

## FP7 Project 2007- Grant agreement n°: 218575

### Project Acronym: **INESS**

### Project Title: **INtegrated European Signalling System**

Instrument: Large-scale integrating project

Thematic Priority: Transport

### Document Title: **INESS\_WS-B\_D-B- 1.1\_Summary\_on\_value\_chain\_mapping\_of\_interlocking\_systems\_Draft \_Ver2009-05-15.doc**

Due date of deliverable	01.09.2009
Actual submission date	15.05.2009

Deliverable ID:	<b>DB 1.1</b>
Deliverable Title:	Summary on value chain mapping of interlocking systems
WP related:	B1
Responsible partner:	FIR
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Start date of the project: 01-10-2008

Duration: 36 Months

Project coordinator: Paolo De Cicco  
Project coordinator organisation: UIC

Revision: Dissemination Level<sup>1</sup>: CO

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**Document Information**

**Document type:** Deliverable  
**Document Name:** INESS\_WS-B\_D-B-1.1\_Summary\_on\_value\_chain\_mapping\_of\_interlocking\_systems\_Draft\_Ver2009-05-15.doc  
**Revision:** 0.05  
**Revision Date:** 26.02.2009  
**Author:** Christian Hoffart  
**Dissemination level:** CO

**Approvals**

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<i>Steering Board</i>				

**Document history**

<b>Revision</b>	<b>Date</b>	<b>Modification</b>	<b>Author</b>
Version 0.01	23.01.2009		Christian Hoffart
Version 0.02	25.02.2009	Update due to current WP progress	Christian Hoffart
Version 0.03	25.03.2009	Update due to current WP progress	Christian Hoffart
Version 0.04	11.05.2009	Update due to current WP progress	Christian Hoffart
Version 0.05	15.05.2009	Format changes and updated references	Karsten Kamps

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## GLOSSARY

To be added...

## Section 1 – EXECUTIVE SUMMARY

The final result of Deliverable B1.1 is a summary on value chain mapping of interlocking systems.

A general approach of work stream B is a focus on a notable standard, DIN EN 60300-3-3. Due to a concentration on the mentioned standard, a general approach of work stream B is a life cycle orientated view. Based on this general approach and according to Rother and Shook, the value chain in question is finally derived from life cycle phases of interlocking systems.

To map the value chain, 6 supreme interlocking life cycle phases have been defined with a close focus on DIN EN 60300-3-3 and results from Barringer (2003). Based on these main phases, sub phases respective sub categories have been developed according to the everyday experiences by the railway and interlocking experts of the work stream. After all, processes that take place both at the suppliers and infra manager's side have been gathered and processed into an interlocking life cycle overview which is comparable to a value stream.

Ultimately, a value chain of interlocking systems has been mapped based on the information mentioned above.

## Section 2 – INTRODUCTION

To reach that goal, all work stream B members confirmed during the 1<sup>st</sup> work stream meeting in Frankfurt, to derive the value chain from Life cycle phases, because of a general Life cycle view, work stream B focuses on.

Therefore, a special model is needed to reach a generic value chain that is valid for all organizations that belong to the consortium.

After fruitful discussions, work stream B decided to focus on DIN EN 60300-3-3 and follow an approach by Rother and Shook as general scope to fulfil the Milestones and results in question. In section 3, the detailed methodology is explained as well as all gained results.

## Section 3 – SUMMARY ON VALUE CHAIN MAPPING OF INTERLOCKING SYSTEMS

### 3.1 General Approach

As explained in section two, the value chain of interlocking systems will be derived from interlocking life cycle phases that will be established by work stream B. Therefore, an expert group was founded, which essentially focuses on issues regarding life cycle phases of interlocking systems.

### 3.2 Life Cycle Phases – Organizational issues to reach Milestone M.B.1.1.

Mr. Maassen from ProRail B.V./ Netherlands is in charge of the expert group “Life Cycle Phases”. His basic task is the coordination of the process development. He has to organize and moderate expert group meetings, telephone conferences etc. and he also has to take care of the final report which has to be delivered to the task and work stream leader within the assessed due dates.

