GoSAFE RAIL
Project Reference: 730814
S2R-OC-CCA-04-2015
Research and Innovation action as part of the Shift2Rail JU
Project Duration: 1 October 2016–30 September 2019

Report on kick-off meeting
Deliverable 5.3

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This project has received funding from the European Union’s Horizon 2020 research and innovation program under grant agreement No.730814
<table>
<thead>
<tr>
<th>Number</th>
<th>Date</th>
<th>Author(s)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>30/11/2016</td>
<td>Ken Gavin (KG)</td>
<td>First Draft sent to IS for review</td>
</tr>
<tr>
<td>02</td>
<td>01/12/2016</td>
<td>Irina Stipanovic (IS)</td>
<td>Reviewed</td>
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</tbody>
</table>
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1. Outline of the GoSAFE RAIL project kick-off meeting

1.1 Introduction

The kick-off meeting of the GoSAFE RAIL project was organised on November 7th and 8th, 2016 in Zagreb, Croatia. The General Assembly (meeting of all participants) began with an Overview of the project from the project officer (PO) and project coordinator. This was followed by presentations by the leaders of Work Package (WP) 1 and 2. The WP leaders presented their WPs, task by task, with the intent of identifying particular needs, discussing collaboration amongst WP participants, requirements and help solving any issues. Decisions were made for each WP and there’ll be follow-ups on their progress through the Milestones and Deliverables’ reports. At the end of the first day a face to face meeting of the Executive Board took place in a dedicated meeting room. The Executive Board Meeting focussed on aspects of the overall management of the project, such as the reports’ templates, the project website and the frequency of meetings. On the second day meetings of WP3 and WP4 were held.

GoSAFERAIL members at the kick-off meeting
## 2.2 Attendance list

<table>
<thead>
<tr>
<th>Person</th>
<th>Participant organisation name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenneth Gavin</td>
<td>Gavin and Doherty Geosolutions (GDG)</td>
</tr>
<tr>
<td>Luke Prendergast</td>
<td></td>
</tr>
<tr>
<td>Cormac Reale</td>
<td></td>
</tr>
<tr>
<td>Meho Sasa Kovacevic</td>
<td>University of Zagreb (UZ)</td>
</tr>
<tr>
<td>Marijan Car</td>
<td></td>
</tr>
<tr>
<td>Lovorka Libric</td>
<td></td>
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<tr>
<td>Nicola Rossi</td>
<td></td>
</tr>
<tr>
<td>Ivra Pisic</td>
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<tr>
<td>Mario Bacic</td>
<td></td>
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<tr>
<td>Velimir. Sporcic</td>
<td>Croatian Railways (HZ)</td>
</tr>
<tr>
<td>Boris Vrojevic</td>
<td></td>
</tr>
<tr>
<td>Amir M Kaynia</td>
<td>Norwegian Geotechnical Institute (NGI)</td>
</tr>
<tr>
<td>Yme Kvistedal</td>
<td></td>
</tr>
<tr>
<td>Stephen Wells</td>
<td>Virtus IT (VT)</td>
</tr>
<tr>
<td>Irina Stipanovic</td>
<td>Infraplan Konzalting (IF)</td>
</tr>
<tr>
<td>Andreas Schoebeil</td>
<td>Open Track Railway Technology (OTRT)</td>
</tr>
<tr>
<td>Jelena Aksentijevic</td>
<td></td>
</tr>
<tr>
<td>Lorcan Connoly</td>
<td>Roughan O’Donovan Innovation Solutions (ROD-IS)</td>
</tr>
<tr>
<td>Alan O’Connor</td>
<td></td>
</tr>
<tr>
<td>Timo Hartmann</td>
<td>Contecht (CT)</td>
</tr>
<tr>
<td>Lucian Ungureanu</td>
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2.3 Meeting Agenda

GoSAFE RAIL KICK-OFF MEETING  
7th/8th November, 2016  
Venue: Faculty of Civil Engineering, University of Zagreb  
AGENDA  

Monday November 7th

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:00 -15.20 pm</td>
<td>Welcome lunch and introductions.</td>
<td>All</td>
</tr>
<tr>
<td>15.20 to 16.00</td>
<td>Overview of Project</td>
<td>Lucas Garvia (S2R) and Ken Gavin (GDG)</td>
</tr>
<tr>
<td>16.00 to 17.00</td>
<td>WP1 Risk Assessment and Methodology</td>
<td>Lorcan Connoly, ROD-IS</td>
</tr>
<tr>
<td>17.00 to 18.00</td>
<td>WP2 Mobility</td>
<td>Andreas Schoebel</td>
</tr>
<tr>
<td>18.00 to 19.00</td>
<td>Executive Board Meeting</td>
<td>WP Leaders</td>
</tr>
<tr>
<td>20.00</td>
<td>Dinner in City Centre</td>
<td></td>
</tr>
</tbody>
</table>

Tuesday 8th November

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00 to 11.00</td>
<td>Decision Support Tool</td>
<td>Irina Stipanovic (IF)</td>
</tr>
<tr>
<td>11.00 to 11.15</td>
<td>Coffee</td>
<td></td>
</tr>
<tr>
<td>11.15 to 13.00</td>
<td>Demonstration and Implementation</td>
<td>Irina Stipanovic (IF)</td>
</tr>
<tr>
<td>13.00 to 13.30</td>
<td>Discussion</td>
<td>All</td>
</tr>
</tbody>
</table>

