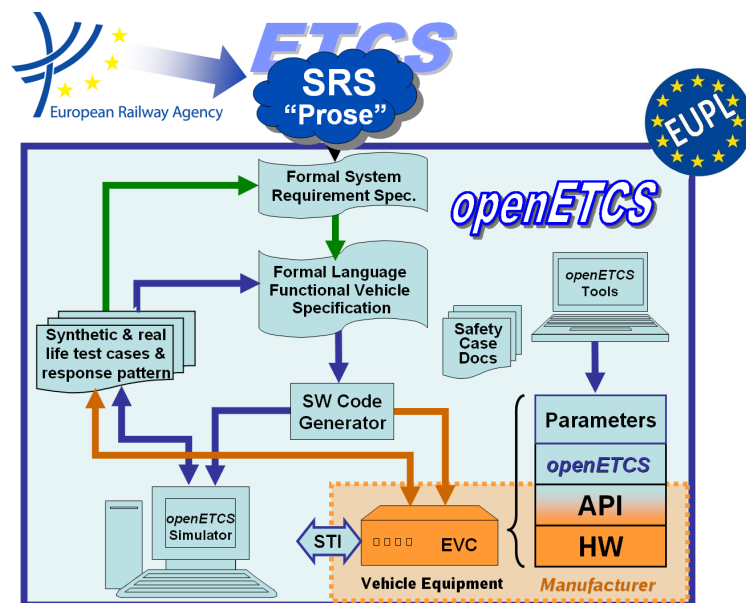


Work-Package 3: "Modeling"

OpenETCS SSRS Description of Work -DoW-

OpenETCS SSRS Task Force

Stanislas Pinte and Baseliyous Jacob

 October 2012
 Revised March 2013


Funded by:


 Federal Ministry
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 Y TURISMO


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**OETCS/WP3/
October 2012
Revised March 2013**

OpenETCS SSRS Description of Work -DoW-

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Description of work

Prepared for openETCS@ITEA2 Project

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Modification History

Version	Section	Modification / Description	Author

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Figures and Tables

Figures

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1 Abstract

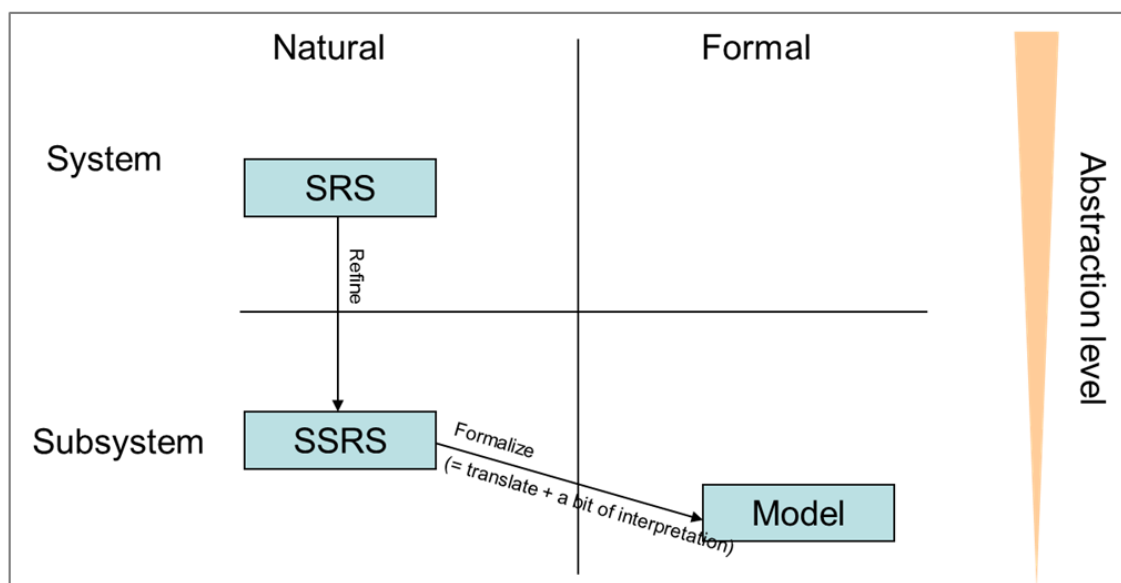
This taskforce will gather and sum up the necessary requirements, documents, variables and interfaces to develop a generic OBU kernel. In this case it is required to add a step of document between the SRS and the intended model of the OBU.

