Compliance shall be esured to Data Storage System for Automated Systems clauses of UN Standard
Diagram	MultiBlock_O30
Id	R5
Link	Company policy
Type	Stakeholder Need

Table 26: **MultiBlock_O30 R5**, cited in the figure MultiBlock_O30

Requirement identifier	MultiBlock_O30 R6
Requirement Text	Compliance shall be esured to Cybersecurity and Software Updates clauses of UN Standard
Diagram	MultiBlock_O30
Id	R6
Link	Company policy
Type	Stakeholder Need

Table 27: **MultiBlock_O30 R6**, cited in the figure MultiBlock_O30

3.3.5 Maintenance constraints

Maintenance contraints requirements describe the system engagement concerning maintenance and repairing needs and expectations. Corresponding system requirements are listed in this paragraph.

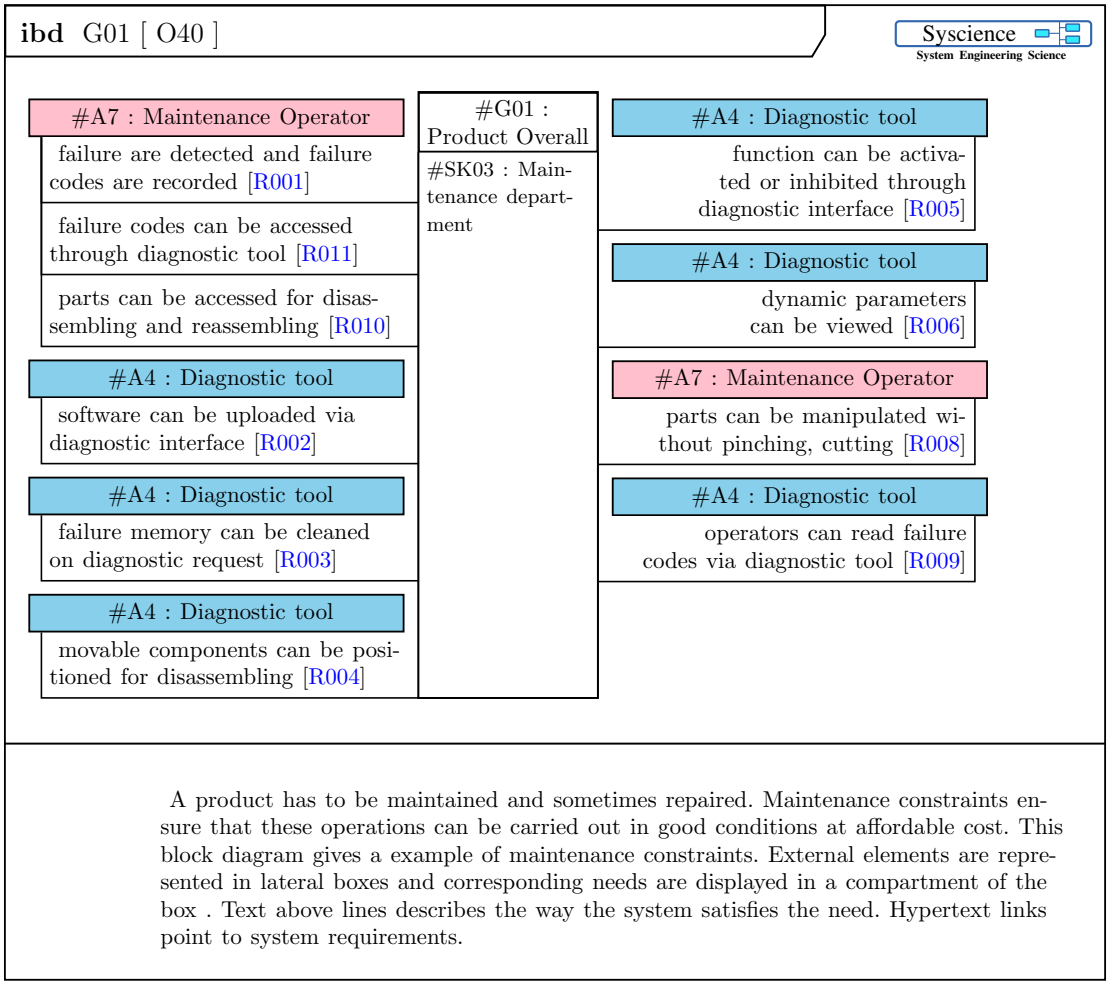

Figure 7: **MultiBlock_O40**

This figure was cited in State_LifeCycle, Tree_OBS.

