

RIVAS Workshop, Madrid

WP 1 Assessment and Monitoring Procedures

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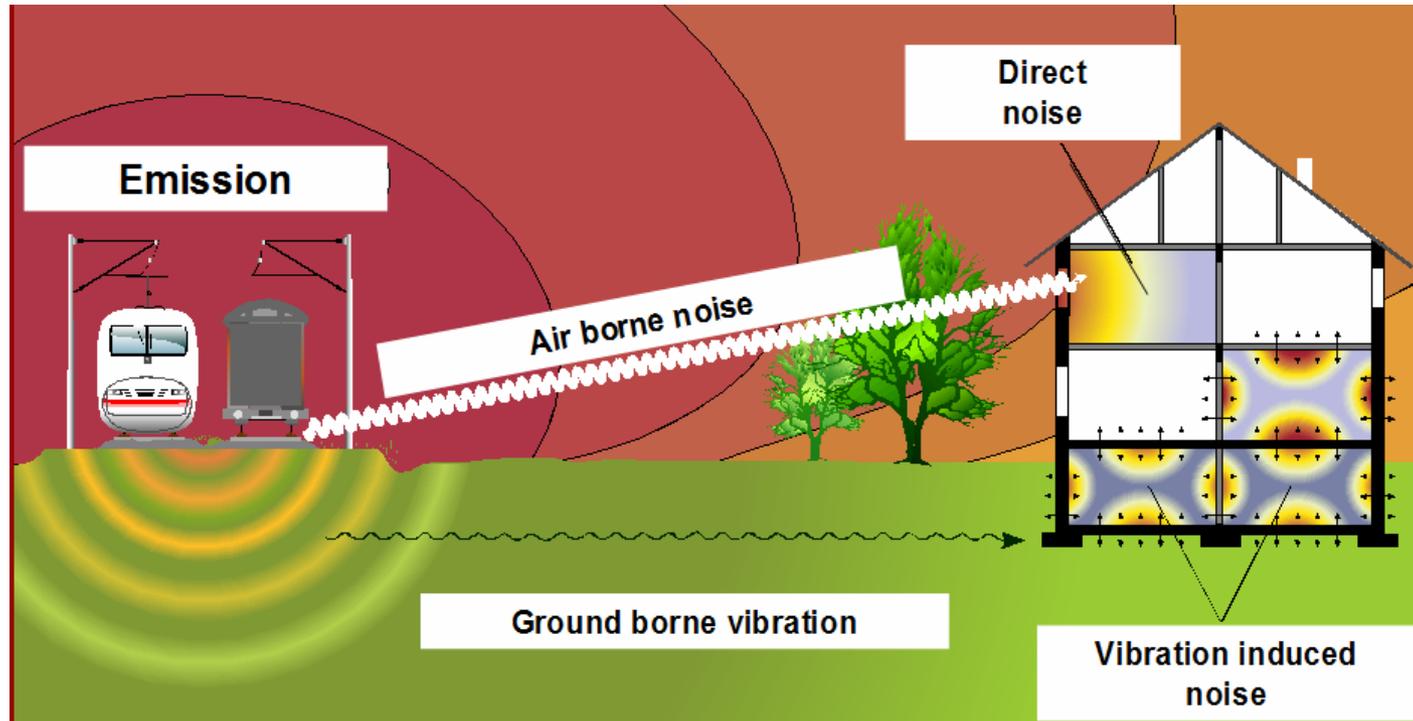
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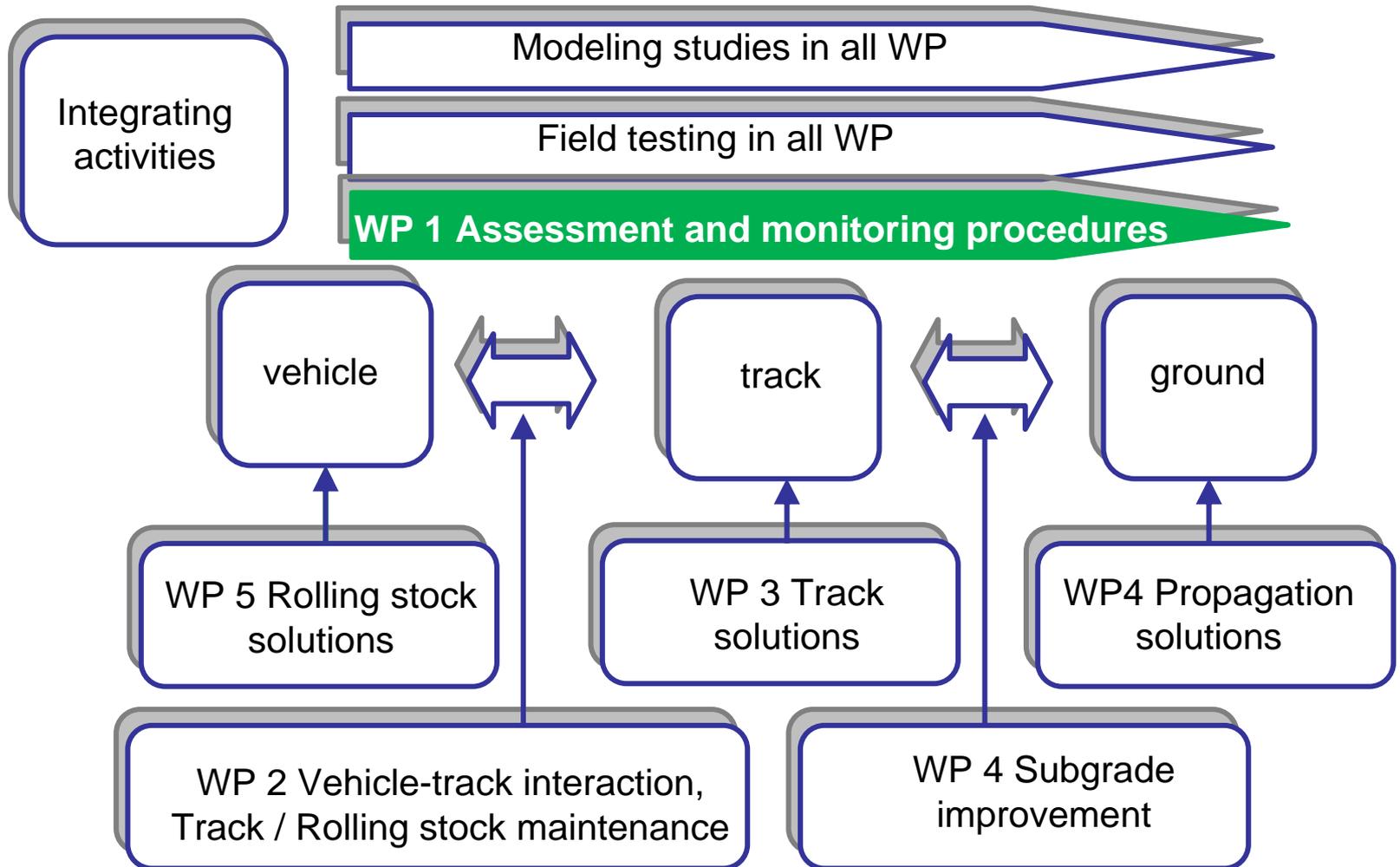
Introduction