The modeling of the SRS would require the following steps:

- to define the scope of the model (~the OBU kernel);
- to provide an architecture for this model (functional and SW);
- to lift ambiguities;
- to detect errors and inconsistencies;
- to transform requirements into an executable content;
- to transform a natural language into a formal language.

Adding a step of documentation allows breaking these difficulties down. This step would be the Sub-System Requirement Specification. This step will allow the following:

- to define the scope of the model (more or less the OBU kernel);
- to provide an architecture for this model (functional and SW);
- to lift ambiguities;
- to detect errors and inconsistencies.



The first outcome of this Task force will be an overview of all necessary documents from the operator, the industry and all the European Railway Authorities to manage this kind of documents.

2 Objectives:

The SSRS will be composed of two parts: 1/ the functional decomposition and the API (architecture) and 2/ the requirements.

The functional decomposition & API (architecture) is a functional breakdown of the subsystem. It makes explicit the boundaries of the onboard subsystem itself, and also provides the internal functional allocations (architecture) of this subsystem. This internal decomposition & API (architecture) is composed of functions and flows of data between these functions. From the API we will derive the limits of this System.

All the objects described will be unambiguously named (in particular I/O) in a data dictionary.

This functional decomposition will be described using a semi-formal language.

This allocations (architecture) is useful for the following reasons:

- it makes the system easier to maintain;
- it provides the boundaries of the system;
- it eases the safety analyses and the V&V (with the internal cut out, and the unambiguous flows of data);
- it also helps with modeling by providing some structure.

The second part of the SSRS is the requirements list. The requirements from the SRS are allocated toward the functions of the SSRS (the architecture), possibly split and rewritten in order to restrict their scope to these functions (of course, traceability is mandatory). They are also rewritten in order to match the objects named in the architecture (in particular internal and external I/O). The requirements are provided in natural language (even if the objects are unambiguously named). The formalization layer is coming below the SSRS, with the model.

The architecture objects (functions, streams...) and the requirements are tagged Vital/Non Vital.

3 Organisation of the work

The Task Force will be split in 4 Tasks:

Task 1: delivering of the Primary sources and the ERTMS knowledge from the industry and the operator. Operators and Industry – running parallel

Responsible: SSRS Task Baseliyos Jacob, Bernd Hekele, Deutsche Bahn???

List of Primary sources:

- ERA documents (subset 26 necessary requirements 4.5.2 + other documents)
- Experience of the Operator
- Experience of the Industry
- Operation Rules of the Operator

- API /
- Hazard Analysis from the Operator

Task 2: Functional Analysis: (2.5 PY)

Identification of the functions (to be realized in the kernel)

including inputs/outputs variables

Identification of the relationships between the functions

Creating of an consistent data dictionary

Clarify the requirements (describe the functions in a clear way)

Responsible: ERTMS Solution

Participants: All4Tec, CEA, ERSa, Lloyds/NS, DB, (SQS), (Systerel)

Reviewer: Alstom, DLR, Siemens, TUBS, (SNCF)

Output:

Data Dictionary (Database) (Attributes???)

Function (Database)

Link between Functions and Datas

Set of clarified requirements (Excel sheet)

Input:

Requirements on the tool:

Attributes??

