Active and Intelligent Packaging: Innovations for the Future.

Introduction

Food packaging exists to make our lives easier. We need packaging to contain foods, protect foods from the outside environment, for convenience, and to communicate information to consumers about the food inside the package. Containment is the most basic function of a package. Even fresh produce, which is displayed unpackaged at the store, must be transported out of the store in some type of container. Packaging provides protection of food from adulteration by water, gases, microorganisms, dust, and punctures, to name a few. A food package communicates important information about the product, how to prepare it, and information about the nutritional content. Packaging also allows for consumers to enjoy food the way they want, at their convenience. Food packages can be geared toward a person's own lifestyle through designs like portability and single serving dishes. Although traditional packaging covers the basic needs of food containment, advances in food packaging are both anticipated and expected.

Society is becoming increasingly complex and innovative packaging is the result of consumers' demand for packaging that is more advanced and creative than what is currently offered. Active packaging and intelligent packaging are the result of innovating thinking in packaging.

Defining Active Packaging and Intelligent Packaging

To understand what active and intelligent packaging have to offer the world of packaging, it is important to clarify what each phrase means.

Active packaging is accurately defined as "packaging in which subsidiary constituents have been deliberately included in or on either the packaging material or the package headspace to enhance the performance of the package system" (Robertson, 2006). This phrase emphasizes the importance of deliberately including a substance with the intention of enhancing the food product. Active packaging is an extension of the protection function of a package and is commonly used to protect against oxygen and moisture.

Intelligent packaging can be defined as "packaging that contains an external or internal indicator to provide information about aspects of the history of the package and/or the quality of the food" (Robertson, 2006). Intelligent packaging is an extension of the communication function of traditional packaging, and communicates information to the consumer based on its ability to sense, detect, or record external or internal changes in the product's environment.
Active packaging systems are developed with the goal of extending shelf life for foods and increasing the period of time that the food is high quality. Active packaging technologies include some physical, chemical, or biological action which changes interactions between a package, product, and/or headspace of the package in order to get a desired outcome (Yam et al., 2005). The most common active systems scavenge oxygen from the package or the product and may even be activated by an outside source such as UV light (Gander, 2007). Active packaging is typically found in two types of systems; sachets and pads which are placed inside of packages, and active ingredients that are incorporated directly into packaging materials.

Active Packaging: Sachets and Pads:
In order to absorb or emit gases to a package or headspace, sachets and pads are very commonly used. Sachets were developed in the late 1970s in Japan. For oxygen scavenging, the sachets essentially utilize the process of rusting, or the oxidation of iron compounds in the presence of oxygen and water. Oxygen scavengers can also be made based on enzyme technology. Oxygen absorbers are usually made of powdered iron or ascorbic acid. Iron based scavengers typically do not pass the metal detector inspections on most packaging lines, and in these incidences ascorbic acid is advantageous. Oxygen absorbers in sachets are commonly found in meat and poultry products, coffee, pizzas, baked goods and dried foods. Sachets that absorb carbon dioxide along with oxygen are also available and are most commonly found in roasted or ground coffee packages. Some sachets are capable of emitting ethanol as an antimicrobial agent to extend the shelf life of high moisture bakery products. Drip absorbent pads may be used in packages containing meats that are likely to leak after temperature fluctuations. These pads prevent the growth of molds or bacteria by absorbing water into superabsorbent polymer granules placed between two layers of microporous nonwoven polymer. Although sachets work well in many applications, they are not appropriate for every situation. Sachets cannot be used in liquid foods. They may not be used in a package made of flexible film, as the film will cling to the sachet and prevent it from performing its function. Sachets have the risk of accidental ingestion by consumers and this may account for their limited commercial success in North America and Europe (Yam et al., 2005).

