ASTRail

SAtellite-based Signalling and Automation SysTems
on Railways along with Formal Method and Moving Block validation

D5.1 - Set up Public Website

Deliverable ID	**D5.1**
Deliverable Title	**Set up public website**
Work Package	**WP5**
Dissemination Level	**PUBLIC**
Version	**1.1**
Date	**2018-06-01**
Status	**Final**
Lead Editor	**Unife**
Main Contributors	**ISMB, SIRTI, ENAC, CNR, ARDANUY**

Published by the ASTRAIL Consortium

Document History

Version	Date	Author(s)	Description
0.1	2017-11-30	UNIFE	First Draft
1.0	2017-11-30	ISMB	Quality Check
1.1	2018-06-01	ISMB	Added legal notice

Legal Notice

The information in this document is subject to change without notice.
The Members of the ASTRail Consortium make no warranty of any kind with regard to this document, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The Members of the ASTRail Consortium shall not be held liable for errors contained herein or direct, indirect, special, incidental or consequential damages in connection with the furnishing, performance, or use of this material.
The Shift2Rail JU cannot be held liable for any damage caused by the Members of the ASTRail Consortium or to third parties as a consequence of implementing this Grant Agreement No 777561, including for gross negligence.
The Shift2Rail JU cannot be held liable for any damage caused by any of the beneficiaries or third parties involved in this action, as a consequence of implementing this Grant Agreement No 777561.
The information included in this report reflects only the authors' view and the Shift2Rail JU is not responsible for any use that may be made of such information.

Table of Contents

1 Introduction

The project public website is one of the main pillars of the ASTRail project dissemination and exploitation strategy.

The document summarises the implementation of the public website and describes all of its main elements and their functionality.

1.1 Scope

ASTRail public website is available on the internet address http://www.astrail.eu/home.aspx and is compatible with most of the modern web-browsers, including those running on the mobile platforms for which the graphical and navigation elements are adjusted to better fit the screen size limitations.

The website is designed as the dissemination tool which allows to easy access to ASTRail – related information for the interested parties, most importantly the railway stakeholders, offering general information, both static and dynamic. The website is the basic tool within the project dissemination and exploitation strategy.

2   Website Structure and Content

2.1   Website Header and Footer

The elements in the header and footer of the website are fixed regardless of the page actually chosen.

- The website header has a static part that, apart from the links to Shitf2rail and European Commission websites, includes a searcher that allows a user to search information in the website introducing words or complete sentences. The dynamic area allows a user to navigate to other parts of the website

- The website footer contains:

  o   Website map with direct link to all the sections that facilitates web browsering.
  o   Direct Links to Shift2Rail and European Union Website within funding description and ASTRail project grant agreement number identification.

Figure 1 – Upper Navigation Panel

Figure 2 – Website Footer (static)

2.2   Homepage

Homepage introduces the website and is designed in the style fully in line with the visual identity of the project. The main functional elements are the shortcuts to the main sections of the web: Description of the project, Last News and Events. A specific window with the latest tweets (@S2R_ASTRail) of the project is located on the right-down side of the homepage.
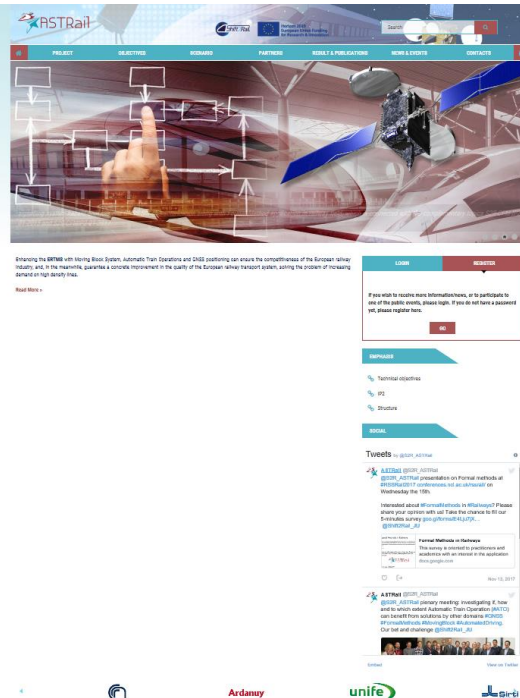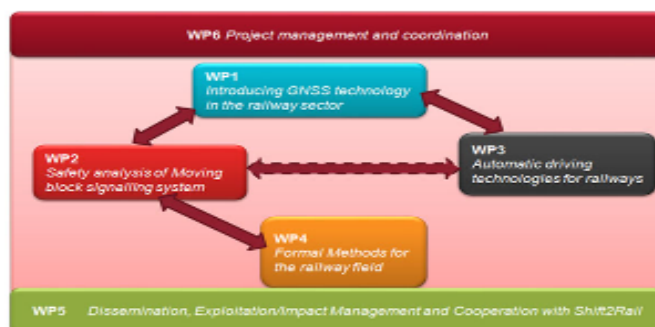
Figure 3 – Homepage

