APIP

PORTUGUESE ASSOCIATION OF THE PLASTIC INDUSTRY

Estrada Exterior da Circunvalação Nº 12.194 – 1º Dtº
4460 – 282 Senhora da Hora

Edifício LIBERSIL – Torre B
Rua de S. José, Nº 35 – 2º C
1150 – 321 Lisboa

OBJECTIVES

APIP is a national non profit association whose main goals are to promote and support the Plastic Industry as well as defending its economic, social and associative interests towards national entities and international organizations.

MEMBERS

TOTAL: 115

Sector:

- *Converters*
- *Recyclers*
- *Companies directly linked to this industrial sector*

***Companies**: Mainly Small or Medium sized*

***Market**: +/- 60% of the national plastic market*

***Employment**: around 10.000 workers*

MAIN ACTIVITY SECTORS

- Electrical and electronic appliances

- Technical, industrial and automotive components

- Agriculture and Household

- Medical and Healthcare

- Construction products

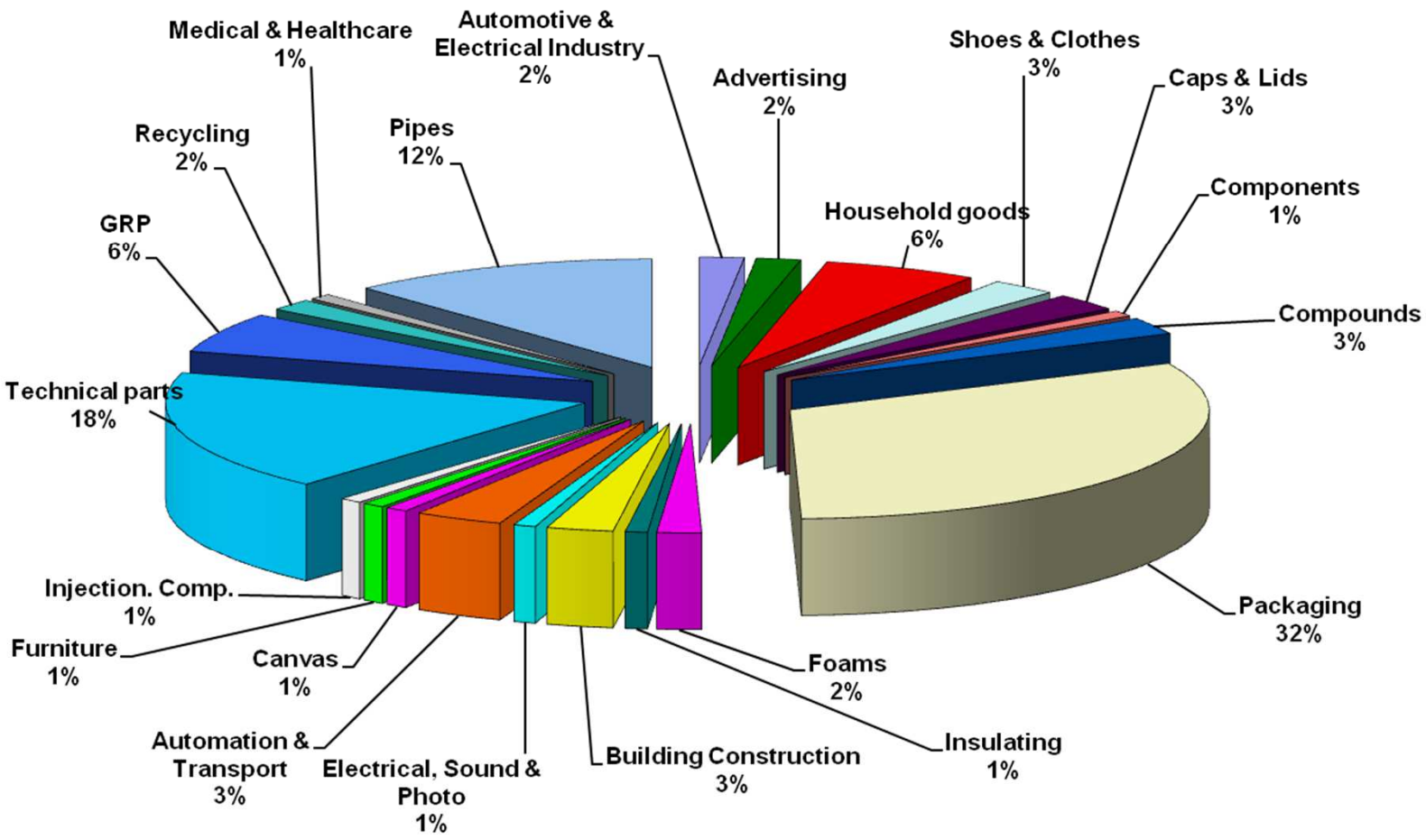
- Automation and Transport

- Thermal insulation

- Packaging

- Recycling

MAIN SECTORS OF ACTIVITY OF THE MEMB



SERVICES RENDERED TO MEMBERS

APIP has **Economical, Technical** and **Juridical** Departments to advise its members

