



Project nr 2008-1/049

duratiNet

Durable Transport Infrastructures in the Atlantic Area Network

Manuela Salta
Project Leader



Investing in our common future



Project CONTEXT

Atlantic Area Transport Infrastructures

- High number of structures with > 30 years
- Most structures needs repair /rehabilitation
- Some structures repaired shown low repair performance
- Sustainability of construction (energy and environment impacts)



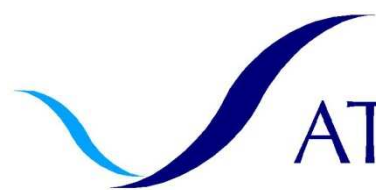
DURATINET PROJECT

The main goal of the project is to create the network of excellence DURATINET

➤ to facilitate an efficient exchange and transfer of knowledge on maintenance of concrete and steel structures and new improvements on inspection and repairing

> to promote the durability, safety and sustainability of transport infrastructures in the **Atlantic Area**,

turning these regions more attractive to live in, to work and for competitive business



ATLANTIC AREA
Transnational Programme

2007-2013

PRIORITY 3. Improve the acessibility and internal links

OBJECTIVE 1. promote the interoperability between different transportation



Project data:

5 Countries PT,SP,FR,IR,UK
17 Partners

TOTAL PROJECT COST- 2. 570 M€
TOTAL ELLIGIBLE COST-2. 480 M€
ERDF FUND (65%) -1. 612 M€



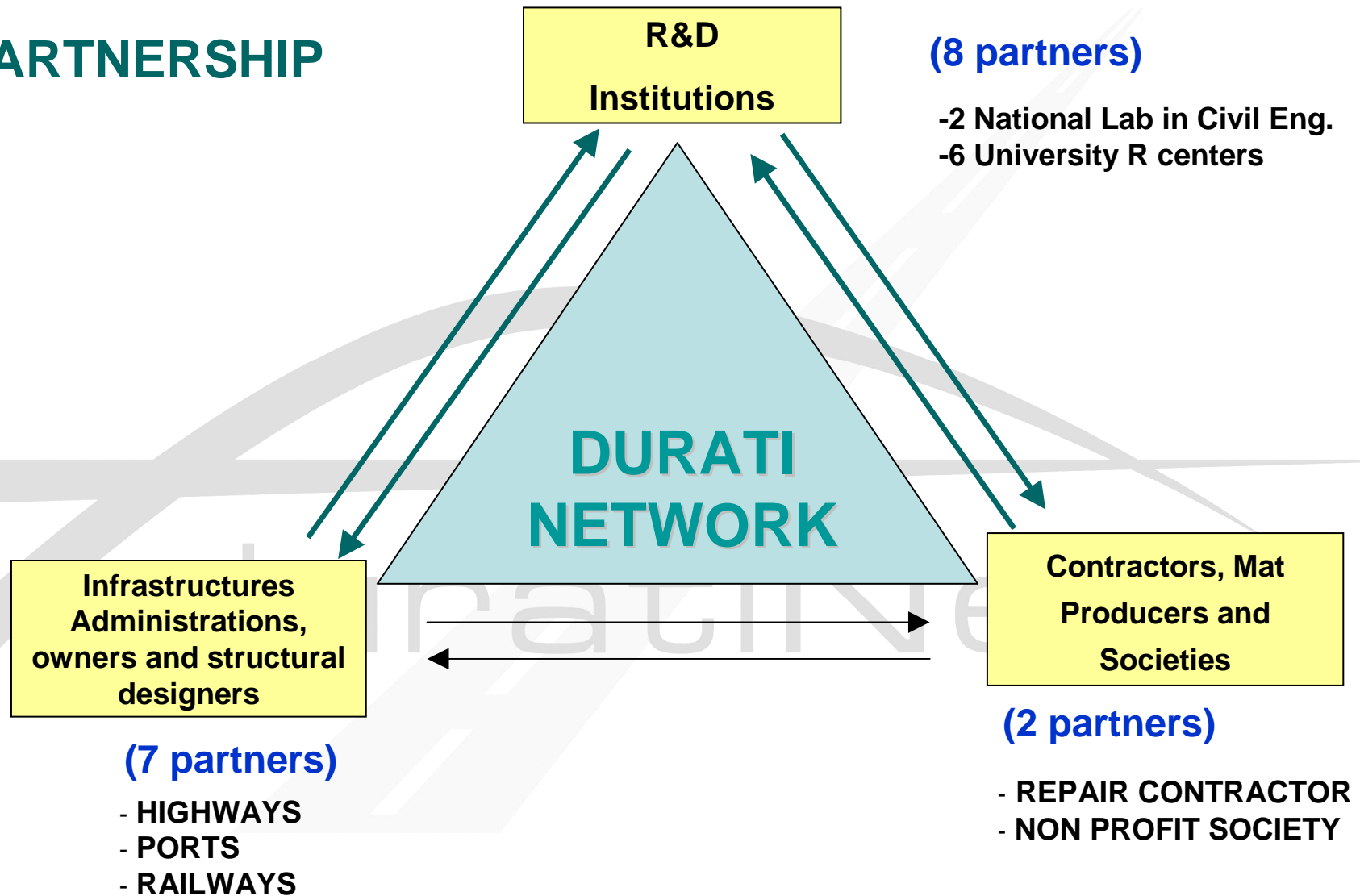


PARTNERSHIP

17 Partners

Portugal (6)
Spain (3)
France (5)
Ireland (2)
United Kingdom (1)

