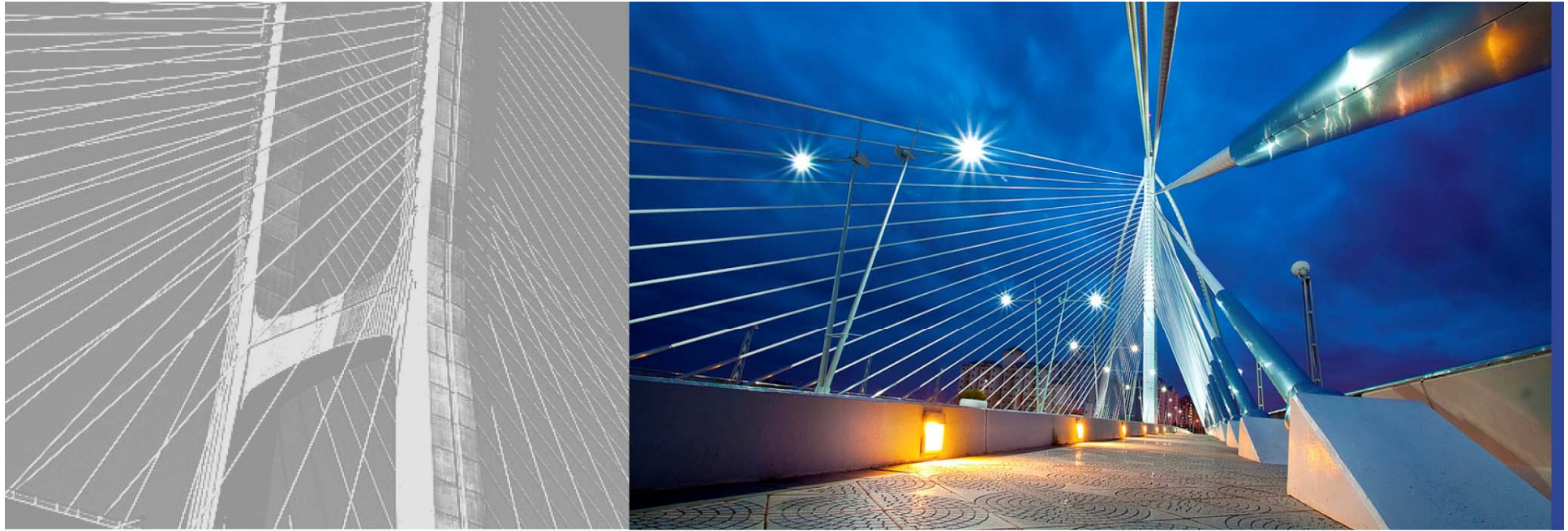


Co-ordinator Prof. Robert Kliger

CHALMERS



Flexible Processes and Improved Technologies for Urban Infrastructure Construction Sites

Javier Bonilla Diaz, Acciona

www.pantura-project.eu



Low-disturbance sustainable urban construction



12 Participants:

Two research institutes + one university

Three building contractors

Three SMEs

Three authorities



Duration: 2011-2013



Low-disturbance sustainable urban construction



OBJECTIVES



The main aim of PANTURA is to realise a radical breakthrough by equipping the authorities, stakeholders and experts with a **comprehensive instrument (methods, tools and techniques)** to prepare and perform **bridge construction, maintenance, repair and renovation processes** in the most effective and efficient way, in the shortest possible time, with the most efficient, sustainable use of resources and with zero disturbance and disruption for the **urban environment** and urban life of the inhabitants.

PANTURA aims to improve highly flexible **off-site production** and construction processes, while significantly reducing labour-, machine- and cost-intensive on-site activities in order to achieve the **optimal performance with the most efficient use of resources and zero carbon emissions**. To co-ordinate these processes in the most effective way, PANTURA aims to develop and use a proactive co-ordination strategy and integrated ICT tools in order to anticipate and prevent any disturbance in the areas surrounding the construction site and the city. These novel approaches and solutions will be validated through real case studies.



