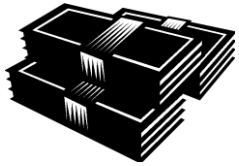
COST Action FP1405 ActInPak

Active and intelligent fibre-based packaging – innovation and market introduction

COST is supported by
the EU Framework Programme
Horizon 2020

Importance of this Action

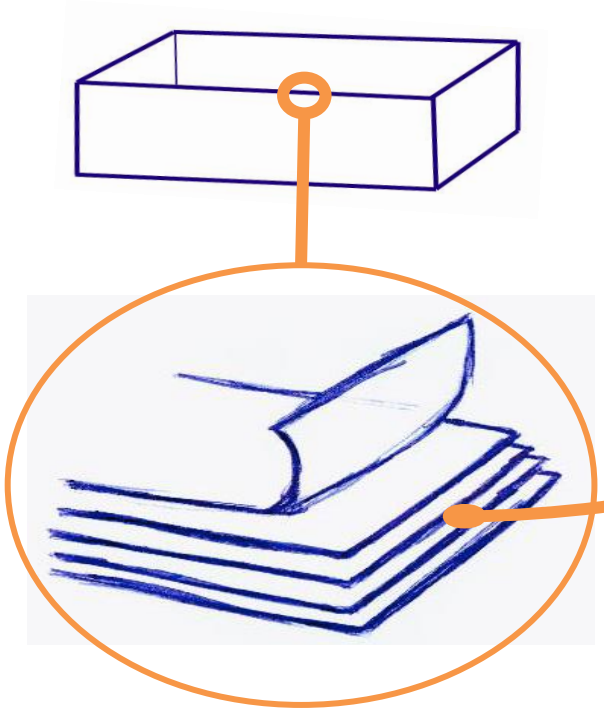


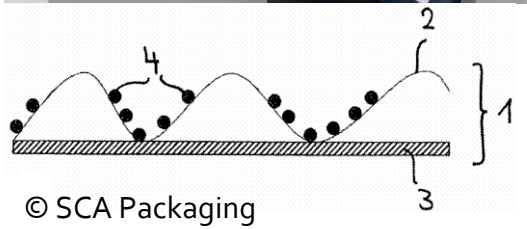
Money

Knowledge

ACTIVE PACKAGING?

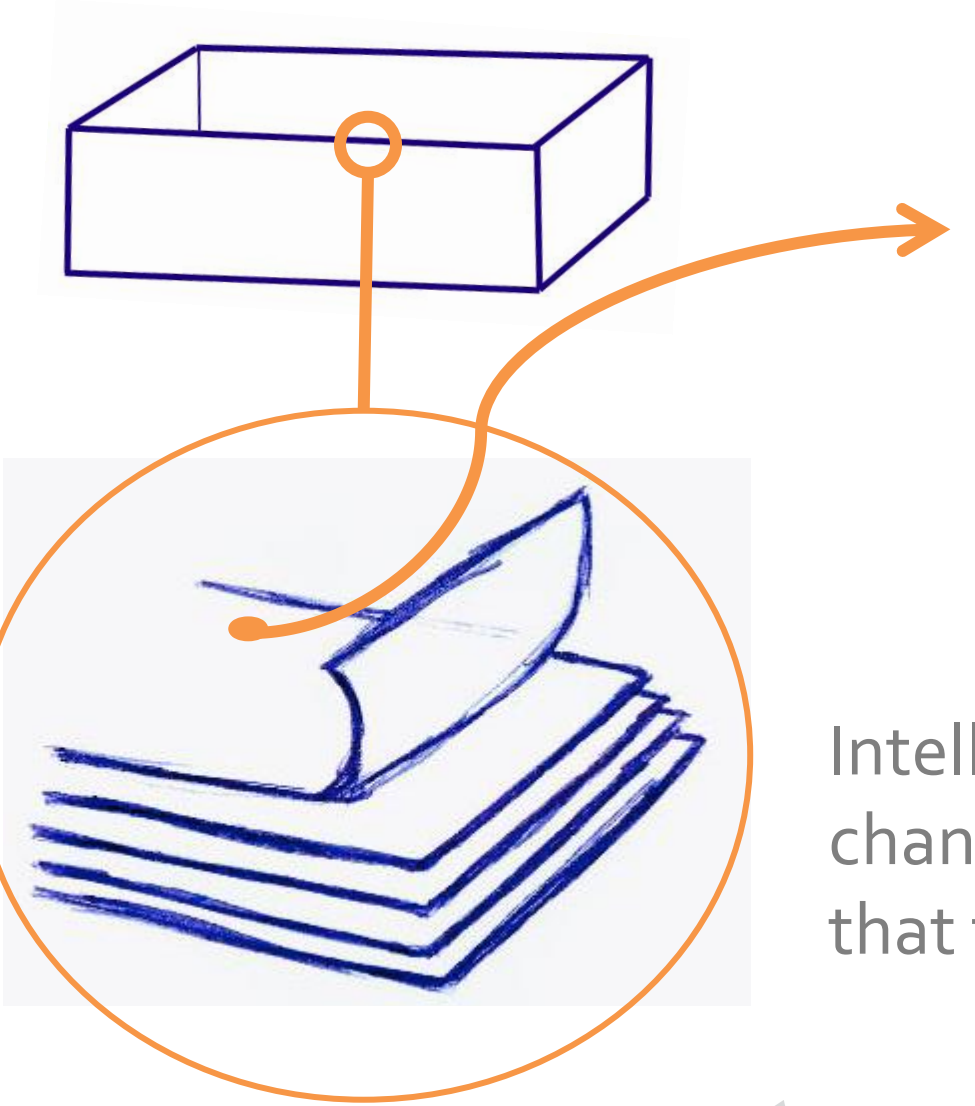
Active packaging influences internal environment of packaging to proactively improve the quality of the packaged good