Meeting Closed

2. Approach
The meeting was organized generally according to the Agenda previously agreed with all participants. Rather than break-out into parallel session the meeting was held in plenary sessions. Work Packages leaders led the discussions and ensured that collaboration amongst tasks and work packages was maximised.
D5.3 Report on kick-off meeting
GoSAFE RAIL – Global Safety Management for Rail Operations

Meet and Greet at the start of the meeting

Presentation on Work Package 2
3. Annexes

3.1 Project Officers Presentation
Kick-off meeting
Project: GOSAFERAIL
GA number: 730817

Lucas GARVIA – S2R JU
7 November 2016
1. Introduction

2. S2R's expectations regarding the project

3. Contractual and administrative issues
1 - Shift2Rail objectives

- Single European Railway Area
- Attractiveness and competitiveness of the European railway system
- Leadership on the global market
1 - The Shift2Rail Framework

From policy objectives to concrete activities:

- S2R Regulation
- S2R Master Plan
- S2R Multiannual Action Plan
- S2R Annual Work Plans
Shift2Rail is specially designed within Horizon 2020 to overcome the issues of R&I fragmentation and to support market uptake and the implementation of innovative solutions.

Shift2Rail represent a powerful instrument to complement and support the establishment of the **Single European Railway Area** and contribute to meeting the ambitious **objectives of the EU transport policy**.
1 - The implementation of the Union funding, within S2R

Programme 967M

S2R (H2020)
Co-Fin 450M

Railway Sector Net Contribution 517M

Values as at 1 Sept 2016 in Million EUR
1 - Rail R&I under Horizon 2020

Horizon 2020
77 028 M€

Excellent Science
24 441 M€

Industrial leadership
17 016 M€

Societal challenges
29 679 M€

Smart, green and integrated transport
6 339 M€

Rail
450 M€

2014 call of H2020: 52 M€

Air
Road
Waterborne
Urban
Cross-cutting

2015-2016 Call of S2R: 88 M€

Shift2Rail JU

~7%
1 – Interactions & roles

Role/Interaction CCA and interactions with GOSAFERAIL

- **Ensuring** continuity/synchronicity of GOSAFERAIL to the CCA and in relation to other IPs.
- **Ensuring** GOSAFERAIL contribution to the realisation of the MAAP.
- **Reporting to the S2R ED** on the basis of the KPI developed under GOSAFERAIL activities.
- **GOSAFERAIL Coordinator** may attend the CCA meetings as observer with the agreement of the ED and invitation by the Chairperson.
- **CCA Coordinators cooperate with GOSAFERAIL.** Coordinator to foster/promote synergies between WAs and CCA Area, different Activities of other IPs and CCA, H2020 1st call projects, etc.

Role of the Coordinator

- **Central Contact Point** for the S2R JU.
- Administers the **S2R financial funding.**
- Reviews the reports to **verify consistency.**
- Monitors the compliance **under the GA.**

Role of beneficiaries

- Carry out the **work** as identified in the **Annex 1.**
- **Provide all data (financial and technical)** requested by the S2R JU.
- Inform the S2R JU of any event that might affect the implementation.

Role of S2R JU’s Programme Manager

- **Ensuring** with the CCA SteCo the fulfilment of the Master Plan
- **Central Contact Point** for GOSAFERAIL.
- **Supervise** GOSAFERAIL and the fulfilment of contractual obligations
  - Check, **deliverables, periodic reports, perform on-site reviews,** etc.
  - Check **financial** statements.
1- First Shift2Rail Calls - key milestones

• **17 December 2015:** Publication of the first calls for activities worth €170 million launched by the S2R JU.

• **17 March 2016:** The deadline for submissions of proposals. 56 proposals submitted (13 for 13 CFM topics and 43 for 15 OC topics).

• **April-June 2016:** evaluation of the proposals

• **17 June 2016:** 27 proposals selected for grant agreement preparation: 13 CFM and 14 OC.

• **July-October 2016:** Grant Agreement Preparation between S2R and the CFM project coordinators (extended to September-October for OC).

• **20 October 2016:** signature of the GA for GOSAFERAIL.

• **1 October:** Start of the GOSAFERAIL project.

• **7 November:** Kick off meeting.