Active Packaging: Materials Containing Active Components:
More recent attempts at active scavenging have focused on incorporating the scavenger into the packaging material itself. These methods has potential for use in polyethylene terephthalate (PETE) bottles and can be included in many plastic containers and closures. Adding scavengers to the plastic rather than a sachet can save many problems. For example, in a packaging film that is tight fitting such as a cheese pack, a sachet to absorb oxygen cannot be used because the tight fitting film would stifle its functionality. Incorporating oxygen absorbing materials into the plastic components of the packaging material could be more efficient. One way in which oxygen absorbers are being incorporated into plastic materials is the use of a polymer based absorber that is coextruded in various packaging structures. The oxygen absorber is activated via UV light so that the scavenging capacity is not exhausted before the end of the product shelf life (Anonymous, 2007). Some systems developed thus far use iron-based chemistry in their packaging material. Flavour absorbers are also being used in active packaging (Robertson, 2006). It has been known for decades that packaging materials can scalp or absorb flavours from foods such as fruit juices. Scalping is now being used in a positive way to absorb unwanted flavours and odours.

Active Packaging: Antimicrobial Systems for Food Packaging:
An exciting innovation in active packaging is the potential for the controlled release of antimicrobials from packaging materials. Antimicrobials incorporated in packaging materials could extend shelf life by preventing bacterial growth and spoilage. In one system, known as “BioSwitch” (de Jong et al., 2005), an antimicrobial is released on command when
bacterial growth occurs. The basic concept is that a change in the environment such as pH, temperature, or UV light occurs and the antimicrobial responds accordingly. The external stimulus results in a release of the antimicrobial component of the package. In this system, the antimicrobial is released on command, and the system is active only at specific conditions. This system could potentially increase the stability and specificity of preservation and reduce the amount of chemicals needed in foods. A common example of release on command antimicrobials in food packaging is the inclusion of polysaccharide particles that encapsulate antimicrobial compounds. Many bacteria will digest polysaccharide when they grow, and so if a bacterial contamination occurs, the growth of bacteria will release the antimicrobial compounds and should inhibit subsequent microbial growth.

**Intelligent Packaging Systems**

Intelligent packaging systems exist to monitor certain aspects of a food product and report information to the consumer. The purpose of the intelligent system could be to improve the quality or value of a product, to provide more convenience, or to provide tamper or theft resistance (Robertson, 2006). Intelligent packaging can report the conditions on the outside of the package, or directly measure the quality of the food product inside the package. In order to measure product quality within the package, there must be direct contact between the food product or headspace and the quality marker.

In the end, an intelligent system should help the consumer in the decision making process to extend shelf life, enhance safety, improve quality, provide information, and warn of possible problems.

Intelligent packaging is a great tool for monitoring possible abuse that has taken place during the food supply chain. Intelligent packaging may also be able to tell a consumer when a package has been tampered with. There is currently work being developed with labels or seals that are transparent until a package is opened. Once the package is tampered with, the label or seal will undergo a permanent colour change and may even spell out “opened” or “stop”. Perhaps intelligent packaging will be able to inform a consumer of an event that occurred such as package tampering that may save their life.

**Intelligent Packaging: Time Temperature Indicators (TTIs):**

The intelligent packaging design that is leading the way in packaging technology is the time temperature indicator (TTI). The TTI is useful because it can tell the consumer when foods have been temperature abused. If a food is exposed to a higher temperature recommended, the quality of the food can deteriorate much quicker. A TTI can be placed on shipping containers or individual packages as a small self-adhesive label, and an irreversible change, like a colour change, will result when the TTI experiences abusive conditions. TTIs are particularly useful with chilled or frozen foods, where the cold storage during transportation and distribution are important for food quality and safety. TTIs are also used as freshness indicators for estimating the shelf life of perishable products. A TTI technology known as Time strip is currently being employed by Nestle in their food service products in the UK (Anonymous, 2007). The Time strip uses a steady diffusion of liquid through a membrane to measure the time that has elapsed at a particular temperature. This action can provide information about how long a product has been opened or in use. The Time strip is very useful for products like sauces that have to be refrigerated and used within a specific time period.
Intelligent Packaging: Gas Indicators:
Food is a complicated material to package because it is capable of respiration and therefore may change its own atmosphere when inside a package. The gas composition within a package can easily change due to the interaction of food with its environment. Gas indicators are a helpful means of monitoring the composition of gases inside a package by producing a change in the colour of the indicator through a chemical or enzymatic reaction (de Jong et al., 2005). The indicators must be in direct contact with the gaseous environment directly surrounding the food in a package. Indicators are capable of signalling whether there is a gas leakage in the package, or they may be used to verify the efficiency of an oxygen scavenger. Gas indicators typically signal the presence or absence of oxygen and/or carbon dioxide. Oxygen in the air can cause oxidative rancidity, unwanted colour changes in foods, and allow aerobic microbes to grow on foods. Oxygen indicators typically result in a colour change when oxygen is present, and the presence of oxygen can indicate that the package has a leak or has been tampered with. Oxygen indicators can also indicate improper sealing of a package. Gas indicators are also being developed to detect water vapour, ethanol, and hydrogen sulphide.

