



## SCAFFOLD: Innovative strategies, methods and tools for occupational risks management of manufactured nanomaterials in the construction industry

**Jesús M. López de Ipiña**  
 TECNALIA Research and Innovation  
 Industry and Transport Division

**Benoît Hazebrouck**  
 EU-VRI - European Virtual Institute for  
 Integrated Risk Management



GA: 280535



## Introduction

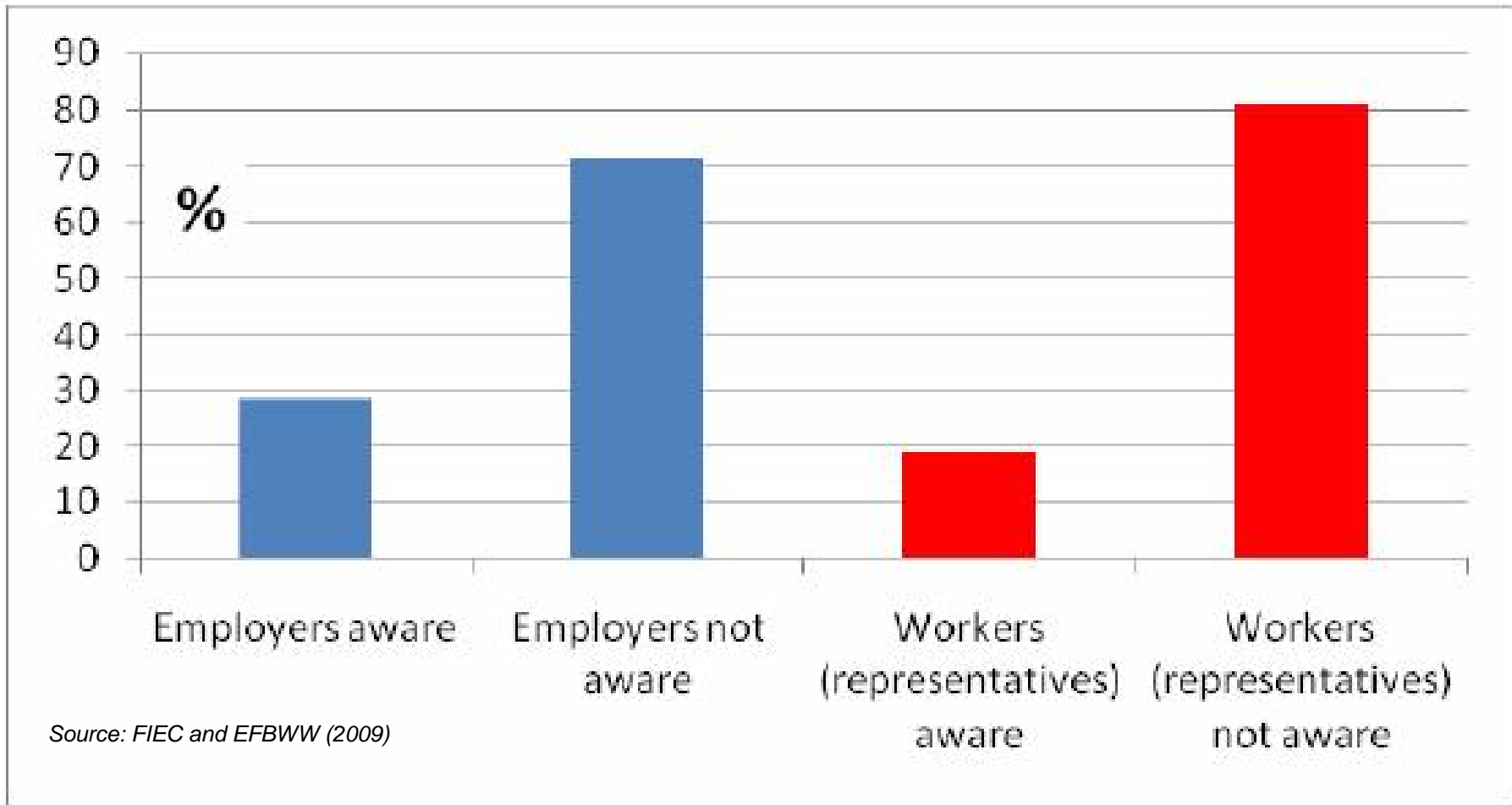
- Use and handling of MNMs and nano-products in construction : large & increasing
- Exposures at different stages of the construction life cycle
- Low awareness
- Occupational Legislation: complex (Stakeholders)