• **October/November:** starting of OC projects
1 - time-bound process

H2020 max. duration to Grant signature:

- Maximum **five months** from call closure date to end of evaluation - until the date of informing applicants
- Maximum **three months** to prepare grant agreement from the date of inviting (informing) applicants until the signature of the grant agreement

Thanks for your cooperation to make possible this achievement
2 - GOSAFERAIL and the Master Plan

CCA
34.57 M€ until 2024

- Long-term needs and socio-economic research
- Smart materials and processes
- System integration, safety and interoperability
- Energy and sustainability
- Human capital

GOSAFERAIL

Complementary project

IP 1
Cost-efficient and Reliable Trains, including high capacity trains and high speed trains

IP 2
Advanced Traffic Management & Control Systems

IP 3
Cost-efficient, Sustainable and Reliable High Capacity Infrastructure

IP 4
IT Solutions for Attractive Railway Services

IP 5
 Technologies for Sustainable & Attractive European Freight

S2R-OC-CCA-04-2015 GOSAFERAIL 1 298 750,00 € until 2019

S2R-CFM-CCA-03-2015 PLASA 349 453,75 € until 2018
### Specific challenge

1. **Safety:** Develop a global approach to an integrated management system for the safety of the railway system, based on a global risk assessment model

2. **Integrated mobility (smart planning):** Improvement of basic micro-level railway network simulation models and test its implementation

### Scope

1. **Safety:** Improvement of the management of the safety of the railway system based on a risk assessment approach.
   - The global approach should identify needed data, events and indicators aiming to build a statistic and predictive model highlighting the trends and potential risks;
   - Establish a state of the art in the safety management methods based on a global approach;
   - Quantify the safety improvements carried out in S2R Technology Demonstrators (TDs);
   - Propose measures to improve vehicle, human and big animal detection on tracks, and specifically on safety-critical sectors of infrastructure.

2. **Integrated Mobility (Smart Planning):**
   - Contribute to the improvement of basic micro-level simulation models and should foresee an implementation for test purposes;
   - Include the development of a punctuality prognosis based on the developed model parameters;
   - Support the development of simulation technology and automation and include support regarding fundamentals in terms of data formats and future IT-requirements;
   - Developments should be based on existing technology to ensure the preparation of an efficient pilot development and to guarantee the exploitation of the results on the long term;
   - The tools must be able to factor in failures of rolling stock and infrastructure.

### Expected impact

1. **Safety:**
   - To enable taking the good decisions to manage the safety of the railway system at a global level, in each situation;
   - To help to evaluate the impact of new equipment integrated in the existing railway system;
   - Considerable reduction of accidents on safety-critical sectors of infrastructure.

2. **Integrated Mobility (Smart Planning):**
   - To help to deliver precise railway network simulation to support railway operational planning;
   - The simulation tools are a core element in order to solve the pressing operational issues on the network and to pave the way towards a more integrated approach of railway planning and operation between the many stakeholders of the system.
• GOSAFERAIL will contribute to the achievement of the Master Plan and the MAAP objectives.

• Through the involvement of JU Members, GOSAFERAIL will constitute a good way of achieving the long-term technological demonstration programme within the Shift2Rail JU.

• GOSAFERAIL will be taken into consideration for the next annual work plans to ensure sufficient complementarity and coherence.

• Particular attention will be given to ensure that there is no duplication of work between GOSAFERAIL and future R&I activities to be launched by the JU.
GOSAFERAIL is the initial step to achieve the main objectives of CCA:

GOSAFERAIL’s deliverables will be the starting point of the CCA S2R programme.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Result</th>
<th>Practical (concrete) Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railway system life cycle cost reduction Socio – economics: Bring an understanding on how rail can be a catalyst in transformational societal changes.</td>
<td>The added value of the WA is that it opens up the railway system to a wider audience with interest in mobility but disinterested in the modes.</td>
<td>The value of Shift2Rail lies in its capacity to address the challenge to enable a better accessibility and connectivity through the delivery of a high capacity and cost effective rail system seamlessly interconnected with other modes and embedded in a local, regional and cross border context.</td>
</tr>
<tr>
<td>Line capacity increase Operational reliability increase Railway system life circle cost reduction KPI and Integrated assessment – The objective of the Integrated Assessment (IA) is to show, that the results of the JU are fulfilling the expected results of the key Shift2Rail targets and the other expected benefits – in advance, during the project run time, and after the completion of the TDs’ work.</td>
<td>Prognosis of KPIs at the beginning of the JU, as well as constant monitoring of the TDs’ progress, and a comparison of the predicted outcomes against the demonstrated results</td>
<td>KPI development anticipates a huge added value for research in the railway sector and future projects is generated. It embodies a systematic approach to the understanding of the complex interrelations in railways, which will also be useful to forecast a project’s costs and benefits. The deployment of the KPI tool for monitoring the IPs’ and TDs’ progress, enables continuous reporting and evaluation of the TDs’ progress, their influence on the Shift2Rail goals and, if necessary, prioritisation of activities.</td>
</tr>
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</table>
GOSAFERAIL is the initial step to achieve the main objectives of CCA:

<table>
<thead>
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<th>Objective</th>
<th>Result</th>
<th>Practical (concrete) Challenge</th>
</tr>
</thead>
</table>
| Line capacity increase  
Operational reliability increase  
Railway system life cycle cost reduction  
Enhanced Interoperability  
Safety, Standardisation, Smart Maintenance, Smart Materials & Virtual certification | Safety: To develop a global approach of the safety of the railway system Quantify the safety improvements carried out in Shift2Rail TDs.  
Standardisation: To transfer Shift2Rail results and outcomes of innovation activities into standards or normative documents. | The safety remains the first priority of the railway transport but the complexity and the constraints become very high. The management of safety becomes a key issue to be addressed here.  
Addressed Shift2Rail target is to remove remaining administrative and technical barriers, in particular by establishing a common approach to safety and interoperability rules to decrease costs. |