Data check

Traceability

Multiuser

Reliability for integration

Flexibility of the database

Reporting

Change Management

Task 3: Documentation of the openETCS System Boundary:

Deriving all the interface specifications from the data dictionary

Defining the scope of the SSRS

Finalization of the SSRS

Responsible: DB

Participants: TUBS, DLR,

Review: Siemens, Lloyds/NS, All4Tec, Fraunhofer, TWT,

Input:

Data Dictionary

Outcome:

OpenETCS Interface specification

Functional architecture

Requirement on the tool:

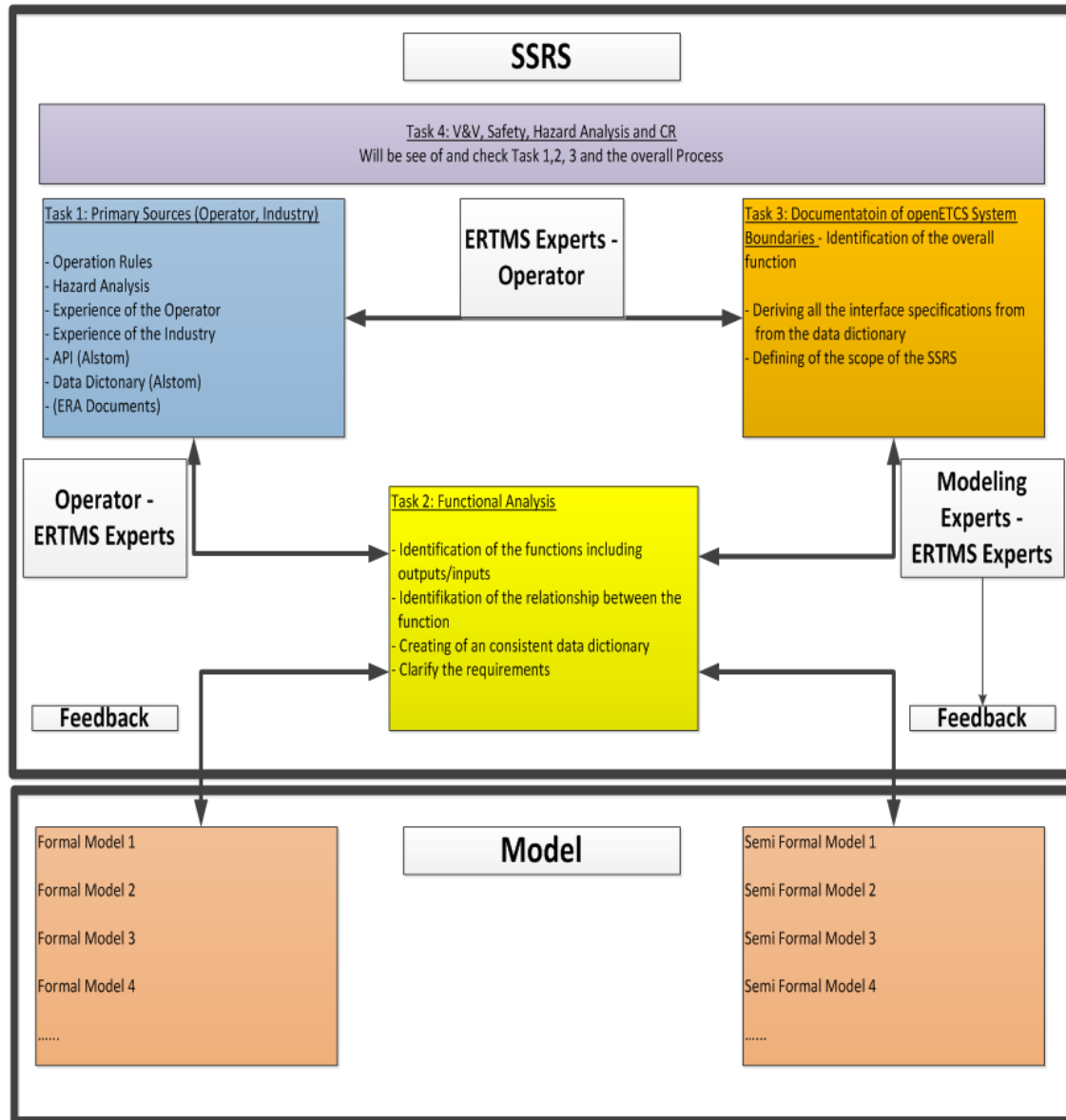
Reliability for integration

Change Management

Task 4: linked with WP 4 V&V

Task 1				
Task 2	ERTMS Solution (ERTMS Experts)	Lloyds (ERTMS Experts)	ERSA (ERTMS Experts)	DB (Operator ERTMS Experts)
Task 3				