© SCA Packaging

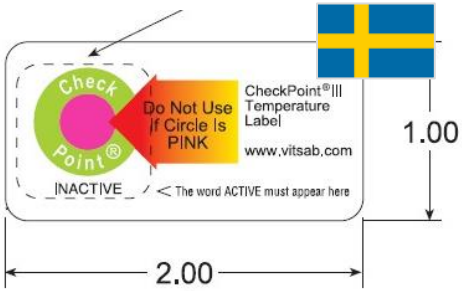
INTELLIGENT PACKAGING?



© KoYang

Intelligent packaging senses changes and communicates that to the consumer

TIME TEMPERATURE INDICATORS

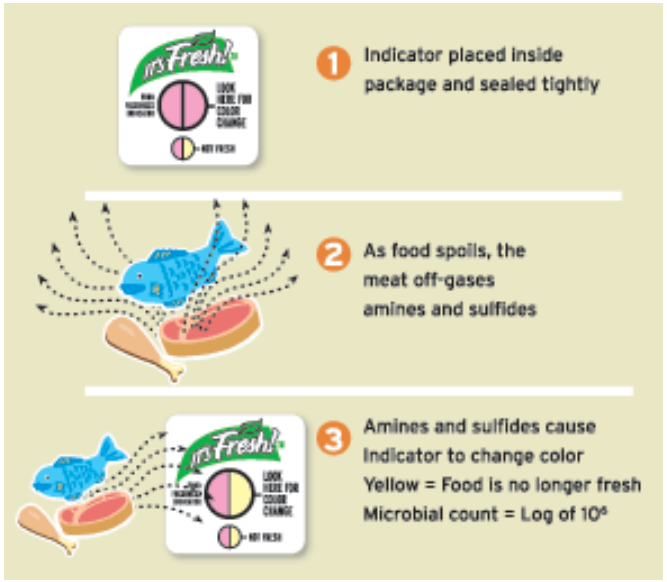


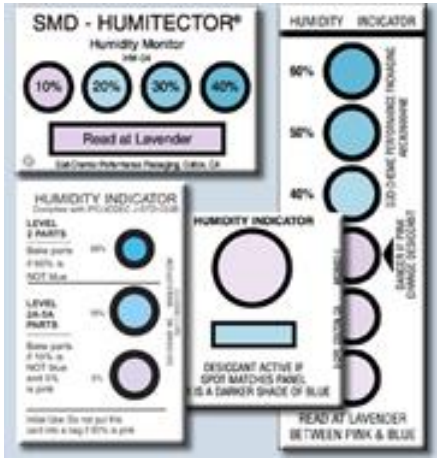
"CheckPoint® III Label"