### How to

- **prevent occupational exposure & risks?**
- **reduce uncertainty for stakeholders?**



## Low awareness of NPs in construction sector



## Aim of the SCAFFOLD project

to develop, test, validate in real conditions and disseminate a **new holistic, consistent and cost effective Risk Management Model (RMM)** to manage occupational exposure to MNMs in the construction sector.

This will be done by integration of a set of innovative strategies, methods and tools developed by the project into **consistent state-of-the-art safety management systems (OSHAS 18001 + ISO 31000)**.

**Project Duration:** Three years (2012 – 2015)

**Project Budget:** 3,7 M€

**Call identifier:** FP7-NMP-2011-SMALL-5

**Work program topic addressed:** NMP.2011.1.3-2 Worker protection and exposure risk management strategies for nanomaterial production, use and disposal.

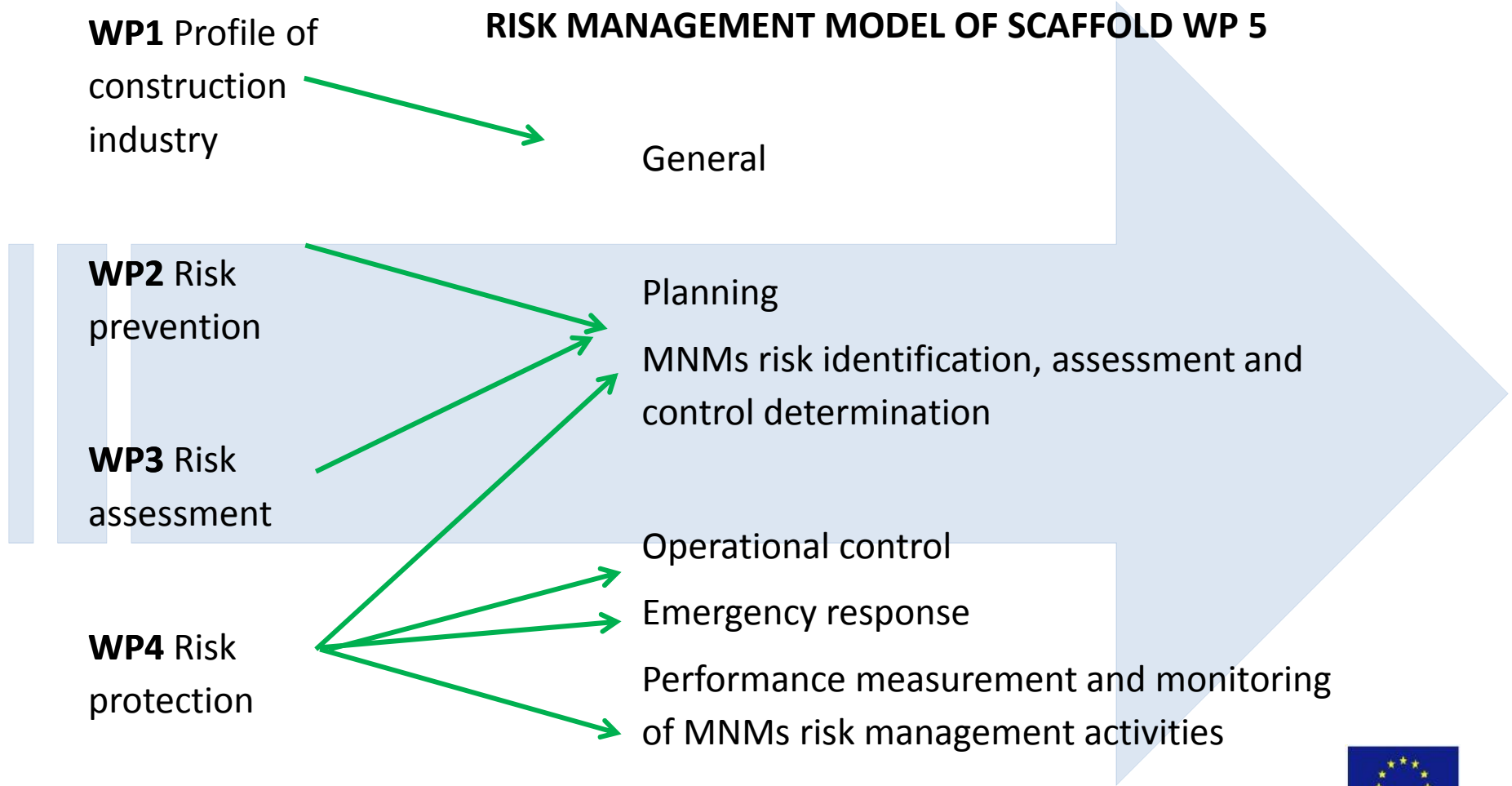
**Project EC Funding:** 2,5 M€



No.	Beneficiary name	Short name	Country
1	Fundación TECNALIA Research and Innovation	TECNALIA	Spain
2	Commissariat à l'Énergie Atomique et aux Énergies Alternatives	CEA	France
3	National Centre for Scientific Research "DEMOKRITOS"	DEMOKRITOS	Greece
4	Centralny Instytut Ochrony Pracy - Państwowy Instytut Badawczy	CIOP-PIB	Poland