PARTNERSHIP





European Union
European Regional
Development Fund

Investing in our common future

DURATINET CONSORTIUM

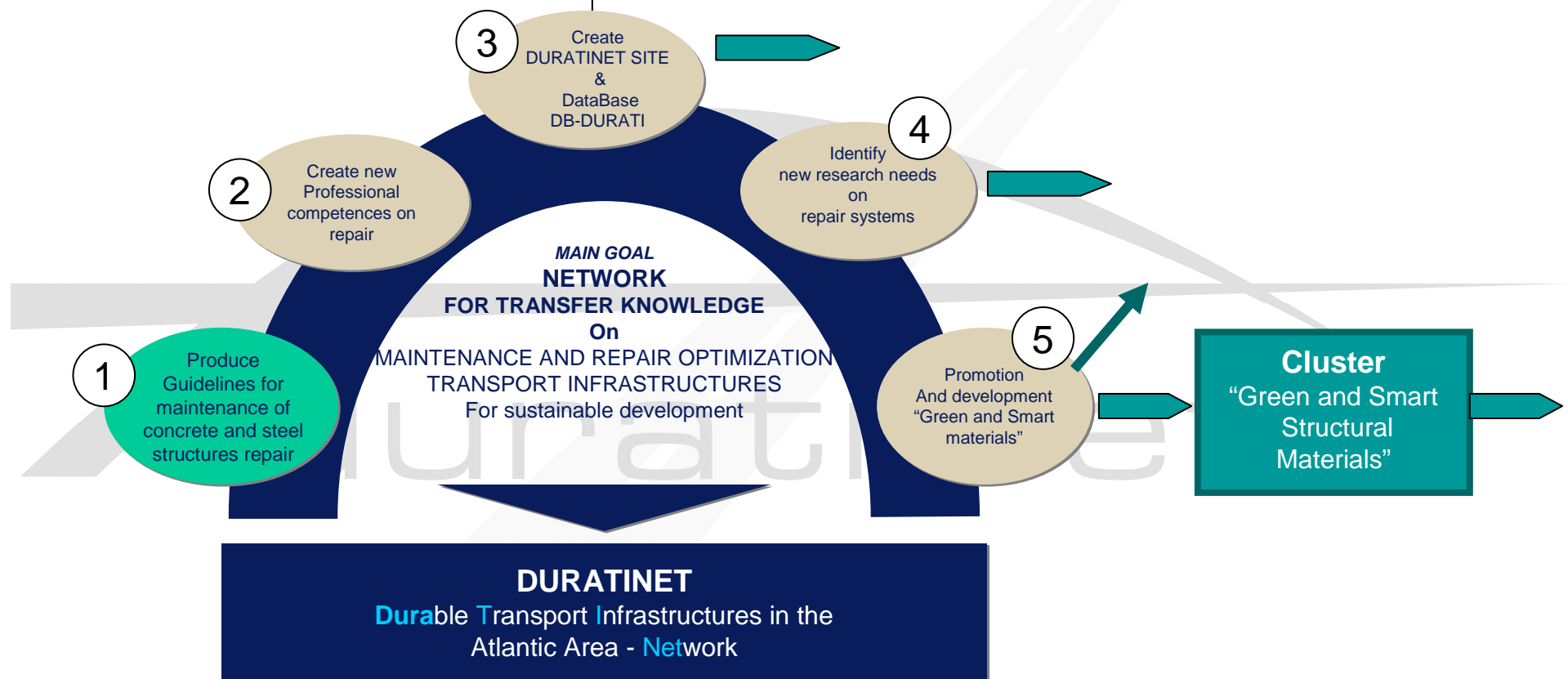
ATLANTIC AREA
Transnational Programme



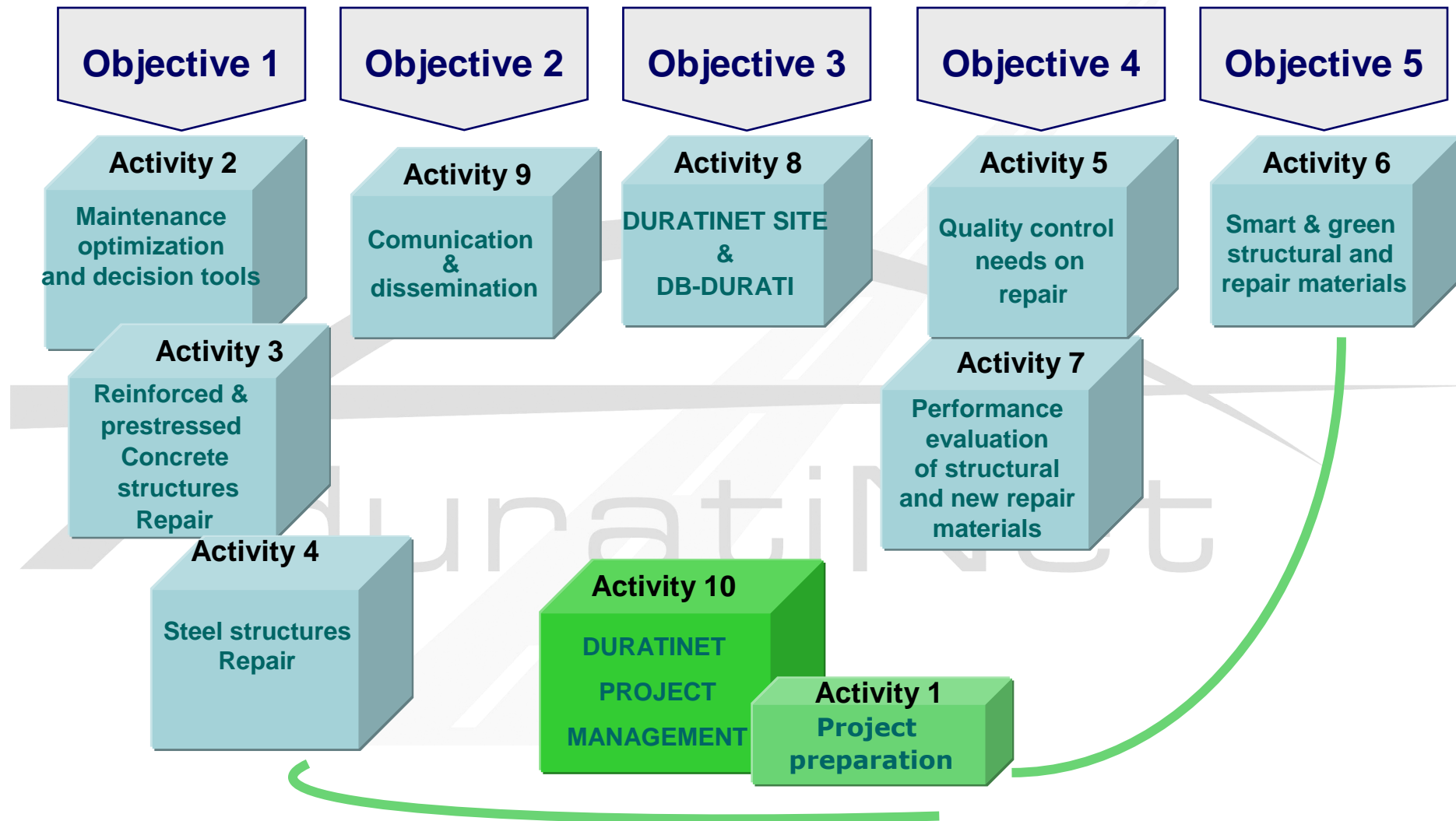
Project Objectives

SHORT - TERM OBJECTIVES AND RESULTS

LONG-TERM OBJECTIVES AND RESULTS



PROJECT ACTIVITIES



ACTIVITY 2

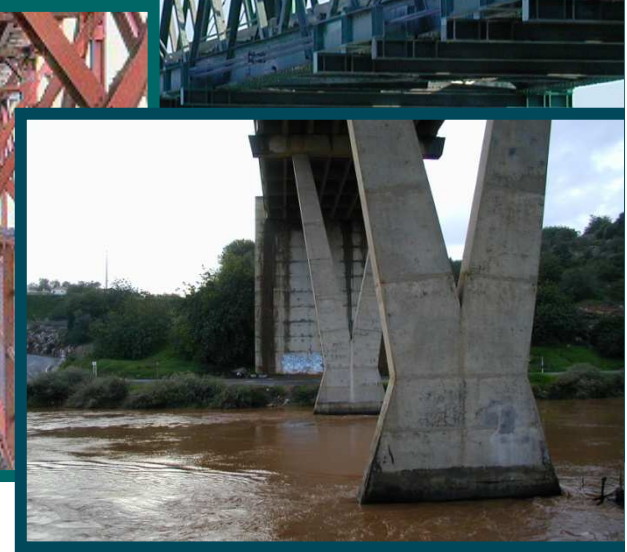
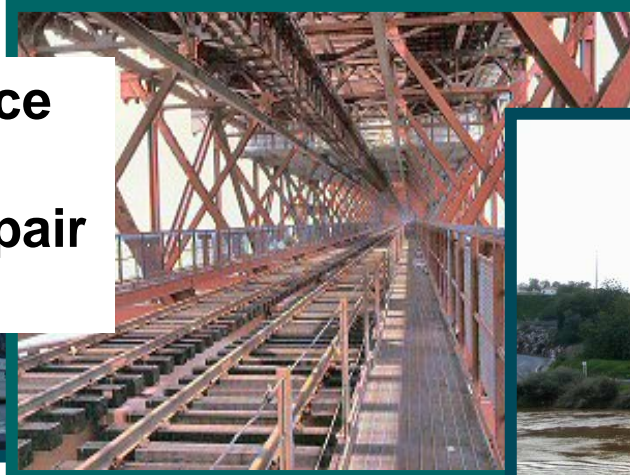
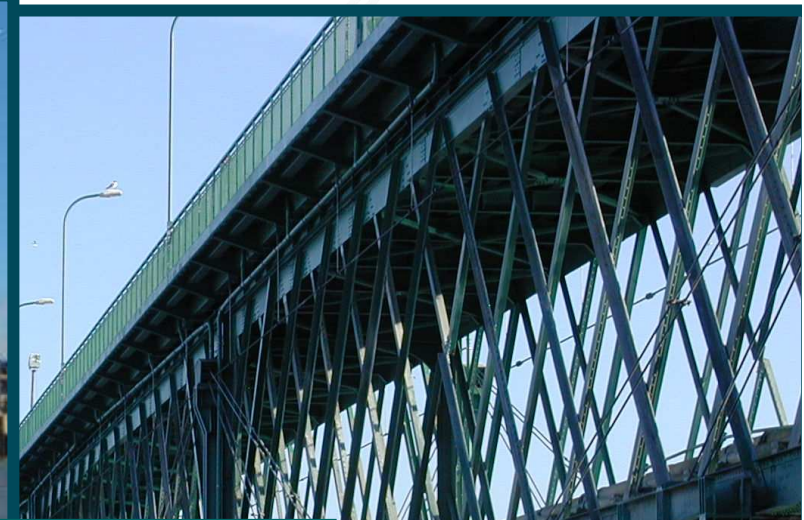
Maintenance optimization and decision tools

- Requirements for maintenance and repairs optimization
- Methodologies to support repair decisions

End-product



- ✓ Web version
- ✓ Printed version



Activity 3

Reinforced and prestressed concrete structures maintenance/repair

- Durability requirements
- Types and degradation mechanisms
- Inspection and diagnosis
- Prevention and service life modelling
- Repair techniques and
- Performance/cost/environmental impact



End-product



- ✓ Web version
- ✓ Printed version



ACTIVITY 4

Steel structures maintenance

- Durability requirements
- Damage mechanisms of steel