JURIDICAL DEPARTMENT

- Collective Agreement for Chemistry Industry
- Regular advice to Members on questions related to legal and labor subjects
- Dissemination of knowledge concerning labor and fiscal regulations, tax proceedings and litigation, accounting…

TRAINING

*APIP participates intensively in developing **Training Programs** for the employees of the companies of this sector as well as for young people who are interested in working in this sector of activity.*

The Training Programs are developed by experts of the plastics industry and emphasize industry standards and best-practices.

Areas:

- *Basic Injection Moulding*
- *Maintenance*
- *Plastic Materials*
- *Moulded part Defects*
- *Health and Safety…*

APIP AS SECTORIAL STANDARDIZATION BODY

Since 1988 **APIP** is recognised by **Portuguese Institute for Quality**, the **National Body,** as a **Standardisation Body (ONS)** in the field of **Plastics** and are represented and working at International (ISO) and European (CEN) levels.

MONITORIZATION:
of all information of the European Committees of Standardization (CEN) and International Organization for Standardization (ISO)

RESPONSIBLITY:
for the management of the National Technical Committees:
CT 58 - plastic pipes and ducting systems
CT 161 - plastic pipes and fittings and valves for the supply of gaseous fuels

COOPERATION:
with other national committees, such as:
CT 42 - Health and Safety at Work
CT 60 – Packaging
CT 142 - Greenhouses

APIP AND THE MAIN AREAS OF ACTION

Through its Technical Staff acts in these issues as partner in dialogue with National and EU Authorities; draw up opinions and make recommendations, provide support and clarifications as required

NACIONAL AND INTERNACIONAL AFFILIATIONS

PROTOCOLS

Instituto Português da Qualidade

Cefamol
Associação Nacional da Indústria de Moldes

ACEPE
Associação Industrial do Poliestireno Expandido

AEP
CÂMARA DE COMÉRCIO E INDÚSTRIA

APQ
ASSOCIAÇÃO PORTUGUESA PARA A QUALIDADE

ANAIP
Asociación Española de Industriales de Plásticos

PUBLICATIONS AND INFORMATIONS

APIP publishes the plastics industry magazine "REVIPLAST"

The "Plastic Seminar" takes place every year and is considered the most important meeting point of the professionals of the sector.

APIP publishes monthly a Newsletter

Workshops

Meetings

www.apip.pt

APIP

NANO SAFE PACK

SEVENTH FRAMEWORK PROGRAMME

NanoSafePACK

Development of a Best Practices Guide for the Safe Handling and Use of Nanoparticles in Packaging Industries

Research for SMEs Associations

CALL FP7-SME-2011-BSG

1st National Meeting on Nanotechnology: “Regulate to Compete” - 3 April 2014

APIP

NANO SAFE PACK

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PROBLEM TO BE SOLVED. WHY THIS PROJECT?

PROBLEM - NEED

➢ The manufacture of Nanocomposite brings new opportunities to the European packaging industry in general, nonetheless, the **safety issues related to workers and consumers have to be faced** prior to the investment in new resources from the SMEs

PROBLEM - NEED

➢Significant **regulatory concerns** from the European Commission have arisen about unforeseen risks likely to arise from Nanocomposites, so that, several legal requirements have been published:

✓ Regulation EC/1935/2004 (contact with foodstuffs)

✓Regulation (EC) 450/2009 (NPs included)

✓Regulation (EC) 282/2008 on recycled plastic mat. / articles

✓REACH Regulation

SOLUTION

Development of a **Best Practices GUIDE to allow the safe handling and use of Nanoparticles in Packaging Industries,** considering integrated strategies to control the exposure to Nanoparticles in industrial settings and provide the necessary data to minimize and control the potential release of Nanoparticles from the Nanocomposites placed on the market.