5	Acciona Infraestructuras S.A.	ACCIONA	Spain
6	Asociación Española de Normalización y Certificación	AENOR	Spain
7	Mostostal Warszawa S.A.	MOSTOSTAL	Poland
8	ROSSAL SRL	ROSSAL	Romania
9	Tecnología Navarra de Nanoproductos S. L.	TECNAN	Spain
10	NETCOMPOSITES Limited	NETCOMPOSITES	UK
11	Institutul de Cercetari Pentru Echipamente si Tehnologii in Constructii	ICECON	Romania
12	European Virtual Institute for Integrated Risk Management	EU-VRI	Germany
13	Tyoeterveylaitos	FIOH	Finland
14	Regents of University of Minnesota	UMN-PTL	United States



## Expected results: RMM and its inputs





## Specifications for the RMM Toolkit

- ✓ Computer application
- ✓ Evaluates MNMs RMM implementation inside a construction company
- ✓ Adaptable to any company and especially to SMEs
  - + SMEs version : simpler, for SMEs with/without OSHAS model / RMM experience
  - Integrates the RMM from the company (with or without OSHAS 18001)
- ✓ Easy-to-use, practical, interactive ,didactic
  - Could also be designed for training, encourage personnel involvement, establish communication with stakeholders and check legal compliance
  - Facilitates the legal compliance
  - Helps for continual improvement
- ✓ Final example diagrams in each module