Requirement identifier	MultiBlock_O40 R001
Requirement Text	#G01 : Product Overall shall ensure that failure are detected and failure codes are recorded.
Diagram	MultiBlock_O40
Id	R001
Link	[G04:MultiBlock_O40 R001]
Type	Maintenance Needs

Table 28: **MultiBlock_O40 R001**, cited in the figure MultiBlock_O40

Requirement identifier	MultiBlock_O40 R011
Requirement Text	#G01 : Product Overall shall ensure that failure codes can be accessed through diagnostic tool.
Diagram	MultiBlock_O40
Id	R011
Link	[G04:MultiBlock_O40 R011]
Type	Maintenance Needs

Table 29: **MultiBlock_O40 R011**, cited in the figure MultiBlock_O40

Requirement identifier	MultiBlock_O40 R010
Requirement Text	#G01 : Product Overall shall ensure that parts can be accessed for disassembling and reassembling.
Diagram	MultiBlock_O40
Id	R010
Link	[G04:MultiBlock_O40 R010]
Type	Maintenance Needs

Table 30: **MultiBlock_O40 R010**, cited in the figure MultiBlock_O40

Requirement identifier	MultiBlock_O40 R002
Requirement Text	#G01 : Product Overall shall ensure that software can be uploaded via diagnostic interface.
Diagram	MultiBlock_O40
Id	R002
Link	[G04:MultiBlock_O40 R002]
Type	Maintenance Needs

Table 31: **MultiBlock_O40 R002**, cited in the figure MultiBlock_O40

Requirement identifier	MultiBlock_O40 R003
Requirement Text	#G01 : Product Overall shall ensure that failure memory can be cleaned on diagnostic request.
Diagram	MultiBlock_O40
Id	R003
Link	[G04:MultiBlock_O40 R003]
Type	Maintenance Needs

Table 32: **MultiBlock_O40 R003**, cited in the figure MultiBlock_O40

Requirement identifier	MultiBlock_O40 R004
Requirement Text	#G01 : Product Overall shall ensure that movable components can be positioned for disassembling.
Diagram	MultiBlock_O40
Id	R004
Link	[G04:MultiBlock_O40 R004]
Type	Maintenance Needs

Table 33: **MultiBlock_O40 R004**, cited in the figure MultiBlock_O40

Requirement identifier	MultiBlock_O40 R005
Requirement Text	#G01 : Product Overall shall ensure that function can be activated or inhibited through diagnostic interface.
Diagram	MultiBlock_O40
Id	R005
Link	[G04:MultiBlock_O40 R005]
Type	Maintenance Needs

Table 34: **MultiBlock_O40 R005**, cited in the figure MultiBlock_O40

Requirement identifier	MultiBlock_O40 R006
Requirement Text	#G01 : Product Overall shall ensure that dynamic parameters can be viewed.
Diagram	MultiBlock_O40
Id	R006
Link	[G04:MultiBlock_O40 R006]
Type	Maintenance Needs

Table 35: **MultiBlock_O40 R006**, cited in the figure MultiBlock_O40

Requirement identifier	MultiBlock_O40 R008
Requirement Text	#G01 : Product Overall shall ensure that parts can be manipulated without pinching, cutting.
Diagram	MultiBlock_O40
Id	R008
Link	[G04:MultiBlock_O40 R008]
Type	Maintenance Needs

Table 36: **MultiBlock_O40 R008**, cited in the figure MultiBlock_O40

Requirement identifier	MultiBlock_O40 R009
Requirement Text	#G01 : Product Overall shall ensure that operators can read failure codes via diagnostic tool.
Diagram	MultiBlock_O40
Id	R009
Link	[G04:MultiBlock_O40 R009]
Type	Maintenance Needs

Table 37: **MultiBlock_O40 R009**, cited in the figure MultiBlock_O40

3.3.6 Safety constraints

Safety contraints requirements describe the system engagement concerning technical characteristics that impact user safety, external peaople safety or environmental safety. Corresponding system requirements are listed in this paragraph.

