



## Project presentation

**Project Coordinator**

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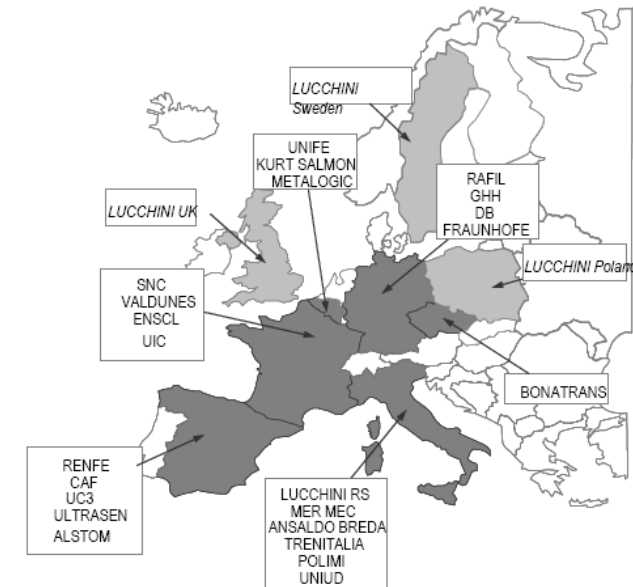
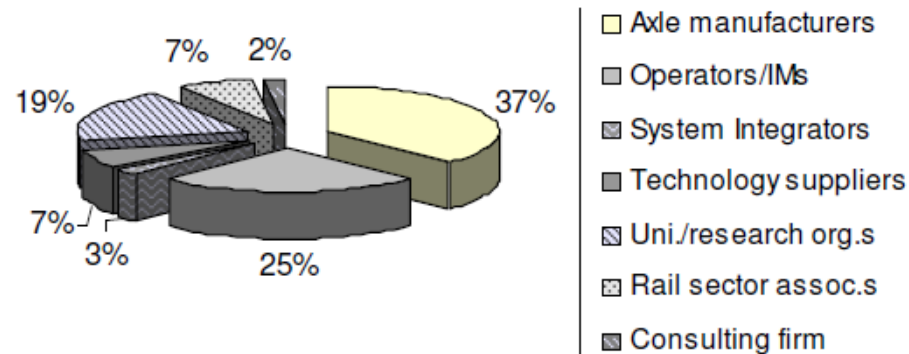
## Main Objectives

The **EURAXLES** project (Duration Nov. 2010 – Oct. 2013) proposes a global concept approach for axles design, production and maintenance including:

1. a new fatigue design approach, coupled with a consistent numerical calculation methodology which predicts the probability of failure of an axle;
2. an improved design of the axles for roughness including the development of innovative painting and coating solutions with regard to environmental requirements;
3. simplified improved/new non-destructive testing techniques that will allow accurate inspection under the train without any disassembly and train stopping for several days.

**RAMS and LCC analyses** undertaken in this research project will allow a cost benefit comparison of the proposed solutions for an optimised market uptake.