Example

Overview

Summary





Infrastructure Managers / Railway Undertakings:

SBB (Swiss) SNCF (France) RATP (France)
Adif (Spain) DB (Germany) TV (Sweden)

R&D Partners:

VTC (France) CSTB (France)
Cedex (Spain) D2S (Belgien)
Satis (NL) KUL (Belgien)
ISVR (UK) BAM (Germany)

Manufacturer: BT (Sweden)

Partners

Task 1.1
Assessment of
human exposure
(CSTB)

WP 1
**Assessment and
monitoring procedures
(DB)**

Task 1.4
Reference track
dynamics for optimized
vehicle design (Satis)

Task 1.2
Assessment of
mitigation measure
performance (DB)

Task 1.3
Assessment of the influence of the soil
on the performance of mitigation
measures (KUL)

Struc- ture

Contents:

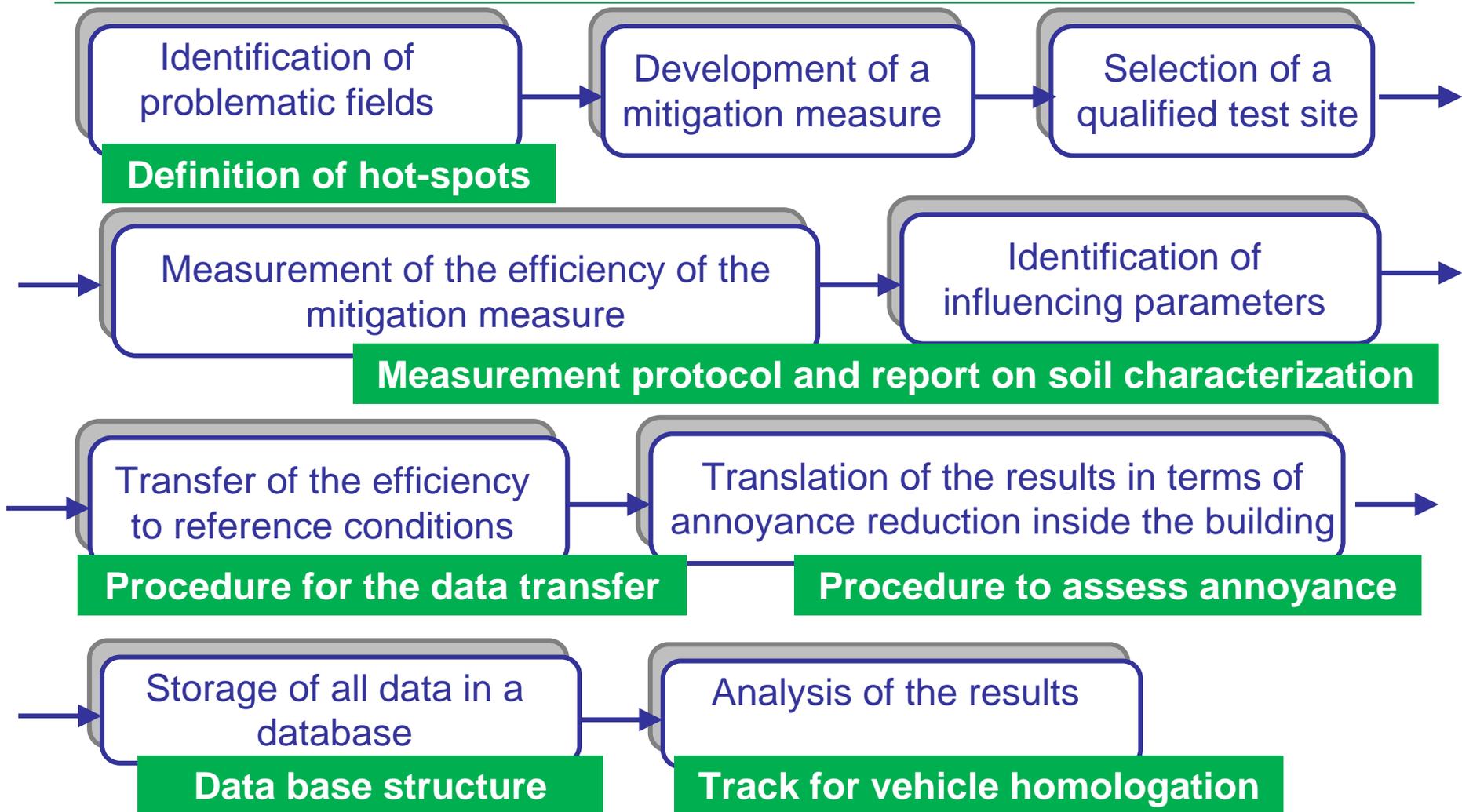
Introduction

Example

Overview

Summary

Example: Development of a mitigation measure



Example

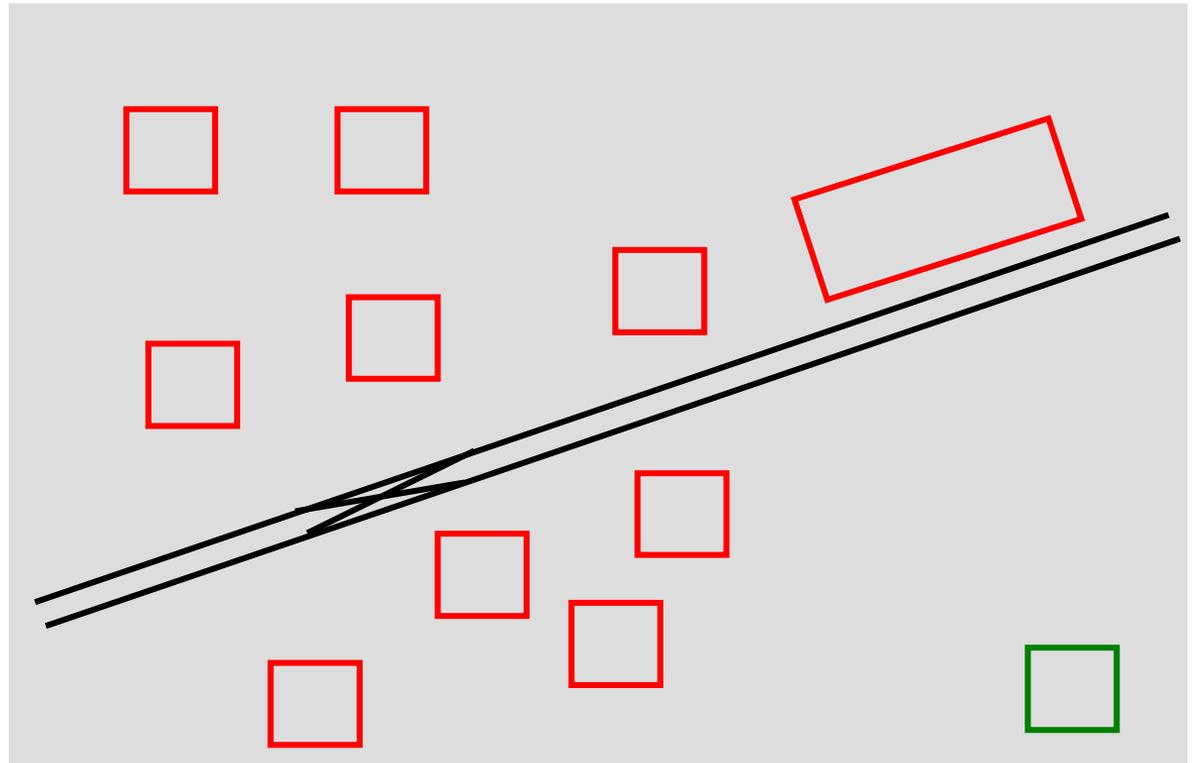
Identification of
problematic fields

Definition of hot-spots



Definition of hot-spots

Typical situation with
vibration problems



Red: vibration
problems occur

Green: no
vibration problems

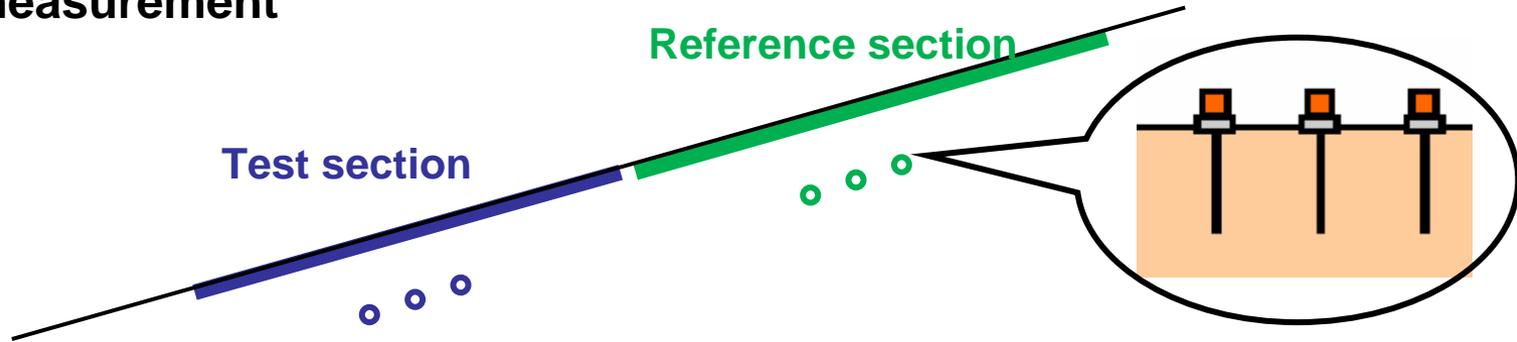
Measurement of the efficiency of the mitigation measure



