



NanoGeCo (SIINN ERA-NET Project)

Nanoparticle generation by atomization processes in spray coating

Coordinator – University of Namur (Namur Nanosafety Centre)



June 12th, 12015



Paint market

- Coatings in Western Europe (2013): 5.6 million tonnes

- From top 25 sellers in Europe (2011):
 - World sales: > 44000 M€
 - Of european companies: > 19000 M€
 - In EMEA: > 18000 M€

Goal

Characterization of the non-volatile fraction of the paint overspray (aerosol)



Main partners



DOTHEE

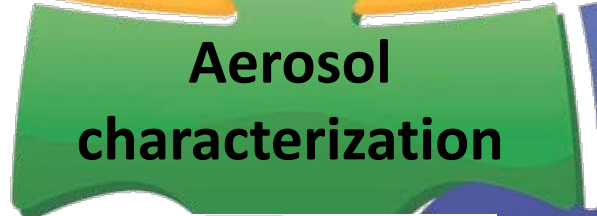
**Paint
formulation**



Modeling



Fraunhofer



**Aerosol
characterization**



**Nanosafety
assessment**



**TU
Graz**



**UNIVERSITÉ
DE NAMUR**



**namur
nanosafety
centre**

INTEGRATED PLATFORM



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Partners

- **University of Namur**, Belgium - whole body exposure, toxicological studies, physicochemical characterization and biopersistence of the nanoparticles in the paint matrix during the aerosol exposition
- **Fraunhofer IPA**, Germany - analysis of nanoparticles, paint application, two-phase flow simulation, risk evaluation
- **TU Graz IVT**, Austria - aerosol measurements, exposure measurement
- **Dothee**, Belgium - manufacturing of waterborne paints

Associated partners

- **SATA GmbH & Co. KG**, Germany - providing spray guns
- **Peter Kwasny GmbH**, Germany - providing industrial spray paint cans
- **Karl Wörwag Lack- und Farbenfabrik GmbH & Co.KG**, Germany - providing solvent paints
- **Byk-Chemie GmbH**, Germany - providing additives for coatings
- **Advisory Office for Risk Assessment**, Germany - biologist and toxicologist

Call topics

Topics concerned in the project

- **Generation of nanoparticles (Topic 1)**
- **Exposure assessment (Topic 2)**
- **Effect of MNM on human health (Topic 5)**