Intelligent Packaging: Thermochromic Inks
Inks are available that are temperature sensitive and can change colours based on temperature. These inks can be printed onto packages or labels such that a message can be conveyed to the consumer based on the colour of the ink they are seeing. Thermochromic inks can let a consumer know whether a package is too hot to touch, or cold enough drink. Thermochromic inks are becoming a popular technology for beverages (Robertson, 2006). The inks used can be adversely affected by UV light and temperatures over 121°C, so consumers should not fully rely on the inks message when it comes to deciding the proper time to consume a food.

Active and Intelligent Packaging of the Future
As exciting as the prospect of active and intelligent packaging is, all packaging material must be approved for use, and the legislation that applies to traditional packaging also applies to active and intelligent packaging. To date, no specific methods exist to determine whether or not active or intelligent packaging is suitable when in direct contact with foods (Robertson, 2006). A major issue is that most active and intelligent packaging systems require that food be in direct contact with a sensor of some kind, and substances from the sensor may migrate into foods. Whether these migrations are intentional or unintentional, the substance, amount of the substance, and possible health affects of the substance must be determined in order for the substances to be allowed and regulated. In addition, the cost of active and intelligent packaging limits its commercial use. Most active or intelligent systems add cost to the package, so innovations in packaging must have a final beneficial outcome that outweighs the extra expenses of adding the technology. In addition, systems must be reliable and effective. This requires that the system be validated to assure the information being conveyed is true and the consumer is not let down when they trust these new technologies over the old ways. It is also important the food producer, retailer, and consumer be in tuned with the active or intelligent system on a large scale. Attitudes must be willing to accept new technologies and those involved in each step of the food chain must be sure that the new system is safe and true for the user. Despite these hurdles, many developments are still on their way. The attitude toward active and intelligent packaging is positive and there is still much potential for exciting innovation to come. The following are some active or intelligent packaging idea that are in the works.
**Biosensors for Pathogen or Toxin Identification:**

Foodborne pathogens are of great concern to the food industry and many consumers have become increasingly aware of this problem. The need to rapidly and accurately detect small amounts of pathogen or toxins in food is an essential step in keeping the consumer safe. A biosensor is an analytical device used to detect a substance, in this case a pathogen, and then transmit this information into some sort of signal that is quantifiable. An intelligent system in the works aims attaches antibodies to a plastic packaging surface to detect pathogens or toxins. If the antibodies come into contact with the target pathogen, the packaging material would display a visual cue to alert the consumer. This intelligent system would only be useful when foods were contaminated with very high concentrations of pathogen or toxin. In reality, a consumer could get ill from just small concentrations of pathogen or toxin and this intelligent system could give the consumer a false sense of security. Also, this system would work only to detect pathogens or toxin on the surface of a food product, and would not alert consumers of the dangerous substances that could potentially be distributed throughout the product. This system has a long way to go before it becomes commercially available.