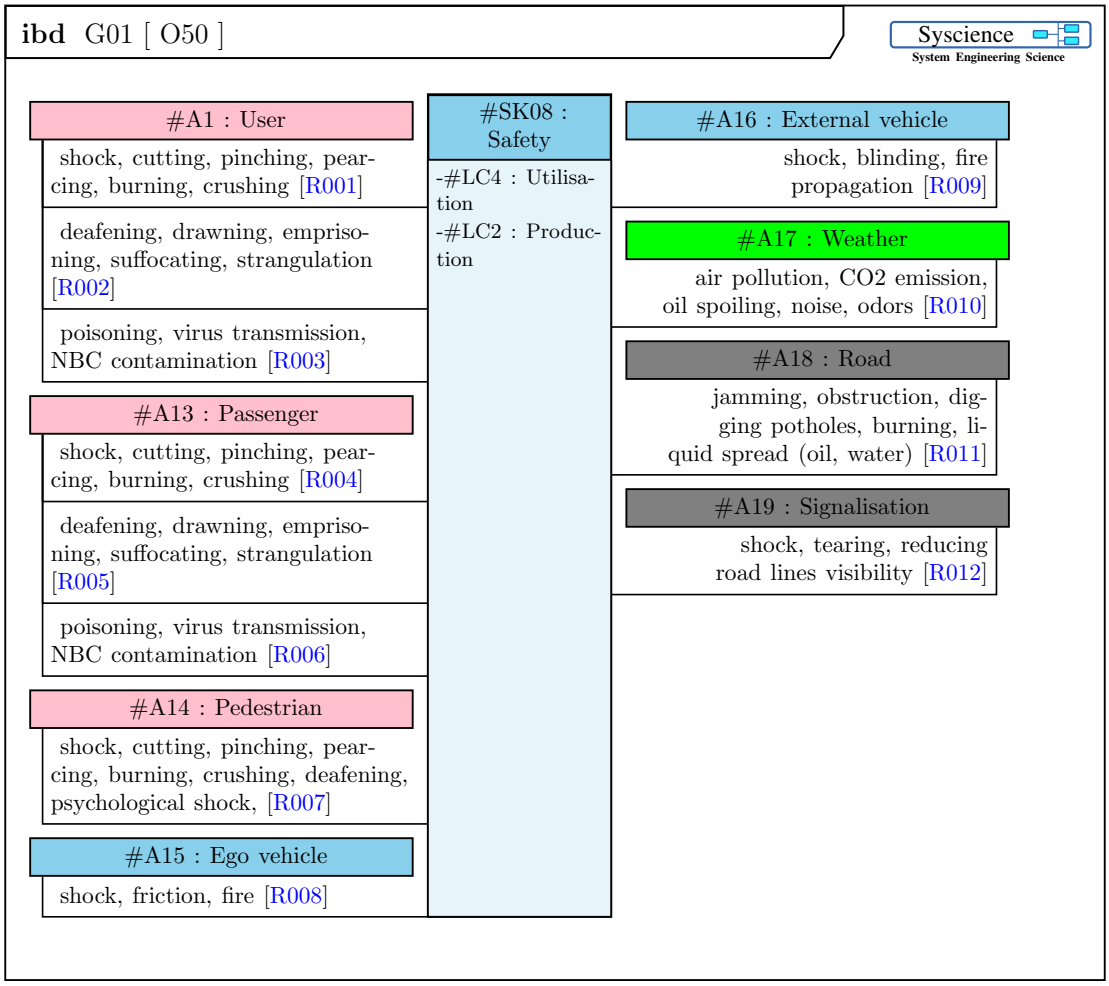

Figure 8: **MultiBlock_O50**

This figure was cited in State_LifeCycle, Tree_OBS.

