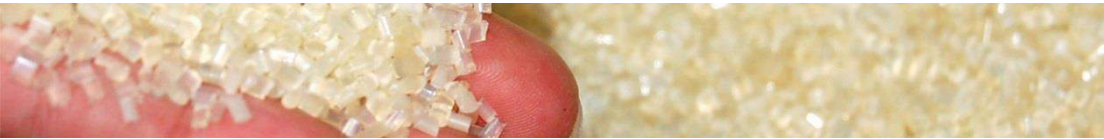


From Research...



...to Market



PACKAGING INNOVATION TO IMPROVE YOUR COMPETITIVENESS

ROADMAP

“Active and Intelligent packaging
in the context of Food waste”

CONCLUSIONS OF SESSION 1

9TH OF MAY, INTERPACK 2014

Organized by ITENE in
collaboration with



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- Aim, Scope and methodology used
- Results
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AIM:

Map the route to fight food waste through the latest packaging developments

1. Map the route through an interactive working session around the latest technology development **Active and Intelligent Packaging** in the packaging industry to save food in industrialized countries.
2. Bring **Key players of the Food and Packaging industry together** and offer the opportunity to participate and generate networking and new ideas.
3. **Identify challenges and new solutions needed** from an industry to ensure implementation of ready-to-market active and intelligent packaging solutions.
4. **Enable interested companies to work together in common R&D projects**, being ITENE and AIPIA facilitators for this to happen.



¿Roadmapping...?

- ❑ Roadmapping sessions offers a unique opportunity to work with other members of the value chain or sector on a specific area, to exchange opinions and ideas on the future of a market or subject.



SCOPE OF THE ROADMAP



- 2014 has been declared the EUROPEAN YEAR against Food Waste
- Focus on ¿HOW CAN ACTIVE AND INTELLIGENT PACKAGING CONTRIBUTE TO THE REDUCTION OF FOOD WASTE IN INDUSTRIALIZED COUNTRIES?
- The global food packaging industry has a lot to contribute not only in addressing food losses but also in ensuring food safety as well as enhancing global food trade, which is a key to economic development.



Methodology used

- ❑ Roadmapping is a strategic tool that allows to identify key market drivers for a concrete sector, in this case, active and intelligent packaging to reduce food waste, in a predefined time scale, at short medium and long term view, in this case, 2015- 2017 and 2020.
- ❑ As a result of the roadmap it is possible to obtain key solutions and applications needed to face the challenges and needs of the market, as well as the route to develop applications.
- ❑ The following report is the result of a 2 hours roadmapping session where participants of the event in Interpack 2014 have shared ideas and opinions.
- ❑ The results of the roadmap session contains the different comments of participants gathered in post-it and represents the discussions held in the group.
- ❑ At the beginning of the session, all participants have been introduced to the methodology and the facilitators explained the aim of this “networking session”.

Methodology used

During the session participants worked on 2 main parts that builds the roadmap landscape:

1. Identification of key Market Drivers:

- Idea generation using *post – its*, indicating time scale and initials.
- Generation of market drivers group by clustering ideas following thematic.
- Voting: the sum of all market drivers groups correspond to the maximum point possible. Groups are ranked by importance

2. Generation of ideas about applications and solutions to answer the key market drivers identified before

- Idea generation using *post – its*, indicating time scale, initials and the associated market driver groups.
 - Creation of application groups by clustering ideas.
- **Furthermore, connections between market drivers groups and applications have been established.**

RESULTS OF THE SESSION AND MAIN CONCLUSIONS



Key Market drivers identified



Main conclusions about market drivers

- ❑ Participants were asked to identify market drivers and trends are moving innovation in active & intelligent packaging in the context of food waste reduction.
- ❑ Innovation in this field is framed by **sustainability, consumer behaviors, global logistic and economics**, that have been identified as the most important market drivers of active & intelligent packaging and food waste reduction.

Key Market drivers identified

- All post-its and ideas shared during the roadmapping session among participants are detailed in the table below. Ideas were put into groups of market drivers.