**Microwave Doneness Indicators:**

Producers of microwave ovenable foods are anxiously anticipating microwave doneness indicators (MDIs). These indicators would be able to detect the readiness of foods that are heating in microwave ovens and signal to consumers when foods are safe to eat. The biggest challenge in this field at the moment is the ability to evenly heat foods in the microwave so that there is a defined stage in which a food could be called safe to eat. Currently, foods heat nonuniformly, and hot spots occur throughout the food. These hot spots would trigger a doneness indicator while cooler regions would not have reached acceptable cooking temperatures. An ideal MDI would be located on the lid or dome of the microwave container so that the consumer could easily see the visual indicator for doneness (Robertson, 2006). This would be functional as a food is heated in the microwave and the space above the food would heat and transfer to the lid. The relationship between the temperature of the food and the temperature of the lid would be the basis of the indicator system. It would be important that the indicator not give false reading because the device itself heats in the microwave. The indicator must also be viewable by the consumer without having to open the microwave. As of yet, MDIs do not exist commercially, but their arrival is much anticipated.

**Radio Frequency Identification (RFID):**

It is believed that tomorrow’s food packages will certainly include radio frequency identification (RFID) tags (Gander, 2007). RFID tags are an advanced form of data information carrier that can identify and trace a product. They are currently used for tracking expensive items and livestock (Anonymous, 2007). In a typical system, a reader emits a radio signal to capture data from an RFID tag. The data is then passed to a computer for analysis. RFID tags contain a microchip connected to a tiny antenna. This allows for the tags to be read for a range of 100 feet or more in more expensive tags, to 15 feet in less expensive tags (Yam et al., 2005). The RFID tag could offer much more than a conventional barcode. In contrast to a barcode, RFID does not need to be in a direct line of sight to be recognized by a scanner. This could revolutionize the way checkout works at a grocery store. Many RFID tags can be read simultaneously at a rapid rate. RFID tags could also store information such as temperature and relative humidity data, nutritional information and cooking instructions. They could be integrated with a time temperature indicator or a biosensor to carry time temperature information or microbiological data (Yam et al., 2005). RFID technology in the food system is still in the early stages. Simple applications like tracking and identification are the focus of most food science matters, and these must be perfected before more complex applications can come to light.

**The Kitchen of the Future**
The use of data processors, scanners, voice recognition, and advances in the internet have innovators in food science and packaging technology thinking big. An idea has been proposed to integrate a convective/microwave oven with a microprocessor, a barcode scanner and an optional voice recognition device that is connected to a touch screen and the internet (Yam, 2000). The microprocessor would have information about oven characteristics and algorithms. A food item would have a bar code on its package and the information from a bar code could be scanned and passed on to the microprocessor in the oven. The microprocessor would then be able to control magnetron, heating elements and the turntable in the oven to ensure perfect cooking with practically zero interaction from the consumer. If the system works properly, the consumer would be left with a high quality food product without consumer induced problems in cooking. The issue with this system would be that different ovens heat foods differently, different foods have different dielectric and thermal properties, different packages come in different shapes and designs, and cooking from one item to the next will never be perfectly replicated. Although this system is highly technical, it is not an impossibility. There are also several ways in which this system could be altered or simplified based on consumer demand. Although the idea has been planted, this is truly a vision of the future.

**CONCLUSIONS**

Active and intelligent systems are a branch of packaging that is truly innovative and offers exciting opportunities for food safety, quality and convenience. Many active and intelligent packaging concepts are commercially available in the United States. Some experts believe that the next round of technology in packaging will include nanotechnologies that will allow new compounds like novel antimicrobials and gas scavengers to be included in packaging films. The advancement of electronic devices that can be made cheaply will also help drive the innovative direction of active and intelligent packaging. As society continues to advance, the expectations of the consumer will continue to advance. The use of active and intelligent packaging will likely become more popular as more technologies make their way to the market, innovate packaging in active and intelligent systems will become more common place. Perhaps active and intelligent packaging will completely replace traditional packaging itself. And as Paul Gander of Food Manufacture Magazine states, “the trend is towards less packaging, and what there is will be more interactive. Whether 2020 will see packs which literally walk off the shelf is quite another matter” (Gander, 2007).

The Region of Murcia, a model in the area of the ecological production.

The idea of this special project is to use as a meeting and exchange place between the different actors of the development of the
ecological production, specially those that are implemented in the area of the internationalization, sustainability, networking and innovation in ecological products.