2.3   Page: Project

Two sub-menus constitute Project section: Structure and Impact. A user could obtain the information clicking in one of them. The selected sub-menu changes dynamically the main content of the website presenting different information depending on the selection.

Structure Section is divided in two main parts that summarize the composition of the project and the main objective of the constituent. A schema represents the organization of the project based on WP constitution and the linkage among them, the second part is composed by a table where main objectives of WPs are described.

Structure

WP	Goal
WP1 – Introducing GNSS technology in the railway sector	ASTRail WP1 is intended to analyze and transfer the applicable requirements and solution from the aviation domain to the railway sector, with a particular focus on the application of Fail-Safe train positioning to moving block signaling. For this purpose, the WP moves its step from the review of aeronautical assumptions: the assumptions, requirements and metrics will be then transferred to the railways, identifying the elements which fit the GNSS-enabled rail applications. The following steps will lead to the definition of a possible GNSS architecture cut for trains, considering technical aspects such as the suitable augmentation systems and the design rules for the target algorithms; the proposed solution will consider constraints such as the hazard analysis of ERTMS related to GNSS faults and the error models known from the literature, eventually leading to the definition of a set of minimum performance requirements.
WP 2 – Safety analysis of Moving block signalling system	ASTRail WP2 will perform Hazard analysis of the Moving Block signaling system, in view of complete removal of trackside detection, with the aim to evaluate the viability of the system to comply with strict Safety Requirements applicable for all railway profiles including high-speed and high-density lines. The approach of the WP2 is to establish a systematic program for the acquisition of the pertinent to Hazard Analysis information and to model the Moving block system. The model of the system will provide the basis for WP2 Hazard Analysis and for WP4 validation applying selected formal methods.
WP 3 – Automatic driving technologies for railways	The aim of the WP3 is to identify which automatic driving technologies from the automotive sector and from other application fields, such as the agriculture, the avionics and the maritime sectors, are the most suited to be applied in the railways to improve Automatic Train Operation. To achieve its scope, the following objectives can be identified: • Identify the state-of-art technologies for autonomous driving considering mature and cutting-edge solutions; • Define the implementation characteristics and the types of applications that from the automotive and the other sectors can be transferred in the railway field; • Determine the best autonomous driving solutions among the identified technologies for future use in railways, considering specific use cases and different grade of automation in Automatic Train Operation, e.g. driverless or unattended operations.
WP 4 – Formal Methods for the railway field	WP4 aims at identifying the most mature formal languages and methods to be used in the railway industry for safety-critical system and software development. This goal is achieved by means of a systematic literature review on formal methods applications in railways, and through trial applications of formal methods and tools to the ERTMS Level 3 Moving Block system concept, and to Automatic Train Operation principles. Surveys with practitioners are also performed to investigate the current uptake of formal methods, and feature desired by the railway industry.
WP 5 – Dissemination, Exploitation/Impact Management and Cooperation with Shift2Rail	WP5 seeks to ensure proper dissemination and promotion of the project and its results, in a way which is consistent with the wider dissemination and promotion activities of Shift2Rail. It will ensure that the outputs of the project are delivered in a form which makes them immediately available for use by the Innovation Programme 2 within Shift2Rail. It will also ensure that all important actors in the European railway sector are informed about ASTRail, its objectives, content and results. A further objective of this WP is to collect feedback on the project's preliminary outcomes to increase the quality and acceptance of the final results.
WP6 – Project management and coordination	The target of WP6 is to provide an effective support to the project activities for what concerning management and coordination. In particular, the following objectives have been identified: ▫ Monitor the execution of the activities to guarantee a timely delivery of high-quality results within the budget limits and in scope with the project objectives ▫ Ensure a day-by-day support to all the partners ▫ Coordinate the progress of the project activities from a technical and scientific perspective ▫ Ensure a correct management of data ▫ Manage risks and contingencies in a timely and effective way; ▫ Monitor the financial and administrative aspects of the project ▫ Support the redaction of reports, the organizations of meetings to foster the collaboration among the partners.