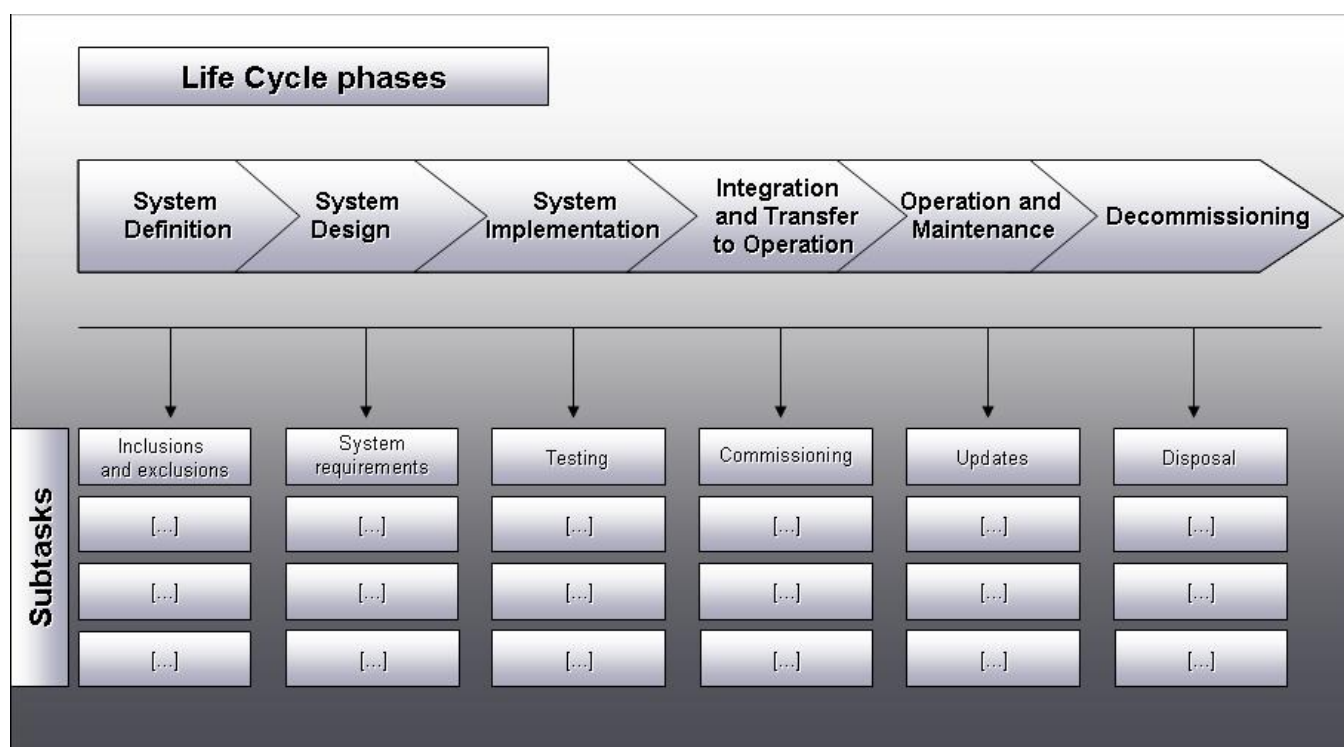
“Life Cycle” expert group members apart from Mr. Maassen are Mr. Hoffart (FIR/ Germany), Mr. Kuhn (Thales/ Germany), Mr. Sandström (Banverket/ Sweden), Mr. Kaminski, Mr. Brandt (Siemens/ Germany) and Mr. Gonzáles (ADIF/ Spain). Essentially, all expert group members have to work on the issues in question and they also have to support Mr. Maassen regarding any content and organizational issues.

### 3.3 Life Cycle Phases – Results

In the following, there is a monthly overview of results that are committed by all work stream members:

2009/01/23

The “Life Cycle Phases” expert group worked out a general approach based on a discussion with all work stream members during the 1<sup>st</sup> work stream meeting in Frankfurt. The results of the discussion are mentioned in Figure 1.



