

# Future requirements for vibration mitigation

---

DB AG

---

Dr. Bernd Asmussen

---

TTZ 112

---

München, 27.10.2010

# Future requirements for vibration mitigation

## What's the problem ?

- **Public sensitivity to vibration issues has increased in recent years.**
- **While noise is an issue for all modes of transport, vibration is specific to rail and therefore stands out all the more as a criticism of rail transport.**
- **Opposition to new lines is as much about the effects of vibration as about noise.**
- **Vibration mitigation features heavily in the cost of railway infrastructure projects**
- **Complaints about vibrations and vibration-induced noise increase where line-side noise is reduced, e.g. using barriers**
- **Lack of established solutions for vibration from surface railways**

**Ensure that in the coming years the expansion of rail transport in the EU is not hindered by public opposition on the grounds of vibration.**



**Innovative solutions for hot-spots**



**Low-vibration vehicles**

# Future requirements for vibration mitigation

Efficient vibration mitigation requires:

**Reliable modelling tools for the planning process**

- optimum choice of mitigation measures
- avoid over-engineered vibration reduction measures

+

**Toolbox of highly efficient vibration reduction technologies**

- Rail fastening system,
- Under sleeper pads,
- Soil stiffening,
- Trenches,
- Low vibration slab track,
- Low vibration vehicles,
- Vehicle & track maintenance,
- ....

+

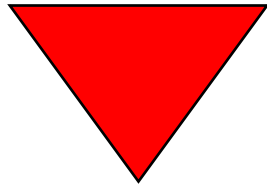
**Clear procedures for the assessment of the available technologies**

- Physical parameters
- Comparability of different options
- Human perception

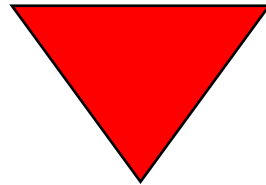
High demand for future activities particularly on European scale

# Future requirements for vibration mitigation

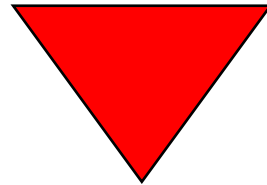
The R&D activities must follow the requirements from the end users



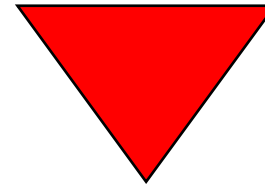
Track



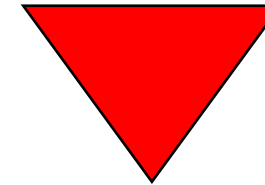
Subgrade



Transmission



Vehicle



Maintenance

R & D priorities have to be defined according to the contributions of the subsystems to the overall target

## Other Criteria:

- **Costs for implementation**
- **Life Cycle Costs**
- **Lead times**
- **Compatibility with system requirements (safety, maintenance etc. )**
- **Retrofit option**

# Future requirements for vibration mitigation

## 7th EU framework programme – 3rd call: Attenuation of ground-borne vibration affecting residents near railway lines

- ⌘ Definition and validation of procedures for the evaluation of annoyance and exposure to vibration
- ⌘ Development of cost-efficient and industrially viable technologies, concepts and prototypes for the mitigation of vibration and of vibration induced noise
- ⌘ Reduction of vibration *creation at source* through improved vehicle/track interactions,
- ⌘ Improved maintenance strategies for track and rolling stock
- ⌘ Development of designs, components or new techniques - including track irregularities, maintenance of wheel shape, rolling stock and track design
- ⌘ Reduction of vibration emission from the infrastructure and transmission in the ground
- ⌘ Establishment of test procedures to efficiently monitor and control the performance of vibration mitigation measures under realistic conditions
- ⌘ Establishment and validation of engineering tools to assess the efficiency of rolling stock- and infrastructure-based mitigation measures

# Future requirements for vibration mitigation



railway induced vibration abatement solutions

## End users

- ADIF
- DB
- RATP
- SBB
- SNCF
- Trafikverket
- UIC

## Suppliers

- Alstom
- Bombardier
- Heitkamp
- Keller Grundbau
- Lucchini
- Pandrol
- Railone
- Sateba
- UNIFE