Section Impact summarizes the main expected impacts in the railway sector at the end of the project.

Impact

The ASTRail proposal fits the rich S2R framework and, as such, its expected impacts necessarily reflect the Work Programme and the MAAP objectives.
In a top-down approach, the expected impacts can be summarized as follows:
- **Work Programme** level "Smart, green and integrated transport"
  o Resource efficient transport that respects the environment
  o Better mobility, less congestion, more safety and security
  o Global leadership of the European transport Industry
- **S2R MAAP** level:
  o Develop, integrate, demonstrate, and validate innovative railway technologies and solutions with the objective to improve the competitiveness and attractiveness of the European Railway Sector
- **S2R IP2** objectives
  o Line capacity Increase
  o Operational realiability increase
  o Railway system life cycle cost reduction
  o Maintain the highest level of safety
  o Reduce costs (CAPEX and OPEX)
  o Strong integration of different technologies and systems not yet largely applied in the railway field
- **Technical Demonstrator** (TD) level
  o TD2.2 Railway network capacity
  o TD2.3 Moving Block
  o TD2.4 Fail-safe Train Positioning
  o TD2.7 Formal methods for smart signaling systems

Obviously, ASTRail alone will not be able to impact on all such aspects. However, as part of S2R eco-system, it will contribute to all of them.
For this reason ASTRail closely cooperate with the S2R actors and projects.

Figure 4 – Impact Section

2.4   Page: Objectives

The main objectives that the project targets are classified in two groups that constitutes the two sub-menus of the section: High Level Objectives and Technical Objective.

High Level Objectives section includes the highest objectives from a global point of view. It means the objective that could be more relevant for European railway stakeholders.

High level objective

The high level objectives of the ASTRail project will be to improve technologies for signalling and automation investigating new applications and solutions that must be carefully analysed in terms of safety and in terms of performances. Insights from other fields, such as avionics or automotive, will also be necessary to exploit cutting edge technologies, scientific approaches and methodologies also in the railway environment.
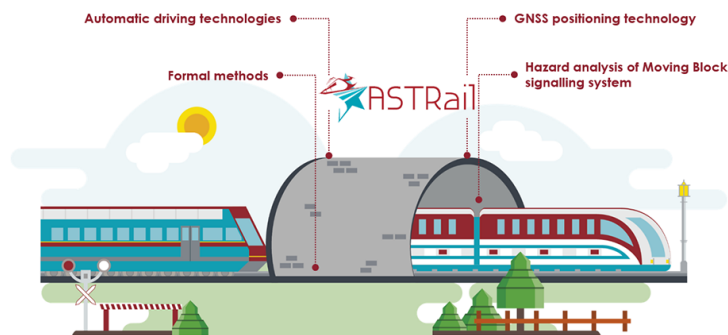

Figure 5 – High Level Objectives Section

Technical Objectives section includes more precise objectives related to the technical solution envisaged in the project. This section also contains the positioning of the project within Shift2rail programme.