- Inspection and diagnosis, NDT
- Protection/ repairing

End-product



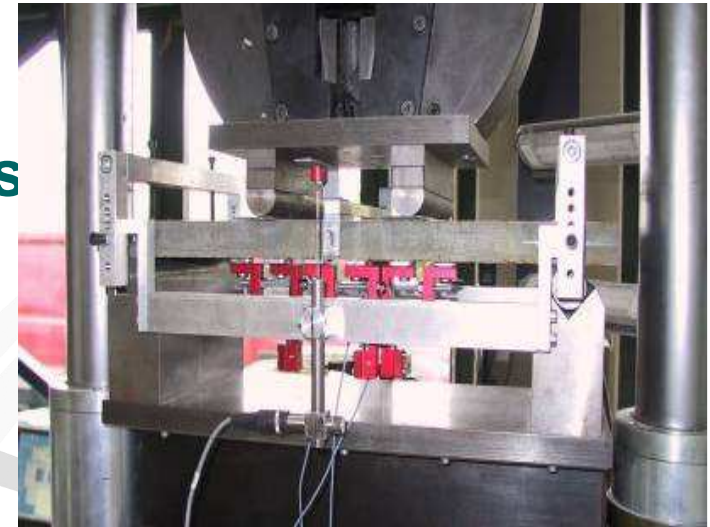
- ✓ Web version
- ✓ Printed version



ACTIVITY 5

Quality control needs on repair systems

- Implications of harmonized standards on quality control at level of the contractors
- Implications of harmonized standards on quality control at level of materials producers



End-product:
Technical report

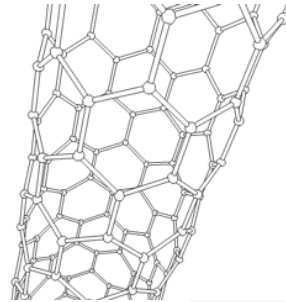
ACTIVITY 6

Smart & green structural and repair materials

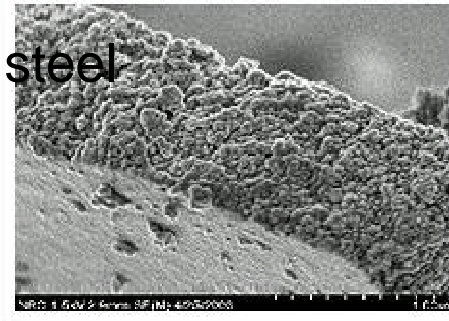
- Concrete with mineral by-products and recycled aggregates
- Water solvents based coatings for steel protection
- Cement with nano particles and nanofibers (Carbon nanotubes)
- Nanomaterials coatings with specific performance properties, easy to clean/Self cleaning and nanoproducts for protection of porous materials
- FRP in new structures and in repairing

End-product:

State -of –the- art Reports



CARBON NANOTUBES FILLING THE CRACKS IN A CEMENTING COMPOSITE



CEMENTING NANOPARTICLES OBTAINED BY THE TECHNIQUES OF "SOFT CHEMISTRY"