Requirement identifier	MultiBlock_O50 R001
Requirement Text	#A1 : User shall be protected against shock, cutting, pinching, pearcing, burning, crushing
Diagram	MultiBlock_O50
Id	R001
Link	Root Requirement
Type	Stakeholder Need

Table 38: **MultiBlock_O50 R001**, cited in the figure MultiBlock_O50

Requirement identifier	MultiBlock_O50 R002
Requirement Text	#A1 : User shall be protected against deafening, drawning, emprisoning, suffocating, strangulation
Diagram	MultiBlock_O50
Id	R002
Link	Root Requirement
Type	Stakeholder Need

Table 39: **MultiBlock_O50 R002**, cited in the figure MultiBlock_O50

Requirement identifier	MultiBlock_O50 R003
Requirement Text	#A1 : User shall be protected against poisoning, virus transmission, NBC contamination
Diagram	MultiBlock_O50
Id	R003
Link	Root Requirement
Type	Stakeholder Need

Table 40: **MultiBlock_O50 R003**, cited in the figure MultiBlock_O50

Requirement identifier	MultiBlock_O50 R004
Requirement Text	#A13 : Passenger shall be protected against shock, cutting, pinching, pearcing, burning, crushing
Diagram	MultiBlock_O50
Id	R004
Link	Root Requirement
Type	Stakeholder Need

Table 41: **MultiBlock_O50 R004**, cited in the figure MultiBlock_O50

Requirement identifier	MultiBlock_O50 R005
Requirement Text	#A13 : Passenger shall be protected against deafening, drawning, emprisoning, suffocating, strangulation
Diagram	MultiBlock_O50
Id	R005
Link	Root Requirement
Type	Stakeholder Need

Table 42: **MultiBlock_O50 R005**, cited in the figure MultiBlock_O50

Requirement identifier	MultiBlock_O50 R006
Requirement Text	#A13 : Passenger shall be protected against poisoning, virus transmission, NBC contamination
Diagram	MultiBlock_O50
Id	R006
Link	Root Requirement
Type	Stakeholder Need

Table 43: **MultiBlock_O50 R006**, cited in the figure MultiBlock_O50

Requirement identifier	MultiBlock_O50 R007
Requirement Text	#A14 : Pedestrian shall be protected against shock, cutting, pinching, pearcing, burning, crushing, deafening, psychological shock,
Diagram	MultiBlock_O50
Id	R007
Link	Root Requirement
Type	Stakeholder Need

Table 44: **MultiBlock_O50 R007**, cited in the figure MultiBlock_O50

Requirement identifier	MultiBlock_O50 R008
Requirement Text	#A15 : Ego vehicle shall be protected against shock, friction, fire
Diagram	MultiBlock_O50
Id	R008
Link	Root Requirement
Type	Stakeholder Need

Table 45: **MultiBlock_O50 R008**, cited in the figure MultiBlock_O50

Requirement identifier	MultiBlock_O50 R009
Requirement Text	#A16 : External vehicle shall be protected against shock, blinding, fire propagation
Diagram	MultiBlock_O50
Id	R009
Link	Root Requirement
Type	Stakeholder Need

Table 46: **MultiBlock_O50 R009**, cited in the figure MultiBlock_O50

Requirement identifier	MultiBlock_O50 R010
Requirement Text	#A17 : Weather shall be protected against air pollution, CO2 emission, oil spoiling, noise, odors
Diagram	MultiBlock_O50
Id	R010
Link	Root Requirement
Type	Stakeholder Need

Table 47: **MultiBlock_O50 R010**, cited in the figure MultiBlock_O50

Requirement identifier	MultiBlock_O50 R011
Requirement Text	#A18 : Road shall be protected against jamming, obstruction, digging potholes, burning, liquid spread (oil, water)
Diagram	MultiBlock_O50
Id	R011
Link	Root Requirement
Type	Stakeholder Need