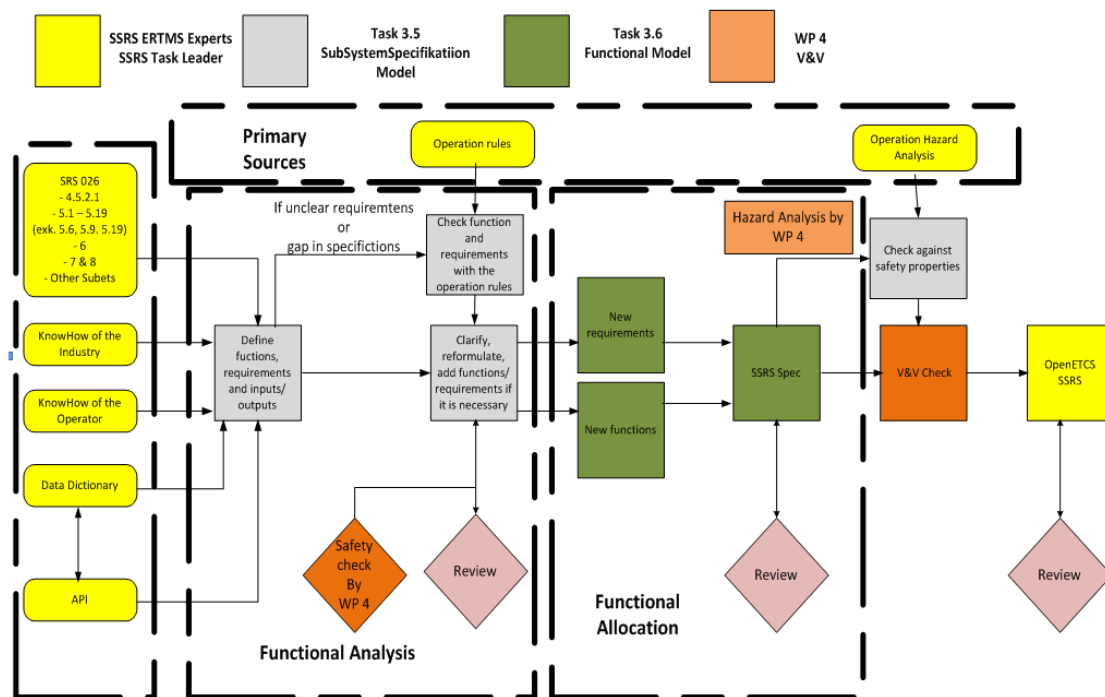
Pic - Task overview



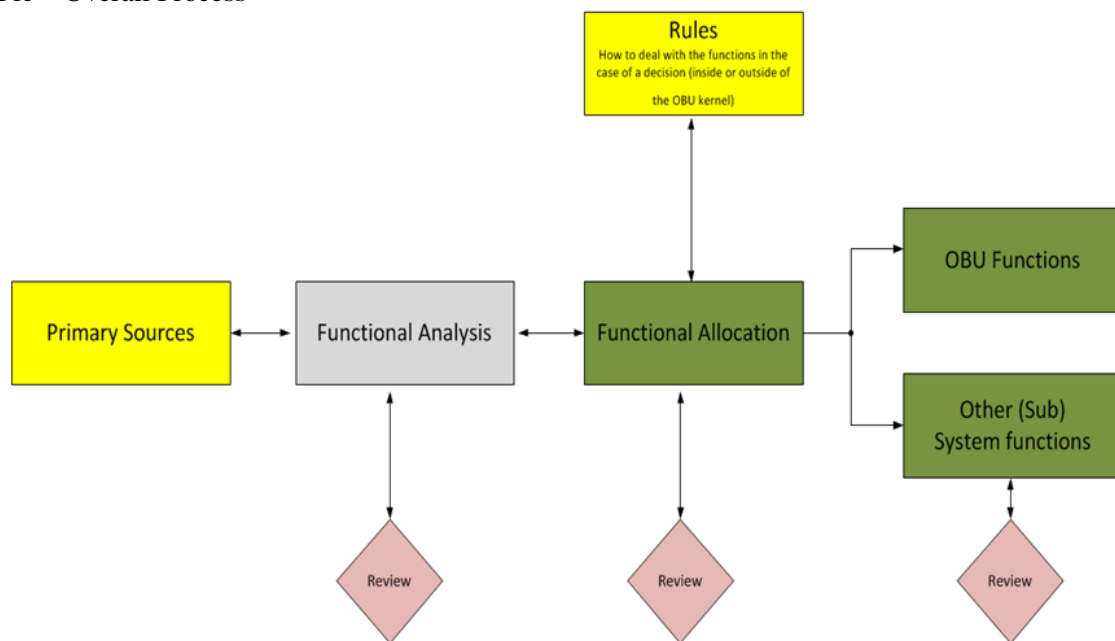
Note: the semi-formal and fully-formal modeling teams in tasks 3.5 and 3.6 should provide feedback to Tasks 1..4 during the whole project, and act as a reviewing team.

Actually, these teams are the customers of the SSRS team, as SSRS is the input for semi-formal model(s) and fully formal model(s).