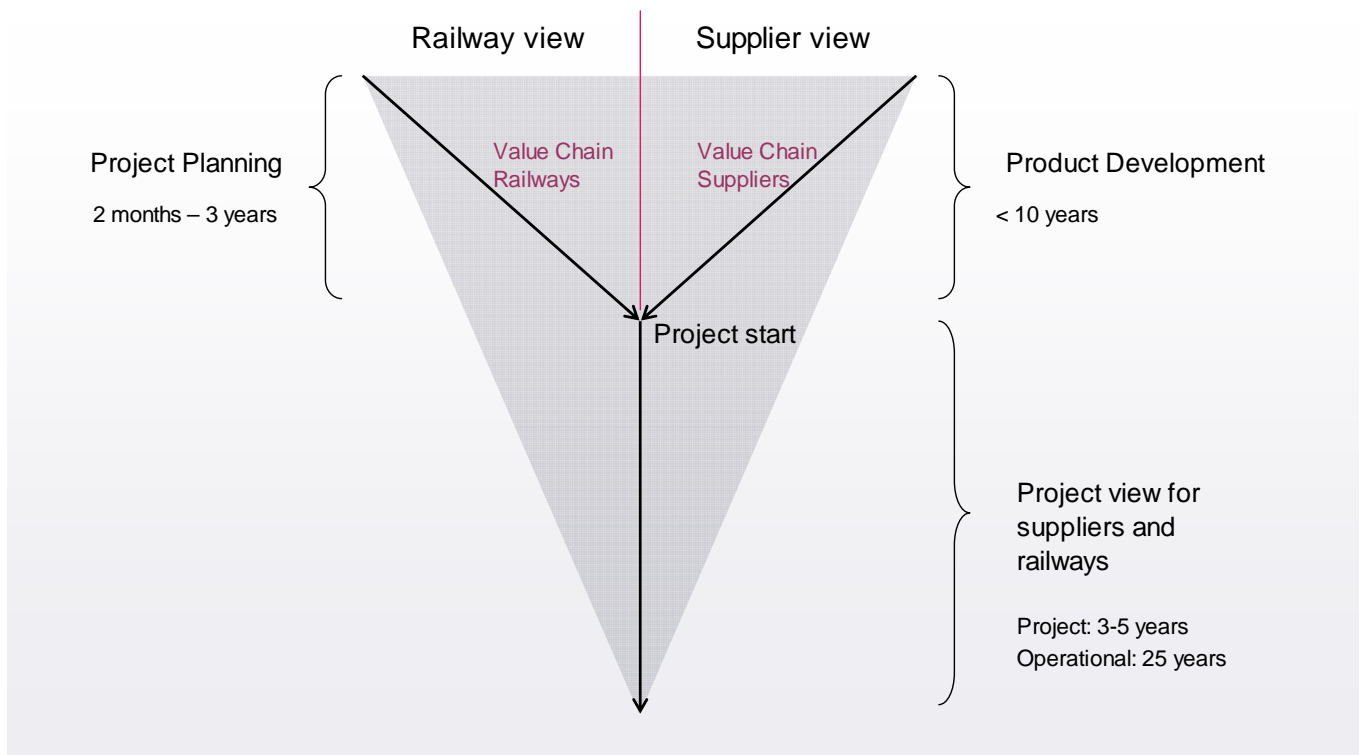
**Figure 1: Life Cycle Phases V1 according to EN 60300-3-3:2004**

To sum up, the life cycle of an interlocking system is mainly built by six phases. Whereas the first two phases are mainly part of the supplier’s scope, the last four phases essentially belong to the railway company’s scope of duties.

2009/02/25

During a WS B meeting in Rome at the end of January the life cycle phase’s expert group came to the conclusion that different views of life cycles have to be regarded due to different tasks of suppliers and interlocking users (railways) within an interlocking life cycle. The expert group developed a general approach according to the everyday business of the supplier and railway companies. This general approach of the different views is summarized in Figure 2.





**Figure 2: Generic Interlocking Life Cycle Approach**

On the one hand, there is an interlocking life cycle “supplier view” which basically consists of the product development phase and different steps during and after the implementation of the interlocking system (project start). The life cycle phases which belong to the scope of the railway companies are the initial project planning and various steps that take place after the project start. After all, there is both a concentration on a product view and focuses on a project view.

Furthermore, the expert group decided about sub phases (sub categories) which have to be considered within each life cycle phase’s view. As well as the generic interlocking life cycle approach the sub phases are based on the everyday experience of suppliers and railways. The ultimate approach is illustrated within Figure 3 and Figure 4.