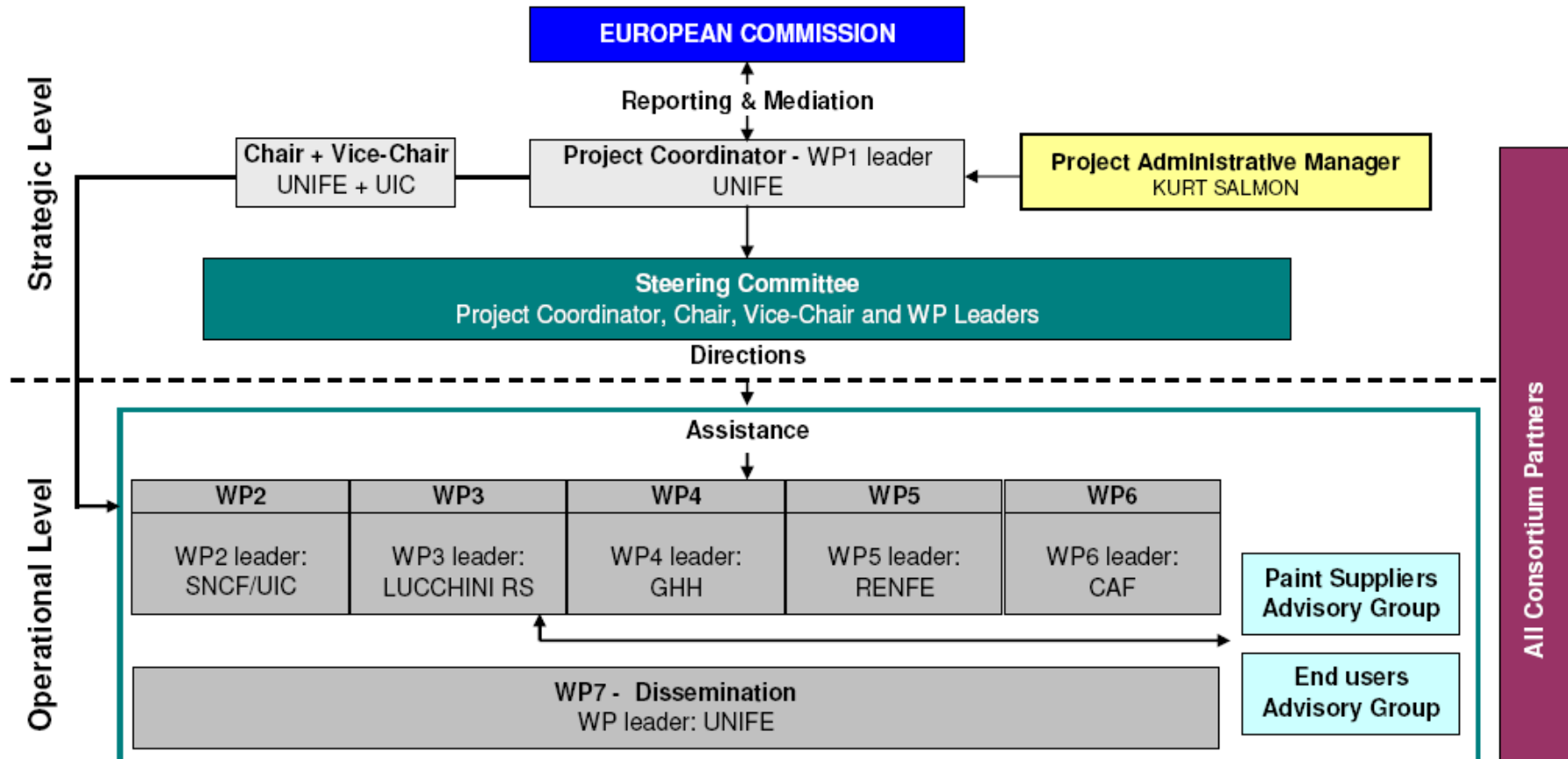
## Consortium



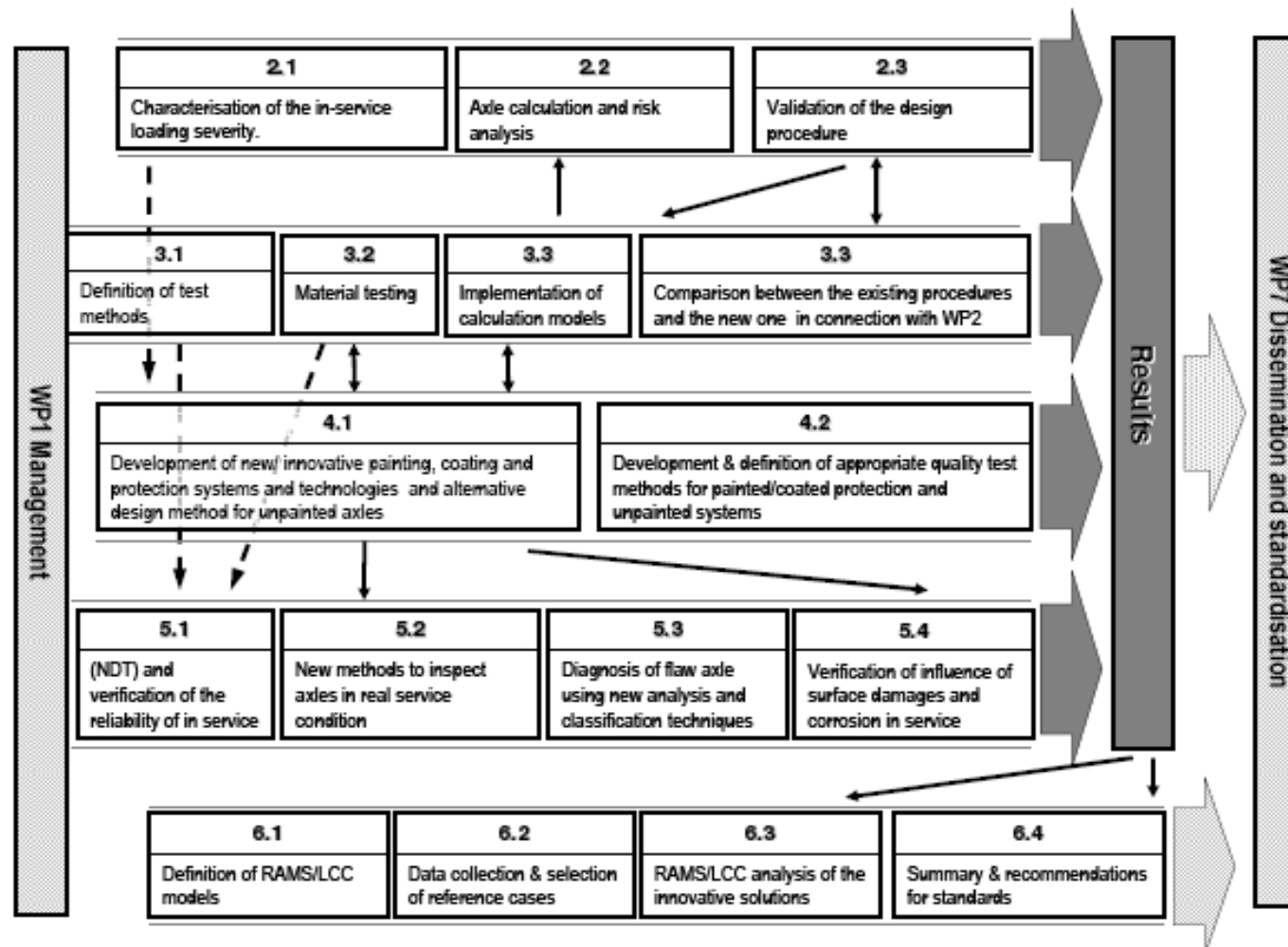
23 partners across Europe including 6 axle manufacturers, 4 railway operators/IMs, 2 system integrators, 3 technology suppliers, 5 universities, 2 rail sector associations and 1 consulting firm



# Management Structure



Develop communication between Euraxles partners,  
between WPs and with SC.



## Objectives of the WP2 “New axle fatigue design method”

To better monitor the axles' fatigue limit (safety)  
within a context of the introduction of innovations and possible evolutions of the  
usages (progressive market opening, traffic, velocities, etc.)

- To develop a methodology to characterize in-service loads severities and compare them to the normative loads
- To develop numerical axle modelling using the finite element method and to analyse the main existing fatigue criteria which can be used to design axles, in order to give some recommendations on the numerical models built-up and develop a commonly accepted numerical validation process
- To develop a consistent methodology which estimates the probability of failure of an axle, taking account of the load variability and the components' strength scattering, to make a correlation with the standards EN13103/13104 and give recommendations for its revision if necessary

## Objectives of WP 3 “New Testing Methods of Railway Axle Fatigue Limit Assessment”

- To use predictive methods to verify that the empirical fatigue parameters described in the design and product specification European Standards for axles and wheel-sets (EN13103, EN13104, EN13260, EN13261) are valid for new materials and axle types;
- To predict the probability of failure associated to the various fatigue limits on axles produced today by the European manufactures;