## Research institutes

- BAM
- CEDEX
- Chalmers Univ.
- CSTB
- ISVR
- KU Leuven

## Other

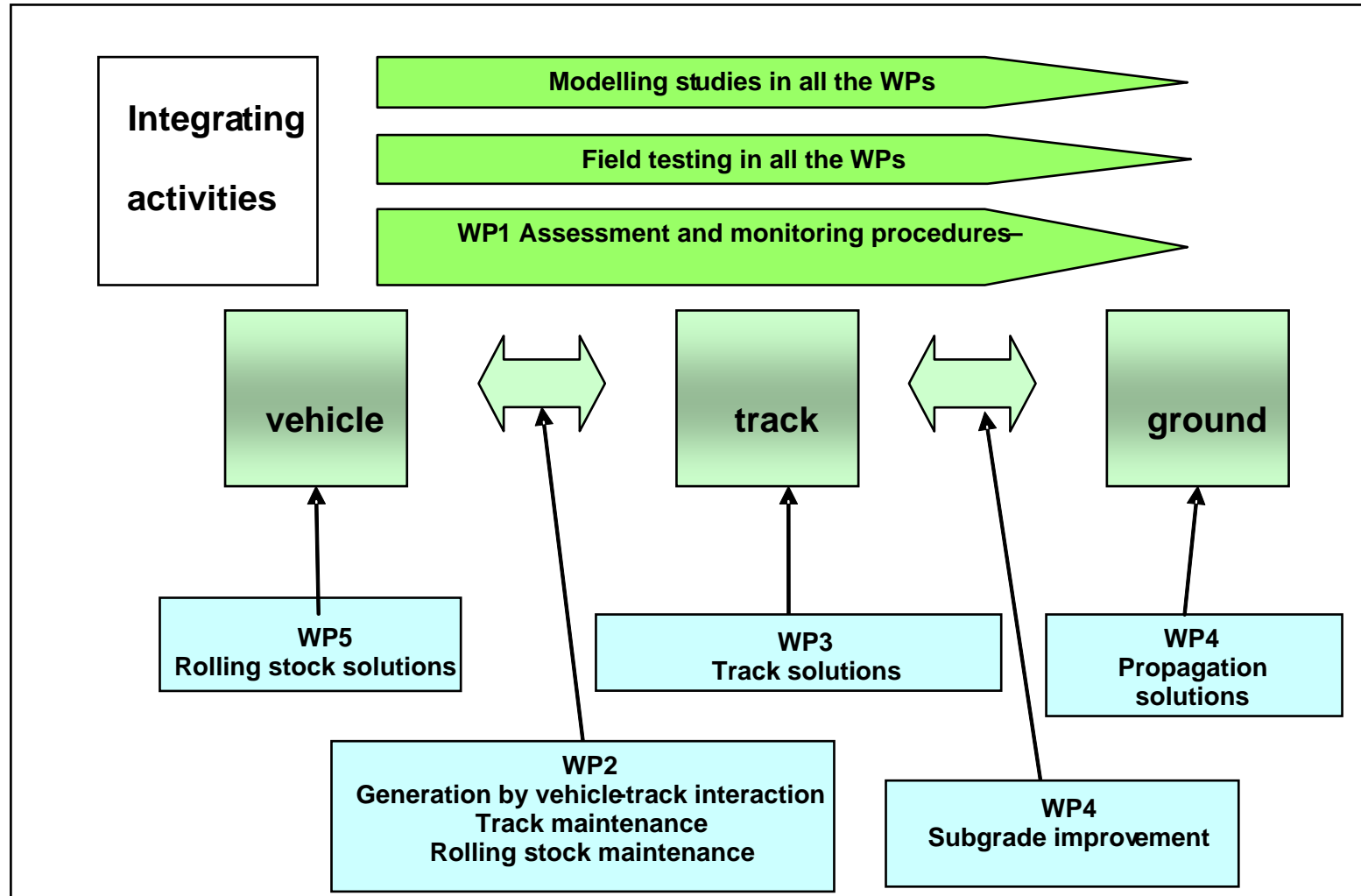
- D2S
- Satis
- TÜV Rheinland
- Vibrattec

# Future requirements for vibration mitigation

## Focus and main objectives of RIVAS:

- Freight traffic. This includes:
  - freight wagons
  - locomotives typical for freight traffic
  - infrastructure characteristic for the major freight routes in EuropeWhere technically feasible, developments shall be applicable also for other modes of rail traffic.
- Open lines; several established mitigation measures especially dedicated to tunnels already exist which, however, cannot be similarly applied to open lines because of stability and other problems
- Activities will be driven by end user organisations to ensure that the project results will meet the specific requirements of the end- users
- Reduction of vibration excitation at source and on the propagation path
- Development of innovative solutions for vibration mitigation technologies. This will include the rail fastening system, resilient elements for track and subgrade, and the rolling stock.
- Solutions will be developed mainly for ballasted track. Slab track is included as option for replacing ballasted track
- Development of cost effective test procedures
- Validation of mitigation measures in laboratory tests and field tests