GOSAFERAIL’s deliverables will be the starting point of the CCA S2R programme.
GOSAFERAIL is the initial step to achieve the main objectives of CCA:

GOSAFERAIL’s deliverables will be the starting point of the CCA S2R programme.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Result</th>
<th>Practical (concrete) Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart Maintenance: The development of an overall maintenance concept taking into account all Smart Maintenance developments within Shift2Rail</td>
<td>Next to energy consumption, maintenance is the other driver of LCC. Lowering maintenance costs by using the new opportunities of knowledge about vehicle’s conditions by digitalisation will have strong impact on reliability, availability and LCC and thus on attractiveness and competitiveness of rail traffic.</td>
<td></td>
</tr>
<tr>
<td>Smart Materials: To explore the latest research in designing of smart materials and possibilities of applying various techniques and innovations in material science for railways.</td>
<td>Smart materials help in removing the boundaries between structural and functional materials, which may result in significant revolution in materials science development. It is a challenge for the railway sector to be on top of this development.</td>
<td></td>
</tr>
<tr>
<td>Virtual certification: reduction of authorisation costs, facilitating cross-acceptance procedure, reduction of time and cost of (sub)-Systems Authorisation Process.</td>
<td>Proposal for mixed experimental/numerical authorisation processes, resulting in less on-site testing, more lab or vehicle testing and more simulations. Common authorisation procedures including standardised lab tests, vehicle tests, on-track tests and simulations procedures. Easier cross-acceptance process, by introduction of virtual testing. Development of harmonised rules for authorisation based on mixed experimental and numerical approaches.</td>
<td></td>
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</tbody>
</table>
GOSAFERAIL is the initial step to achieve the main objectives of CCA:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Result</th>
<th>Practical (concrete) Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational reliability increase</td>
<td>Smart Mobility: To provide the basis for an open micro-level simulation, integrating planning activities and status information from the various actors within the railway system, (e.g. RU with their fleet and staff planning processes, IM whose assets are in a certain condition), to schedule planning and external parameters.</td>
<td>Enable railway stakeholders to make the best decisions for the overall system, for example concerning schedules and the availability of rolling stock and staff, based on up-to-date operational data, taking into account all essential information in order to ensure quality promised is delivered to customers.</td>
</tr>
<tr>
<td>Railway system life circle cost</td>
<td></td>
<td></td>
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<tr>
<td>reduction</td>
<td></td>
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<tr>
<td>Smart Planning</td>
<td></td>
<td></td>
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<tr>
<td>Integrated Mobility Management</td>
<td>Integrated Mobility Management I2M To specify, develop and integrate all necessary Elements into the Traffic Management System to integrate actual and forecasted Traffic Asset and Freight Operations status information into a seamless operation process</td>
<td>Challenge here addressed for Integrated mobility management is to be smart and based on a real-time seamless access to heterogeneous railway data sources (signalling data, maintenance plans, environmental conditions, fleet status, passengers requests and needs; etc.)</td>
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2 - GOSAFERAIL and the overall Shift2Rail Programme

GOSAFERAIL is the initial step to achieve the main objectives of CCA:

GOSAFERAIL’s deliverables will be the starting point of the CCA S2R programme.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Result</th>
<th>Practical (concrete) Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental sustainability</td>
<td>Deliver a standardised methodology for estimation of energy consumption by simulation and a standardised methodology for measurement of energy consumption enabling the standardised specification of energy efficient railway systems</td>
<td>Reduce the operational costs through a reduction of energy consumption.</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental sustainability</td>
<td>Develop future methods for predicting overall noise and vibration performance on a system level including both rolling stock infrastructure and its environment Ensure that the N&amp;V aspects are properly considered and integrated in all relevant Technology Demonstrators within the different Innovation Programmes of Shift2Rail</td>
<td>To reduce the annoyance and exposure to noise and vibration (N&amp;V) related to the railway sector in Europe. This will enable an increase of traffic and enhance the attractiveness of the rail as mean of transportation</td>
</tr>
<tr>
<td>Noise and Vibration Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational reliability increase</td>
<td>Increasing flexibility for both, employer and blue collar employees Making use of the benefits of digitisation and automation for job profiles and skills</td>
<td>Overcome the challenges imposed by demographic change and comprehensive and radical technological innovations</td>
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<tr>
<td>Human Capital</td>
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</tbody>
</table>
2 - GOSAFERAIL and the overall Shift2Rail Programme

- GOSAFERAIL has several links & Synergies between WAs in CCA and with other IPs and projects.

- S2R is a global programme where cross-fertilisation is crucial.
GOSAFERAIL is expected to provide access to results for the assessment of KPIs (CCA projects and related Tenders already in the pipeline) and go towards Integrated Technology Demonstrators.
2 - How to ensure that GOSAFERAIL will be successful?

• **Delivering on time** the expected results in accordance to the plan

• **Regular dialogue with the S2R Programme office** to ensure a good flow of information about the project and its progress.

• **Collaboration with the bodies of the Joint Undertaking** (in particular the CCA Steering Committee or other working groups set up by the Governing Board) will be important.