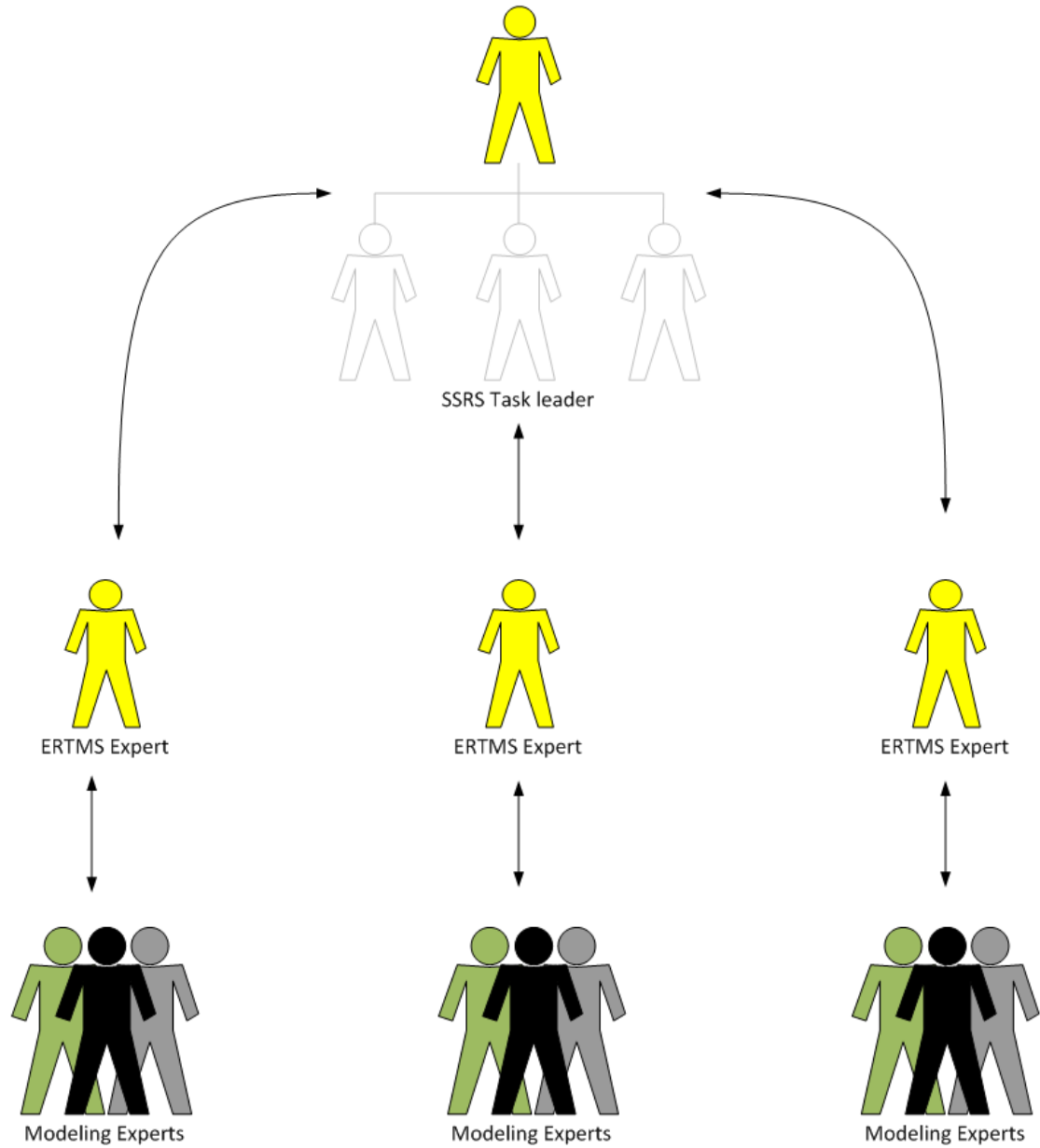
Pic 2 – Steps of Process



Pic – Overall Process



Pic – Working Couples



3.1 Sprint List

Main Requirements Sources

4.5.2.1 Active FunctionsTable	
5.1 – 5.19 (exc. 5.6, 5.9, 5.19)Procedures	
6 Management of older systems	
7 ERTMS/ETCS Language	
8 Messages	
TSI Annex A	

3.2 Goal

Weekly Telco (30 min.)

Newsletter

Short communication sessions between operator – modeler – ERTMS Experts