UNBROKEN COLD CHAIN

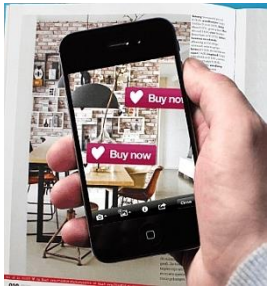
BROKEN COLD CHAIN

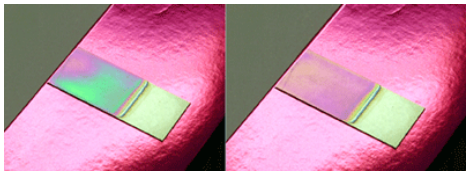
FRESHNESS AND HUMIDITY INDICATORS

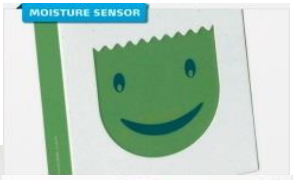


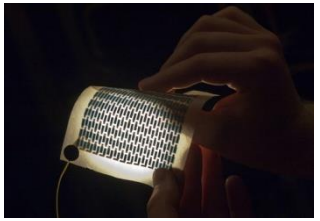


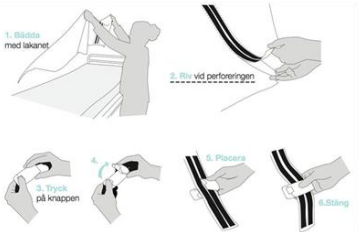
PRINTED INTELLIGENCE / ELECTRONICS

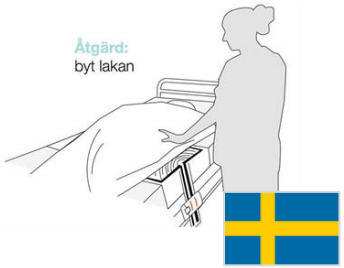












ACTIVE SOLUTIONS FOR PACKAGING

Manufacturer	Coutry	Tradename	Funct
Mitsubishi Gas Chemical Company	Japan	Ageless®	
Toppan Printing Co.	Japan	Freshilizer™	
Keplon Co.	Japan	Keplon™	
Oji Kako Co.	Japan	Tamotsu™	
Powdertec	Japan	Wonderkeep™	
Ueno Seiyaku Co.	Japan	Oxycatch™	

	Format		Tradename	Manufacturer	Country	Packaging material
Oxygen scavenger	Film	Multi layer	Bioka®	Bioka Ltd	Finland	EVA modifier PE + LDPE + Polyamide
		Laminate	OS2000®	Sealed Air Corporation	USA	PVDC
		Multilayer	ZERO2™	CSIRO and VisyPak	Australia	PE, PET, EVA or PP
			Shelfplus	Ciba Specialty chemicals	Switzerland	PET bottle
	Concentrate		Amosorb®	Amoco Chemical	USA	PET bottle
		Multilayer	Oxyguard™	Toyo Seikan Kaisha Ltd.	Japan	EVOH and PP layer
	Closure Liner		Celox™	Grace Darex Packaging Technologies	USA	Beverage bottles
			Daraforms 649(	Grace Darex Packaging Technologies	USA	Polyolefin
Antimicrobial	Concentrate	Multilayer	Zeomic®	Sinanen Zeomic Co. Ltd.	Japan	Dispersed in PP or PE layers
			Agion	Agion Technologies	USA	n/a
			MicroFree™	E. I. du Pont de Nemours and Company	USA	Powder for coating, fibers or polymers
			Microban®	Microban Products	USA/Europe/Asia	Every applications
	Extract		Citrex™	Quimica Natural Brasileira	Brazil	n/a
			Nisaplin®	Integrated Ingredients	USA	Food preservatives
	Film		MicroGard™	Rhone-Poulenc	USA	Touch surface application
			Piatech	Daikoku Kasei Co.	Japan	n/a

Table 1-I.4. Current active packaging commercialized. The active compound is intro

packaging material.