Summary

Project duration: 36 months

Date of beginning: 01/2015

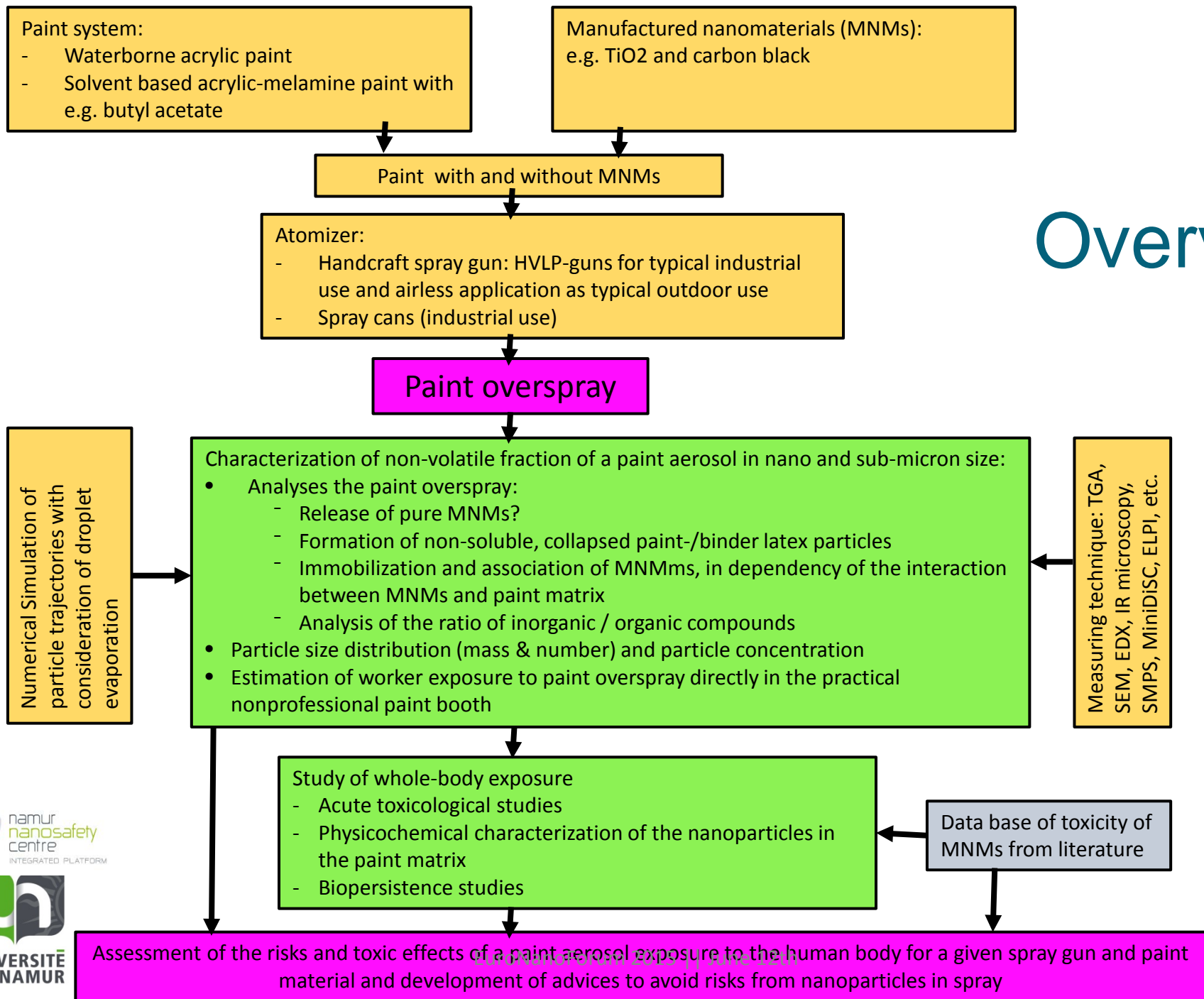
Date of end: 12/2017

Total costs: 960 788 euros

Coordinator: University of Namur,

Namur Nanosafety Centre

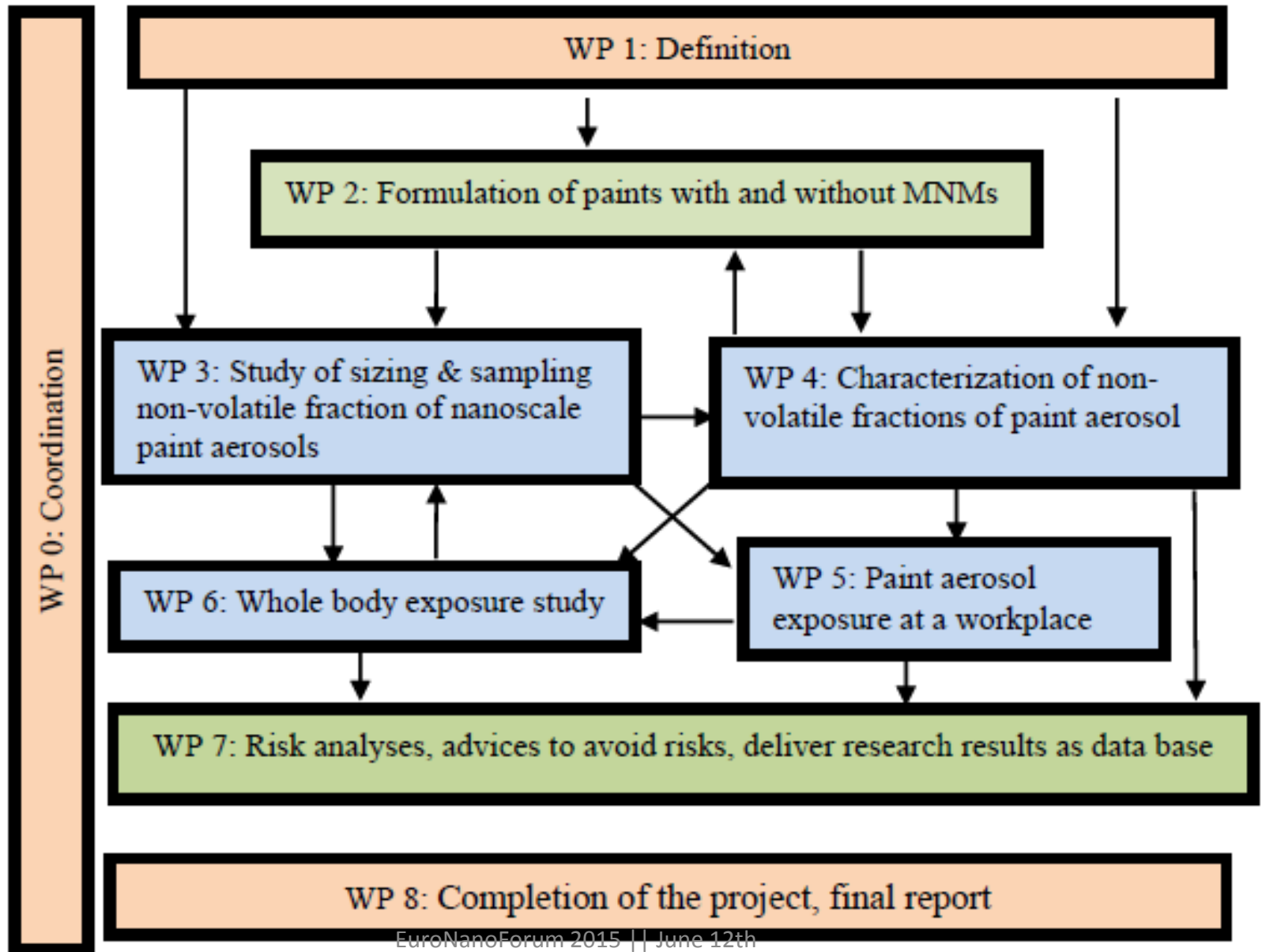
Overview



Work packages

Number	WP Title	Duration months	Start month	End Month	Planned result
WP0	Coordination and project management	36	1	36	
WP1	Definition of spray organs and paints	3	1	3	Spray guns and paints
WP2	Formulations and production of paints with MNMs	27	4	30	Original paints and Nanopaints
WP3	Study of probe sampling for particle size and chemical substance analyse	18	7	24	Suitable methods for probe sampling
WP4	Characteristic of the non-volatile fraction of paint aerosol	21	10	30	Particle size distr. & chemical substance in overspray
WP5	Characterization of paint overspray at a workplace	8	25	33	Exposure to worker
WP6	Acute toxicological studies	20	16	35	Acute toxicity assessment
WP7	Risks evaluation	3	34	36	Research data base & advice
WP8	Completion of the project	2	35	36	Final report

Work Packages



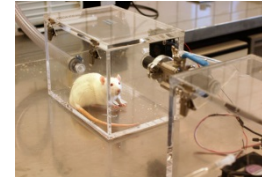
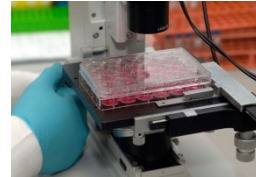
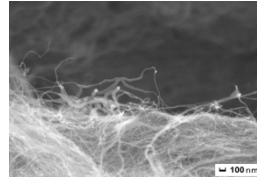
Milestones

Number	Milestone Title	Relevant WP	Delivery month	The milestone is achieved when:
M1	Sizing and sampling atomized nanoparticles (non-volatile fraction).	1,2,3	12	Measuring chamber & aerosol instr. Work.