It tries to serve to exchange and to analyze approaches and better practices to answer the question what kind of development is it necessary to promote in order to put the sector of ecological products as a model? To be a model or a reference Region in the area of the ecological production, it means to be a Region worried by the food safety and by the environment.

**Definition of the sector.**

The ecological agriculture also known like biological or organic, it is a way of cultivating and being careful of the land and to raise the cattle of a respectful way with the Nature, without using chemical toxic products (pesticides, herbicides, etc.); without seeds modified genetically (called transgenics or GMO); without forcing the cycles of fertility non of supply of the animals. His purpose is to obtain for all, healthy food, in his point of maturity, with all the flavour, the aroma, the texture, with the whole vitality and all the advantages of the healthy food.

The ecological agriculture, it is possible to define in a simple way as a compendium of agrarian technologies that excludes normally the use, in the agriculture and ranching, of chemical products of synthesis like fertilizers, pesticides, antibiotics, etc., with the aim to preserve the environment, to support or increase the fertility of the soil and to provide food with all his natural properties.

**Regulation:**

The ecological agriculture is regulated legally in Spain from 1989, in which there was approved the Regulation of the Generic Name “Ecological Agriculture”, which was of application up to the entry into force of the Regulation (CEE) 2092/91 on the agricultural ecological production and his indication in the agrarian and food products. Nowadays, from January 1st, 2009, date in which it has entered in application, the ecological production is regulated by the Regulation (CE) 834/2007 the Advice on production and labelling of the ecological products.

**Murcia and Ecologic Agriculture.**

The Region of Murcia has a great tradition in the ecological culture and has been pioneering in the production of fruits, vegetables, rice, grape, almond and cereals.

The fabulous climate that we enjoy and the quality of our soils together with the knowhow of our farmers makes that our Region be an ideal place for the practice of the Ecological Agriculture.

**Ecological production in Spain:**

Indicatives of the advance of the ecological agriculture in Spain are the following figures: In the year 2000 the cultivated hectares were approximately 400,000 and the value of the commercialized production was of approximately 120 million Euros; a decade later the number of hectares overcomes the 1,650,000 and the value 700 million Euros.

The speed of growth of the ecological agriculture has multiplied his parameters by 500 between the year 1990 and 2010 and by 5 between the year 2000 and 2010.
One of the more respectful ways of food conservation preserving its organoleptic and nutritional qualities is the one that it is known as “IVth Range”. Essentially it consists of the application combined of the refrigeration and the modification of the atmosphere that makes a detour to the food. The refrigeration slows down the chemical and biochemical reactions of alteration and limits the proliferation of aerophil microorganisms. The modification of the atmosphere diminishes the respiratory rate of the vegetable avoiding his premature fading and it controls the getting in red colour on having diminished the partial pressure of the oxygen. The food of the IVth Range and specially fruits and vegetables are widely spread at present; nevertheless it is not in case of the artichoke, for his special characteristics and his facility of alteration.

There exist two principal ways of applying the modified atmosphere (AM): packaging to the emptiness or under gas. The packaging to the emptiness is not adapted for fresh vegetables since in absence of oxygen the vegetables derive his metabolism towards the fermentation with a rapid alteration. When the atmosphere is packed under gas it can be obtained replacing the air with a gas or gas mixture, or generating the atmosphere inside the packing of passive form (most used in vegetables) or it activates (using absorbers of oxygen).

The substitution of the air can be done by dragging by gas, which is injected of constant form and is displacing the initial atmosphere, or by compensated emptiness. In this second process the emptiness is realized first to eliminate the air of the interior of a packing and later there interferes the gas or mixture of wished gases (The quantity this of residual oxygen below 1%).

The generation of an atmosphere modified (AM) inside the packing can carry out of passive or active form by means of absorbers/issuers. In the first case the film of the packing is permeable selectively to the O₂ and CO₂ and the own breathing of the vegetable modifies the atmosphere. In the active generation of the AM, they are in use absorbers of O₂ and ethylene, or issuers of CO₂ and antimicrobial substances.