Ref	Group	Date	Initials	Comments
1	SUSTAINABILITY	2014-2016	BM	SUSTAINABILITY
		2015-2020	JC	TRANSPORT PACKAGING. RAW MATERIALS, RENEWABLE, RECYCLABLE AND BIODEGRADABLE
		2015-2021	JC	ONLY SUSTAINABLE SOLUTIONS: FINANCIAL, SOCIAL, ENVIRONMENTAL
		2014-2020		WATER FERTILIZER, RUN OUT OF RESOURCES
				REDUCE IMPACT OF PACKAGING BY RECYCLABLE MATERIALS
		2020	BM	PLANET CONCERNS
2	FOOD WASTE	2014	NH	REDUCE FOOD WASTE
3	LEGISLATION	2014	NH	MORE RESTRICTIVE LEGISLATION
4	ECONOMIC	2014-2016	BM	REDUCE COSTS
5	MORE INFORMATION	2014	NH	CONSUMERS DEMAND MORE INFORMATION
			BM	CONSUMERS INFORMATION REQUIREMENTS
			AD ES	TRANSPARENCY FOR CONSUMER: PRODUCT ORIGIN, HEALTH INDICATIONS, ADJUST TO DEMOGRAPHY
6	AUTHENTICATION	2014-2020	AD ES	AUTHENTICATION OF THE PRODUCT
			BM	TRACEABILITY
7	NUTRITION/HEALTH	2015	MS	HEALTH/NUTRITION AWARENESS
			BM	HEALTHY CONCERN
			BM	NATURAL AND FRESH FOOD
				LOCAL PRODUCTS
8	DIFFERENTIATION FROM COMPETITORS	2015	NH	DIFFERENTIATION FROM COMPETITORS
9	AGEING POPULATION	2020		LIFE EXPECTANCY: TAYLOR MADE FOOD
		2020	MS	AGEING POPULATION IN INDUSTRIALIZED COUNTRIES
		2020	BM	POPULATION
		2020	JN	AGEING POPULATION, SMALLER HOUSEHOLDS, NEED FOR SMALLER FOOD PORTIONS WITH INCREASED SHELF LIFE
10	CONSUMER BEHAVIOURS	2016	JN	INCREASED URBANIZATION IN CITIES WITH GROWING POPULATIONS, CHANGING SHOPPING PATTERNS
		2014-2016	AD ES	SUPPORT CHANGE OF BEHAVIOUR: MOBILE MARKETING, EDUCATION, PACKAGING
		2020	MS	CONSUMER BEHAVIOUR CHANGES IN EMERGING COUNTRIES
11	GLOBAL SUPPLY CHAIN	2015	JN	GLOBAL, CROSS BORDER AND GEOGRAPHY/ SUPPLY CHAIN: NEED FOR LONGER SHELF LIFE
12	FOOD STORAGE	2015	JN	ARE THERE EFFECTIVE FOOD STORAGE AND REFRIGERATION SYSTEMS?
			AD ES	EASY STORAGE AT RETAIL AND CONSUMER (SUPPORT TIME, CONDITIONS/ EASY UNDERSTANDING)

Key Market drivers identified

- Market drivers groups have been prioritized by participants, being sustainability, consumer behaviors, global supply chain and economical driver the most important.

Ref	Group	Votes
1	SUSTAINABILITY	8
2	FOOD WASTE	2
3	LEGISLATION	1
4	ECONOMIC	3
5	MORE INFORMATION	2
6	AUTHENTICATION	0
7	NUTRITION/HEALTH	3
8	DIFERENTIATION FROM COMPETITORS	0
9	AGEING POPULATION	1
10	CONSUMER BEHAVIOURS	5
11	GLOBAL SUPPLY CHAIN	3
12	FOOD STORAGE	2

Key Market drivers identified

SUSTAINABILITY

Sustainability is a major market driver with a focus on reusing and recycling, either by using recycled plastics or being recyclable by enabling different materials to be separated for easier collection.

Increased consumer environmental awareness and packaging regulations are pushing the need for material reduction and research and innovation on new biodegradable materials.

Moreover sustainability has the potential to accelerate revenue and create opportunities for growth.



Key Market drivers identified

CONSUMERS BEHAVIORS

New packaging innovations and trends are being motivated by changing shopping patterns due to demographic changes (increased urbanization, changing family structures and migration), such as size-adapted, ergonomic and more convenient packages.

Increased Mobile Marketing supports and influences changes of consumers' behavior.



Key Market drivers identified

GLOBAL SUPPLY CHAIN

Market globalization and increased competitiveness of emerging countries means higher complexity of the supply chain.