• **Coordination and cooperation** with the **complementary grants** (and other ongoing research projects) will be essential.

• **Coordination and communication** among the different **WPs**.
3 - Contractual and administrative issues

- Project factsheet
- Contractual agreements
- Grant Agreement Structure
- Consortium agreement & collaboration agreement
- Amendments
- Guarantee Fund
- Project management
3 - Project factsheet

Topic: S2R-OC-CCA-04-2015
Call deadline: 17 March 2016
Info letter sent: 17 June 2016
Grant Agreement signed: 20 October 2016
Starting date: 1 October 2016
Duration: 36 M

Maximum EU contribution: 1,298,750,00 €
Reporting periods: 2
Coordinator: GAVIN AND DOHERTY GEOSOLUTIONS LTD
Number of participants: 10
3 - Range of Contractual Agreements

- **Consortium Agreement**
  - Coordinator
  - Beneficiary x
  - Beneficiary y
  - Beneficiary z

- **Subcontractor**
- **Contract**
- **Complementary Project(s)**
3 - Grant Agreement structure

Annex 1: Description of the action part A & B
Annex 2: Estimated budget
Annex 3: Accession forms of beneficiaries
Annex 3a: Declaration joint liability of third parties
Annex 4: Model financial statements
Annex 5: Model certificate on financial statements
Annex 6: Model certificate on the methodology
3 - Consortium Agreement

- The S2R JU is NOT part of it

Key issues addressed in the Consortium Agreement:
- Management
- distribution of funds
- internal organisation of work, internal reporting
- evolution of the consortium
- IPR (to be decided before signature of contract)
- Risk management / collective responsibility
- Decision-making process
3 - Collaboration Agreement

– Collaboration Agreement to be signed between the complementary beneficiaries of OC with beneficiaries of CFM (Arts. 2 and 41.4 of the GA).

– S2R JU prepared a Model Collaboration Agreement that should normally be used as a starting point (fine-tuned by the parties to suit the specific needs).
  • If you use a different Collaboration Agreement S2R JU would appreciate to receive it as soon as available.

– It is **not required to have it signed before starting the project** but the JU encourages consortiums to initiate **contact at soonest**.

– If your collaboration entail **changes in your own project**, an **amendment** of your Description of Action may be needed.

→ More details will provided in the Coordinator day (where CFM and OC projects participate).
3 - Amendments to GA

See Article 55

• Request in **writing** (electronically)
• Only the **Coordinator** may submit an amendment request
• Amendments must not have the purpose of making changes to the agreement which might **call into question the decision awarding the grant**.
• Enlargement of the consortium to new contractors and new activities may be foreseen

• **No change of the GA needed** for the following cases:
  - changes in beneficiaries’ data (address changes, authorised representatives)
  - transfer of budget between different activities and between themselves as long as the work is carried out as foreseen in Annex 1
• A guide to amendment available through the participant portal.

• **Talk to the PM first!**
• Participant’s Guarantee Fund is established amounting to **5% of total funding contribution**
• The Guarantee Fund **belongs to all beneficiaries** of grant agreements under H2020
• Financial interests generated by the Guarantee Fund will serve to **cover against financial risks**
• The amount contributed to the Fund will be **reimbursed at the end of the final payment** after the end of the project
### Project management – payment modalities

<table>
<thead>
<tr>
<th></th>
<th>Time-to-Pay</th>
<th>From</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>One Pre-financing (50% of total funding)</strong></td>
<td>30 days</td>
<td>10 days before starting date or entry into force</td>
</tr>
<tr>
<td>→ Retention 5 % of maximum grant amount for the <strong>Guarantee Fund</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interim Payments</strong></td>
<td>90 days</td>
<td>From reception of periodic report</td>
</tr>
<tr>
<td>→ Based on financial statements, with limit = 90 % of the maximum grant amount (10% retention)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Payment of the Balance</strong></td>
<td>90 days</td>
<td>From reception of final report</td>
</tr>
</tbody>
</table>
GOSAFERAIL official Reporting periods are stated in Article 20.2 of the GA /  

Tentative schedule of project reviews to be agreed.

ARTICLE 20 — REPORTING — PAYMENT REQUESTS

20.1 Obligation to submit reports

The coordinator must submit to the JU (see Article 52) the technical and financial reports set out in this Article. These reports include requests for payment and must be drawn up using the forms and templates provided in the electronic exchange system (see Article 52).

20.2 Reporting periods

The action is divided into the following ‘reporting periods’:

- RP1: from month 1 to month 18
- RP2: from month 19 to month 36
3 - Project management - Information and communication:

See article 29
Community support shall be highlighted

- JU logo and the EU emblem to be displayed
- Disclaimer to be added on any communication (publicity reflects the author’s view and the JU is not liable of any use ...)