BACKGROUND AND VISION

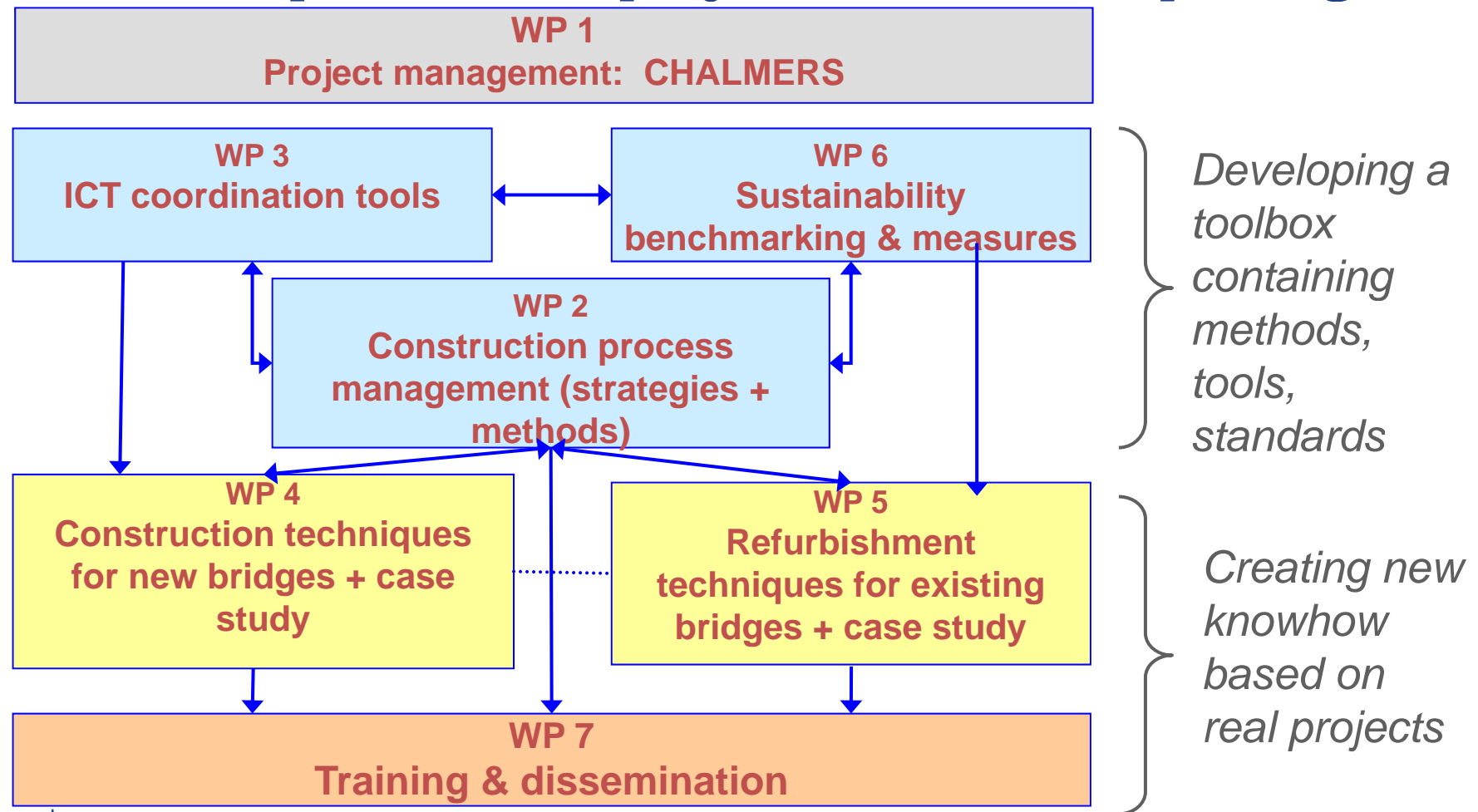
What we want to achieve?