M2	Characterization of atomized nanoparticles.	1,2,3,4	24	Measuring results of particle size and chemical substances.
M3	Determination of an aerosol penetration factor for a spray jet.	1,2,4,5	20	Simulation results of droplet evaporation.
M4	Whole body exposure study.	2,3,4,6	30	Aerosol trace conc. In Rodent'lung & physicochemical characterization of paint aerosol.
M5	Evaluation of the risk of atomized nanoparticles and reduction of the health risks.	4,5,6	34	Analysis & summary all of the results.
M6	Discussion with relevant organisations.	8	36	Final report.

Agenda

Numéro du WP/tâche	Année 1 (Mois 1-12)				Année 2 (Mois 13-24)				Année 3 (Mois 25-36)			
	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	31-33	34-36
WP0	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
WP1/T1.2	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
WP2/T2.1	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
WP2/T2.2	☐	☒	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐
WP2/T2.3	☐	☐	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐
WP3/T3.2	☐	☐	☐	☒	☒	☒	☒	☒	☐	☐	☐	☐
WP4/T4.2	☐	☐	☐	☒	☒	☒	☒	☒	☒	☒	☐	☐
WP5/T5.1	☐	☐	☐	☐	☐	☐	☐	☐	☒	☒	☒	☐
WP6/T6.1	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☒	☐
WP6/T6.2	☐	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐
WP6/T6.3	☐	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐
WP6/T6.4	☐	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐
WP7/T7.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☒	☐
WP8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒

Multidisciplinary platform



Coordination

Coordinator

Dr Olivier Toussaint (URBC)

Characterization (PMR-LARN)

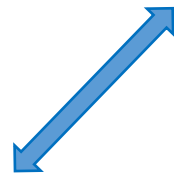
Prof. Stéphane Lucas
Dr Omar Lozano
Dr Jorge Mejia Mendoza

In Vitro Toxicology (URBC)

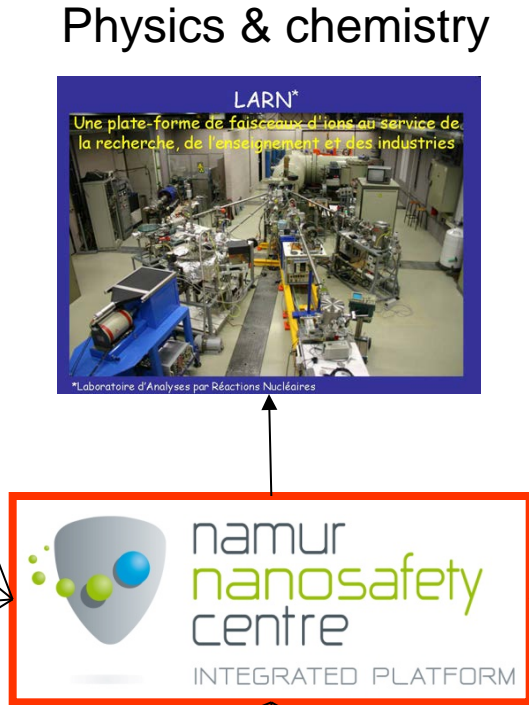
Prof. Martine Raes
Dr Jean-Pascal Piret
Elise Dubuisson

In Vivo Toxicology (Dpt. Of Pharmacy)

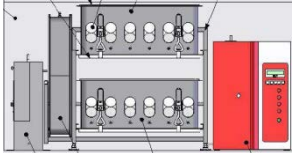
Prof. Jean-Michel Dogné
Dr Julie Laloy
Lutfiye Alpan