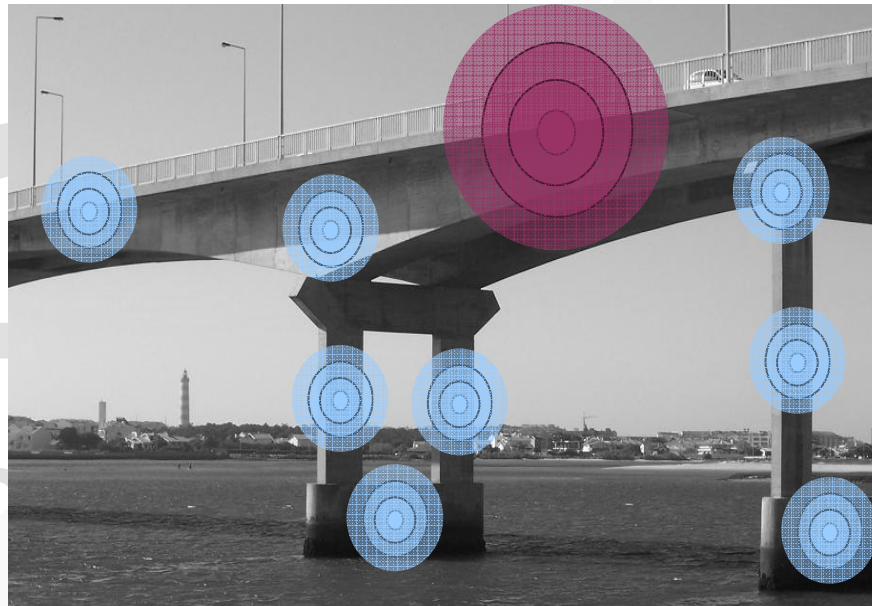
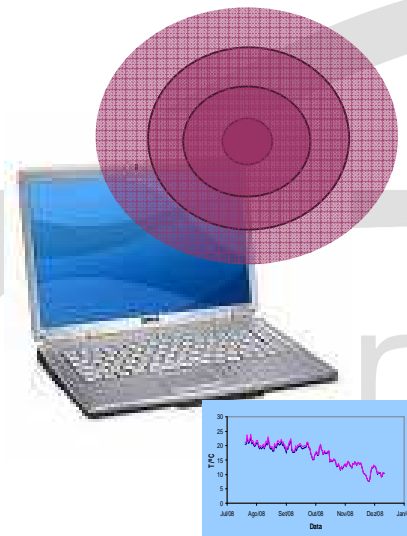
NANOLAYERS OF CALCIUM ALUMINATE



ACTIVITY 6

➤ On-line Monitoring wireless systems

SMART STRUCTURES



Wireless sensor network
Wireless data transmission

End-product:

❑ State-of-the-art reports on sensors development

ACTIVITY 7

Performance evaluation of structural and new repair materials

- ❖ In situ application de new repair
- ❖ products and systems
- ❖ Collecting materials data from
- ❖ natural exposure to fill dB-DURATI



Portugal- Port of Peniche



Portugal: Cabo Raso



France - La Rochelle

- > Estruturas em estudo
- > BARRA
- > Ferry

duratiNet

CREATION



WEBTOOLS

WEBPLATFORM

WEBSITE

DB-DURATI & Manual web -version

basecampb



www.duratinet.org



OPEN to
Contractors &
material producers
performance systems
technical data

Private domain
for project
partners
Management &
communication

Public Domain
Project activities/results,
project events,
publications final results

Database
Data on materials &
repair performance and
structures inspection

OPEN to
Administrations
for Institutions news
and experiences on
their infrastructures
repair activities



Cluster
"Smart and green materials"

Web Forum
on
Infrastructures
Maintenance/repair

ACTIVITY 8

Project promotion , divulgation and dissemination actions

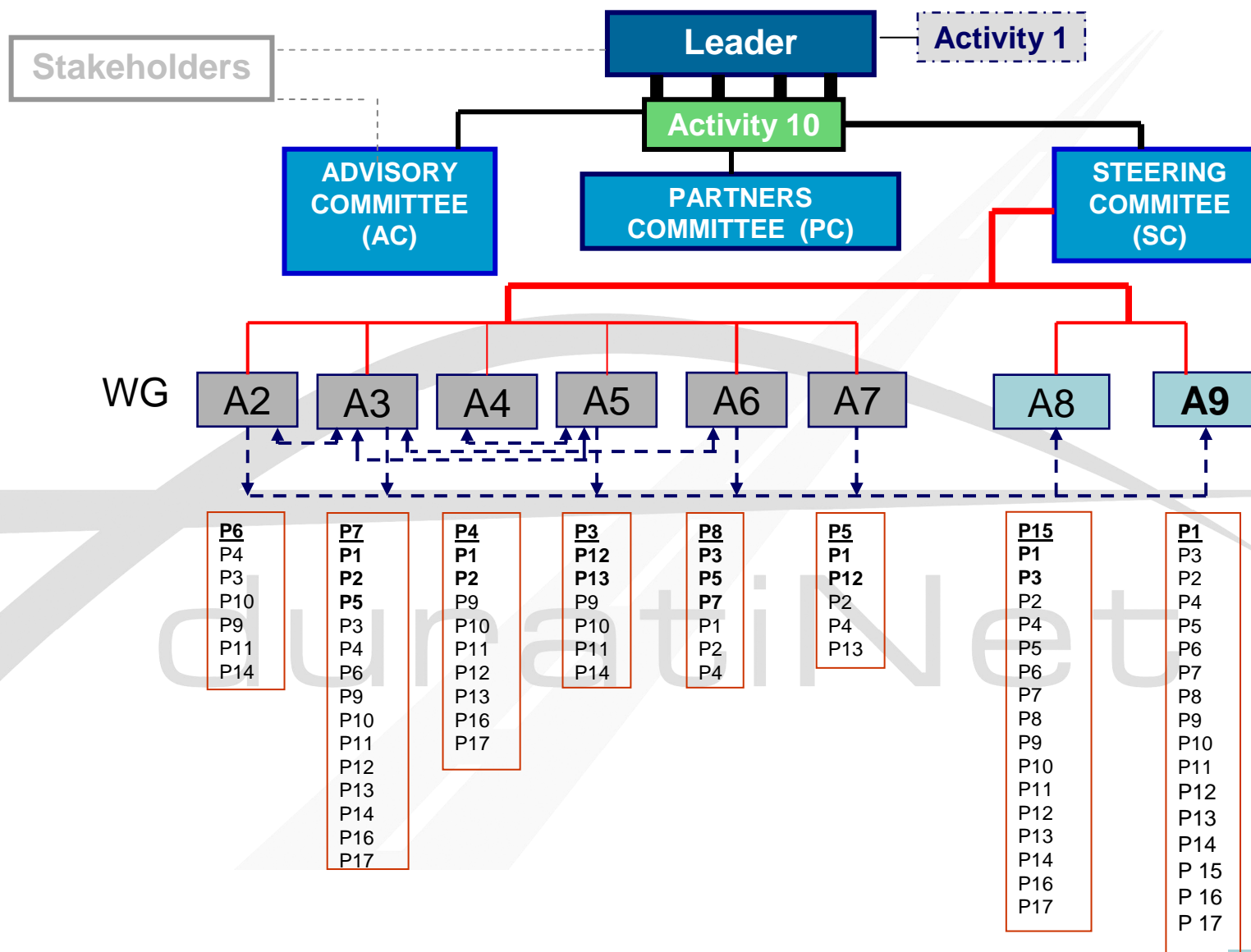
Organization of EVENTS for dissemination of project results and action