Freund Industrial Co.	Japan	Ethicap®
Freund Industrial Co.	Japan	Negamold®
Techno Intl. Inc.	USA	Fretek®

Table 1-I.3. Currently commercialized active packaging a

Table 7.2 Examples of Commercial Antimicrobial Packaging Products an Manufacturers

Trade Name	Active Compounds	Manufacturer	Refs.
Piatech	Silver oxide	Daikoku Kasei Co. (Japan)	Brody et al.
Silvi Film	Silver oxide	Nimiko Co. (Japan)	Brody et al.
Okamoto Super Wrap	Silver oxide	Okamoto Industries, Inc. (Japan)	Brody et al. (2
Apacider		Sangi Co. (Japan)	
Zeomic	Silver zeolite	Shinanen New Ceramics Co. (Japan)	Brody et al. (20
Bactekiller	Silver zeolite	Kanebo Co. (Japan)	Brody et al. (20
Cleanaid		Gyunghyang Ind. Co. (Korea)	
AgION	Silver zeolite	AgION Technologies LLC (USA)	Brody et al. (200
	Silver zeolite		Cho et al. (2009)
MicroFree	Silver	DuPont (USA)	Suppakul et al. (2003a), www.agion-tech.com
Novaron	Silver, copper oxide, zinc silicate		
Surfacine	Silver zirconium phosphate	Milliken Co. (USA)	Vermeiren et al. (2002), Brody et al. (2001)
Ionpure	Silver halide		
Microban	Silver/glass	Surfacine Development Co. (USA)	Vermeiren et al. (2002)
Sanitized, Actigard, Saniprot	Triclosan	Ishizuka Glass Co. (Japan)	Vermeiren et al. (2002)
Ultra-Fresh	Triclosan and others	Microban Products Co. (USA)	Vermeiren et al. (2002)
WasaOuro	Triclosan and others	Sanitized AG/Clariant (Switzerland)	Brody et al. (2001)
Wasa Power	Allyl isothiocyanate	Thomson Research Assoc. (Canada)	Vermeiren et al. (2002), Suppakul et al. (2003a)
MicroGarde	Allyl isothiocyanate	Green Cross Co. (Japan)	Vermeiren et al. (2002)
Take Guard	Clove and others	Sekisui Plastic Co. (Japan)	Brody et al. (2001)
Acticap	Bamboo extract	Rhone-Poulenc (USA)	Cho et al. (2009)
Ageless SE	Ethanol	Takex Co. (Japan)	Brody et al. (2001)
Biocleanact	Silver	Freund Industrial Co. (Japan)	Brody et al. (2001)
Microatmosphere	Antibiotics	Mitsubishi Gas Chem. (Japan)	Smith et al. (1987)
Grape Guard	Chlorine dioxide	Micro Science Tech Co. (Korea)	Cho et al. (2009)
Uvasy	Sulfur dioxide	Southwest Research Institute (USA), Bernard Technologies Inc. (USA)	Han and Moon (2002)
	Sulfur dioxide	Quimica Osku S.A. (Chile)	Brody et al. (2001)
		Grapetek (S. Africa)	Scully and Horsham (2007)
			Scully and Horsham (2007)

Source: Dr. Nathalie Lavoine

ANTIFUNGAL FOR FOOD FOR CONSUMERS

Testimonials

"The Miracle Paper"
THE WASHINGTON POST

"Ingenious"
THE NEW YORK TIMES

"The best *non-diet* diet tip we've ever heard"
OPRAH MAGAZINE

"We tried it, & it works!"
PREVENTION MAGAZINE

WHY THIS ACTION?

1. Most developments are plastic based. Development of integration into paper based products.

2. So many examples, but so little evidence of succesful market introduction in Europe. Why?

FIBRE BASED INDUSTRY BENEFITS

- Round up of commercially available solutions; cooperation in development of new solutions
- Stronger positioning of paper and board based packaging in competition with other materials
- Access to knowledge specifically tailored to use in fibre based products and solutions
- Integrate activity and intelligence in paper products