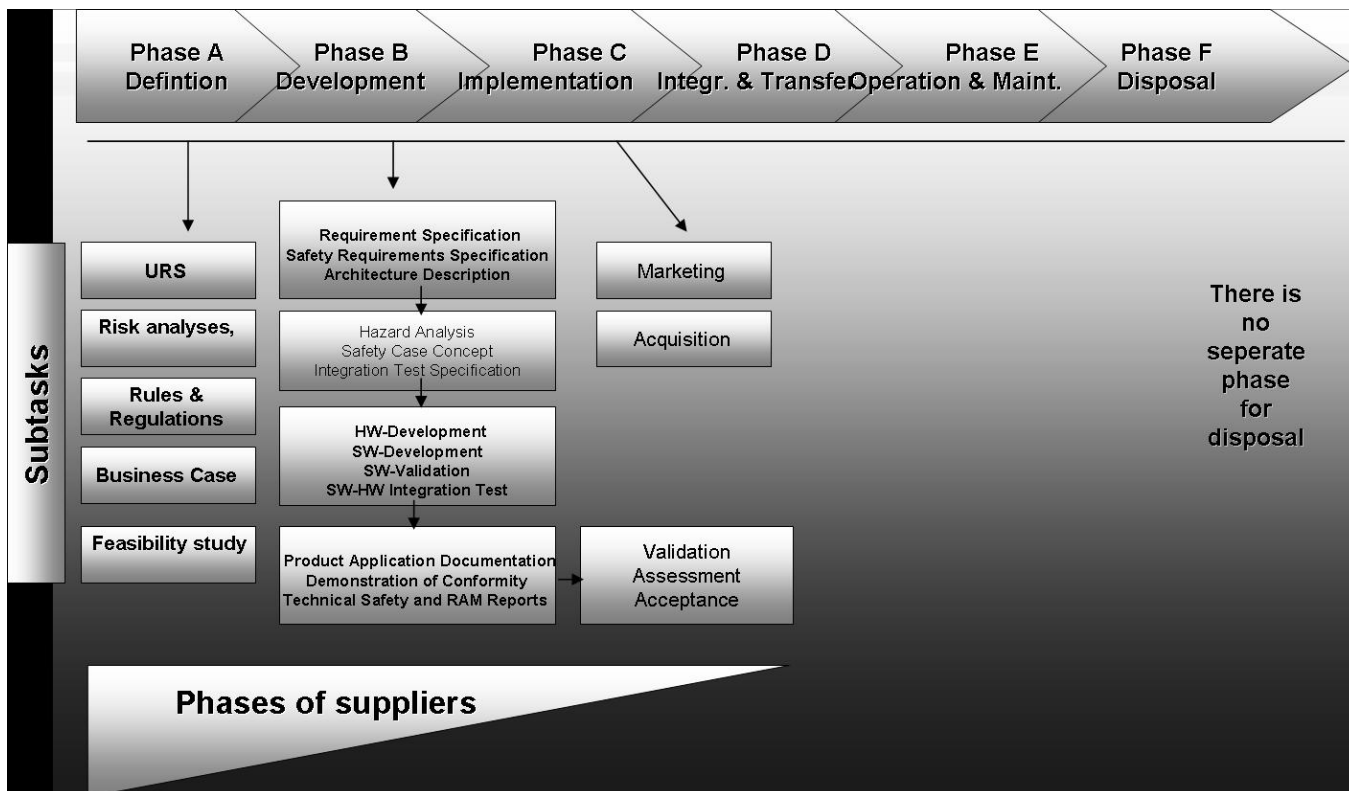


Figure 3: LC Phases Supplier – Product view

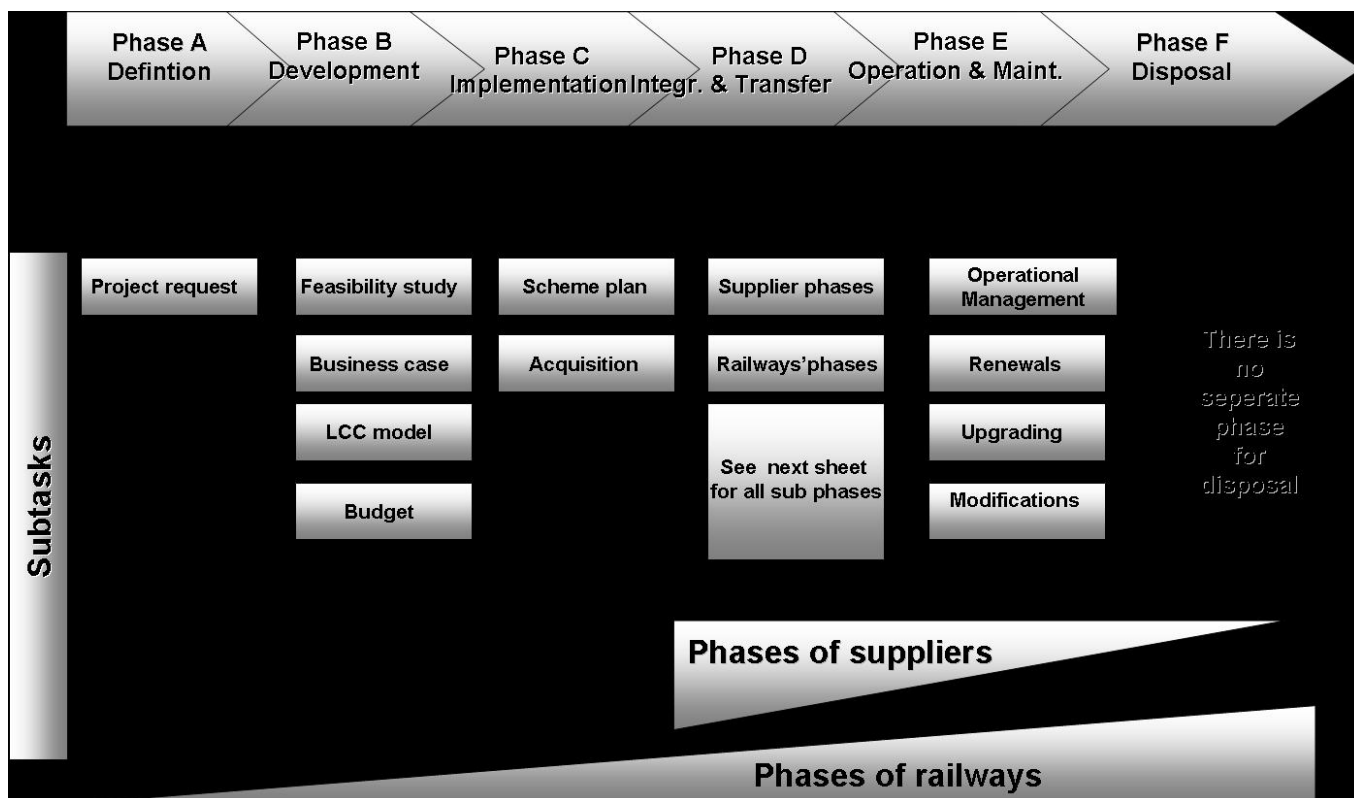


Figure 4: LC Phases Railway – Project view

After all, there are two different life cycle views; one for the supplier and one for the Infra Managers. They differ in time, involvement and intensity.

Whereas the supplier has to develop and sell a product, the Infra Manager needs to satisfy a requirement and seek a supplier with the appropriate product. Only at this stage the supplier and Infra Manager path's cross. The issue that is used to bring the supplier and the Infra Managers together is both the request for tender and the contract. From this point of view suppliers and Infra Managers work together to construct and commission a new Interlocking. After commissioning the Infra Managers operate and maintain the product until it has to be decommissioned. During this phase the supplier (depending on the type of contract) could be deeply involved on an ad hoc basis. Ultimately, there is certain interdependency between suppliers and Infra Managers during this phase.

**Phases of the supplier**

The supplier develops and produces interlocking systems which are purchased by Infra Managers. In a lot of cases Infra Managers buy developed and market ready products. This means that a supplier must have the right product for the right application at the right time. When a supplier decides to develop a product, he certainly has to make investigations regarding demanded types of products, the market requirements it selves etc. With this input the supplier starts an internal development project. The period of time for these phases could cover a few years.

The product and supplier go through the following phases:

### **A) Definition:**

In this phase the supplier prepares the development and does investigations, business cases, risk analyses, feasibility studies, etc. to determine whether the development of a new product is feasible or not and if there is a special need by the customers.