> **6 Trans-national Workshops** for stakeholders and end-users

> **International Congress DURATINET** – end 2011

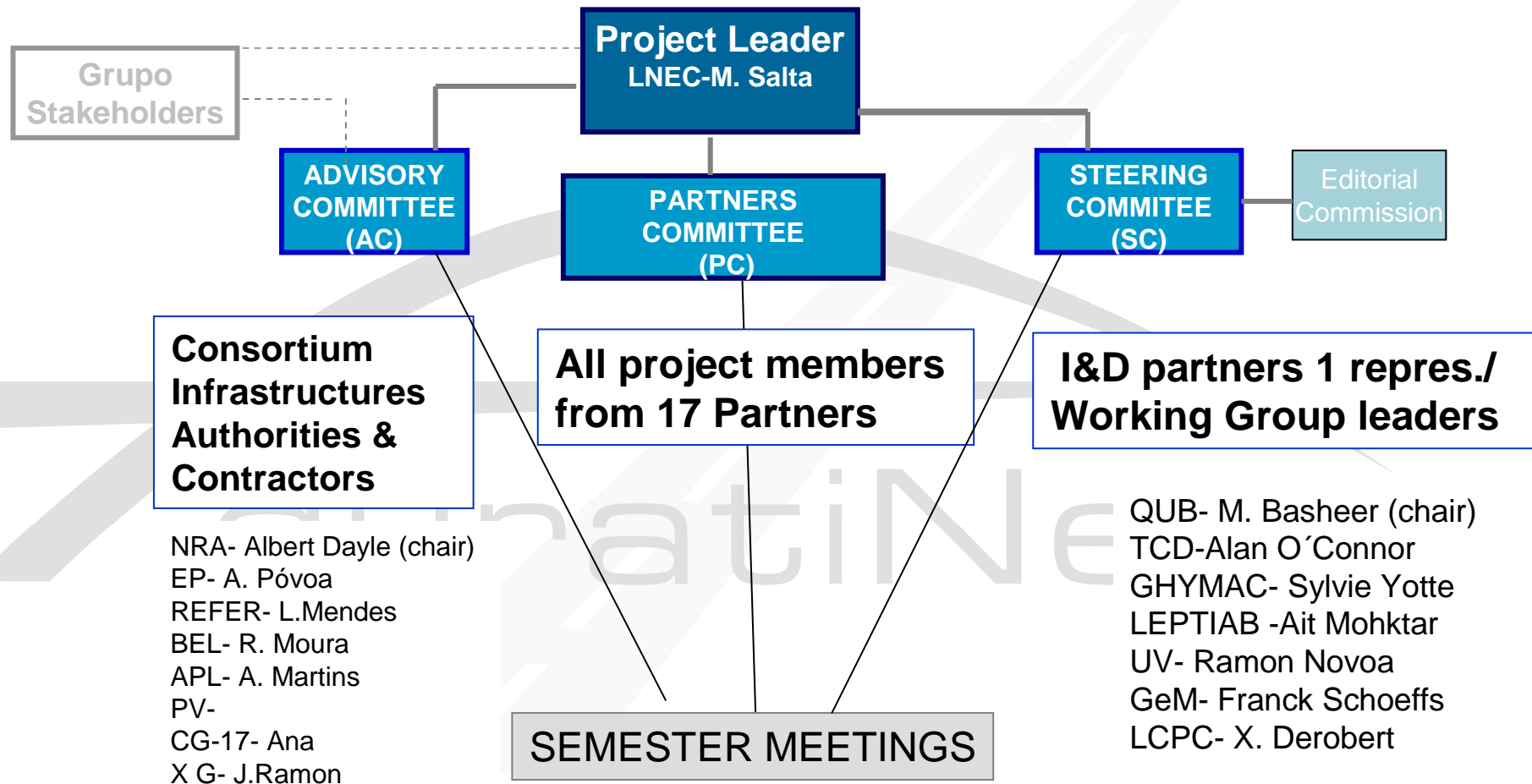
> **Course on inspection techniques and diagnosis** and demonstration actions on repairs –2nd semester 2011

ACTIVITY 9



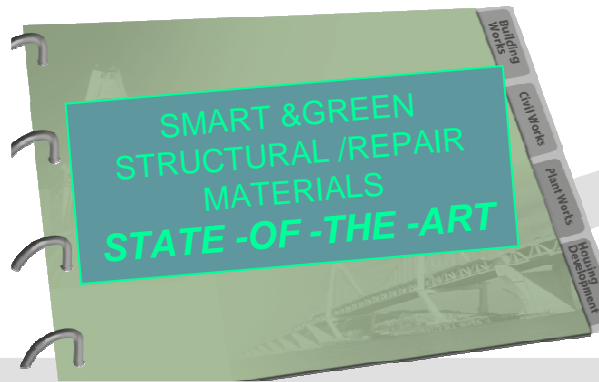
ACTIVITY 10

Activity 10

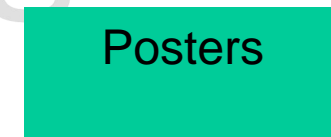
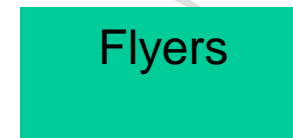
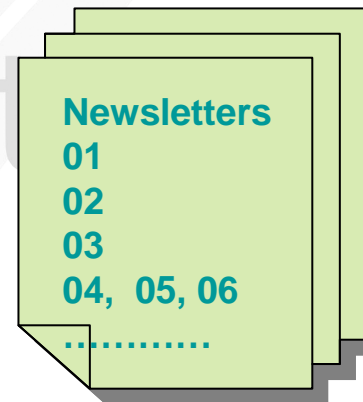