# LCA - Process

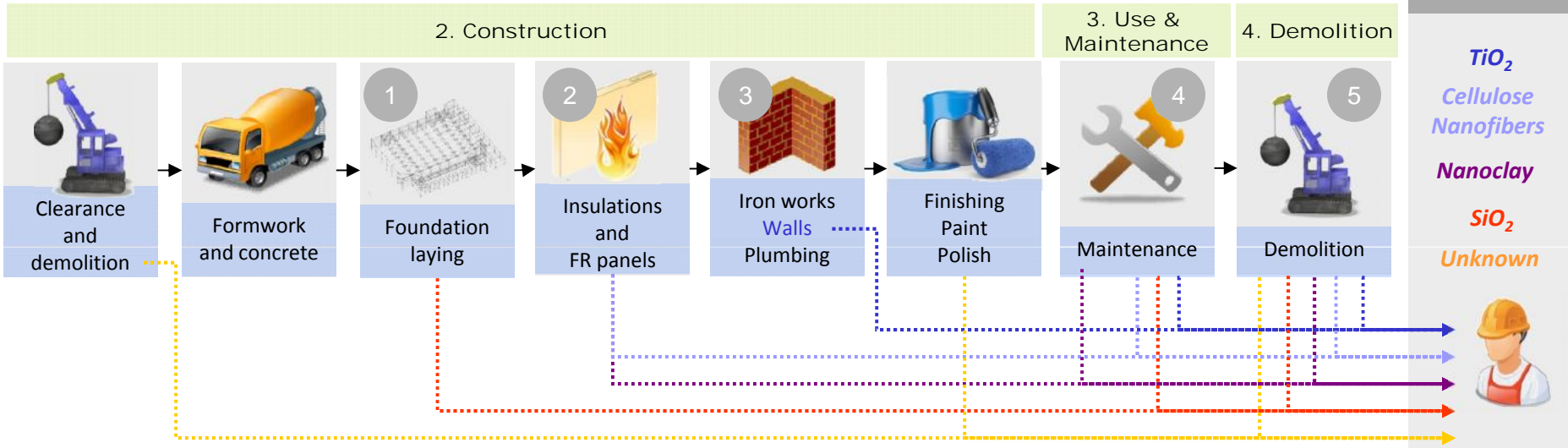


## Process Data Sheet

### BUILDING

Residential, Educational, Commercial, Industrial, Military, Official, Sport

**WORKER EXPOSURE TO:**



### EXPOSURE SCENARIOS:

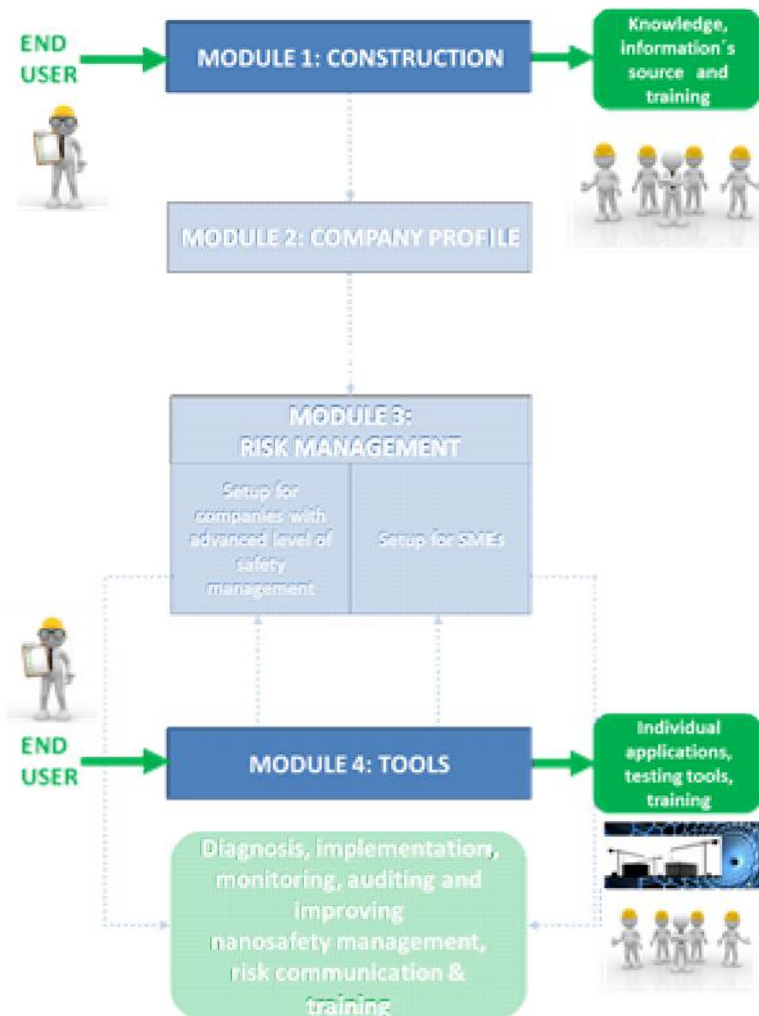
- 1 FOUNDATION LAYING**
  - ES7:** Concrete mixing for piles, slabs and special structures
  - ES8:** On-site Assembly/Machining
- 2 INSULATIONS AND FIRE RESISTING PANNELS**
  - ES19/ES23:** Off-site manufacturing → *Not considered in the project*
  - ES20/ES24:** Fitting of the pannles and machining for the superficial instalations of other elements