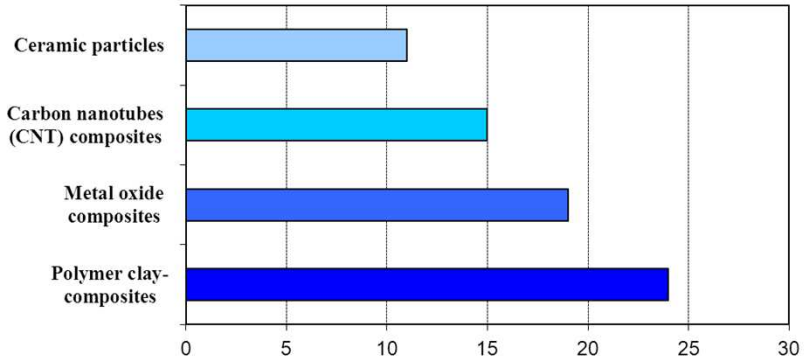
❑ Origin of the idea

The idea of **NanoSafePACK** arises from the consideration of the following issues:

- One of the most extended applications of the Nanotechnology is the development of **Nanocomposites**, polymers reinforced with engineered Nanoparticles that improve the properties of the original material.
- The novel properties that make engineered Nanomaterials benefic for new composites and packaging materials may also raise new questions about the possible **risk to the human health and the environment.**
- Evident **lack of knowledge** about the behavior of the Nanoparticles once they are in the Nanocomposite placed on the market.
- New regulatory actions **restricting the commercialization of this kind of products**, and more even in the case of the food packaging.

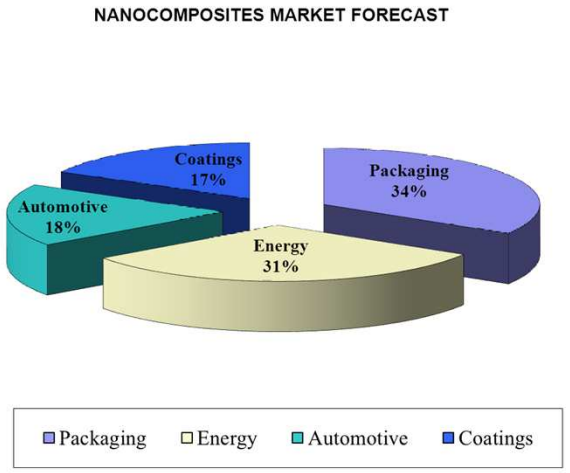
WHY NANOCOMPOSITE INDUSTRY ?

Due to the new properties addressed by the use of Nanomaterials in packaging materials, the Nanocomposites Industry is **one of the fastest growing segment in the polymer composite market** and are estimated to **more than double** in size in the next four years



Global Forecast of NPs Consumption in Packaging Industry

It's expected that the **Packaging Sector become the leader application of the Nanocomposites**, therefore, a better understanding of the nanofillers properties and applications in polymeric matrix, health, safety and environmental protection and safety regulatory requirements are all key aspects to promote the use of nanotechnologies in the European SMEs.



Packaging applications and market forecast

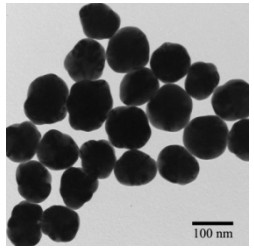
OBJETIVES

The main objective of NanoSafePACK Project is to **develop a Best Practices GUIDE to allow the safe handling and use of Nanoparticles as Nanofillers in packaging industries** and specifically:

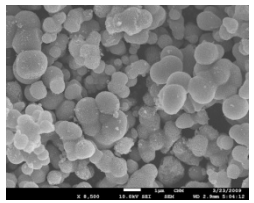
- To **characterize** physicochemical properties, toxicological and ecotoxicological profile of the specific NPs employed in the packaging industry.
- To Characterize the **NP migration** potential
- To assess the **toxicity of the Nanocomposites** as such
- To **characterize the exposure to Nanoparticles** (life cycle approach)
- To **improve the effectiveness of the risk management measures**
- To develop a **cost effective strategy to improve the safety** during Nanocomposites production, use and disposal.
- To characterize the **regulatory aspects** concerning the use of NPs
- To **disseminate the research results** for a large community of SMEs

OBJETIVES

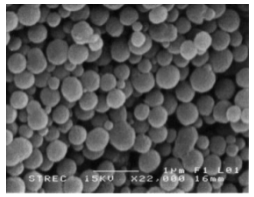
In summary, the use of Nanoparticles in new packaging materials **have a great potential for new applications**, leading to products with new or enhanced properties, and opening new market opportunities.