Example

Measurement protocol

Vibration measurement



Test section

Track without measure

Track **with** measure

Control

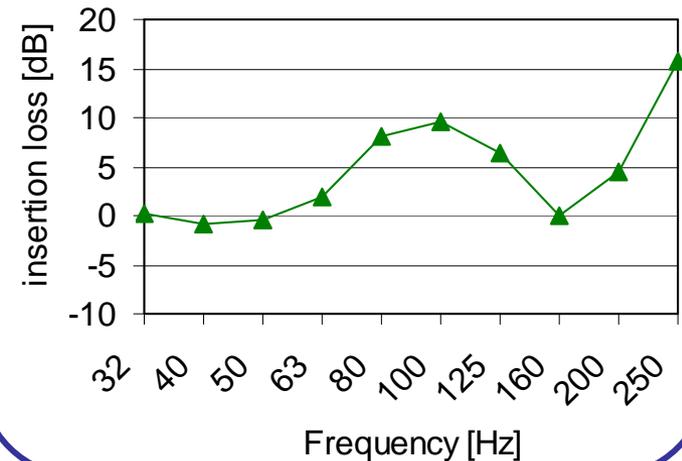
Reference section

Track without measure

Track without measure

Control

Efficiency



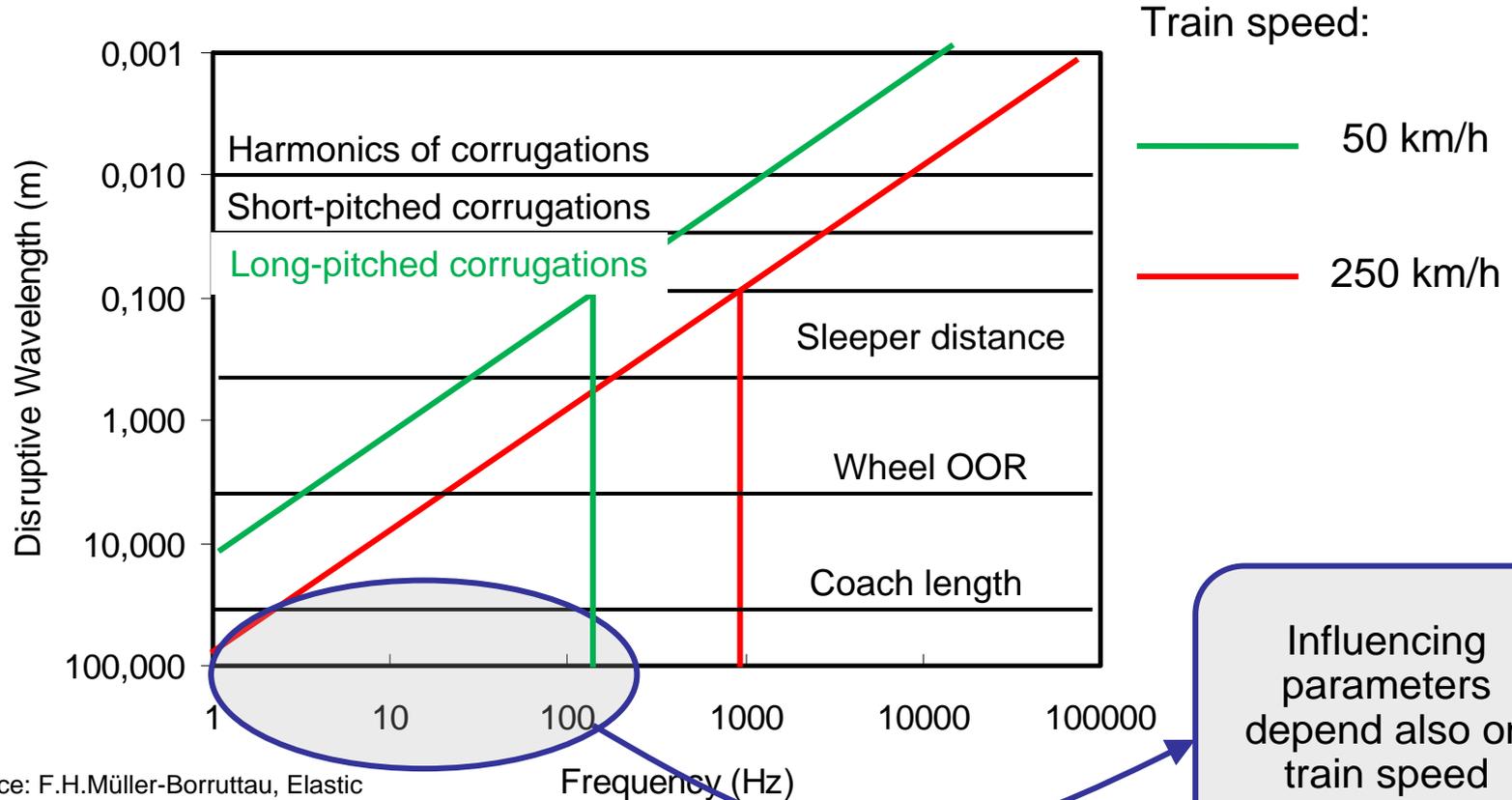
Example

Identification of influencing parameters



Measurement protocol

Excitation characterization



Source: F.H.Müller-Borrutttau, Elastic elements reduce the loads expected on the permanent way

Example

Identification of
influencing parameters



Report on soil characterization

Soil characterization

Influence of soil parameters on

- vibration emission,
- vibration propagation and transmission and
- mitigation-measure efficiency.

⇒ Measurements needed!

Classical soil
mechanics tests
e. g. density,
degree of
saturation

Classical in-situ
tests e. g. cone
penetration test

Dynamic soil characterization

Laboratory tests
e. g. resonant
column test

In-situ tests e. g.
spectral analysis
of surface waves

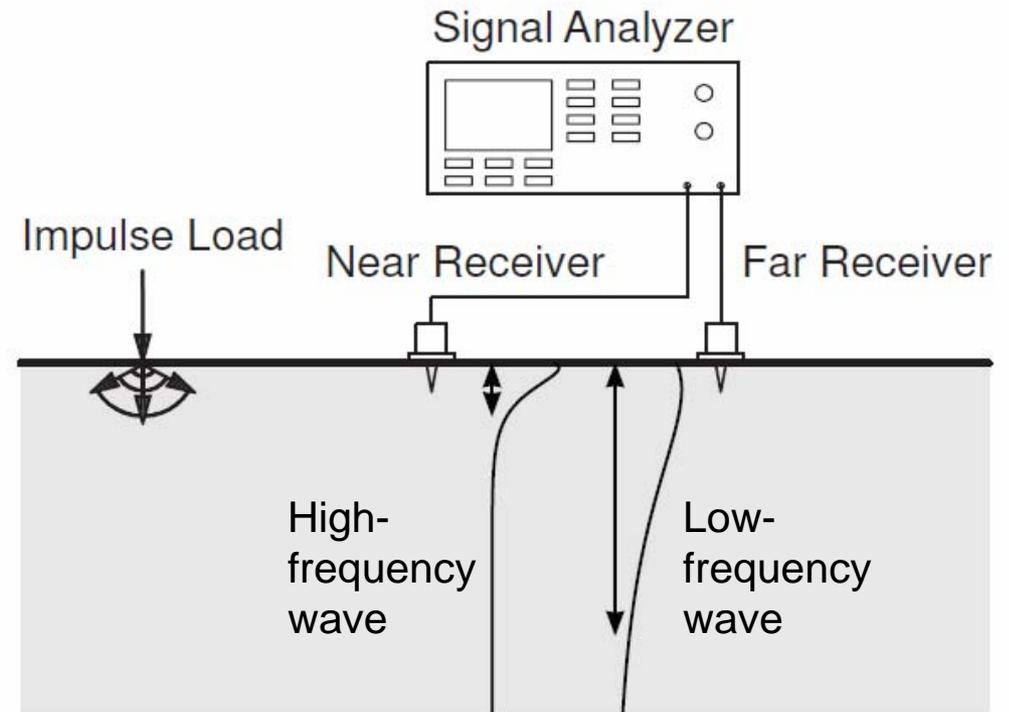
Example

Identification of
influencing parameters



Report on soil characterization

Spectral analysis of surface waves (SASW)