Right for the S2R JU to publish information on the project

- The consortium shall ensure that all necessary authorisations for such publications have been obtained

Confidentiality:

- During the project and for a period of 5 years after completion
THANK YOU FOR YOUR ATTENTION

Contact:
Info-Call@shift2rail.europa.eu

Visit our website:
http://shift2rail.org/
3.2 Overview by Coordinator
GoSAFERail

Overview

Ken Gavin, GDG
GoSAFE RAIL

• European H2020/Shift2RAIL project: Global Safety Framework for Rail Operations
• Duration 01/10/2016 – 30/09/2019
• 10 European partners
• Total Cost EU Contribution € 1,298,750
## Consortium

<table>
<thead>
<tr>
<th>Participant No *</th>
<th>Participant organisation name</th>
<th>Country</th>
</tr>
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<tr>
<td>1 (Coordinator)</td>
<td>Gavin and Doherty Geosolutions (GDG)</td>
<td>Ireland</td>
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<td>2</td>
<td>Irish Rail (IÉ)</td>
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<td>3</td>
<td>Roughan O’Donovan Innovation Solutions (ROD)</td>
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<td>Infraplan Consulting (IF)</td>
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<td>Croatian Railways (HŽ)</td>
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<td>Norwegian Geotechnical Institute (NGI)</td>
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<td>9</td>
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<td>10</td>
<td>Virtus IT (VT)</td>
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Challenge

Fatality risk passenger transport (EU-27 in 2008-2010)

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<tr>
<th>Transport Mode</th>
<th>Fatalities per billion passenger km’s</th>
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<tr>
<td>Airline</td>
<td>0.1</td>
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<tr>
<td>Rail</td>
<td>0.16</td>
</tr>
<tr>
<td>Car</td>
<td>4.45</td>
</tr>
<tr>
<td>Bus/Coach</td>
<td>0.43</td>
</tr>
<tr>
<td>Motorised two-wheel</td>
<td>52.59</td>
</tr>
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</table>

Despite the very encouraging safety record, a number of high profile failures of rail infrastructure have occurred in recent years, with the incidence appearing to increase in response to climate change challenges and aging networks amongst other factors.
Challenge

Collision at level crossing, Netherlands, 2016

Derailment St. Moritz, 2014

Rockfall on Zagreb-Split track, Croatia, 2014

Flood damage, UK, 2014
Challenge

- ageing rail infrastructure with 95% of the network having been built before 1914

- EU transport policy:
  - to increase the productivity of existing rail networks,
  - prioritise renewal and optimise new sections to reduce bottlenecks,
  - increase productivity and achieve a switch from freight transport by road to rail.
Project Aim

**Global Railway Safety Framework**

- **Optimal maintenance strategies**
  - Integrated mobility

- **Decision Support Tool**
  - Smart Planning

- **Data updating (e.g. railML, SHM data)**
  - Machine learning
  - Artificial intelligence

- **Risk-based Optimisation**
  - Probabilistic Modeling
  - Network capacity modeling
Project structure

WP 1 Risk Assessment Methodology
1.1 Identification of Global Safety KPIs
1.2 Monitoring Systems
1.3 Assessment and Ranking of Risks

WP 2 Mobility
2.1 Micro-planning simulation models
2.2 System testing (punctuality prognosis)
2.3 Big data integration
2.4 Data management standard

WP 3 Decision Support Tool
3.1 Global Safety Management Model
3.2 Validation and training of the model
3.3 Visualization
3.4 Decision Support Tool

WP 4 Demonstration and Implementation
4.1 Case study 1 – long distance corridor TEN-T
4.2 Case study 2 – complex urban network
4.3 Guidelines for implementation in practice
Concept

Evolutionary Decision Support Tool: The overall concept is the development of a decision support framework that self-learns (evolves) based on machine learning algorithms and artificial intelligence.
Near-Miss Concept: The key to successful implementation of machine learning is data. Consequence of the low number of failures experienced on the railway network is that training (learning) on such a statistically insignificant dataset is not possible.
Concept

**Microsimulation Modelling:** multi-criteria optimization algorithms to address complex requirements (passengers and freight transport)

- To use Open Track tool for micro-simulations, to deal with dispatching rules, connections between trains and circulation of train sets.
- To provide the support to IMs in order to achieve maximum amount of time slots for railway undertakings and for punctual operation.
- To simulate the behaviour of the reality to prove that the optimization algorithm provides suitable solutions within a short period of time.
Object Detection: specifically on safety-critical sectors of infrastructure, such as level crossings, bridges and tunnels', and on open-tracks by:

- developing a new train mounted multiple sensor system
- use of embedded geophones to detect avalanches through the generated seismic waves
Demonstration projects

- Demonstration site in Croatia for multi-sensor monitoring system
- Demonstration site in Norway for landslide early warning system
- DST on the network level in Croatia and complex partial regional network in Ireland
Deliverables

- Global safety framework / DST
- Improved micro-simulation model
- Object detection report
- Data management standard
- Modular open source repository
- Guideline documents
Administrative

• Please ensure you refer to Shift2Rail JU when referring to the EC

• “complementary grant” (project acronym “PLASA”, reference number 730814) larger focus on traffic flow modelling. We will sign a collaboration agreement
Thank you for your attention!
3.3 Work Package 1
GoSAFE Rail
Work Package 1
Risk Assessment

Lorcan Connolly, ROD-IS
Task 1.3: Risk Assessment

• Current assessment methods
  • Rely on visual inspections
  • Deterministic Approaches
  • Disparate in Nature