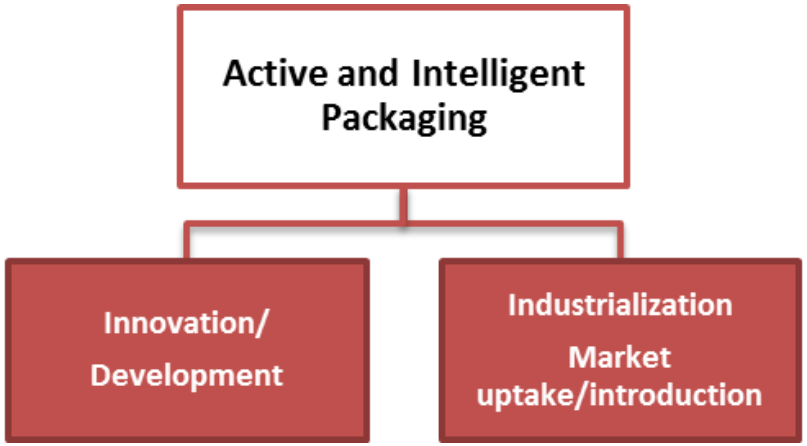

OVERALL BENEFITS

Society: Contribution to less food waste/poisoning; information towards public, undergraduate students and early stage researchers

Industry: Available knowledge relating complete supply chain needs, wishes and demands = know where to focus in market introduction of new packaging products; contribution to competitiveness

Research: Propose new active and intelligent packaging solutions; Database (commercial products, research, legislation) as source of information for further research

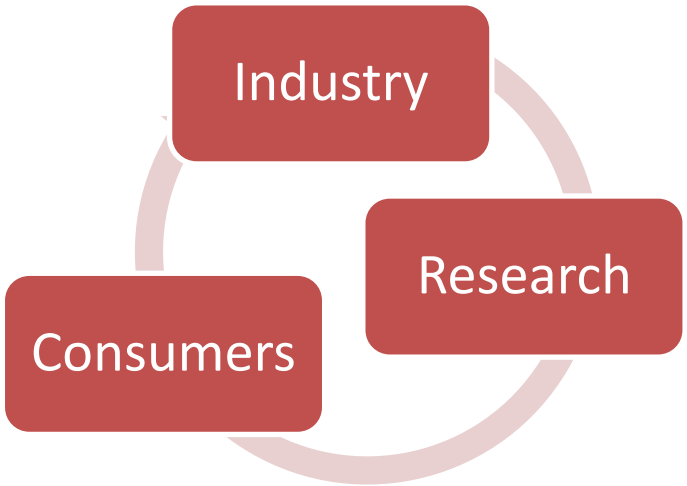
AIM AND GOAL



To define innovative solutions and identify opportunities and obstacles in market introduction for future active and intelligent packaging in the area of paper and board based products

MoU OBJECTIVES - MAIN

The main objective of the Action is to develop a knowledge-based network on sustainable, active and intelligent fibre-based packaging in order to overcome current technological, industrial, and social limitations that hinder the wide deployment of existing and newly developed solutions in market applications.



MoU OBJECTIVES - SECONDARY

- To direct future innovations and contribute to existing development efforts into scientific/ technical research into fibre-based materials, new additives and techniques for active and intelligent functions.
- To identify market demands, possibilities and any obstacles to market introduction of active and intelligent fibre-based packaging.

MoU objectives – WG related

- Identify the technical limits and opportunities for development of active and intelligent fibre-based packaging.
- Identify market demands and supply chain challenges to ensure easy introduction of smart packaging.
- Identify sustainability, health and safety issues.
- Disseminate knowledge to industry and society.

MoU WORKING PROGRAMME

Focus on

- identifying and solving issues that prevent active and intelligent fibre-based solutions from entering the market.
- Technology Readiness Levels (TRL, as defined in Horizon 2020) 4 to 11; the means thus to achieve the objectives are mainly pilot trials with the industry, and transfer of knowledge to the industry.