Result: Shear wave velocity as a function of depth

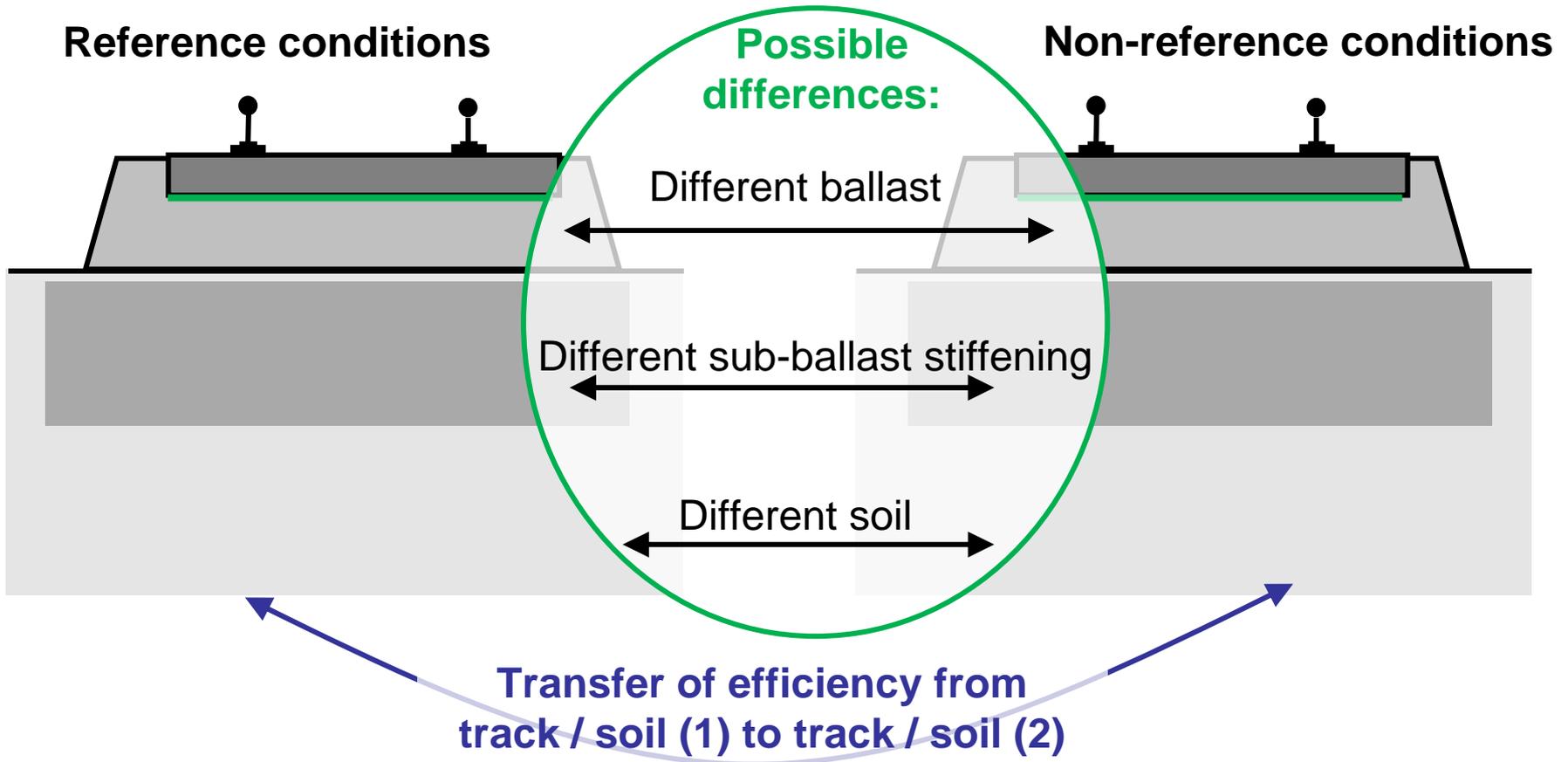
Example

Transfer of the efficiency
to reference conditions



Procedure for the data transfer

Reference conditions and transfer of data



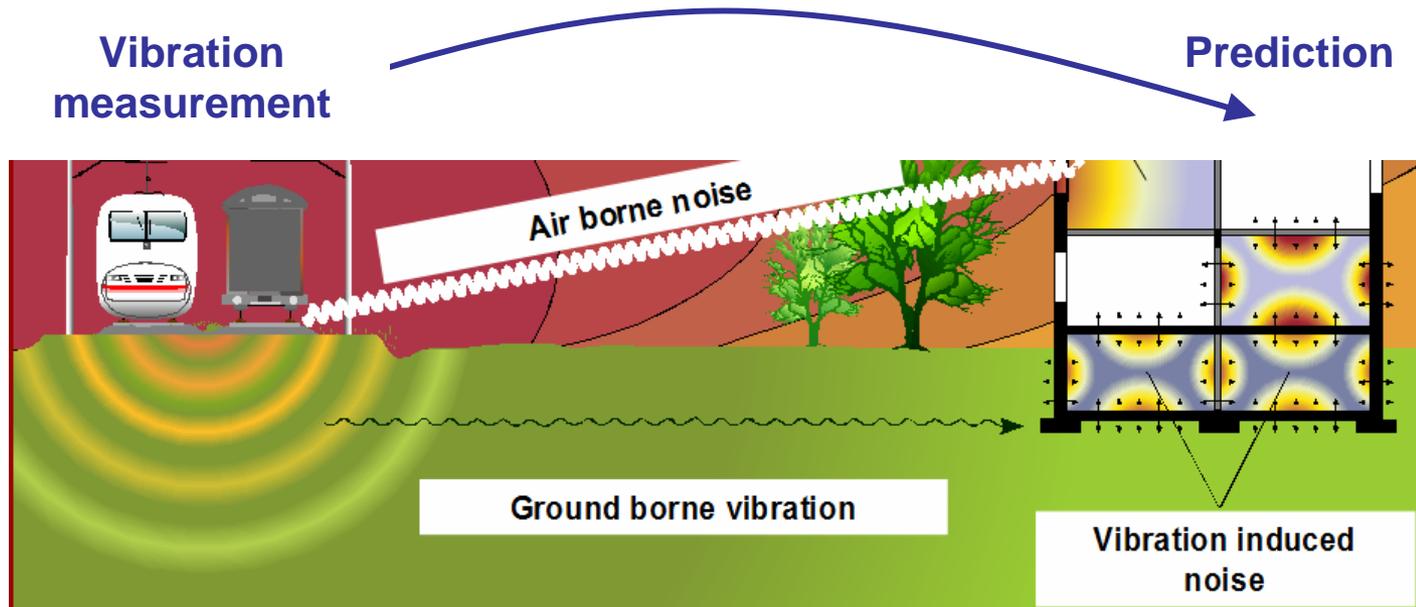
Example

Translation of the results in terms of annoyance reduction inside the building

Procedure to assess annoyance



Prediction of vibration and vibration-induced noise exposure in buildings



Example

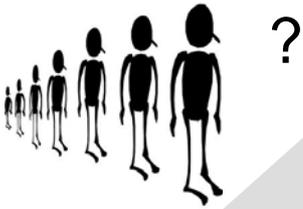
Translation of the results in terms of annoyance reduction inside the building



Procedure to assess annoyance