• Work Package 1
  • To develop set of universal railway safety key performance indicators.
  • To develop monitoring system for obstacle (vehicle, human and big animal) detection on tracks
  • Developing a global safety framework underpinned by probabilistic risk calculations for a range of assets.
Key Tasks

• T1.1 Identification of Global Safety KPIs (IF)
• T1.2 Monitoring Systems:
  • Obstructions (UZ)
  • Landslides (NGI)
  • Infrastructure objects (ROD-IS)
• T1.3 Assessment and Ranking of Risks (ROD-IS)
Task 1.3: Risk Assessment

- Actual bridge performance
- Ideal bridge performance
- Assessment & preventative actions
- Increased required performance (e.g., load increase)
- Minimum acceptable performance level
- "Do nothing option"
- Assessment & corrective action
- Intended Service Life
Task 1.3: Risk Assessment

1. **Deterministic Assessment**
   - Define required Reliability Index $\beta_t$
   - Model variables stochastically

2. **Compute Reliability Index $\beta$**
   - Increase Allowable Load?
   - Reduce Allowable Load?

3. **Decision Points**
   - $\beta < \beta_t$?
   - Is $\beta = \beta_t$?
   - $\beta < \beta_t$?

4. **Classification Achieved**
   - Sensitivity Analysis
   - Incorporate Updated / Additional Information
Task 1.2: Monitoring Systems

The Boyne Viaduct

- Triaxial Accelerometers
- Rosette Strain Gauges
- Currently data available for 35 days
- 843 events with 724 train events
Deliverables

• D1.1 Report on railway global safety indicators (M 6)
• D1.2 Pre-standardisation document for advanced risk assessment of railway infrastructure (M 12)
• D1.3 Report on monitoring system for obstruction detection (M 18)
• D1.4 Report on microseismic monitoring and early warning system (M 18)
• D1.5 Report on monitoring data usage for infrastructure objects (e.g. bridges, slopes) for risk assessment (M18)
• D1.6 Report: Risk assessment & risk ranking (M 20)
Milestones

- M1.1 Establishment of a unified database of railway global safety indicators (M3)
- M1.2 Probabilistic assessment framework (M6)
- M1.3 Selection of site in Croatia for multi-sensor monitoring system testing (M6)
- M1.4 Selection of site in Norway for testing of microseismic monitoring and early warning system (M9)
- M1.5 Risk assessment & risk ranking framework (M 12)
- M1.6 Demonstration of multi-sensor monitoring system (M15)
- M1.7 Demonstration of microseismic monitoring and early warning system (M15)
Thank you for your attention!
3.4 Work Package 2
GoSAFE RAIL WP2

Andreas Schöbel, ORT
Motivation

Lüthi, 2009
Tasks & Responsibilities

• T2.1 Micro-planning simulation (ORT, HŽ, UZ, IE)
• T2.2 System testing in terms of punctuality (ORT, UZ, HŽ, IE)
• T2.3 Big data integration (CT, VT, IE, HŽ)
• T2.4 Data management standard (CT, VT, IE, HŽ)
Deliverables & Milestones

• D2.1 Report on integration of algorithm into micro-planning simulation (M 15)
• D2.2 Report on big data integration (M 18)
• D2.3 Data management standard (M21)
• M2.1 Selection of case study in collaboration with HZ (M6) … Rijeka - Zagreb is mentioned in the proposal for WP4
• M2.2 Testing of integration of algorithm into micro-planning simulation (M9)
• M2.3 Evaluation of punctuality on case study (M15)
• M2.4 Demonstration project of big data integration (M14)
Data Flow in Microsimulation

Input
- Rolling stock
- Infrastructure
- Timetable

Simulation
- Interactivity
- Animation

Output
- Diagrams
- Train graph
- Occupations
- Statistics
Structure of railML
Tools already using railML
Technical Concept

**Microsimulation Modelling:** multi-criteria optimization algorithms to address complex requirements (passengers and freight transport)

- To use Open Track tool for micro-simulations, to deal with dispatching rules, connections between trains and circulation of train sets.
- To provide the support to IMs in order to achieve maximum amount of time slots for railway undertakings and for punctual operation.
- To simulate the behaviour of the reality to prove that the optimization algorithm provides suitable solutions within a short period of time.
Thank you for your attention!
3.5 Work Package 3
GoSAFE Rail
WP 3 Decision Support Tool

Irina Stipanovic,
INFRA PLAN konzalting
Project structure

WP 1 Risk Assessment Methodology
1.1 Identification of Global Safety KPIs
1.2 Monitoring Systems
1.3 Assessment and Ranking of Risks

WP 2 Mobility
2.1 Micro-planning simulation models
2.2 System testing (punctuality prognosis)
2.3 Big data integration
2.4 Data management standard

WP 3 Decision Support Tool
3.1 Global Safety Management Model
3.2 Validation and training of the model
3.3 Visualization
3.4 Decision Support Tool

WP 4 Demonstration and Implementation
4.1 Case study 1 – long distance corridor TEN-T
4.2 Case study 2 – complex urban network
4.3 Guidelines for implementation in practice
Concept

Evolutionary Decision Support Tool: The overall concept is the development of a decision support framework that self-learns (evolves) based on machine learning algorithms and artificial intelligence.
Objectives

• To develop a decision support tool to support *infrastructure and operations managers* to plan railway network *assets and operations* in an *integrated manner*

• Collaborative decision making activities between operations and infrastructure managers.