Inadequate preservation/protection, storage and transportation have been mentioned as causes of food waste. In this context, new packaging solutions are required in order to extend food products shelf life and to increase resistance during storage and transportation.

ECONOMIC DRIVER

In tougher economic times, pressure is on costs. Undoubtedly keeping costs low is key in many areas, consumers are more cautious when choosing their products, being price a key factor.



Key Market drivers identified

NUTRITION AND HEALTH

Evidence indicates that consumers are becoming increasingly interested and invested in products with sustainability attributes. Actually, increased focus on health and well-being, a rising incidence of allergies, and concern about chemical safety have elevated demand for organic and natural products.

Furthermore, consumer demand healthier, fresher and natural products that are free of chemicals, free of artificial preservatives and additives.

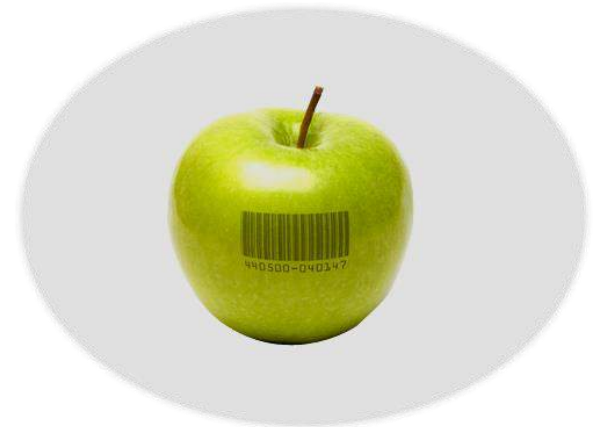
Consequently, preservation requirements regarding packaging have increased and new packaging solutions enabling shelf life extension are demanded.



Key Market drivers identified

MORE INFORMATION

Consumers are demanding more information about the product they are purchasing. For consumers it is becoming more and more important to know the origin of the product and should be seen as a tool to increase confidence in the manufacturer.



Key Market drivers identified

FOOD WASTE

Food waste from manufacturing, food services and catering, retail and wholesale sectors represents a 58% of all food waste generated in the EU, amount responsible for 99 million tones of CO₂ emissions annually. Combined with increases in both population and disposable income, food waste generation is expected to climb up to 126 million tones per year by 2020 if no actions are taken.

Food losses can occur at all levels of the food chain, from production (agriculture, breeding, etc.) to consumer and can be explained by a number of different causes: biological, technical, environmental but also socio-economical.

Packaging systems play a key role in food losses prevention.



Key Market drivers identified

AGEING POPULATION

New packaging innovations and trends are being motivated by demographic changes such as increased life expectancy. Ageing population drives food consumption demanding for tailor made food, smaller food portions, ergonomic and more convenient packages that requires adaptation to this increasing consumer segment.



FOOD STORAGE

One of the key-questions during the session dealt with food storage and refrigeration systems. Are they effective? Those must ensure the required temperature and the easy understanding of both retailer and consumer.

Key Market drivers identified



AUTHENTICATION

In an interconnected and globalized world, traceability of products is a key driver to ensure control of supply chain, increase communication among the supply chain and reducing unnecessary cost and guarantee authentication of products.

LEGISLATION

Legislative requirements are severe in terms of food safety and besides, they must be adapted to technological advances applied to packaging and labelling. The legislative standardization is an increasing demand for producers and consumers.



Key Market drivers identified

DIFERENTIATION FROM COMPETITORS

Differentiation is more than a trend, it is a requirement in a highly competitive consumer good market. It is a requirement to face this competition using differentiation strategies and improving their image. INNOVATION in the shelves is needed to stand up from other products. Active and Intelligent packaging can make the difference.



Key applications and solutions identified

Main conclusions

- ❑ Participants were asked to generate ideas about solutions and applications in the field of active & intelligent packaging in order to answer key market drivers identified.

- ❑ **Main solutions discussed were:**
 - Active Packaging to extend shelf life
 - Intelligent packaging (indicators, control during transport, traceability...)
 - Optimization of packaging and design (reduce packaging, eco-design, reclosure systems...)
 - Sustainable packaging materials (reuse, recycle, biodegradable materials...)
 - Education, communication and marketing

Key applications and solutions identified

- All post-its and ideas shared during the roadmapping session among participants are detailed in the table below. Ideas were put into groups of applications.