Technical objectives

ASTRail will in particular, address the following specific technical objectives:

- leveraging the expertise of the aeronautic sector on GNSS technology to improve localization of trains; ASTRail will define which assumptions and requirements about GNSS technology can be transferred from the aeronautical standards to the railway system; ASTRail will define architecture, specific algorithms, and the software definition for testing purposes in order to assess the minimum achievable performance by GNSS technology in the railway system; the overall result will be an informed setting of "Minimum Performance Requirements for GNSS technology in the ERTMS Signalling System";
- defining a model of the Moving Block Signalling system and perform its Hazard Analysis considering use cases that will be defined by parameters such a system state (degraded operation, transition phases), traffic type, environmental condition (tunnels, urban areas, etc.) and Grade of Automation;
- identifying which automatic driving technologies can be reused in the railway sector from the automotive or other application fields, such as maritime and aeronautics sectors, or even agriculture; ASTRail will further contribute to the development of Automatic Train Operation by analysing which characteristics and requirements of the identified technologies can be also applicable to the railway field and it will assess the most suitable technologies that can be reused in the railway;
- reviewing and assess the main formal modelling and verification languages and tools used in industrial railway applications, as well as the most promising ones highlighted by the scientific literature; ASTRail will take further the analysis to define the optimal set of languages and tools and will validate them with representative components deriving from other tasks of the project.

Figure 6 – Technical Objectives Section

2.5   Page: Scenario

The positioning of ASTRail project is the main objective of this section. It aims to describe the scenario where ASTRail is located in terms of European Union Research and Innovation. Through its four sub-menus a user could browser the initiatives where ASTRail is included as well as previous R&I project linked to ASTRail.

Horizon2020

Horizon 2020 is the current Framework Programme for Research & Innovation of the European Union, following the FP7 (Framework Programme 7), which was deployed between 2007 and 2013 with a total budget of about € 50 billion.

Horizon 2020 is the biggest EU Research and Innovation programme ever, with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market.

A significant budget (about € 6,3 billion) is allocated to the Transport Challenge, with the aim to boost the competitiveness of the European transport industries and achieve a European transport system that is resource-efficient, climate-and-environmentally-friendly, safe and seamless for the benefit of all citizens, the economy and society.

Within such context, for the first time the railway sector is joining its resources in a coordinated effort, creating a PPP (Public Private Partnership) which will steer research & innovation for really breakthrough results. Such common initiative, which follows some years of preparation work coordinated by UNIFE, is named Shift2Rail.

Figure 7 – Horizon 2020 Section

Shift2Rail

Shift2Rail is a JU (Joint Undertaking) putting together resources from the European Commission (with funds coming from Horizon 2020) and from main railway stakeholders (Founding Members and Associated Members), for a total budget of € 940 million, aimed at steering research activities in the railway sector.

Shift2Rail will foster the introduction of better trains to the market (quieter, more comfortable, more dependable, etc.), which will operate on an innovative rail network infrastructure reliably from the first day of service introduction, at a lower life-cycle cost, with more capacity to cope with growing passenger and freight mobility demand. All this will be developed by European companies, thereby increasing their competitiveness in the global marketplace.

Shift2Rail is organized according to five Innovation Programmes (IP), addressing the main railway challenges in specific areas (Rolling Stock, Control & Command, Infrastructure, IT services and Freight) and five Cross-Cutting activities, addressing topics which have a transversal impact on all areas.

Specifically, IP2 addresses the subject of **Advanced Traffic Management and Control Systems**

Figure 8 – Shift2Rail Section

IP2

Taking the high-level objectives set out in the Shift2Rail Master Plan as a starting point, and considering the potential of ERTMS to offer increased functionalities and become even more competitive, the high-le summarized as follows:

1. Enhance overall line capacity throughout a better use of infrastructure by operating more trains on the same line and with a more flexible use of the vehicles on the line.