• Systematic integrated mobility that allows for *quick micro-simulation based experiments* to understand different network conditions and intervene appropriate and timely
• based on:
  – an information management system that supports different existing standards, such as RailML, IFCRail, and CityGml.
  – a modular GIS based graphical user interface that allows collaborative interactions with the micro-simulation within a web based decision support environment
  – GIS based visualization modules that represent outcomes of micro-simulations, machine learning efforts, and corresponding heuristics to decision makers.
• Task 3.1 Framework for Global Safety Management (GDG, CT, ORT, IE, HZ)
• Task 3.2 Validation and training of the model (VT, CT, IE, HZ)
• Task 3.3 Information Management and Visualization (CT, GDG, IF, VT)
• Task 3.4. Decision Support Tool (IF, CT, GDG, ROD, IE)
Task 3.1 Framework for Global Safety Management (GDG, CT, ORT, IE, HZ)

- A Global Safety Management Framework will be developed in this task. The first step will be to integrate risk assessment frameworks from a number of asset categories including; Slopes and retaining walls (GDG), Level Crossings and Bridges (GDG), Tracks (IF) and Tunnels (HZ). Considering the integration of network flow ORT will advise on consequence and the two rail companies (Irish and Croatian Rail) who are both IM’s and RU’s will provide advice on implementation. The framework developed within the project will be fully compatible with the European Railway Agency’s Safety Management System (SMS WHEEL).
Task 3.2 Validation and training of the model (VT, CT, IE, HZ)

- Artificial Intelligence algorithms will be implemented to compare the outputs from the Risk Models (in terms of infrastructure performance) and the network model (in terms of travel times/disruptions etc.) and use the performance as a means of model improvement. This testing will be done at range of scales using data obtained from Irish Rail. An integrated approach for a quality-oriented operational railway planning will be developed within this task and implemented on Irish and Croatian railway network.

- Integration of the automatic train control systems, which continuously monitor all train movements and provide fail-safe signalling, will be tested against railway network simulation models.
Task 3.3 Information Management and Visualization (CT, GDG, IF, VT)

- This task will develop four java script based Open Source modules that can be used for the development of web based decision support systems that follow the technical and process innovations of Project Acronym:
  - an information management system that integrates different existing information model standards for representing all aspects of a rail network (RailML, IFCRail, City GML). The information management system will be based upon a graph database which allows the streamlined storage of large network based data.
  - A GIS based rail network visualization module to visualize railway network and object based railway information. For the development of the visualization the state-of-the-art web based Cesium browser will be used.
  - A GIS based rail network modeller that allows for the visual interaction with the OpenTrack micro simulation environment
  - A data visualization library for presenting the outcomes of micro-simulations and machine learning efforts. Both GIS based visualizations as well as graph based visualizations will be provided that can be combined in custom information views.
Task 3.4. Decision Support Tool (IF, CT, GDG, ROD, IE)

- A Decision Support Tool (DST) will be developed, which will help infrastructure managers and railway undertakings make robust, cost-effective decisions that increase safety and maximize the network capacity. The decision making process in the context of dealing with a number of previously identified and ranked risks. The tool will be developed to ensure that outputs of WP1 (risk assessment and monitoring) and WP2 (mobility) are practically integrated and used under specific process workflows and modules.
Task 3.4 DST

- Demonstration → WP 4
- tested at two levels on selected sections of the TEN-T network (see task 4.1 and 4.2).
- The DST should form the basis for the development of ‘pre-standard’ or benchmark guidelines, See Task 4.4 that can be used by infrastructure managers and railway undertakings to support robust development measures which ultimately mitigate multiple risks that are associated with aging railway networks, increased traffic and climate change impacts, along with decreasing maintenance budgets.
DST

• The DST will use the innovative Graphical User Interface features for executing contextual risk management workflows for strategic decision-support, that take on board EU regulations and ISO standards. This work package will be conducted in close collaboration with partners in WP4 in which the tool will be demonstrated.
Deliverable

• D3.1 Report on Global Safety Framework (M10)
• D3.2 Report on validation and training of the model (M16)
• D3.3 Report on Information Management System (M20)
Deliverable

• D3.4 Modular open source repository with documentation: RailML/IfcRail/CityGML information management system; GIS based rail network visualization; GIS based network modeller; micro-simulation/machine learning visualization (M27)

• D3.5 Report on the Decision Support Tool (M30)
## Deliverables

<table>
<thead>
<tr>
<th>Del. Number</th>
<th>Deliverable name</th>
<th>WP No.</th>
<th>Short name of lead participant</th>
<th>Type</th>
<th>Dissemination level</th>
<th>Delivery date (in months)</th>
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Milestones

- M3.1 Workshop on Global Safety Framework with IM’s and RU’s (M6)
- M3.2 Integration of IMS into the DST (M16)
- M3.3 DST tool to be tested at railway agencies (M18, M22)
Thank you for your attention!