The Nanoparticle panel will be focused on **those Nanoparticles employed in large scale by packaging industries** , contained in the list published by the WPMN – Working Party on Manufactured Nanomaterials (OECD) and **recommended by the Project partners** :



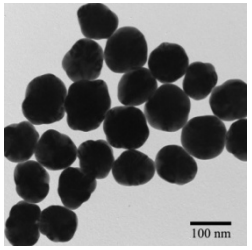
- Silver Nanoparticles & FexOy Nanoparticles
- Silicon Nanoparticles (SiO_2)
- Zinc Oxide Nanoparticles (ZnO)
- Titanium Oxide (TiO_2)
- Cerium Oxide (CeO_2)
- Aluminium Oxide (Al_2O_3)
- Nickel Nanoparticles
- Carbon Nanotubes (CNT)
- Nanoclays
- Nanocellulose

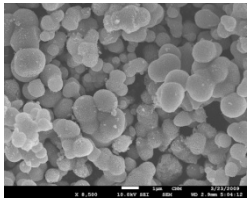


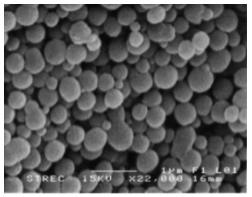
OBJECTIVES

Applications of ENMS to the Polymer Composite Industry

NANOPARTICLES		POLYMER MATRIX	ENHANCED PROPERTIES	PACKAGING SECTORS
Nanoclays (MMT)	**Functionalized with methyl ammonium**	**PLA, PP**	• **Mechanical** • **Thermal** • **Barrier**	**Food and Beverage** **Cosmetics**
	Functionalized with acetylcholine	**PLA**		
		PET		
Silver - Ag		**PE, PP** **LDPE**	**Antimicrobial**	**Food and beverage**
Zinc oxide - ZnO		**PE, PP**	**Antimicrobial**	**Food and beverage**



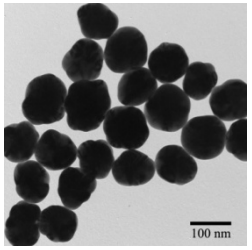


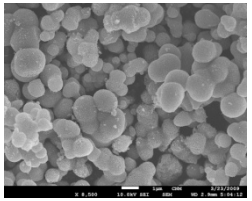


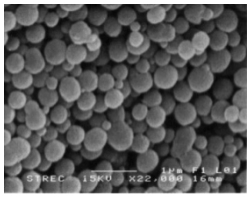
OBJECTIVES

Applications of ENMS to the Polymer Composite Industry

NANOPARTICLES	POLYMER MATRIX	ENHANCED PROPERTIES	PACKAGING SECTORS
Silicon oxide - SiO_2	**PET**	• **Thermal stability** • **Antimicrobial**	**Food and beverage**
Titanium dioxide – TiO_2	**PET,PLA**	• **Antimicrobial** • **UV Protection** • **Strength**	**Food and beverage**
Carbon Nanotubes	**PE, PP,** **Polyvinyl alcohol fibers**	• **Tensile strength** • **Modulus** • **Mechanical**	**Electronics**
Precipitated Calcium Carbonate- $CaCO_3$	**PE, PP,PET, PLA**	• **Viscosity** • **Stiffness** • **Dimensional stability** • **Thermal properties**	**Food and Beverage** **Cosmetics** **Chemicals**

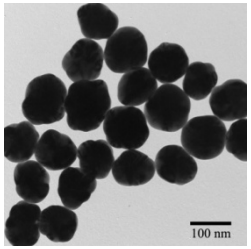


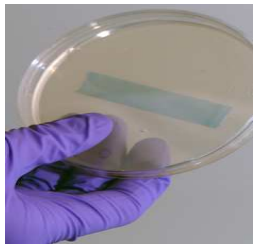




CONCEPT OF THE PROJECT

The **NanoSafePACK Project** is focused in the development of a Best Practices GUIDE to ensure the safety use of nanofillers in the packaging industry by means of the following activities:

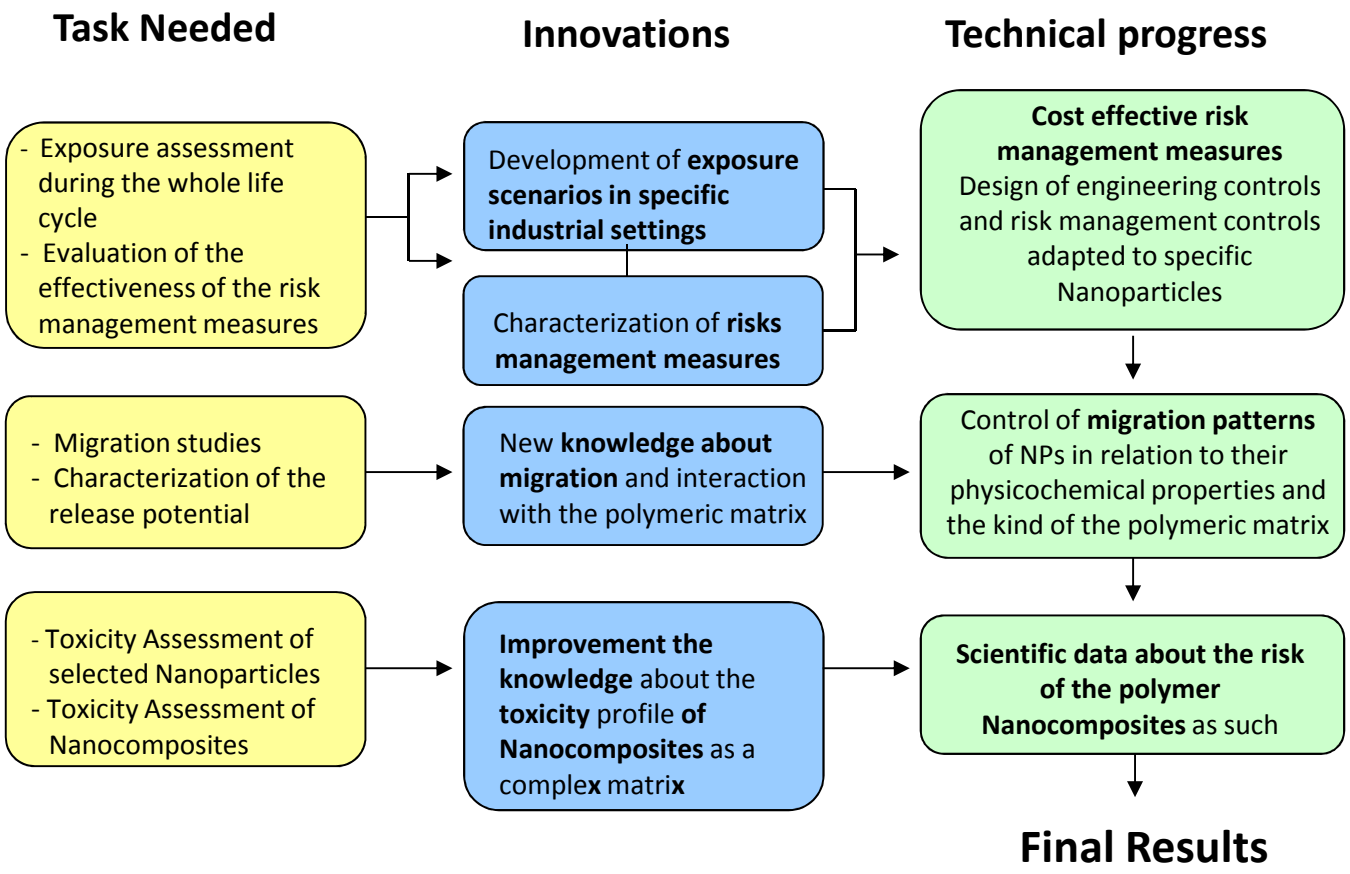




1. **Selection / Characterization of NP Panel**
2. **Toxicity assessment (NPs and functional products)**
3. **Exposure assessment to Nanoparticles released (industrial use and service life)**
4. **Migration studies under use conditions**
5. **Regulatory aspects compliance**