- 3 WALLS**
  - ES15:** Preparation, dosification of coatings
  - ES16:** Application of coatings, superficial machining
- 4 MAINTENANCE**
  - ES10/ES18/ES22/ES26:** Accidental Fire: MNMs combustion
- 5 DEMOLITION**
  - ES9/ES17/ES21/ES25:** Demolition, end of life

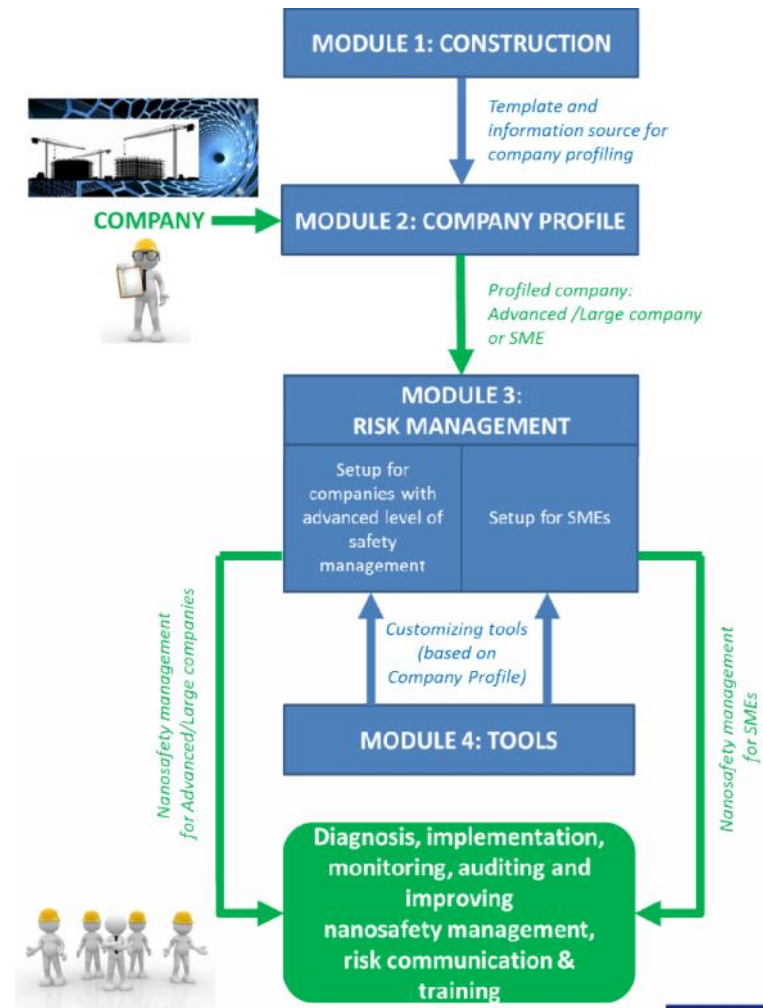


# RMM - Toolkit

## General Operation Mode

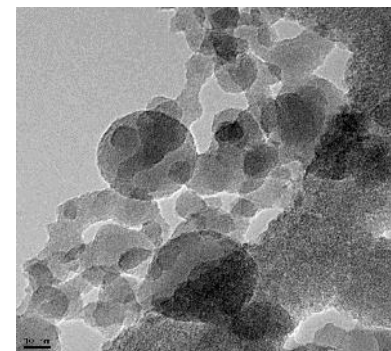


## Customized Operation Mode



## Six applications of MNMs in construction

1. Depollutant mortars
2. Self-compacting concretes
3. Stabilised, Bituminous road-surface
4. Self-cleaning external coatings
5. Fire-resistant panels and
6. Insulations

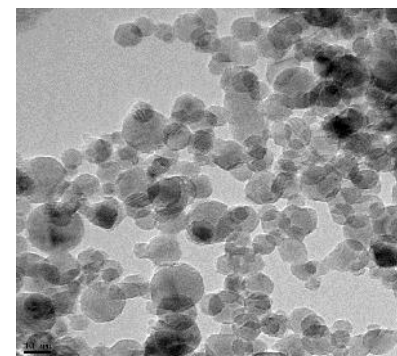


**Five MNMs:**  $\text{TiO}_2$ ,  $\text{SiO}_2$ , Cellulose Nanofibres, Carbon Nanofibres and Nanoclays

## Six steps of exposure scenarios

(integrating 26 individual exposure scenarios)

1. Manufacturing NMs
2. Manufacturing products containing MNMs,
3. Preparation, mixing, and application on site
4. Assembly and machining
5. Demolition and disposal
6. Accidental fires (Combustion of MNMs)



## Demonstration activities: 5 Industrial Use Cases (WP6)

5 stages of the MNMs Life Cycle

### 1.- Manufacturing NMs



TECNAN (ES)

### 2.- Manufacturing CP containing NMs



ICECON (RO)

### 3 &4.- Preparation and use of CP containing NMs

*Buildings*



MOSTOTAL (PL)

*Civil Works*



ACCIONA (ES)

### 5.- End o life of CP containing NMs



ROSSAL (RO)