WORKING METHOD

- Open platform
- Significant involvement of industrial parties.
- Multidisciplinary network,
- Workshops/discussions/meetings to
  - foster and collect information
  - share information with industry
  - bring together all parties
- Exchange of staff between science and industry
- Promote communication between science and industry

INDUSTRY VERSUS SCIENCE

Action aims at active involvement **of complete value and supply chain**

Currently: 19 companies from 11 different countries, ranging from large to small

MANAGEMENT STRUCTURE

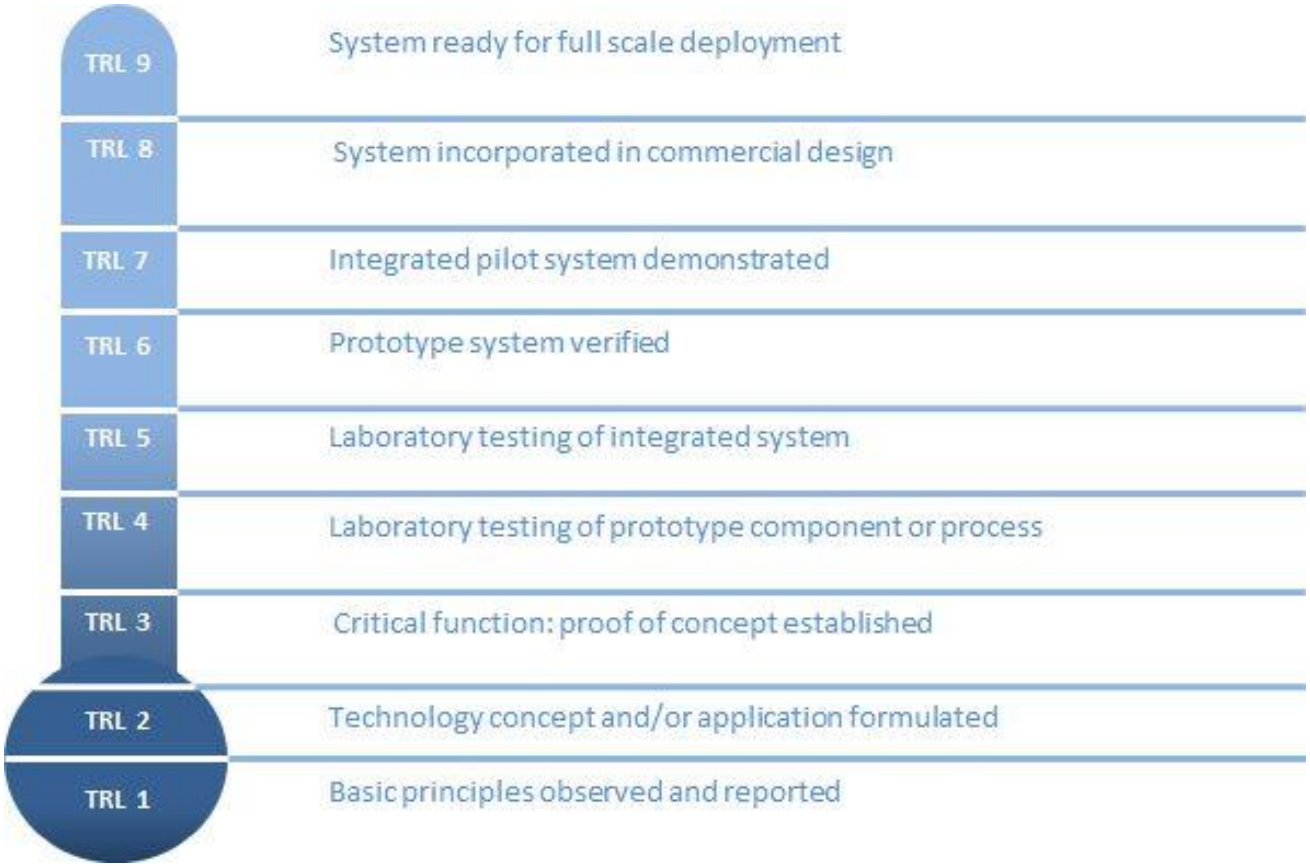
Steering Group

Leaders of:

- GH
- Chair
- VC
- WG
- STSM
- IIC
- EB
- KTC

Management Committee

Working Groups


TRL 9
System ready for full scale deployment
TRL 8
System incorporated in commercial design
TRL 7
Integrated pilot system demonstrated
TRL 6
Prototype system verified
TRL 5
Laboratory testing of integrated system
TRL 4
Laboratory testing of prototype component or process
TRL 3
Critical function: proof of concept established
TRL 2
Technology concept and/or application formulated
TRL 1
Basic principles observed and reported