08/7- 19/7. Sprint 1

Sprint 1 shall include the following work:

Baseliyos Jacob and Stan. Pinte:

- Put in operation a Temporary requirement tool
- Plan Next sprint tasks + schedule

Task 1 team:

- Gather operational and national rules documents
- Gather hazard analysis documents

Task 2 team:

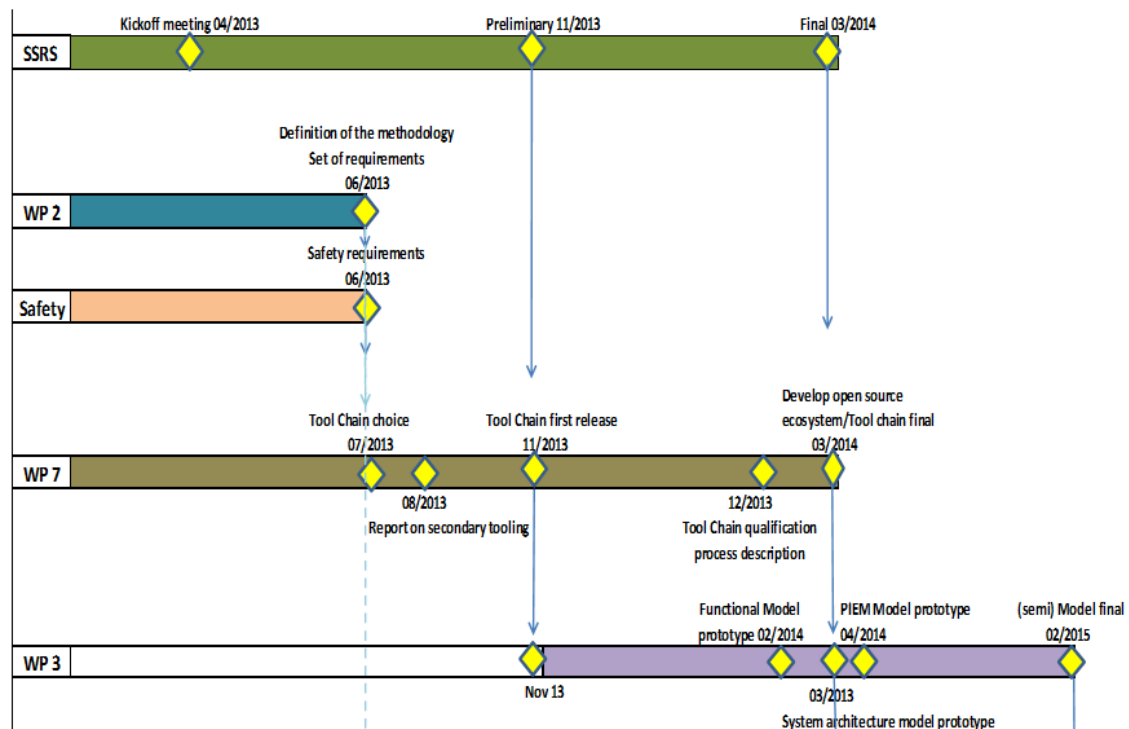
- Start graphical functional decomposition by modeling top-down the Subset-026, defining functions and data flows