In the packaging basically three types of gases are in use: N₂, O₂ and CO₂, that are combined in different proportion in order to obtain an inert atmosphere (N₂), semi-active (CO₂/N₂, O₂/CO₂/N₂) or it activates (CO₂, CO₂/O₂). The utilization of one or other and the concrete proportion of each one of them changes according to the type of product to preserve. In case of vegetable products it influences such factors as respiratory and/or photosynthetic intensity during the
Vth Range Products.

Initially "Vth range = Ready to eat dishes (RTE) " was designating to the plates precooked or prepared in advance and to the cooked vegetables presented to emptiness.

Today since Vth range defines the food prepared with culinary production proved from the preparation in crude or from cooking or precooking, of one or more food products of animal or vegetable origin, with or without the addition of other authorized substances and, in his case, flavoured. It will be able to appear packed or not and arranged for his consumption, directly or after a warming or culinary additional treatment.

The Food Spanish Code (CAE) defines plates prepared like: "the products obtained by mixture and flavoring of animal and vegetable food, with or without addition of other authorized substances, contained in appropriate packings, hermetically closed and treated by the heat or another procedure that assures his conservation, and ready to be consumed after a simple warming."
NEWS AND EVENTS

MURCIA FOOD EVENT 21-22th October 2013

This will be the 6th edition of the international biannual meeting, Murcia Food Brokerage Event 2013, where the latest novelties in the field of food technology will be presented, and diverse technological necessities will be shared among all the participants, giving a chance to establish technology cooperation agreements between companies from several European countries.

As usual, the VI Food Technology International Symposium will take place in parallel with the brokerage meetings, gathering select group of speakers expert in the most innovative technologies and the most up-to-date issues.

In addition, during the second day, it will be held a conference cycle showing the technology foresight in the food sector. Important institutions and companies, such as OPTI (Industrial Technology Foresight Observatory), CDTI (Centre for Industrial Technological Development), Siemens, Hero and CSIC (Spanish National Research Council) presented the trends and foresight in their respective fields.

Background

The Murcia Food Brokerage Event is a meeting arranged every two years. Since the first edition in 2003, the event has achieved a growing success and recognition. We can remark the high attendance number of the last editions. The fourth edition in 2009 had the largest participation rate, with 340 companies registered from 13 countries. There were more than 350 technological offers and requests, and no less than 1,000 bilateral meetings during two days.

Summary and a few figures

This 5th edition of the Murcia Food Brokerage Event could be described as the one of the excellence, where the rate of attendance gave way to the quality of the technological profiles introduced and the interest emerged during the bilateral meetings.

The current state of the European’s countries economy and specially the consequences that the economical crisis in Spain has involved that the number of participants decreased considerably both in the international and Spanish participants. But this fact has been used to provide a better assistance to all the companies: helping to write and correct the profiles, monitoring of the meetings selection for avoiding troubles during the event, mentoring to the participants during the meetings, solving specials request of participants, etc.

Altogether 160 companies and universities gathered in the meetings, introducing almost 300 technological profiles. Over 500 bilateral meetings were scheduled before the event, though finally it was about 600 meetings during the two days, taking the un-scheduled meetings into account.

For the 6th edition is expected a similar affluence of companies, universities, and stakeholder of the agrofood sector, and there will be plenty of arrangements and businesses among all the participants. It provides an international, technological scenario for companies interested in: Finding out about the latest European technologies in the agrofood sector and Holding bilateral meetings for making technology transfer.

A number of conferences and presentations will take place within the 6th International Symposium on Food Technology, in which the latest creations in the sector will be presented.
MURCIA PACMAn LOCAL EVENT:
“Technology Fair” in Food Technological Centre. 5th June 2013

This has been the first time that several national companies have shown their new technologies and applications for a future manufacturing model more sustainable and with plenty of innovation.

It was a very good experience for R&D people from Murcia SMEs, because without travelling to another place or region of Spain, they could be in touch with this kind of technologies.

VALENCIA PACMAn LOCAL EVENT:
“Workshop Innovation as a success factor in the Agrofood sector” 8th June 2013 (organized by IVACE Valencia).

The event took place in the framework of the start race of the Route the Prince Regatta (routeprinces.com).