### **B) Development:**

If suppliers decide during phase A to work on a new product, a full scale development program/project is starting. All required specifications have to be evaluated, hard- and software has to be developed, tests and assessments have to be done as well as necessary certifications and approvals. At this step, the life cycle phase development ends. Afterwards, the supplier has a marketable product and he starts his marketing campaign.

## **Phases of the Infra Managers**

Infra Managers start an acquisition project to obtain a product/ system which meets their requirements best.

After the initial acquisition there are life cycle phases, too, but different ones compared to the product development. The Infra Managers mainly accomplish project preparation activities and they are essentially not involved in the product development. This leads Infra Managers to different tasks within their first activities of their involvement compared to the workload of suppliers.

In the following all different life cycle phases Infra Managers have to deal with, are explained in detail:

### **A) Definition:**

This is the start of a new interlocking project for the Infra Managers. The Ministry, the Infra Managers themselves, the railway undertakers, etc. develop an actual need/requirement for a new interlocking which is the starting point for an interlocking project from railway companies point of views.

### **B) Planning:**

The Infra Managers start with preparations for an interlocking project. For some Infra Managers this phase is very short and for others it involves the following activities:

- ❑ Feasibility study
- ❑ LCC model
- ❑ Business Case
- ❑ Investment proposal and approval.

### **C) Engineering:**

At this stage Infra Managers have the approval and budget for the project and they are able to start with the required engineering. The result of this phase is at least a scheme plan. This plan appears how the layout must be, informs about the different requirements as well as about a complete technical design for the new project. This plan is the basis for the project which is used to contract a supplier and after all it is also used to test the installed product as well as the technical solution.

### **D) Integration and Transfer to Operation:**

At this stage the supplier and Infra Managers start to work together. The supplier starts to prepare his product for a specific application. This basically includes the configuration of hard- and software, the performance of all tests (FAT, SAT, data, installation, etc.), the system installation at the location and performance integration as well as operational tests. Afterwards, he supplies logistic products (training, documentation, spare parts, etc.) and hands the system over to the Infra Managers.

The Infra Managers monitor the contract, attend the FAT, SAT etc. and do all necessary activities to prepare the site, sub contract, field element suppliers, monitor progress and take the system and logistics into service.

### **E) Operation and Maintenance:**

Depending on the type of contract and needs of the Infra Managers the suppliers plays an active or passive role in this phase whereas the Infra Managers play the major role. Now, the system is in operation and has to be operated and maintained by the Infra Managers. The supplier is playing an important role in the maintenance and reparation of the system. Depending on the contract model the supplier could perform 1st to 3-5th line support. This phase can extend for a period of 25 years (for an electronic interlocking system). During this period and due to changing requirements it is important to upgrade, modify or renew the hard- and or software which is usually done in cooperation with the supplier.

### **F) Disposal:**

In the expert group none of the members regard this phase as a separate phase in their contracting and replacement models. The removal and disposal of an old system is contracted as part of the installation contract and performed while the new system is installed or put into service.