PROJECT RESULTS

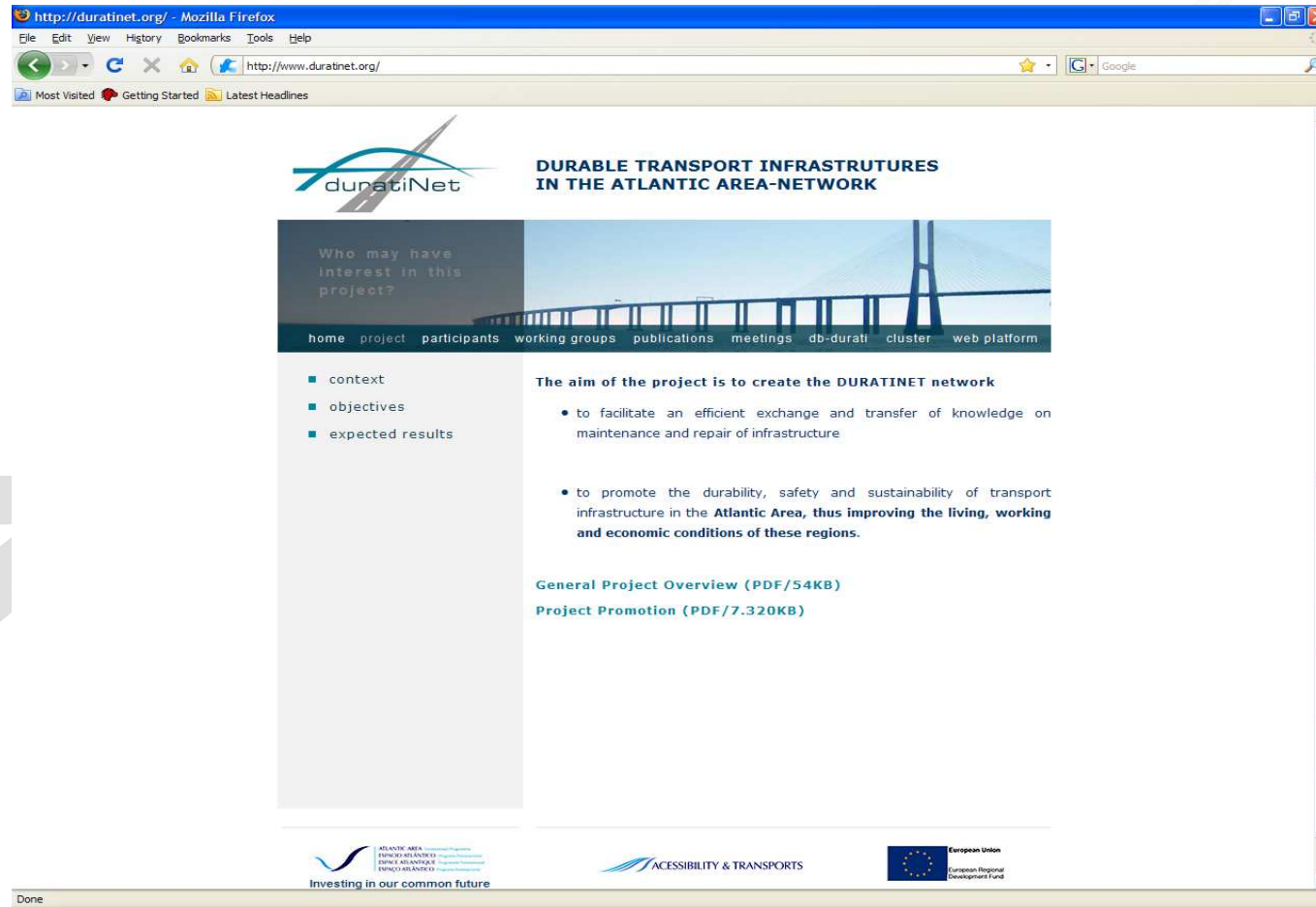
□ DIFFERENT KIND OF PUBLICATIONS



Web version
CONCRETE & STEEL
Guidelines Manual

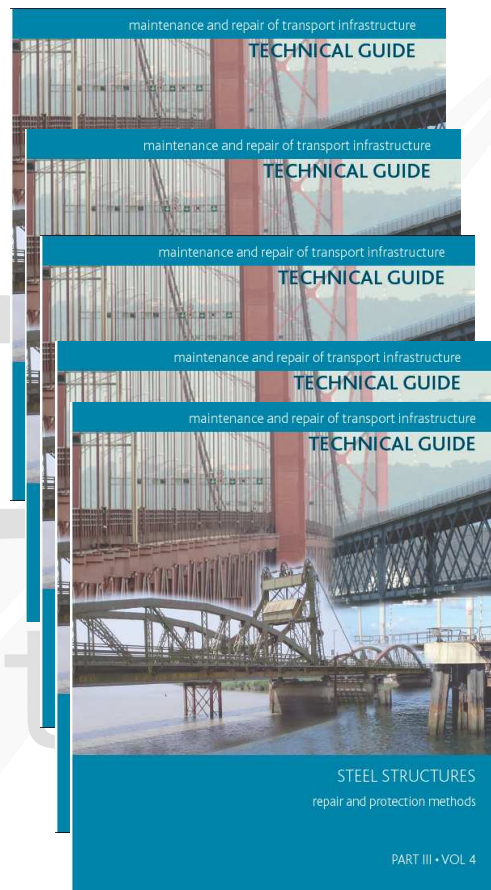
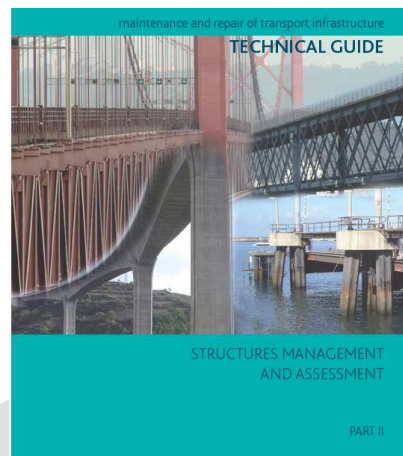
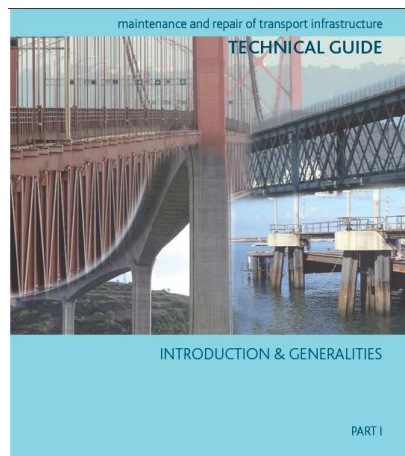