Assessment procedure

First approach: Ask a lot of people for annoyance due to vibrations and vibration-induced noise



DIN 4150-2
Descriptor:
maximum of
 $KB_F(t)$

ÖNORM S 9012
Descriptor:
maximum of
 $KB_S(t)$,

BS 6472-1
Descriptor:VDV

Examples of possible
vibration descriptors

Second approach:
Analyze the vibration
levels by using
descriptors and
limits

SS 4604861,
Descriptors:
 $v_{w \max, S}$
or $a_{w \max, S}$

...

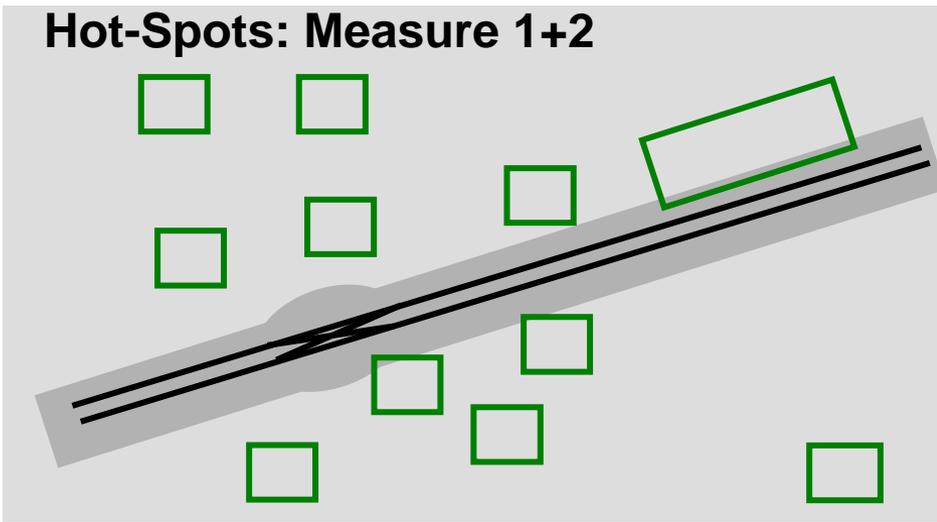
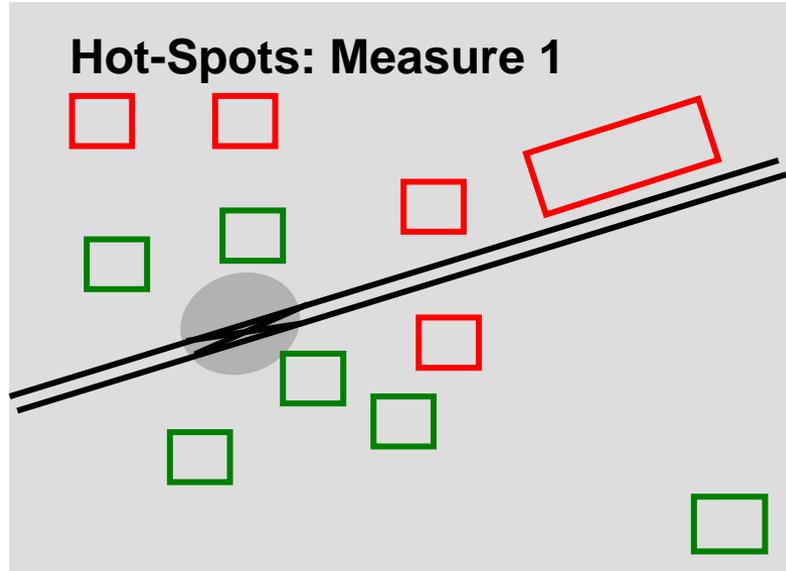
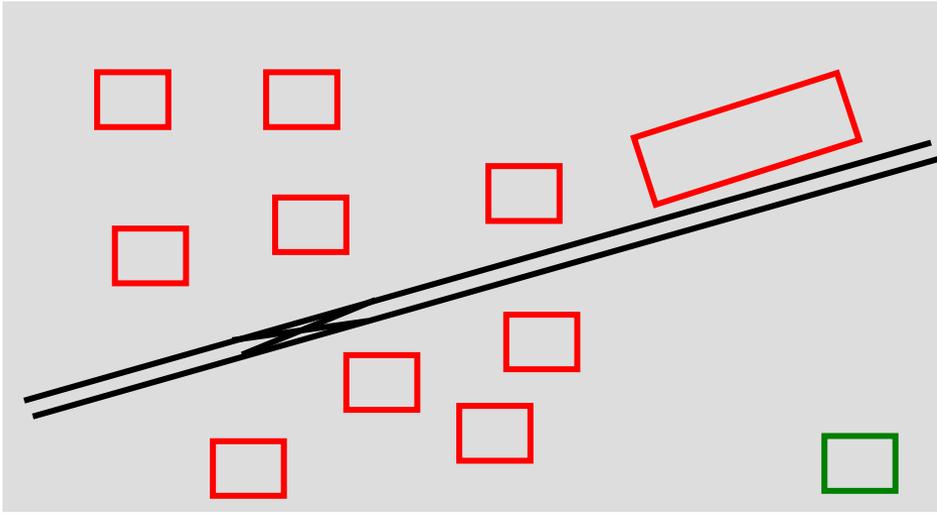
Translation of the results in terms of annoyance reduction inside the building