Ref	Group	Date	Initials	Comments	Connections	
1	REUSE/RECYCLING	2016		IMPLEMENT RECYCLING STREAMS FOR POST-CONSUMER PACKAGING	1	
			BM	REUSE, RECYCLE, NEW BIODEGRADABLE MATERIALS	1,4	
		2016	JN	WIDESPREAD USE OF RECYCLED MATERIALS IN NEW PACKAGES	1	
			BM	FACILITIES: CONTAINERS, RECYCLING PLANTS, COMPOST PLANTS	1	
2	PACKAGING OPTIMIZATION AND CONVENIENT DESIGN		AD ES	RECLOSURES: EASY STORAGE, CLEAN AND FRESH FEEL		
			BM	ECO-DESIGN: SMALL PORTIONS, EASY-PEEL, OPTIMISATION	1,10,2,9	
				USE OF ONE PACK, REDUCE THE NUMBER OF PACKS	1,4	
3	ACTIVE PACKAGING TECHNOLOGIES		BM	NATURAL INGREDIENTS IN ACTIVE PACKAGING	7,1	
			BM	SHELF LIFE EXTENSION		
				INCREASE SHELF LIFE OF PRODUCTS	1,4	
			2016	NH	ACTIVE PACKAGING SOLUTIONS	3,12,2,4,11
				MS	ENABLE AGRICULTURAL TECHNOLOGIES TO ENSURE AVAILABILITY WORLDWIDE AND SHELF LIFE	7,1,2, 4,11
4	REDUCE MATERIAL NEW BIODEGRADABLE MATERIALS	2016		MULTIFUNCTIONAL MATERIALS	1,4	
			BM	NEW MATERIALS BIOSUSTAINABLE, BETTER PROPERTIES, REDUCE MATERIAL, SHELF LIFE EXTENSION		
			BM	MATERIAL REDUCTION	1,4	
				BIODEGRADABLE MATERIALS (ADDITIVES) FOR PACKAGING	1	
5	SMART PACKAGING	2015	NH	TRANSPORT CONTROL DEVICES	1,4,11	
			2016	NH	INTELLIGENT PACKAGING SOLUTIONS	1,2,3,4,5,10,11,12
		2016	JN	INTELLIGENT PACKAGING IDENTIFIES ORIGIN OF FOOD FOR MORE INFORMATION AND TRACEABILITY	5	
			AD ES	SMART PACKAGING FOR RETAIL, LOCAL PACKED GOODS		
			BM	INDICATORS	6, 10	
6	EDUCATION & MARKETING		BM	EDUCATION	1,2	
			2016	JN	CLEAR INSTRUCTIONS FOR RECYCLE OR SUSTAIN BENEFITS	1
			2016	JN	ACTIVE PACKAGING MAKES SHOPPING CHOICES EASIER AND SIMPLER	10
			2015-2020	JC	LEGISLATION, COMMUNICATION, CERTIFICATION	1
				AD ES	EDUCATE AT POST AND AT HOME/ GIVE INCENTIVES, DISCOUNTS AS REWARDS	
	2020	MS	EDUCATION, MORE AWARENESS	1,2,11,12		

Key applications and solutions identified

REUSE & RECYCLING

In a short and medium term several actions must be carried out for promoting reuse and recycling, involving companies, national and local authorities as well as citizens. These are such as implementing recycling streams: increasing collection facilities (containers), increasing and improving recycling and compost plants or developing simplified and reduced-material packaging so as to make recycling easier.

At medium term (2016) the use of more sustainable materials such as recycled or biodegradable packaging material will be more demanded. Facilities, infrastructure and recycling processes must be adapted to ensure market penetration of these materials.



Key applications and solutions identified

PACKAGING OPTIMIZATION AND CONVENIENT DESIGN

Another option for reducing food losses is to assure the safety and the integrity of the packaging system. In this respect, optimizing the system container / packaging is essential to ensure the integrity of assets throughout the supply chain. Different testing and methodologies can assure the best quality and safety of packaging in contact with foodstuffs, in accordance with the legislation requirements, and also with the highest quality standards required by the food sector.

In other way, consumers demand more convenient packages adapted to their life style: reclosure for easy-storage, easy-opening, packaging size (small portions for monoparental houses, big family size) and eco-design are solutions mentioned during the session.