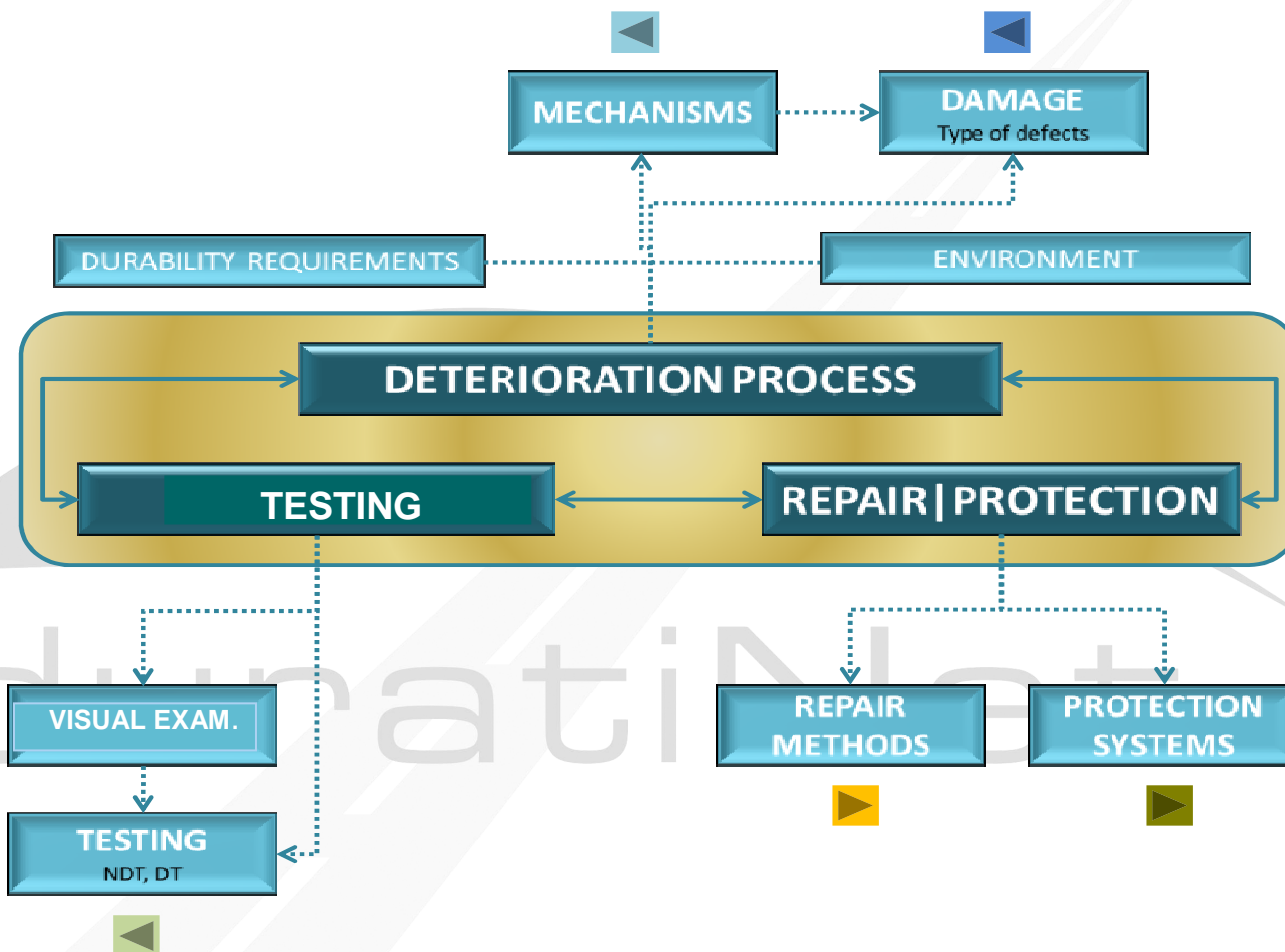
DURATINET WEBSITE



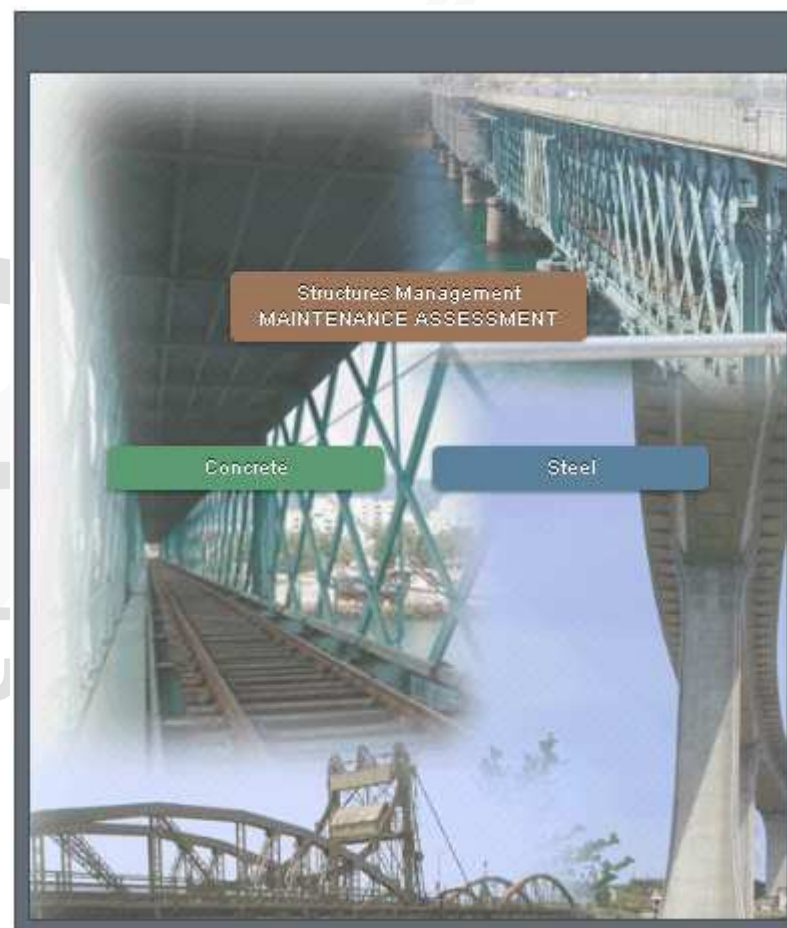
IN ENGLISH, PORTUGUESE, FRENCH, SPANISH

DURATINET TECHNICAL GUIDE

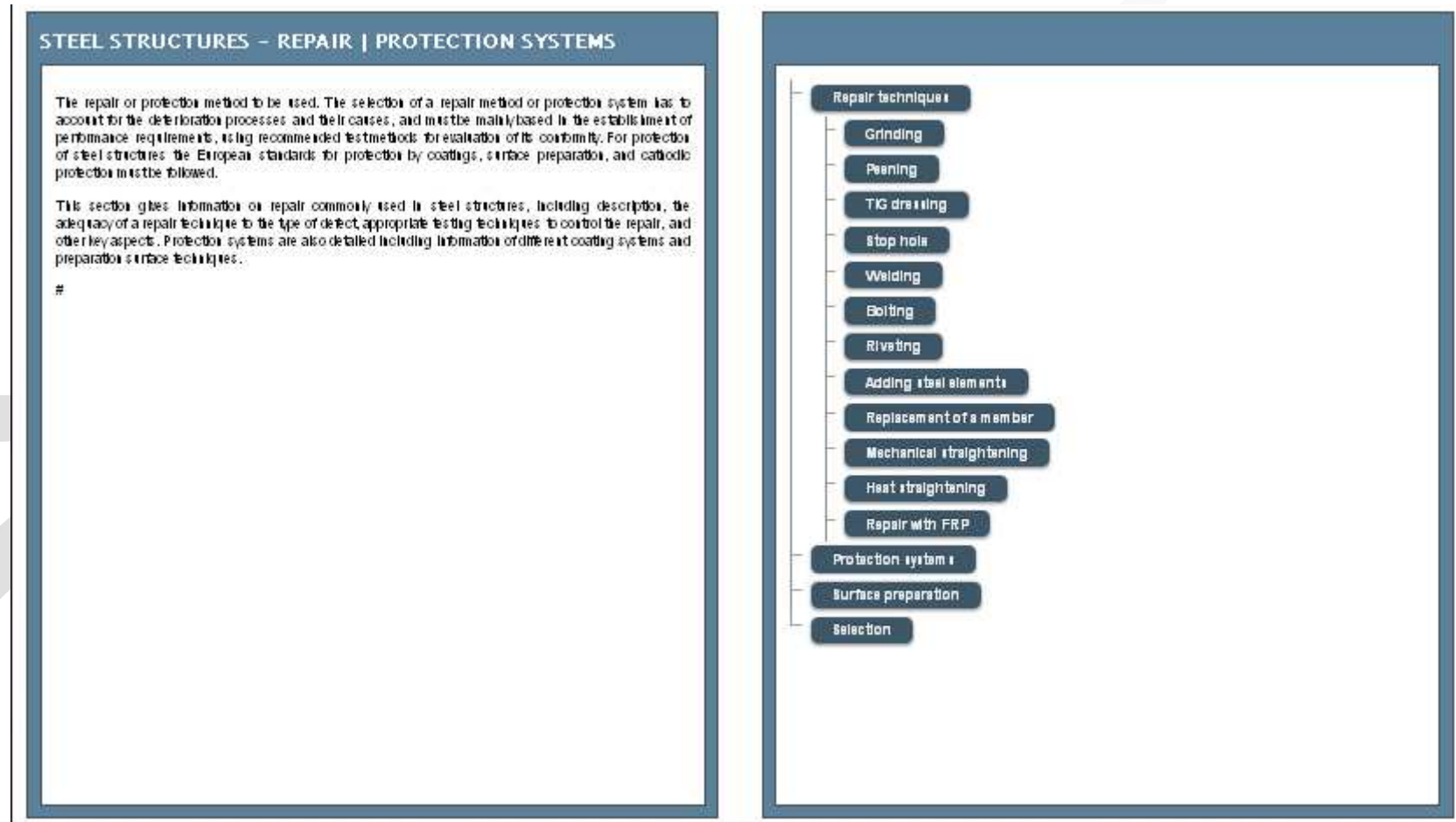




DURATINET TECHNICAL GUIDE - WEB





DURATINET TECHNICAL GUIDE - WEB



DURATINET TECHNICAL GUIDE - WEB

STEEL STRUCTURES

DEFECTS	
DETERIORATION	<div style="display: flex; justify-content: space-around;">   </div> <div style="display: flex; justify-content: space-around;"> Uniform Localized </div>
Damage classification	<input type="checkbox"/> Bare metal <input type="checkbox"/> Bare metal <input type="checkbox"/> Bare metal <input type="checkbox"/> Bare metal
Component	<input checked="" type="checkbox"/> Basic Component <input type="checkbox"/> Bolted Riveted Connector <input type="checkbox"/> Welded Connector
Description	Uniform corrosion is the most common form of corrosion, with a general reduction in thickness of the metal. It is a result of the metal reacting with the environment. Localized corrosion is a more severe form of corrosion, which can lead to the failure of the structure. It is a result of the metal reacting with the environment.
Deterioration process	<input checked="" type="checkbox"/> Chemical & Biological <input type="checkbox"/> Corrosion <input type="checkbox"/> Fire
Construction or design features	<input checked="" type="checkbox"/> Defective or inadequate material <input type="checkbox"/> Poor labour <input type="checkbox"/> Water accumulation <input type="checkbox"/> Poor design <input type="checkbox"/> Poor design <input type="checkbox"/> Poor design
Testing techniques	<input checked="" type="checkbox"/> Visual survey <input type="checkbox"/> NDT <input type="checkbox"/> DT
Repair/Protection/Prevention	Surface preparation, Paint systems, etc.







* Number may be required for identification of the defect.

* Number 1-5 may be used to support the deterioration severity, and then severity should be made up manually. For further information see technical guide.


* Expert decision may be obtained for the selection of the repair methods, taking into account the material and the defect. Other repair methods may be used, but they should be approved by the expert information centre on request.

* For further information see technical guide.

DIAGRAMS
VIDEOS
IMAGES


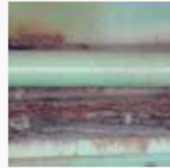







DURATINET TECHNICAL GUIDE - WEB



STEEL STRUCTURES

DEFECTS

DETERIORATION	 Uniform		 Localized	