NanosafePACK

CONCEPT OF THE PROJECT



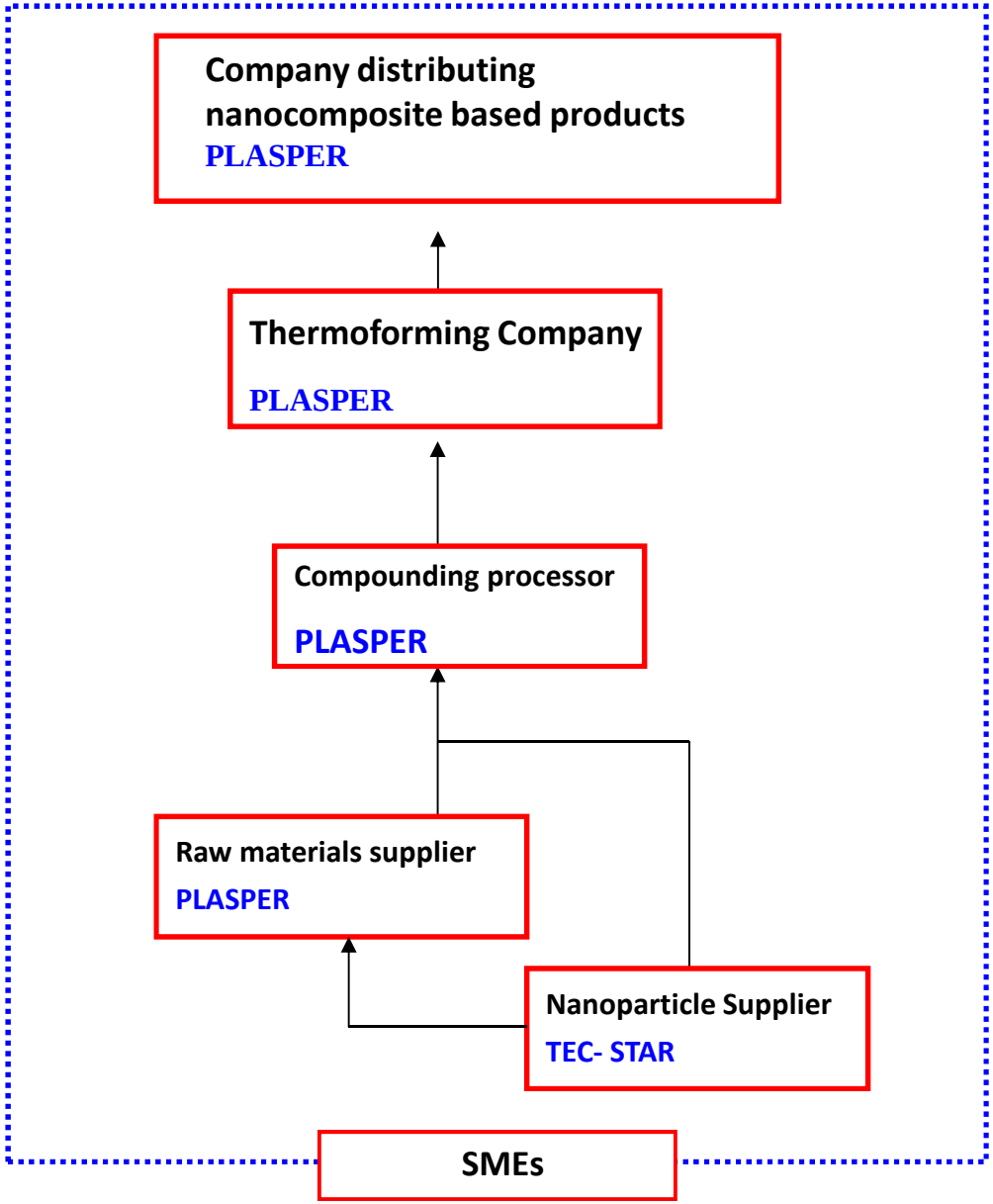
Best Practices Guide

- **Controlling and prevent the worker exposure to Nanoparticles**
- **Providing new knowledge about the toxicity of the composites reinforced with Nanoparticles**
- **Predicting the release pattern to minimize the migration potential**
- **Preventing the release of Nanoparticles to the consumer**
- **Complying with the regulation**

NanoSafePACK CONSORTIUM

Nº	Name	Ref	Type	Country		
1	Centro Español de Plásticos	C.E.P.	SME-AG	Spain		- C.E.P. is the Coordinating Association, over seeing all project activities and collating all deliverables and milestones report - Training and dissemination activities
2	European Plastic Converters	EuPC	SME-AG	Belgium	EuPC	- EuPC will exercise the role of dissemination and exploitation manager, being responsible of the dissemination and exploitation activities
3	The Portuguese Association of Plastic Industry	APIP	SME-AG	Portugal	APIP	- Dissemination and training activities in the Portuguese Nanocomposite industry
4	Instituto Tecnológico del Embalaje, Transporte y Logística	ITENE	RTD	Spain	ITENE	- Research and development activities: Nanocomposite characterization, migration studies, risk assessment (RMM)
5	Institute of Occupational Medicine	IOM	RTD	UK	IOM	- Research and development activities: nanocomposite characterization, migration studies, risk assessment (Exposure Scenario)
6	Tecni-Plasper, S.L.	Plasper	SME	Spain	plasper	- SME dedicated to the manufacture of the nanoplastics compounds: validation studies
7	Tec-Star, S.r.l.	Tec-Star	SME	Italy	TEC STAR	- Technological SME dedicated to the manufacture of NPs: validation studies