- Prove that ***very-low*** or even ***zero disturbance*** large-scale construction project in the urban environment is ***possible***, ***feasible*** and ***practical***
- Provide the project stakeholders with the necessary systems and knowhow:
 - Developing a toolbox containing methods, tools, standards
 - Creating know-how based on real projects as learning and testing cases



BACKGROUND AND VISION

How we will perform the project? *the work packages*

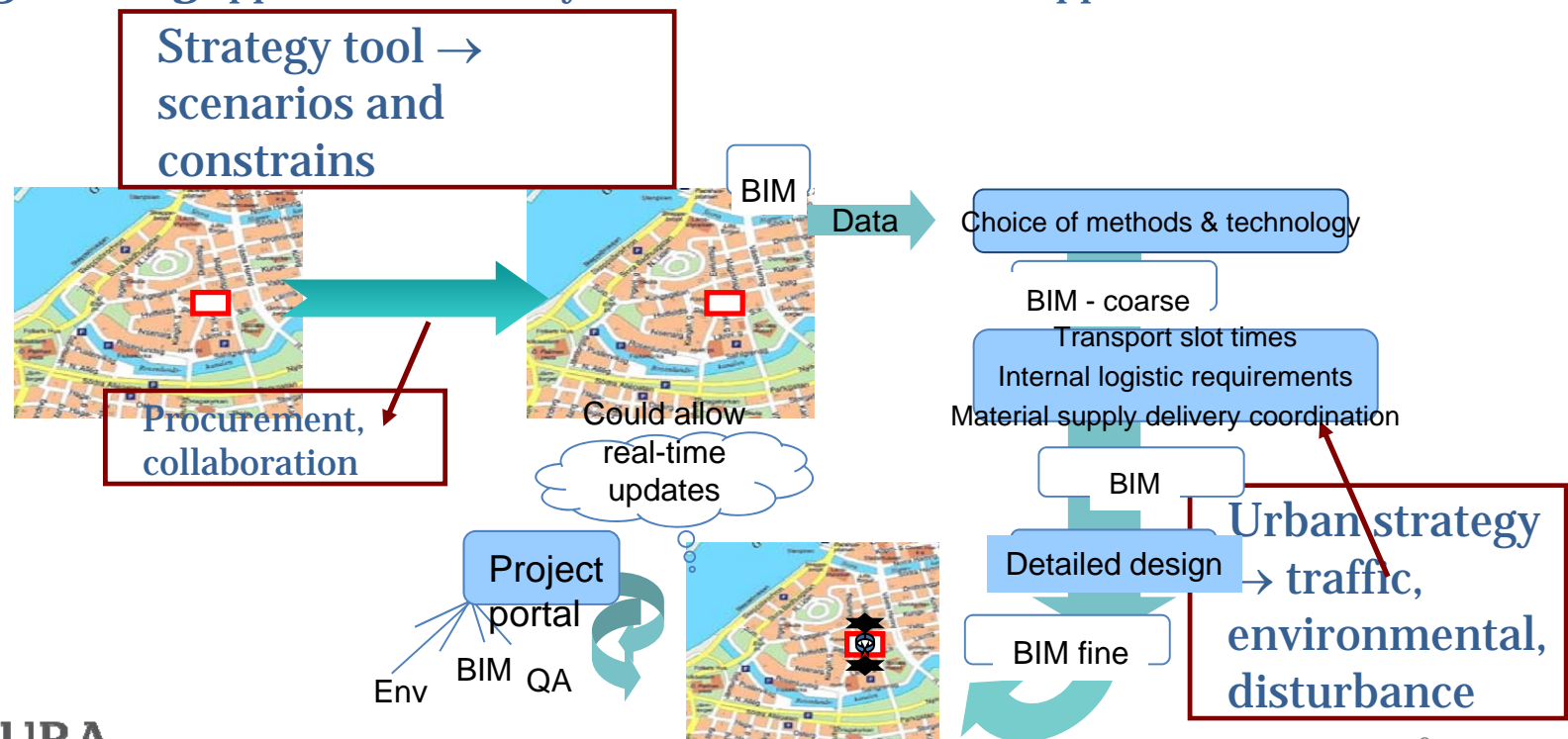




WP2 Methods for flexible construction processes @ urban sites

The goal is to propose an integrated process approach to achieve sustainable solution by avoiding the normal sub-optimization of sub processes using:

- **virtual planning** to avoid conflict and unnecessary transport and achieve zero inventory and zero waste at construction sites towards to zero carbon emission construction
- **system engineering** approach to identify the stakeholder values, opportunities and threats





WP3 Integration of tools

The goal is to develop an interactive tool for monitoring, planning and co-ordinating complex urban projects, which will support the flexible method for construction processes to be developed in WP2.