- To revise the stress concentration factors associated to various geometry grooves or transition sections subjected to cyclic fatigue.
- To determine the fatigue resistance associated with parameters regarding geometries and compositions of press fitted parts.
- To determine the influence of surface and coating quality on the fatigue resistance that is not clearly described in the Standards
- To facilitate the introduction of innovative materials.
- To obtain at the end of the project all the necessary information to revise the present Standards to enable a more optimised and safe design.
- To validate innovative design procedures developed in WP2



## Objectives of the WP 4 “Tools, technologies and surface protection systems minimizing the negative influence of corrosion or surface damage on the free axle surface”

- Develop new reliable methods for improvement of the adhesion behaviour of water based painting systems applied on axles with various surface roughness conditions; new requirements for the paint process technology
- Investigate innovative painting and coating systems, introducing more environmentally friendly technologies and reducing VOC pollution versus traditional methods
- Define the requirements for new alternative design method recommendations without a necessary painting system and for innovative treatment solutions
- Investigate the alternative quality test methods for the painting/coating and protection systems to meet a quality standard under consideration of the realistic operating conditions
- Implement the results into the rules for new production and maintenance of wheel-sets and act as a guideline for more cost/time efficient wheel-set production, maintenance and repair
- Improve and revise the European standards for wheel-sets by deriving recommendations concerning design and product requirements.