The workshop counted with experts and companies of the agro-food sector in the Valencia Region. OriginalCV, the first distributor specialized
in only Valencian gourmet products will introduce the session that will count with the presence of producers that will share their success stories:

- Terra i xufa, the first company to certify "bio" their production of Valencian "xufa".

- Vinalopo Protected Designation of Origin = The only grape producers to use paper bags before growing for improvement of their quality.

- Séria's oil from millenary olive tree; taking advantage of the largest colony of Millenary trees in Europe to produce high quality olive oil.

- Los Frailes Celler; Ecological wine producer, promoter of the use of our own grapes Monastrell to produce and internationalize Valencian wine.

Links of interest:
http://www.routedesprinces.com
https://www.facebook.com/routedesprincesuk
NEWS AND EVENTS

S3 THEMATIC WORKSHOP
Key Enabling Technologies for Smart Specialisation Strategies (RIS3) on Agrofood

What
As part of the Europe 2020 Strategy, the ‘Innovation Union’ flagship initiative sets out a comprehensive innovation strategy to enhance Europe's capacity to deliver smart, sustainable and inclusive growth. It highlights the concept of Smart Specialisation as a way to achieve these goals.

Smart Specialisation is a strategic approach to economic development through targeted support to Research and Innovation, which implies concentrating resources on key priorities in a region based on the region’s economic potential rather than spreading efforts and investments too thinly. Smart Specialisation involves a process of developing a vision, identifying competitive advantages through an entrepreneurial process of discovery, setting strategic priorities and making use of smart policies to maximise the knowledge-based development potential of any region, strong or weak, high-tech or low-tech.

In March 2012, the European Council have reinforced this approach, specifically advocating the strengthening of Key Enabling Technologies (KETs) to achieve the EUROPE2020 objectives. The Commission defines KETs as 'knowledge intensive and associated with high R&D intensity, rapid innovation cycles, high capital expenditure and highly skilled employment.

The purpose of this workshop is to discuss the role of KETs in the process of developing and implementing RIS3. As a number of European Regions have identified agrofood activities to be focused on in their RIS3 exercises, the event will specifically address the role and importance of KETs in this agrofood sector. The sector must be understood from a cluster approach, comprising of Agriculture, Food Industry, Logistic, and Environmental aspects, etc.

The event will be organized around four main subtopics: How to map KETs on agrofood in the Regions and addressing the issue if it should be a priority for regions; Industry and Academia addressing and challenging the ‘KETs Discovery Process’; Regions presenting their RIS3 strategy in relation to their agrofood priority and Instruments to promote a KETs Market and collaboration in Regions.

Presentations are performed by European Commission representatives, by leading academics, practitioners, and policy makers aligned with presentation of regional case studies. The event aims at gathering academics and regional/national policy makers involved and regional representatives with set priority in agrofood sector.

PACMAN project is aligned with this exercise; it worth mentioning that PACMAN project activities will be duly presented in the workshop and considered as one of the local events of INFO Murcia.

Organizers
European Commission (S3 Platform, DG Regio), Region of Murcia (Spain).

When
11th to 12th April 2013

Where
Archivo General de la Región de Murcia. Avenida de los Pinos, 4, 30009 – Murcia

Some of the presentations will be:

- European Union perspective on KETs for RIS3 on Agrofood by the European Commission.
- The relevance of KETs for Smart Specialisation Strategies.
- How to map KETs in the Regions.
- Enterprise Europe Network (EEN) supporting KETs transfer among regions.
- Debate Industry and Academia, Policy-makers and Regions
**www.pacmanproject.eu**

www.pacmanproject.eu is the first output of the PACMAAn operation. Designed as a portal, it is structured in several thematic areas easily and immediately accessible, useful and flexible. The PACMAAn portal responds to the aims of the project, through a clear vision of the overall contents of the project, a detailed description of the partnership and updated news and information of ongoing events at European level on the agrofood sector. Visiting www.pacmanproject.eu you will be able to find the project contacts and the state of the art of the activities and the final products will be downloadable as to inform the users on the project midterm and final results.

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