Table 48: **MultiBlock_O50 R011**, cited in the figure MultiBlock_O50

Requirement identifier	MultiBlock_O50 R012
Requirement Text	#A19 : Signalisation shall be protected against shock, tearing, reducing road lines visibility
Diagram	MultiBlock_O50
Id	R012
Link	Root Requirement
Type	Stakeholder Need

Table 49: **MultiBlock_O50 R012**, cited in the figure MultiBlock_O50

3.3.7 Recycling constraints

Recycling contraints requirements describe the system engagement concerning the end of life of the system, and needs and expectations concerning recycling and reuse. Corresponding system requirements are listed in this paragraph.

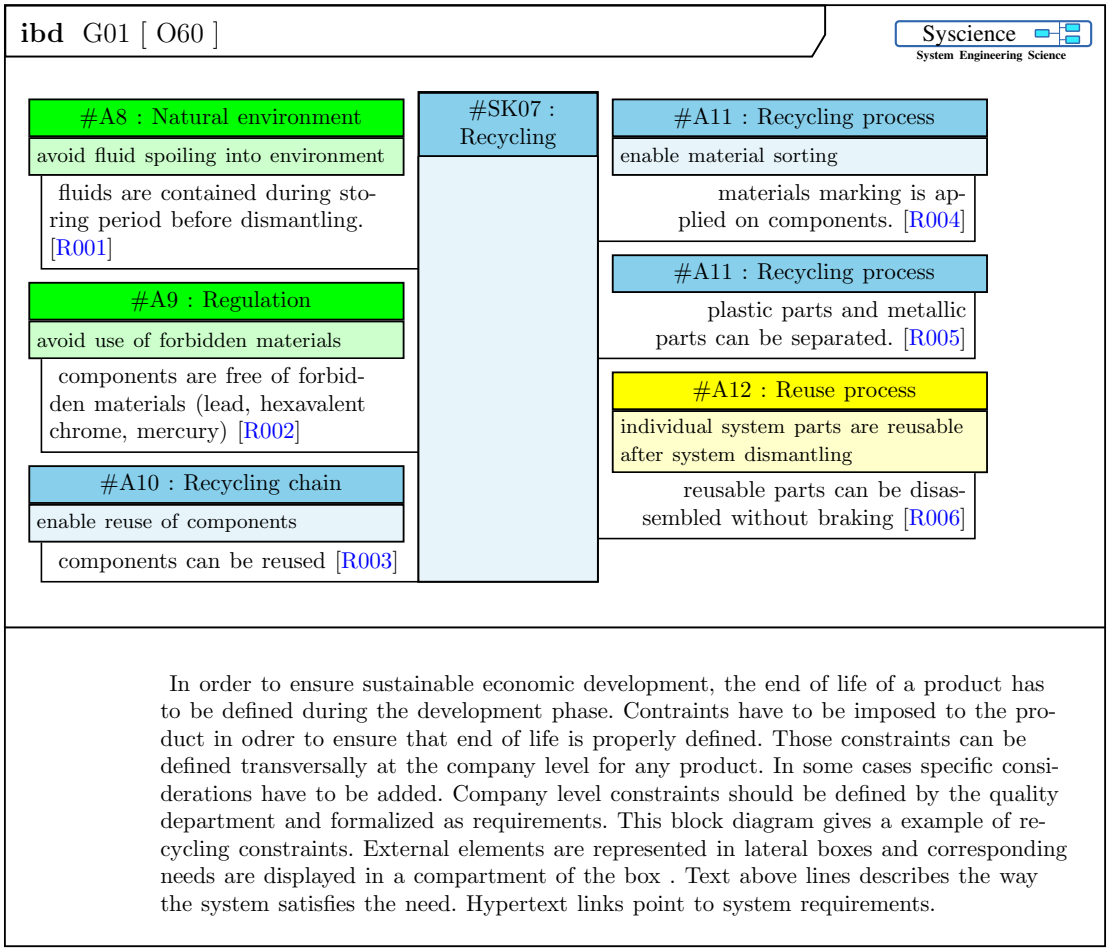

Figure 9: **MultiBlock_O60**

This figure was cited in State_LifeCycle, Tree_OBS.