2. Contribute to railway system life-cycle cost reduction throughout a reduction in the capital cost of signalling and telecom infrastructures, maintenance costs and the consumption of energy.

3. Increase of operational reliability fundamentally with the use of more reliable technologies and components as well as architectures more simples and suitable to continued operation in case of failure.

4. Maintain ERTMS as a basis for any evolution, extending the new signalling and traffic management system to all railway transportation segment.

5. Ensure continuity and backwards compatibility with the current signalling and supervision systems bust fostering the highest integration possible.

Figure 9 – IP2 Section

Related Projects

The figure below summarises the most relevant research and innovation activities linked to the project that serve as a starting point for ASTRAIL.

Other previous projects are Airbus Study [ENAC involved], MODCONTROL [CNR partner], SATCOM Rail, EuroInterlockin, EurailCheck, INESS, EULYNX and OpenETCS-ITEA2.

01 TRITON
Aimed at giving answers to intentional jamming and spoofing in the maritime sector, focusing on increasing the trustworthiness of the vessel on-board instrumentation used to report vessel information to the control organisms.

02 ASSITS-2
It focuses on the development of an automatic control of snow ploughs equipment, in order to optimize automatic salt spreading operations, avoiding manual intervention of the driver.

03 FUNTIME
The main goal of FUNTIMES is the research, development, refinement and consolidation of new concepts and technical solutions suitable to the future generation of Galileo signals

04 INDRIVE
The main objective of the InDrive project consists in the development and demonstration of semiautomatic driving, heavily relying on accurate and high-integrity satellite navigation

05 AUTOPILOT
The objective of the AUTOPILOT project is to merge automotive and IoT technologies to move Automated Driving towards a new dimension

06 MISTRAL
MISTRAL will elaborate the Technical Specification of the future communication system for all railways in light of the migration from the current obsolete GSM-R

07 NGTC
NGTC project targets research on satellite positioning and moving block.

08 STARS
The scope is to predict GNSS performance for application with ERTMS (accuracy, availability and safety), using receivers built according to the guidelines specified in NGTC

09 GRAIL-2
The objective of GRAIL-2 FP7 project was to develop and validate a GNSS based ETCS prototype/application in Rail Low Density Lines.

10 TRACE-IT
One of the goals of the TRACE-IT project was the design, development and experimentation of a Communications Based Train Control system (CBTC)

11 RHINOS
Rhinos is focusing on virtual balises. It focuses on GNSS (in particular EGNSS) and deals with both random and systematic failures, like multipath, reflections, etc

12 E-KnoT
A technology transfer initiative of the EC, E-KNOT aims at bringing together educators, researchers and industry to share knowledge.

Figure 10 – Related Projects Section

2.6   Page: Partners

The map in the upper part demonstrates the geographical coverage of the ASTRail consortium. Below the page contains project partners` logos with links to their respective websites.

Figure 11 – Partners Section

2.7 Page: Results and Publications

The list of the project deliverables and a link, to download those that are public and approved by the Consortium and the Shift2Rail-JU, will be included in the section of results. The same structure will be followed in the sub-section "Publications". It will be allowed to download the publicly available dissemination materials, documents and presentations.

2.8 Page: news and events

The page contains the list of project news and information about related events. The section will be updated continuously throughout the lifetime of the project.

2.9 Page: Contacts

The users of the website will find here the direct contact information on how to reach the coordinator and how to get the information for which they may be interested in.

The embedded contact form is a convenient tool for contacting the project representatives without the necessity to use any other external communication tool (e.g. email client).

Contacts

Riccardo Scopigno
Project Coordinator

In order to send a message to the contact persons, please fill in this form with your data.

Name *

Email *

Message *

Captcha *

I'm not a robot — reCAPTCHA — Privacy - Terms

Send

Figure 12 – Partners Section

List of figures