Example

Procedure to assess annoyance

Red: vibration problems occur
Green: no vibration problems



Example

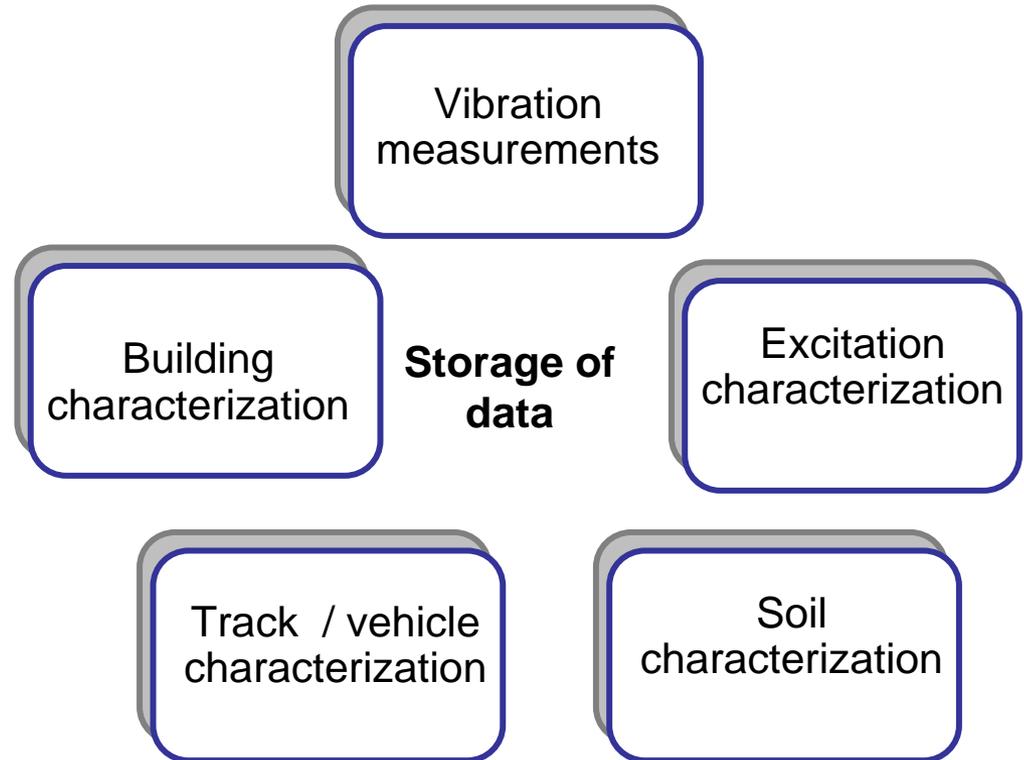
Storage of all data in a
database

Data base structure



Data base structure

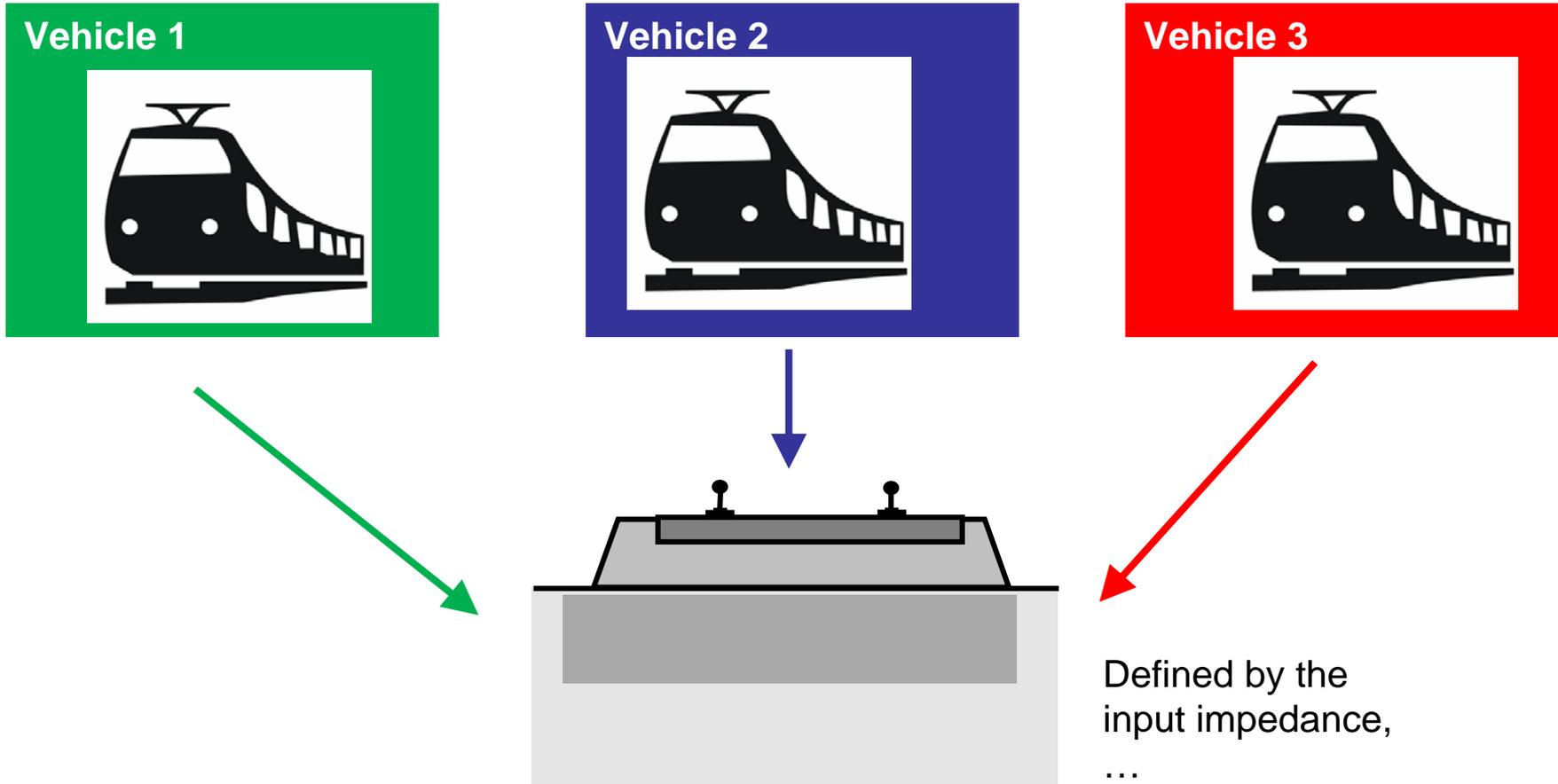
- Server will be provided
- Structure will be proposed
- Templates are developed
- All partners have access