Requirement identifier	MultiBlock_O60 R001
Requirement Text	fluids are contained during storing period before dismantling.
Diagram	MultiBlock_O60
Id	R001
Link	[G05:MultiBlock_F60 R001]
Type	Recycling

Table 50: **MultiBlock_O60 R001**, cited in the figure MultiBlock_O60

Requirement identifier	MultiBlock_O60 R002
Requirement Text	components are free of forbidden materials (lead, hexavalent chrome, mercury)
Diagram	MultiBlock_O60
Id	R002
Link	[G05:MultiBlock_F60 R002]
Type	Recycling

Table 51: **MultiBlock_O60 R002**, cited in the figure MultiBlock_O60

Requirement identifier	MultiBlock_O60 R003
Requirement Text	components can be reused
Diagram	MultiBlock_O60
Id	R003
Link	[G05:MultiBlock_F60 R006]
Type	Recycling

Table 52: **MultiBlock_O60 R003**, cited in the figure MultiBlock_O60

Requirement identifier	MultiBlock_O60 R004
Requirement Text	materials marking is applied on components.
Diagram	MultiBlock_O60
Id	R004
Link	[G05:MultiBlock_F60 R004]
Type	Recycling

Table 53: **MultiBlock_O60 R004**, cited in the figure MultiBlock_O60

Requirement identifier	MultiBlock_O60 R005
Requirement Text	plastic parts and metallic parts can be separated.
Diagram	MultiBlock_O60
Id	R005
Link	[G05:MultiBlock_F60 R005]
Type	Recycling

Table 54: **MultiBlock_O60 R005**, cited in the figure MultiBlock_O60

Requirement identifier	MultiBlock_O60 R006
Requirement Text	reusable parts can be disassembled without braking
Diagram	MultiBlock_O60
Id	R006
Link	[G05:MultiBlock_F60 R006]
Type	Recycling

Table 55: **MultiBlock_O60 R006**, cited in the figure MultiBlock_O60

3.3.8 HMI requirements

HMI requirements define the characteristics of the system HMI. Corresponding system requirements are listed in this paragraph.