- Open source BIMserver
- Urban Strategy
- Urban- & Build Environment Render Viewer
- C2B

Task 3.1 Meta-information modelling

Task 3.2 Open-source semantic web



WP 6: Sustainability benchmarking & measures

The goal is to use existing and improved sustainability assessment tools and indicators to analyse and benchmark the best practices and to extend measures and standards for the lifecycle sustainability of urban projects

Task 6.1 Best practices and benchmarking

Task 6.2 Health, safety and urban sustainability measures and technical standardisation

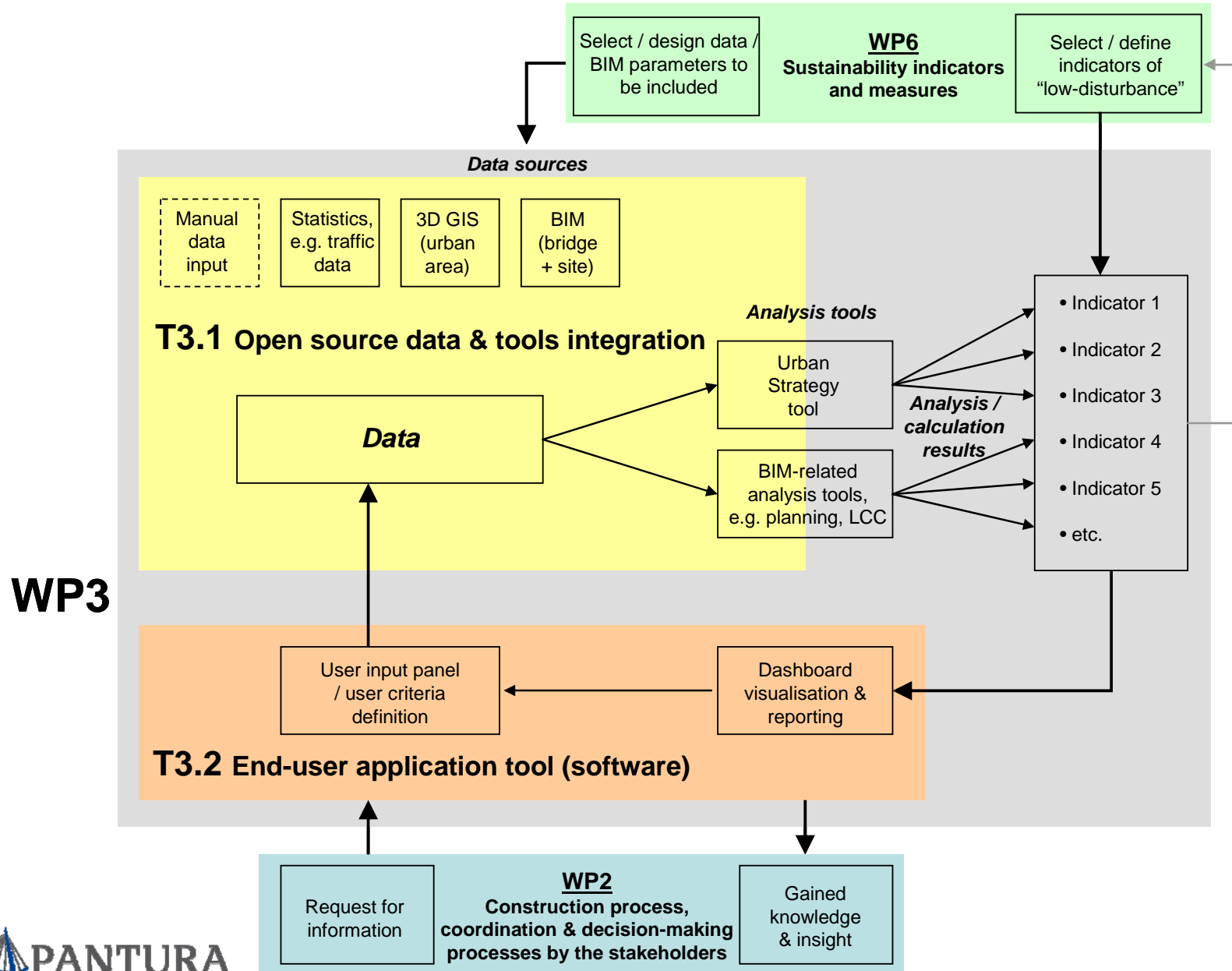


WP 6: Sustainability benchmarking & measures

Example of indicators related to lifecycle phase

Lifecycle phase	Top Indicator
Problem statement	Mobility
Goals and objectives definition	Safety of residents