Damage classification	<input type="checkbox"/> Contamination	<input type="checkbox"/> Deformation	<input checked="" type="checkbox"/> Deterioration	<input type="checkbox"/> Discontinuity <input type="checkbox"/> Displacement <input type="checkbox"/> Loss Of Material
Component	<input checked="" type="checkbox"/> Basic Component	<input checked="" type="checkbox"/> Bolted Riveted Connector	<input checked="" type="checkbox"/> Welded Connector	<input type="checkbox"/> Coating System
Description	Uniform corrosion or other material uniform modifications with eventual reduction of mechanical properties, such as strength, impact resistance, and hardness. Extreme cases of deterioration may result in significant section reduction and loss of material.			
Steel	<input checked="" type="checkbox"/> Chemical & Biological	<input type="checkbox"/> Physical		

OVERVIEW

REPORT

Structures

Bridges

Bridge A


Bridge B

Bridge C

(...)

FILTER

QUERY



GENERAL

ENVIRONMENT

MATERIAL

HISTORICAL

GENERAL INFORMATION

Country: Portugal

Owner | Manager: x

Construction date: y

(...) (...)



General view



Sketch 1



Type:

Spans:

(...)


Ref. Point (x, y, z):

INSPECTION

2006/04/01

Special inspection: Beam East (VE); Beam West (VO); Abutment South (ES);
Abutment North (EN); Piers P1 to P6; General observations

Images



		Elements									
		VE	VO	ES	EN	P1	P2	P3	P4	P5	P6
Methods	Cover Thickness	X	X			X				X	X
	Icorr	X	X			X				X	X
	Compressive Strength	X		X		X					
	Carbonation Depth	X	X	X		X	X			X	X
	Chloride content		X							X	
	Microscopy						X				
	Mineralogy						X				X
	Visual inspection	X	X	X	X	X	X	X	X	X	X

Maintenance

Repair

Monitoring

HISTORICAL – INSPECTION DATA

ENVIRONMENTAL DATA

Atmosphere

Rural	<input checked="" type="checkbox"/>
Urban	<input type="checkbox"/>
Industrial	<input type="checkbox"/>
Marine	<input type="checkbox"/>
Marine plus industrial	<input type="checkbox"/>

Corrosivity

C1	<input checked="" type="checkbox"/>
C2	<input type="checkbox"/>
C3	<input type="checkbox"/>
C4	<input type="checkbox"/>
C5	<input type="checkbox"/>

Metereological

Date 2006/04/01

Atm. pollution

Water

Soil

pH	8,01
CaCO ₃ (mg/dm ³)	0
NH ₄ ⁺ (mg/dm ³)	0,7
Mg ²⁺ (mg/dm ³)	10,4
SO ₄ ²⁻ (mg/dm ³)	18,9

ME – left riverside

Material

Concrete	√
Steel	√
(...)	

2

Steel

Designation	x
Class	y
(...)	(...)

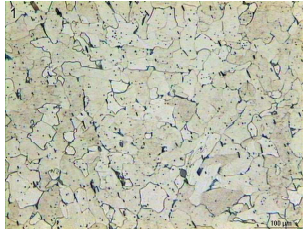
Chemical

Physical

Protection

Images

C	Si	Mn	P	S	Cr	Mo	(...)
...	(...)



Microstructure

2

MATERIAL PROPERTIES

MERCI

**DURATINET VOS INVITE POUR ÊTRE
NOTRE STAKEHOLDER**