WG1 DEVELOPMENT/INNOVATION

- Technical limits and opportunities
- Identify the technical limits and opportunities for development of active and intelligent fibre-based packaging.
- Analysis into existing solutions and current research
- Innovation and pilot trial tests to identify most promising solutions

- WG leader: Selcuk Yildirim

WG1 METHODS AND MEANS

WG1 will start considering smart fibre-based packaging solutions **present on the market or studied at lab scale and existing legislation** related to this topic will be **reviewed**. Information will be collected not only through literature search and patent analysis but also through the organisation of a **seminar and workshop**. The results of these activities will be grouped and ordered in order to create an overview to be **discussed in expert panels** to define the most promising technologies and the technological evolution needed for their successful development. Based on this research into solutions and technologies, innovation and pilot trial tests are key to **identify the most promising active and intelligent fibre-based solutions**. In the end, this WG targets TRL 4 to 8.

WG1 ANTICIPATED OUTCOMES

- Overview of the present research in different areas of active and intelligent fibre-based packaging as well as the main achievements of the partners. Presented on ActInPak website and review papers
- Guidelines for future research and development, focusing on major technical challenges to overcome for the successful exploitation of smart packaging solutions.

WG2 Industrialisation/Market intro

- Social, Legislative, Economic limits and opportunities
- Identify market demands and supply chain challenges to ensure easy introduction of smart packaging.
- Address and tackle industrial issues
- Define strategies for efficient industrialisation and market introduction

- WG leader: Johanna Lahti

WG2 METHODS AND MEANS

Workshops/discussions to address industrial issues and help industry enter the market with new smart packaging. Every year one or two specific meetings will be dedicated to a **'problem box' focusing on industrial challenges**. Industry can introduce their current problems or issues, and one (or more) will be selected to be discussed using problem-solving methods (for example Ishikawa, 5 Whys, or TRIZ) and *brainstorming techniques* (result from COST FP1104). Furthermore, the meetings will be used in order to **gather information**, consumers' associations will be invited and the events will be open to non-experts for participation in order to reach the general public. The results of these activities will be discussed in multidisciplinary panels formed by technologists, industry covering the whole value chain, and market experts. The aim is to **define strategies for an efficient industrialisation and market introduction** of active and intelligent fibre-based packaging solutions. In particular, actions to be undertaken for the evolution of possible solutions from TRL 8 to 11 will be considered.

WG2 ANTICIPATED OUTCOMES

- Preparation of a publication, targeted towards the industry and non-experts, summarising the information collected as well as guidelines resulting from the discussion.
- A seminar and workshop will be organised to collect info and help industry solve problems.
- A roadmap will be used as guideline to provide directions towards market implementation.

WG3 LCA/SUSTAINABILITY

- Identify sustainability, health and safety issues.
- Analysis of currently existing information
- Consumer perspective to evaluate risks

- WG leader: Greg Ganczewski

WG3 METHODS AND MEANS

As in WG1 and WG2, the activity will be developed starting from the **collection and analysis of currently existing information** on environmental impact and safety issues related to smart packaging.

Once again, a literature search will be completed and complemented by the **organisation of a seminar** that will bring together experts from the different areas involved.

Consumer perspectives will be also considered in order to evaluate possible **differences between the real risks and those perceived** by the public opinion while talking about intelligent and active fibrebased packaging.

WG3 Anticipated outcomes

- The outcome of WG3 will be summarised in technical work and scientific papers covering the topics related to sustainability and health and safety issues of intelligent and active fibre-based packaging.
- Workshops and summer schools
- A road map will represent the state-of-the art from which future research directions will be identified.