NanoSafePACK CONSORTIUM



ITENE

RTD 1
Risk Management and Polymer Nanocomposites processing

IOM

RTD 2
Hazard & Exposure Assessment

EuPC
European SME Association
Dissemination and training

CEP
National SME Association 1
Dissemination and training

APIP
National SME Association 2
Dissemination and training

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BENEFITS OF THE PROJECT TO THE SME-AG / SMEs

- SMEs Associations will improve their activity and image, supporting their partners with new solutions
- SMEs will open new markets, ensuring the regulation fulfillment
- Competitive differentiation of non European Markets
- Direct exploitation of the project results

- Compliance with occupational safety regulations
  - ✓ REACH regulation
  - ✓ Ocupacional Hygiene
  - ✓ Environmental protection

- Social Benefits
  - ✓ Promotion of advanced products
  - ✓ Satisfaction of consumers' demands for new products based on nanoparticles
  - ✓ Increased demand of nanocomposite materials will lead to improve the wellness of the citizens

Main Task and Responsibilities

The activities , related workpackages and responsibilities are explained below:

1. Scientific and Technological Development

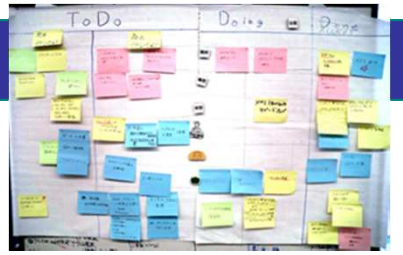
a) Characterization of Nanofillers (WP1)

These tasks will be carried out mostly by **EuPC**, who has the expertise in this area. Both **ITENE** and **IOM** will support each task. In this sense.
ITENE will support the identification and selection of nanometer-sized particles, studying the Nanocomposites placed on the market and consulting specialized associations.
On the other hand, IOM will help with the full characterization of some of the Nanoparticles selected using their own instruments in order to compare and validate the results.

b) Hazard Assessment (WP2)

This task is lead by **IOM**, who is a recognized leader in this field. The experiments will be conducted by IOM in their product safety and toxicology laboratories.
ITENE and **EuPC** will support the particle migration studies, reproducing the experiments and comparing the results in order to analyze and validate the results of this task

Main Task and Responsibilities



c) Development of Exposure Scenarios (WP3)

IOM will lead this task due to their accredited experience in occupational hygiene, workplace exposure sampling and simulation, assessment of control methods and risk assessment.

ITENE will support the exposure measurements and the evaluation of the effectiveness of the risk management measures due to their experience in field surveys and chemical safety.

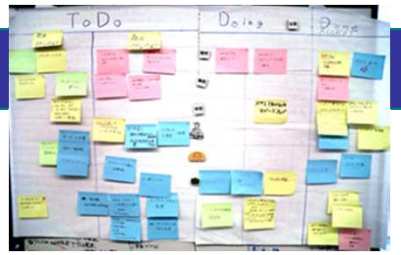
Both IOM and ITENE will cooperate to conduct all the exposure assessments.

The Nanoparticles and Nanocomposites will be provided by **TecStar** and **Plasper** respectively, enabling the assessment of materials that can be potentially on the market.

d) Environmental impact of Nanocomposites for Packaging (WP4)

This task will be carried out mostly by the sustainability department of **ITENE** which has conducted several LCAs involving Nanoparticles and polymer composites.

On the other hand, the analysis of environmental aspects involving the use of ecotoxicological properties will be supported by **IOM**.



e) Development of the Best Practices GUIDE (WP 5)

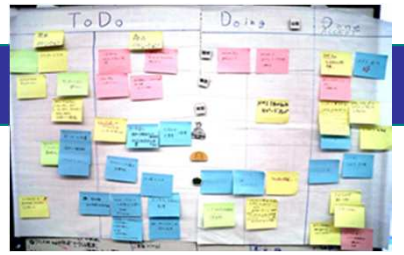
The development of the guide will be conducted mostly by **EuPC** with the support of a technical reviewer from **ITENE**.

In a second stage, the draft of the Best Practices GUIDE will be reviewed by the **SME Associations – CEP and APIP**, whom must critically appraise and make comment on the guide contents. Last, once the contents had been reviewed by the Associations, **EuPC** the workpackage leader will complete the first edition of the guide.

2. Validation Activities (WP 6)

The scientific and technological activities conducted within the previous task will be carried out with the **support of the industrial partners** in order to validate the results and ensure the applicability of the project results.