A unique technological platform park



Engineering & prototyping



Physics & chemistry



Clinical biology



Level 3 biosafety

Small animal



Multimodal imaging



Proteomic & MassSpec



Genotyping



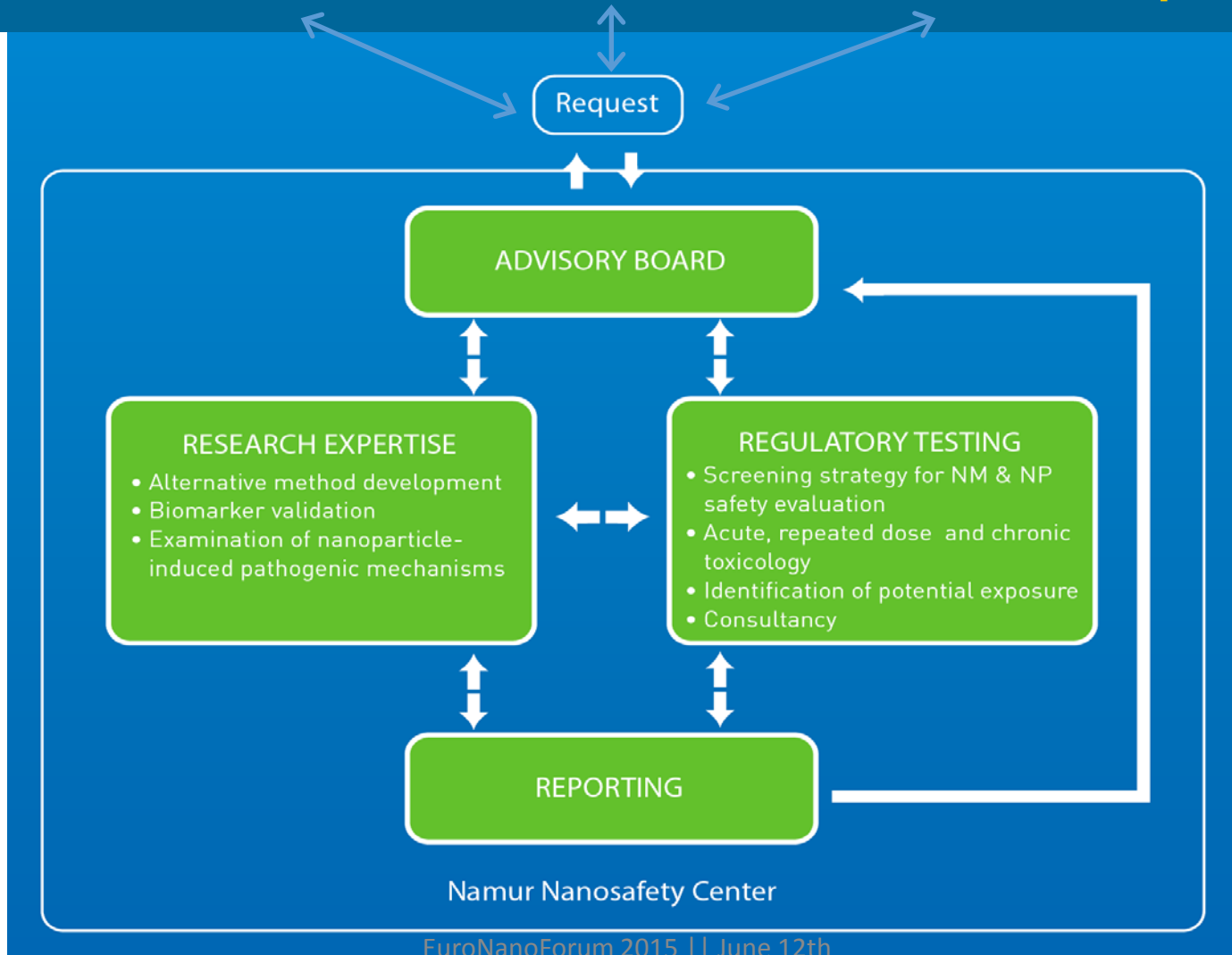
Pathology

NNC & Narilis: toward global competence

Research & Academia

Public Sector

Private Companies



In vitro studies

- Saout C & Toussaint O. (2009) *Science & Technology*, 4: 124-125.
- Piret J-P, et al. (2010) *J Nanoparticle Res*, 12: 75-82.
- Vankoningsloo S, et al. (2010) *Nanotoxicology*, 4: 84-97.
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- Piret JP, et al. (2011) *Journal of Physics: Conference Series* 304 (DOI: 10.1088/1742-6596/304/1/012040).
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- Piret, J.P., et al. (2012) *Nanoscale*. 4(22):7168-84.
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Characterization

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- Lozano, O., et al. (2013) *J. Phys.: Conf. Ser.* 429 012013.
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In vivo studies

- Laloy J, et al. (2012) *Nanotoxicology* 6(2): 213-232.
- Lopez-Santos, C., et al. (2012) *Journal of Biomedical Materials Research: Part A*. DOI: 10.1002/jbm.a.34489.
- Lozano, O., et al. (2012) *Toxicology and Applied Pharmacology*. Vol. 264, No. 2, p. 232-45.
- Laloy, J., et al. (2014) *Nanotoxicology* 8(2): 220-32.
- Laloy, J., et al. (2014) *Toxicology Reports* 1: 172-87.
- Laloy, J., et al. (2014) *Nanomaterials and Nanotechnology*, DOI: 10.5772/59346

Current European Projects

QualityNano : <http://www.qualitynano.eu>

A pan-European **Infrastructure** Project (27 partners) for processing, analysis and characterisation (physico-chemical properties, health and environmental impact) of engineered nanomaterials, nanoparticles and nanostructures.

QualityNano will also pro-actively seek to drive, develop and promote the highest quality research and practices via Joint Research Activities, Networking Activities and provision of Transnational Access functions:

- **Proteomics** **URBC**
 - **Toxicogenomics**
 - **FEG-SEM**
 - **Disc centrifuge**
 - **PIXE**
- } **LARN**

NanoValid: <http://www.nanovalid.eu>

Large scale integrated project (29 partners): development of reference methods for hazard identification, risk assessment and life cycle assessment of engineered nanomaterials

NANoREG: <http://www.nanoreg.eu>

Large scale integrated project: A common European approach to the regulatory testing of Manufactured Nanomaterials.

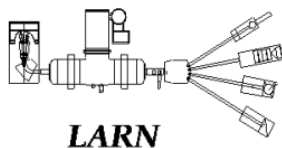
Establish close cooperation between regulators, industries and scientists.

The innovative and economic potential of Manufacture Nanomaterials (MNMs) is threatened by limited understanding safety along the value chains : today's knowledge is not comprehensive enough for regulatory purposes. The approach of NANoREG will provide answers to Society, Industry and the National Regulation and Legislation Authorities.





Thank you for your attention



Department of Pharmacy