## Objectives of WP5 “Non Destructive Testing (NDT) and verification of the reliability of axles in service”

- Identification, evaluation and improvement of the current methods and technologies used for preventive maintenance of railway axles.
- To define optimal technologies and methods for reliable preventive detection of critical defects in railway axles.
- To identify predictive techniques and methodologies for on-board continuous measurement for reliable preventive detection of critical defects in railway axles.
- To verify the influence of surface damage and corrosion in service using standard electrochemical and other NDT techniques.

## Objectives and tasks of the WP6 “RAMS and LCC taking into account market uptake”

- The main objective of this work package is to review and analyse the market uptake of different solutions to minimize the risk of failure of axles developed during the present project.
- The assessment will follow RAMS/LCC methodologies, a recognized method for assisting optimisation process in engineering systems.
- Specific objectives:
  - To define a set of RAMS/LCC models which will serve as a base for the comparison of the different solutions developed in the project.
  - To perform a comparative analysis of the different innovative solutions based on RAMS and LCC parameters in order to determine the most promising solution for a particular desired application.
  - To derive recommendations for future revisions of European Standards concerning the design and maintenance of railway axles.

## Objectives and tasks of the WP7 “Dissemination and exploitation of results”

- To set up a dissemination strategy and tools to facilitate widespread information transfer among and beyond the members of the consortium;
- To ensure the project outputs reach the relevant rail stakeholders who will implement them;
- To ensure the project output reaches targeted decision makers at EU and national level for input in the standardisation and regulation work;
- To guarantee the delivery of high-quality results and sound technical solutions with the help of advisory groups.

## Expected results

Due to the strategic nature of this project with respect to environmental and industry standards and aided by the key role of many EURAXLES partners in standards working groups, certain deliverables will be transmitted to European standardisations and regulations bodies to affect specific European Norms and regulations Technical Specifications for interoperability.

UNIFE/UIC **TecRec** standard will apply where relevant ([www.tecrec-rail.org](http://www.tecrec-rail.org))



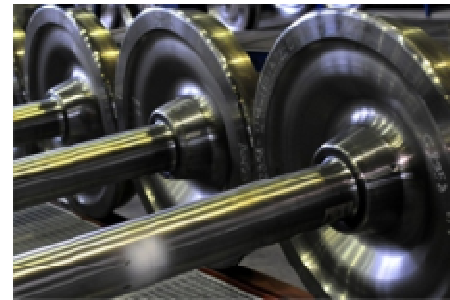
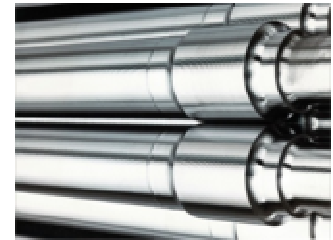
### Reference to specific standards:

- European standards for the **design** and **fatigue strength assessment** of axles: EN 13103 (Railway applications - Wheelsets and bogies - Non powered axles - design guide) and 13104 (Railway applications - Wheelsets and bogies - Powered axles - Method of design)
- European standards regarding **product requirements** among other things concerning **protection against corrosion** and **mechanical aggression, fatigue strength and fatigue life of the axles**: EN 13260 (Railway applications - Wheelsets and bogies - Wheelsets - Product requirements) and EN 13261 (Railway applications - Wheelsets and bogies - Axles - Product requirements)
- European standard for **maintenance**: EN 15313 (Railway applications - In service wheelset operation requirements – In-service and off-vehicle wheelset maintenance)

## EURAXLES a new start built on continuity...

EURAXLES will use some of the results of the following projects:

1. WIDEM FP6 (2005-2008)
2. EBFW I (2000-2004)
3. EBFW II, started as DEUFRAKO project (2004-2008)
4. EBFW III (planned for 2011-2015)
5. SOR, financed by UIC
6. Wolaxim



# For more information

Please visit: [www.euraxles.eu](http://www.euraxles.eu)