Key applications and solutions identified

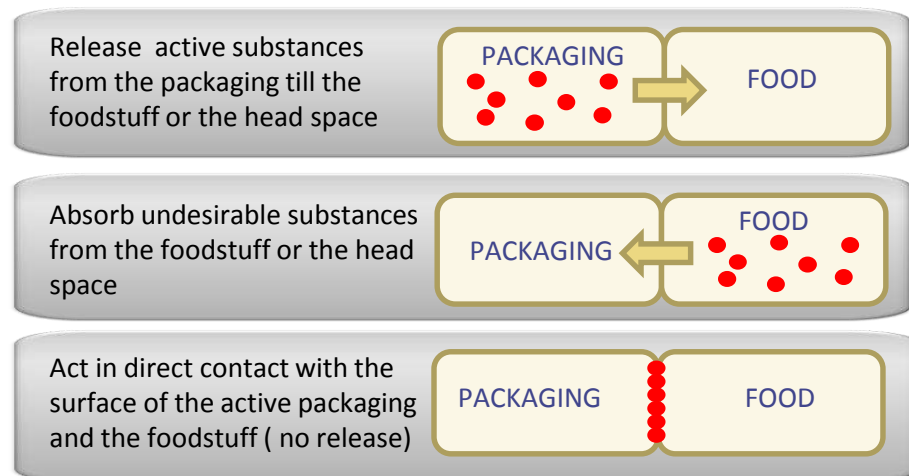
ACTIVE PACKAGING

One of the new R&D trends to solve food waste is the development of Active Packaging technologies, able to extend food shelf-life even twice as much as conventional packaging does. Natural ingredients should be used as active components to extend shelf life.

These innovative solutions avoid food losses not only in household but also in the industry and commercial sectors. Thanks to these reductions, active packaging contributes to a smarter management of world limited food resources.

A few examples of active packaging :

- Antimicrobial packaging
- Antioxidant packaging
- Antifungal packaging
- Oxygen scavenger packaging
- Ethylene scavenger packaging
- Humidity controllers



Key applications and solutions identified

NEW BIODEGRADABLE MATERIALS AND MATERIAL REDUCTION

Packaging Waste prevention is the first action to be considered. The best waste is the one that is not generated. Thus one of the aims is to reduce the quantity of material in the packaging but maintaining or even improving its properties.

Conventional materials like plastics, paper, and glass, among others, have reached incredible reduction figures (among the 20-40%) in some applications. Research in new manufacturing packaging technologies has made possible these achievements that were impossible in the past. **New additives** coming from the nature may help to keep or even overcome mechanical barrier and other interesting properties by being added to the packaging material.

Several natural polymers have been developed on the base of **renewable raw materials**. At medium and long term, participants identified the use of **biomaterials** in packaging as well as compostable packaging as a solution to most relevant applications to be developed by increasing their properties (e.g. barrier). The use of biodegradable packaging aims at being more sustainable but also generate differentiation and image in the market.



Key applications and solutions identified

SMART PACKAGING

Another solution to reduce food waste comes from the development of Smart Packaging technologies able to provide valuable information (i.e. not only an uncertain expiration date) to the user and consumer about current product spoilage, thus helping them to make decisions.

Colorimetric indicators (labels) are incorporated onto packaging and change their color to show product freshness level, product exposure to unsuitable temperatures, etc. So these smart indicators give reliable information about foodstuffs to avoid unnecessary food loss along the whole supply chain.

These are traceability tools designed to assist food processors, foodservice and retailers with developing systems that support track-and-trace objectives.



Thank you for your great participation



Complete participants list

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Agenda



10h30	Welcome from AIPIA and ITENE
10h40	Speaker Presentation: Eef de Ferrante, Director of AIPIA
10h50	Speaker Presentation: Jorge García, Business Director of ITENE
11h00	Speaker Presentation: Peter Higgins, CEO of UWI Labels
11:10-11:15	Introduction to the roadmap methodology
11:15-12:15	Define Key drivers for Active and Intelligent Packaging, Discuss challenges of food waste and where to act
12:15-13:15	Generate Ideas about solutions and how can active and intelligent packaging contribute to the main market drivers and challenges
13:15- 13:20	Conclusions
13:30 –14:00	Light lunch and Networking