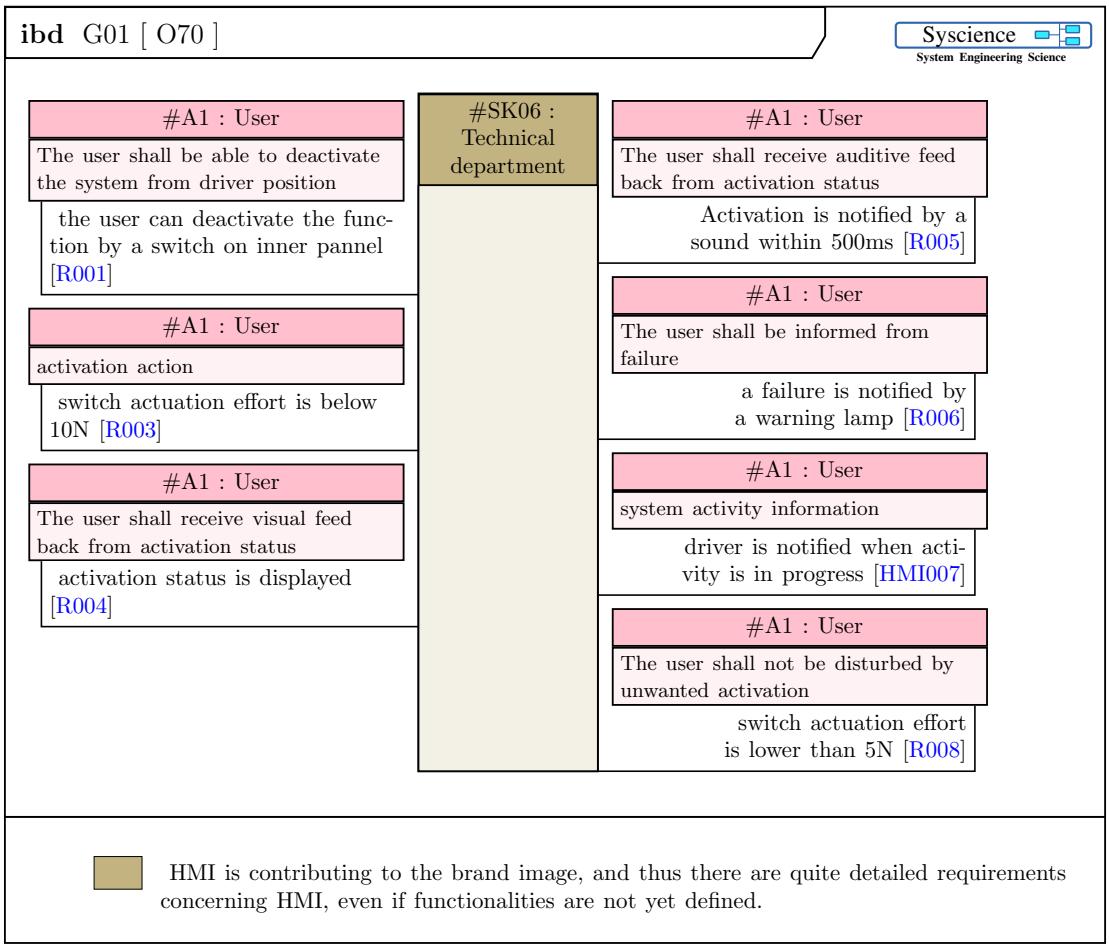

Figure 10: **MultiBlock_O70**

This figure was cited in State_LifeCycle, Tree_OBS.

Requirement identifier	MultiBlock_O70 R001
Requirement Text	the user can deactivate the function by a switch on inner pannel
Diagram	MultiBlock_O70
Id	R001
Link	[G03:MultiBlock_O70 R001]
Type	Stakeholder Need

Table 56: **MultiBlock_O70 R001**, cited in the figure MultiBlock_O70

Requirement identifier	MultiBlock_O70 R003
Requirement Text	switch actuation effort is below 10N
Diagram	MultiBlock_O70
Id	R003
Link	[G03:MultiBlock_O70 R003]
Type	Stakeholder Need

Table 57: **MultiBlock_O70 R003**, cited in the figure MultiBlock_O70

Requirement identifier	MultiBlock_O70 R004
Requirement Text	activation status is displayed
Diagram	MultiBlock_O70
Id	R004
Link	[G03:MultiBlock_O70 R004]
Type	Stakeholder Need

Table 58: **MultiBlock_O70 R004**, cited in the figure MultiBlock_O70

Requirement identifier	MultiBlock_O70 R005
Requirement Text	Activation is notified by a sound within 500ms
Diagram	MultiBlock_O70
Id	R005
Link	[G03:MultiBlock_O70 R005]
Type	Stakeholder Need

Table 59: **MultiBlock_O70 R005**, cited in the figure MultiBlock_O70

Requirement identifier	MultiBlock_O70 R006
Requirement Text	a failure is notified by a warning lamp
Diagram	MultiBlock_O70
Id	R006
Link	[G03:MultiBlock_O70 R006]
Type	Stakeholder Need

Table 60: **MultiBlock_O70 R006**, cited in the figure MultiBlock_O70

Requirement identifier	MultiBlock_O70 HMI007
Requirement Text	driver is notified when activity is in progress
Diagram	MultiBlock_O70
Id	HMI007
Link	[G03:MultiBlock_O70 R007]
Type	Stakeholder Need

Table 61: **MultiBlock_O70 HMI007**, cited in the figure MultiBlock_O70

Requirement identifier	MultiBlock_O70 R008
Requirement Text	switch actuation effort is lower than 5N
Diagram	MultiBlock_O70
Id	R008
Link	[G03:MultiBlock_O70 R008]
Type	Stakeholder Need

Table 62: **MultiBlock_O70 R008**, cited in the figure MultiBlock_O70