2009/03/25

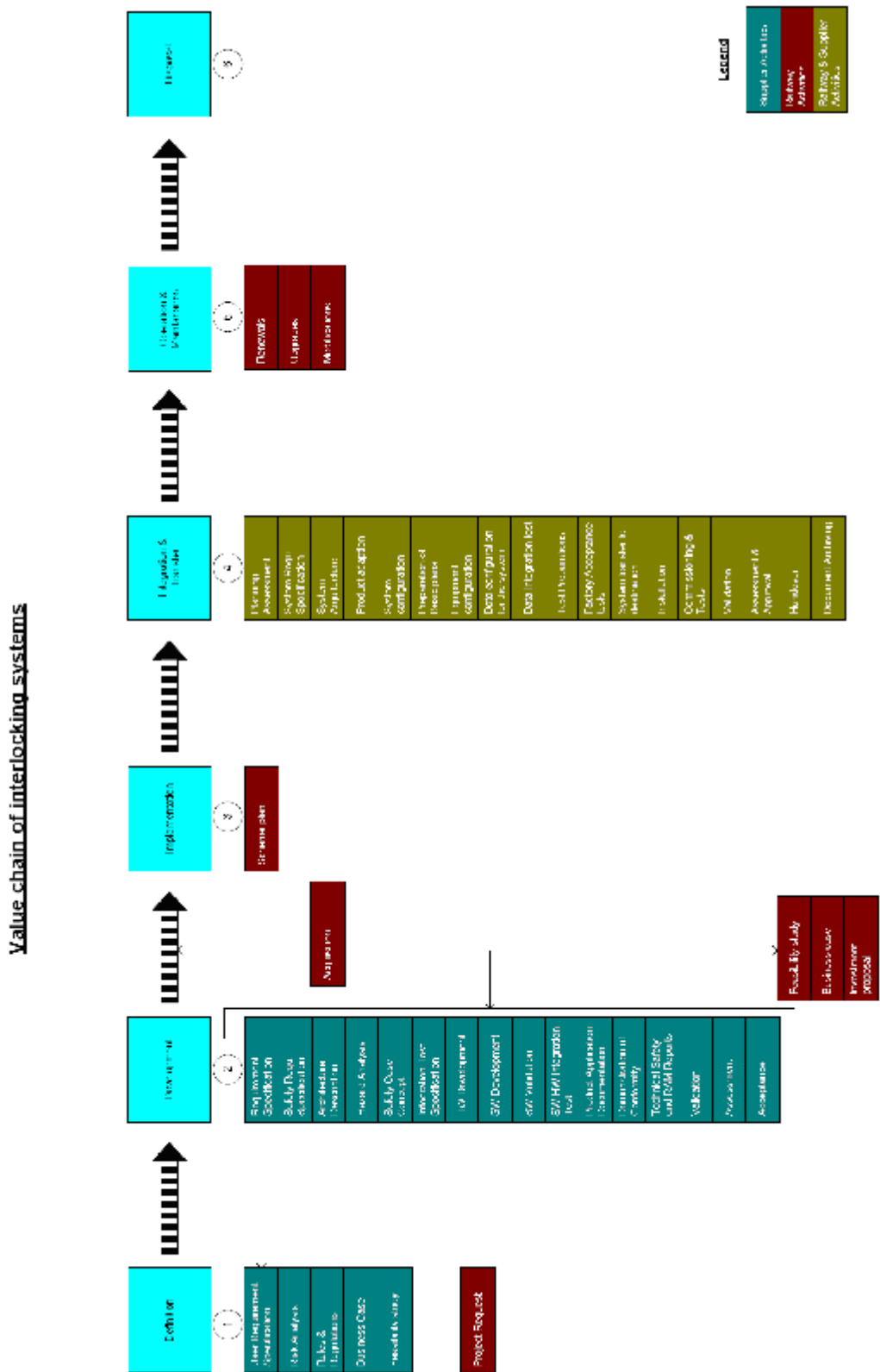
During a WS B meeting in Rome mid of March the whole WS B consortium agreed upon the results of the LC phases expert group mentioned above. Based on these results the value chain in question has been derived and is described in chapter 3.3.

### **3.4 Value chain deduction from Life Cycle Phases**

As already explained in chapter 3.3 the interlocking value chain will be derived from life cycle phases.

Rother and Shook, 2 leading researchers in the field of “economic value added” establish value chains based on processes respectively tasks. Deriving a value chain from phases, which exactly represent processes or tasks along the interlocking value creation, implicates Rother and Shook in a consistent way. According to Rother and Shook (1999), this methodological approach is appropriate to establish a well structured and valid value chain; especially for durable, technical products with a long term lifespan of more than 10 years.

After all, the following value chain (Figure 5) of interlocking systems has been established by WS B:



**Figure 5: Value chain**

## Section 4 – CONCLUSIONS

A basic result of the first two work stream meetings regarding D.B.1.1 is an approach to develop the value chain in question.

All in all, an expert group focuses on different Life Cycle phases of an interlocking system, due to the issue that it will be the framework for the development of the value chain.

In the following, a monthly overview of any new results and further steps is mentioned:

### 2009/01/23

Results: - 6 supreme life cycle phases are defined.

Further steps: - Sub-categories of the supreme six Life Cycle phases have to be established.

### 2009/02/25

Results: - 3 different views on generic life cycle phases have been established.  
- Sub-categories of an interlocking life cycle have been defined.

Further steps: - Derivation of an interlocking value chain.

### 2009/03/25

Results: - Establishment of a value chain for interlocking systems.

Further steps: - Further discussions and amendment of the results.

### 2009/05/11:

Results: - Work stream commitment of the established value chain



## Section 5 – BIBLIOGRAPHY

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