Stakeholder's analysis	Mobility & Safety of residents
Risks profiling	Safety during construction & Total construction time
Requirements specification	Noise emissions
Procurement	Emission of GHG & Reused/recycled materials
Design and conditioning	Total use of materials
Realisation	Safety during construction

Inter-WP coordination issues





WP4: Flexible construction techniques for new bridges

The goal is to develop methods and technologies that provide alternative, effective methods for the new construction of bridges in densely populated urban environments covering:

Task 4.1 Integral design and engineering

Task 4.2 Flexible off- & on-site techniques

Task 4.3 Flexible assembly methods

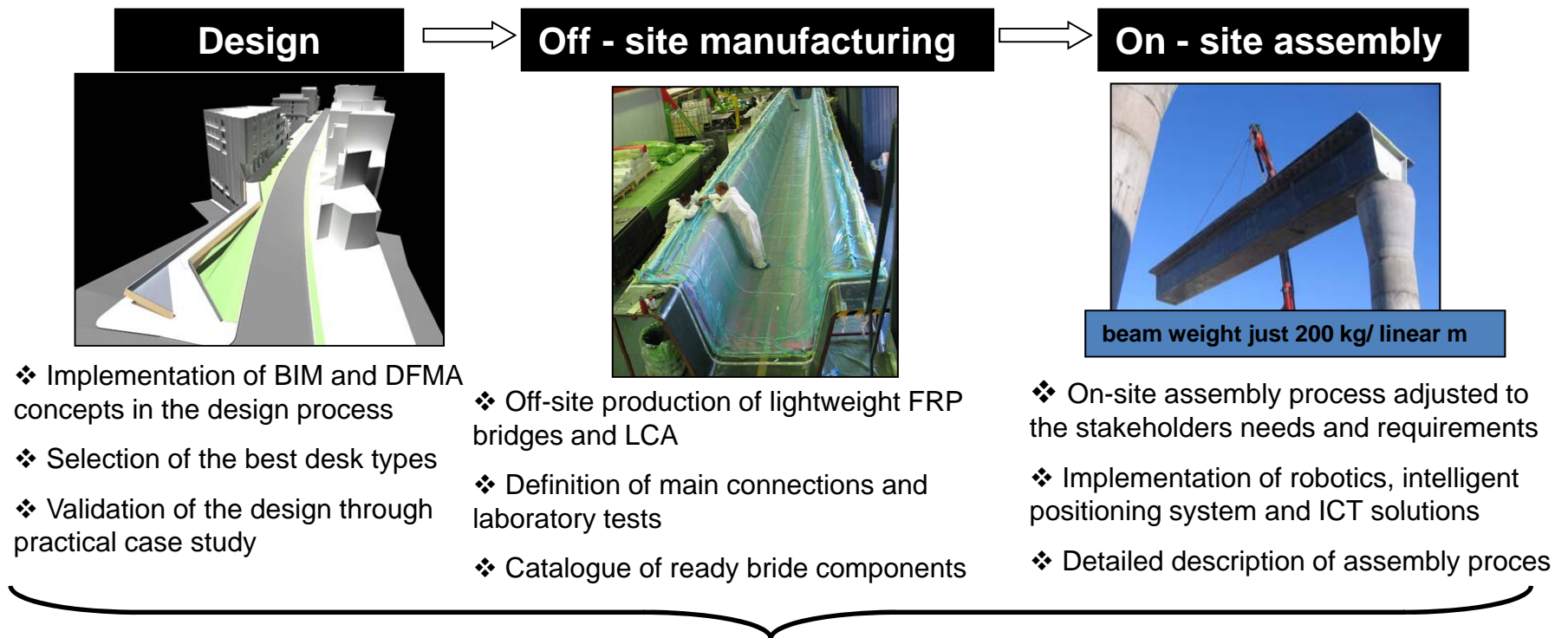
WP4: Objectives and scope





New construction process for new bridges in the densely populated urban area:

- ❖ Efficient off-site manufacturing
- ❖ Effective connections
- ❖ Rapid on-site assembly
- ❖ Standardised design solutions
- ❖ Long service life
- ❖ Low maintenance costs



Validation of the solutions through practical case study bridge in La Palma on the Canary Island



Example of new **integrated** design and engineering solutions for the **off-site** fabrication





WP5: Construction techniques for existing bridges

The goal is to develop new bridge strengthening and upgrading techniques and enhance existing ones that focus on avoiding traffic disruption and environmental disturbance in densely populated cities

Task 5.1: Management of strengthening and repair of bridges

Task 5.2: Flexible refurbishment techniques



Task 5.1: Management of strengthening and repair of bridges



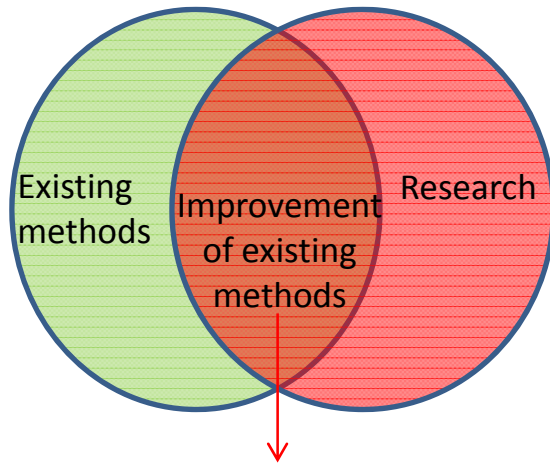
Sahil Salvi

Mapping the need for strengthening and repair

Mapping the problems with existing solutions

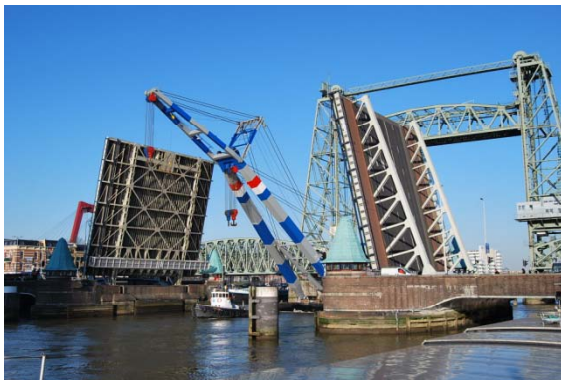
Identification of bottlenecks

Task 5.2: Flexible refurbishment techniques



Application

Case study? ➔ Rotterdam?



(a) Primer application



(b) Cleaning CFRP laminates



(c) Epoxy application on laminates



(d) Epoxy application on beam



(e) Placement of CFRP laminates
(Phares et al. 2003)



(f) CFRP laminates installed



WP 7: Dissemination and training

The goal is to assure the sustainable knowledge transfer and implementation of PANTURA results to clients, the construction industry and other stakeholders and to stimulate new market opportunities and knowledge development. The aim is actively to involve stakeholders to use the new knowledge in practice.

- Task 7.1 Stakeholders' Panel: It has been established
- Task 7.2 Training documentation and pilot training courses
- Task 7.3 PANTURA Public Website: www.pantura-project.eu
- Task 7.4 Dissemination and implementation roadmap



Thank you for your attention!



The Pantura project is co-financed by the European Commission with contract No.: 265172.

© Copyright © 2011-2013. All rights reserved.

All rights reserved. Any duplication or use of objects such as diagrams in other electronic or printed publications is not permitted without the author's agreement.



PANTURA

Low-disturbance sustainable urban construction