This workpackage will be headed by **ITENE**, who will coordinate each sampling in collaboration with the SMEs. **IOM** will support the posterior data analysis, supporting ITENE and the SMEs in the interpretation of the analytical data



3. Project Management (WP 7)

This work includes the tasks to be completed by the **Project Coordinator** and contains the tasks required to successfully manage the Project.

The coordination activities will be undertaken by the Spanish Plastic Center - **C.E.P.**
In this sense, C.E.P. will manage the technical development of the project and the partners' obligations compliance. At the same time, each partner will support the project management, collaborating with their assigned task in an appropriate and timely manner.

4. Dissemination Related Activities (WP 8)

In order to achieve an optimal use of the Project across the EU, dissemination, training and exploitation are essential to the success of the NanoSafePACK Project

These tasks will be managed by the European Association **EuPC** with the support of the National Associations - **CEP** and **APIP -** in relation to the training activities and dissemination of the project results to other SMEs and stakeholders. The RTD partners will organize technological conferences in cooperation with the SMEs, enabling a better understanding of the best practices guide and its implementation

IMPACTS OF THE PROJECT

❑ Human Health

- NanoSafePACK will guarantee the safety of consumers and workers
- Less hazardous Nanocomposites will have a potential impact not only on worker protection but also on human health, **avoiding diseases** resulting from direct contact with the Nanoparticles at consumer level

❑ Environment

- It will **minimize the release of Nanoparticles** from the manufacturing process and consumer stage, considering the emission via air, water and soil.
- LCA will provide a **better understanding of the fate of the engineered Nanoparticles in their service life**, evaluating at the same time the potential release of Nanoparticles during the their use and disposal
- NanoSafePACK will provide **new knowledge to the development of new Best Available Techniques (BATs)** to prevent pollution

IMPACTS OF THE PROJECT

❑ Technological

- NanoSafePACK project will take into account the applications emerging nowadays, that will be massively employed in the nearest future, providing a **strong basis for the future development of the nanocomposite industry.**
- New nanotechnology based composites will **increase the development of new and innovative products**, improving the technological level of the European industry

❑ Economic

- The promotion of new and advanced Nanocomposites will **improve the business opportunities** of the European composites industry.

❑ Social

- NanoSafePACK will **improve the approbation of this kind of products** into the society as well as a better image of the new technologies, ensuring the commercialization in the near future

EXPECTED RESULTS

- ✓ The main outcome of the project will be **a best practices guide for the safe handling and use of nanofillers in packaging industries**, including a compendium of proven and technically feasible handling procedures and protection measures able to guarantee the safety of workers dealing with Nanoparticles.

- ✓ In the consumer stage, we expect to generate **reliable data on the hazard properties of the most common nanofillers**, defining a list of nanofillers and polymeric matrices that can be considered safer on the basis of the tested toxicological and migration potential.

- ✓ **It's** foreseen a high **socio-economic impact derived from the improvement of the consumer acceptance of novel technologies** aimed at developing new advanced products containing ENMs, the promotion of the business opportunities and the sustainable development of the Nanocomposites industry.

EXPECTED RESULTS

In detail, it's expected to produce the following final results:

- ✓ Edition of the **NanoSafePACK Best Practices GUIDE by 2015** in English, Spanish and Portuguese, including the publication in paper and PDF version.
- ✓ A complete **description of the adverse effects posed by the use of nanofillers** based on the migration potential and the physicochemical, toxicological and ecotoxicological properties of the most common nanofillers for packaging applications.
- ✓A **complete description of the current exposure scenarios across the Nanocomposites life cycle.**
- ✓ New **information on the release rates** to air, surface fresh and marine water, waste water and soil for each relevant stage on the life cycle
- ✓ New **knowledge on the airborne behavior of the target NMs**, including new data on their aggregation/agglomeration patterns and deposition factors under the specific operative and environmental conditions of use presented in the Nanocomposites production facilities.
- ✓ A set of **informative material to disseminate the project actions** at a Regional, National and European level.

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TO BE CONSIDERED

❑ The following points must be given prime consideration:

- We must demonstrate that the Nanoparticles are can be processed
- We have to Ensure the safety of Nanofillers / Nanocomposites
- Starting up a committee to avoid duplicity with other on going research projects
- Our results must be easy to implement by industrial partners (LE – SMEs)
- Quantify the economic costs of or solution
- Identify the potential risks in each stage of the production process

THANK YOU FOR YOUR ATTENTION

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NanoSafePACK