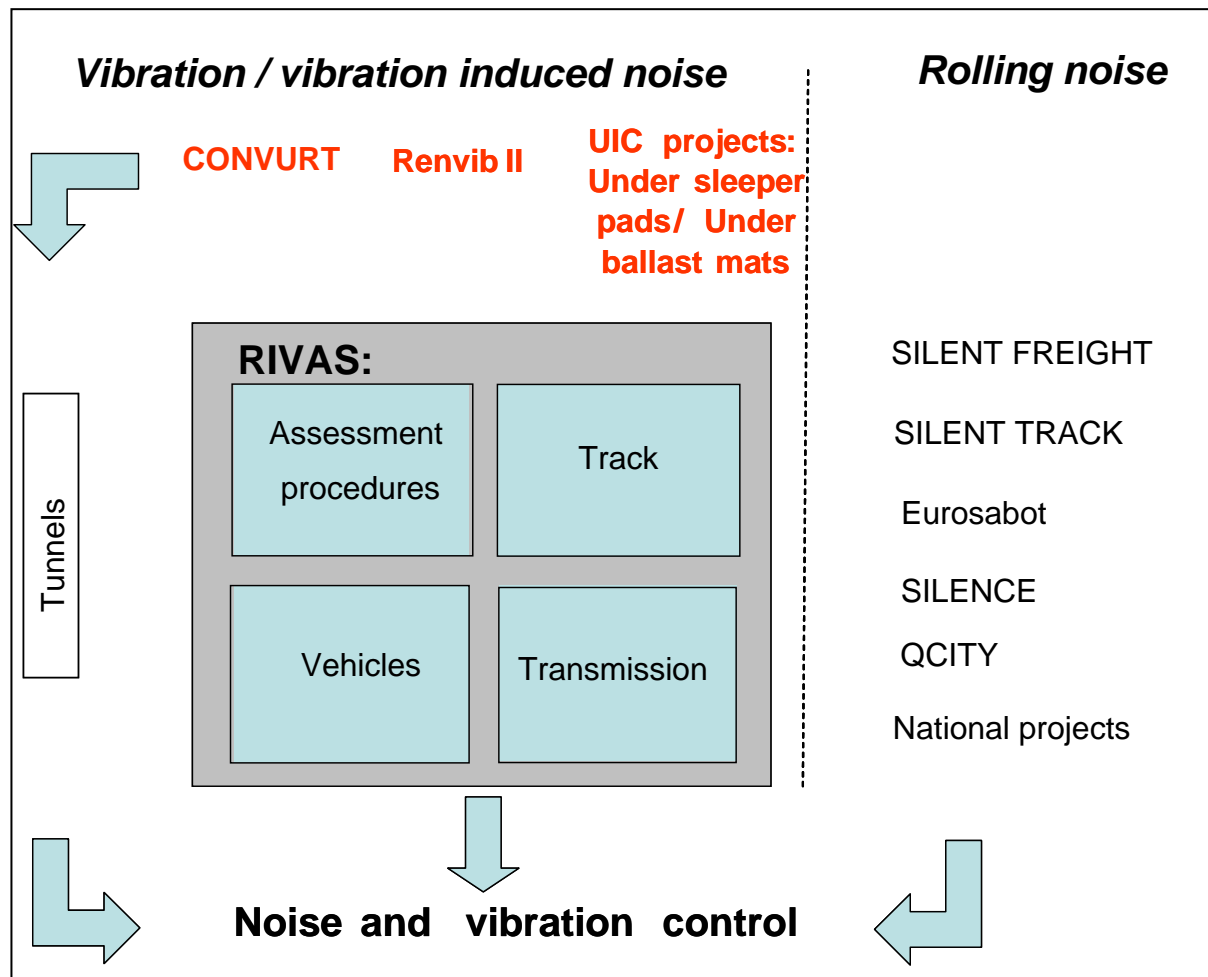
# Future requirements for vibration mitigation





# Future requirements for vibration mitigation

## Interaction with other projects

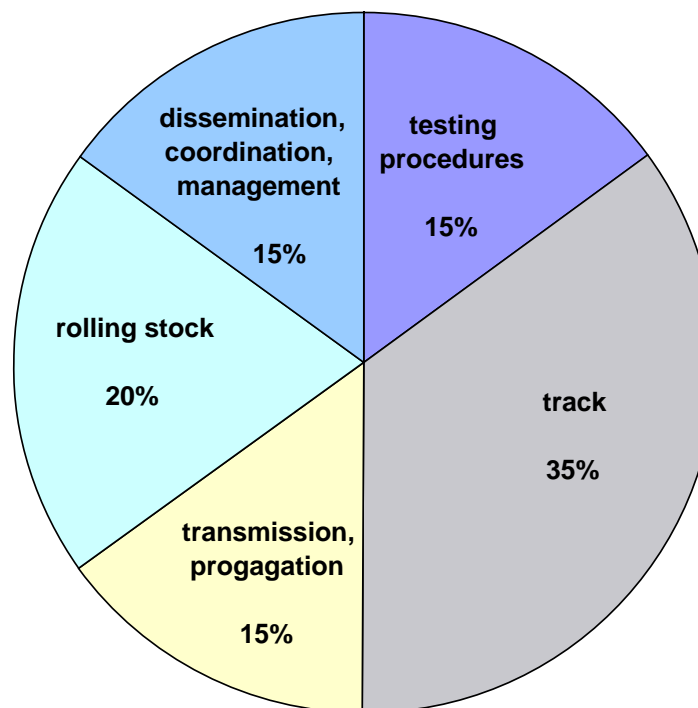


# Future requirements for vibration mitigation



**Total budget:** 9 Mio€  
**Start:** 2011  
**Duration:** 3 years

## Distribution of effort:



**Thank you very much  
for your attention**