Example

Track for vehicle homologation

Reference track for vehicles



Contents:

Introduction

Example

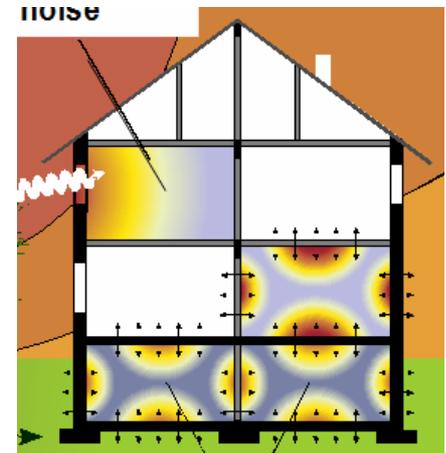
Overview

Summary

Aims: Procedures for the assessment of human exposure to vibration and vibration-induced noise, and associated annoyance

Activities:

- Literature review
- Identification of procedures to predict the vibration and vibration-induced noise exposure in buildings
- Translation of mitigation-measure efficiencies to reduction of the vibration exposure in the buildings and the decrease of annoyance



Next Output:

Del. 1.4 Review of existing standards, regulations and guidelines, as well as field and laboratory studies concerning human exposure to vibration, 10/2011

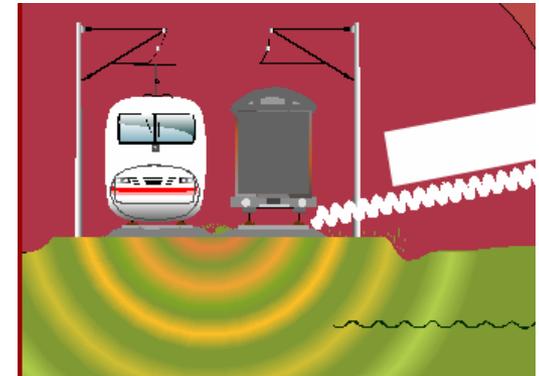
Overview: Task 1.2 Assessment of mitigation measure performance



Aims: Standardized procedure how to unambiguously estimate the performance (e.g. insertion loss) of a mitigation measure

Activities:

- Protocol for vibration measurements
- Definition of reference conditions and hot-spots
- Data transfer from non-reference to reference conditions
- Definition of a database structure
- Recommendations for standards and specifications



Next Output :

- Del. 1.2 Protocol for free field measurements of mitigation effects in the project RIVAS for WP2,3,4,5, 9/2011
- Del. 1.5 Definition of reference cases typical for hot-spots in Europe with existing vibration problems, 12/2011

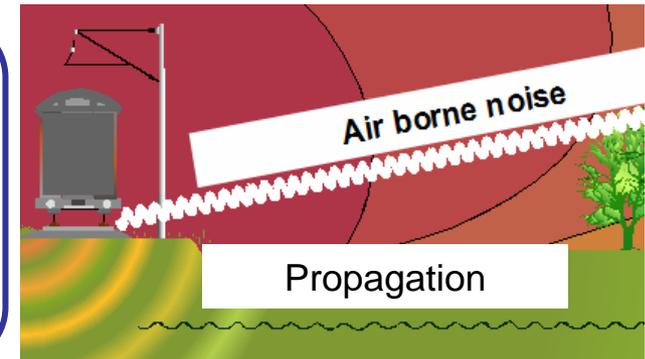
Overview: Task 1.3 Assessment of the influence of the soil on the performance of mitigation measures



Aims: Standardizes procedure to measure the dynamic soil characteristics

Activities:

- Procedures based on “in situ” geophysical tests, laboratory tests and classical soil mechanics tests
- Validation of the procedures (with WP 3 and 4)
- Collection of data from soil testing in a database
- Recommendations for standards (soil properties)



Next Output:

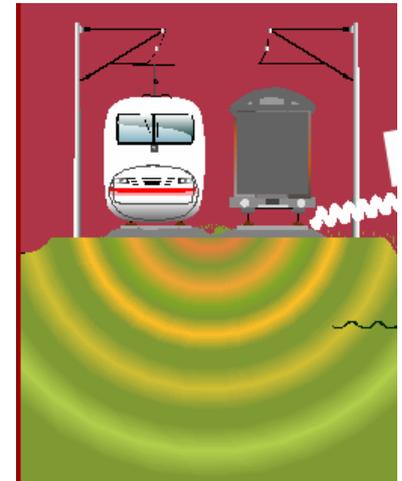
Del. 1.1 Report with a description of test procedures for the determination of the dynamic soil characteristics 9/2011

Overview: Task 1.4 Reference track dynamics

Aims: Definition of a standard track quality in terms of input impedance to be used as design parameter for the vehicle manufacturer

Activities:

- Summary of relevant parameters, their influence on overall vibration generation, their interdependency and their typical spread for both, vehicle and track parameters
- Definition of a reference track design for vibration characterization of vehicles, including draft measurement guideline for vehicle homologation



Next Output:

Del. 1.7 Report on relevant parameters, their influence on overall vibration generation (the source term), their interdependency and their typical spread, both for vehicle and track parameters, 6/2012

Contents:

Introduction

Example

Overview

Summary

WP 1 is an integrating activity which supports the development of mitigation measures in the following fields:

- Assessment of human exposure
- Detection of the mitigation-measure efficiency
- Measuring the influencing parameters of vehicle, track and soil
- Storage and analysis of the resulting data

For more information please visit our internet site: www.rivas-project.eu

Thank you for your attention!