Task 3 team:

- Integrate + Reviewing ERA documents and Spread the Requirements from the SRS026
- Integrate data dictionary from existing ERTMSFormalSpecs data dictionary

3.3 Time Schedule

Pic – Working Couples



4 Requirement for SSRS Tools:

4.1 Requirements for the SSRS Requirements Management tool.

- Need an documents based outcome (Excel)
- Must be compatible to a graphical decomposition and (semi) formal model tool
- Version management
- Multi user
- Data Dictionary Check

Attributes:

- Requirement ID
- Document Source
- Related SRS §
- National Operation Rules xx country
- Variable Name – Input Variable/Output Variable
- Description
- ETCS language reference

- Version (Document)
- Source (source of required information)
- Range (possible values)
- Source assumed (if source is not clear)
- Comment
- Proposal
- Remark
- User – Unique/Multiple
- Discussion of the requirement in Subset 25 – xx ID
- Functions
- Functional Block
- Validated
- Information of requirement (need to/shall be)
- approval

4.2 Requirements for the SSRS Graphical Functional Analysis tool

- Must be compatible to the requirement management and (semi) formal tool
- Graphical Human interface
- Data Flow Check
- Data Dictionary Check

5 Requirement on the SSRS at all

The following is not part of the MoM, but is provided for the sake of completeness. This is an excerpt of the D2.6 – D2.9 document (current draft version).

R-WP2/D2.6-X-10 The SRS (SUBSET-026 for the reference baseline) shall be refined into a SSRS.

R-WP2/D2.6-X-10.1 The SSRS shall provide a functional architecture of the OBU.

R-WP2/D2.6-X-10.1.1 The SSRS shall split the KERNEL into independent functions.

R-WP2/D2.6-X-10.1.2 The description of the architecture shall be semi-formal.

R-WP2/D2.6-X-10.1.3 This architecture shall provide the functions and the data streams between them.

R-WP2/D2.6-X-10.1.4 The SSRS shall describe which part of this architecture will be modelled.

R-WP2/D2.6-X-10.1.5 The SSRS shall provide the interfaces between the considered subsystem and its environment.

R-WP2/D2.6-X-10.1.6 When the boundary of the formalized subsystem corresponds to a FIS or FFFIS, the SSRS shall try to comply to it even when it is not mandatory.

R-WP2/D2.6-X-10.2 The SSRS shall allocate the requirements of the SRS to the functions and their I/O.

R-WP2/D2.6-X-10.3 Full traceability between the SRS and SSRS shall be provided.

R-WP2/D2.6-X-10.3.1 Interpretations, additions and omissions shall be tracked and justified.

Architecture vs. functional decomposition

Definition of architecture

What do we need?

What is safety means? Robustness?