## 2-way communication



## better Outcomes more impact



1. **Safer products** for construction: dispersions, formulations for fire-retardant panels, concretes, bituminous pavements, coatings, insulations.
2. **Library of guidelines:** strategies, methods and tools for risk prevention, risk assessment, risk protection and risk management
3. **Toolkit** (Databases, procedures, models, CBA, targeted tools for training, etc)
4. **New device for trapping NPs**
5. **Standardization:** CWA + new ISO item PPE
6. Proposal for a **European OHS strategy**
7. **Roadmap** for construction

- Identification of needs
- **Common visions: Delphi workshops**
- **Reviewing**
- **Joint dissemination:** editing, publications, events,...?
- ...

## Expected Impact

### 1. European Construction Industry and Society:

- ✓ Workers exposed
- ✓ SMEs are more vulnerable to occupational risks

### 2. Market (products):

- ✓ Safe Nanoproducts (e.g. Nanocomposites)
- ✓ Safety Management systems (e.g. OHSAS 18001)
- ✓ New safety services for market (e.g. OHS, certification)

### 3. European policies, regulations and standards:

- ✓ New information to elaborate better regulations and new standards (OHS and Safety of products)
- ✓ Supporting deployment of new Community Strategy on Health and Safety at work, Action Plan for Construction of the Lead Market Initiative (LMI), European policy on nanotechnology, H2020, etc.

### 4. Strategic Research Agendas (SRAs) of the European Technology Platforms (ETPC, ETPIS, NANOFUTURE).



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