WG4 KNOWLEDGE TRANSFER

- Disseminate knowledge to industry and society.
- Surveys to gain insight in the knowledge level of understanding throughout Europe
- Give visibility to the Action's existence and progress

- WG leader: David Ravnjak

WG4 Means and methods

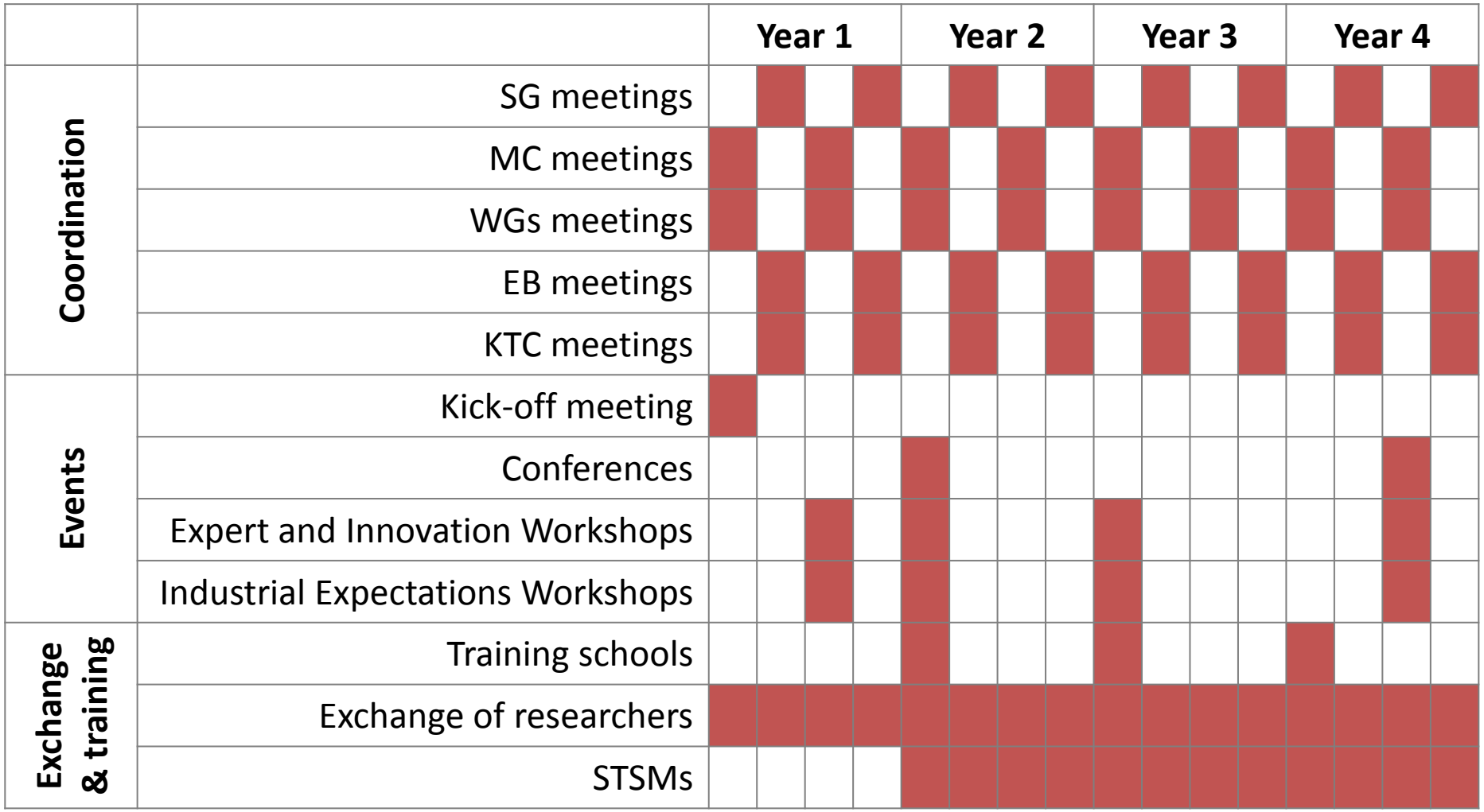
As a basis for evaluation of the knowledge on active and intelligent packaging and its market introduction **a survey** will be sent all over Europe at the start of the Action. The same questions will be sent again at the end of the Action in order to compare the knowledge level of understanding of active and intelligent packaging.

The tools used for dissemination and knowledge transfer will be those cited in the COST Rules and Procedures and will include, among others, the organisation of Conferences and Seminars, Innovation Workshops and Training Courses. **Short-Term Scientific Missions** (STSMs) will be supported by the Action as well as the exchange of reports, publications and scientists between Action members but also outside the Action boundaries. A **website** will be created and maintained to give visibility to the Action's progress and main results and to act as a virtual arena for exchange of information on Action topics.

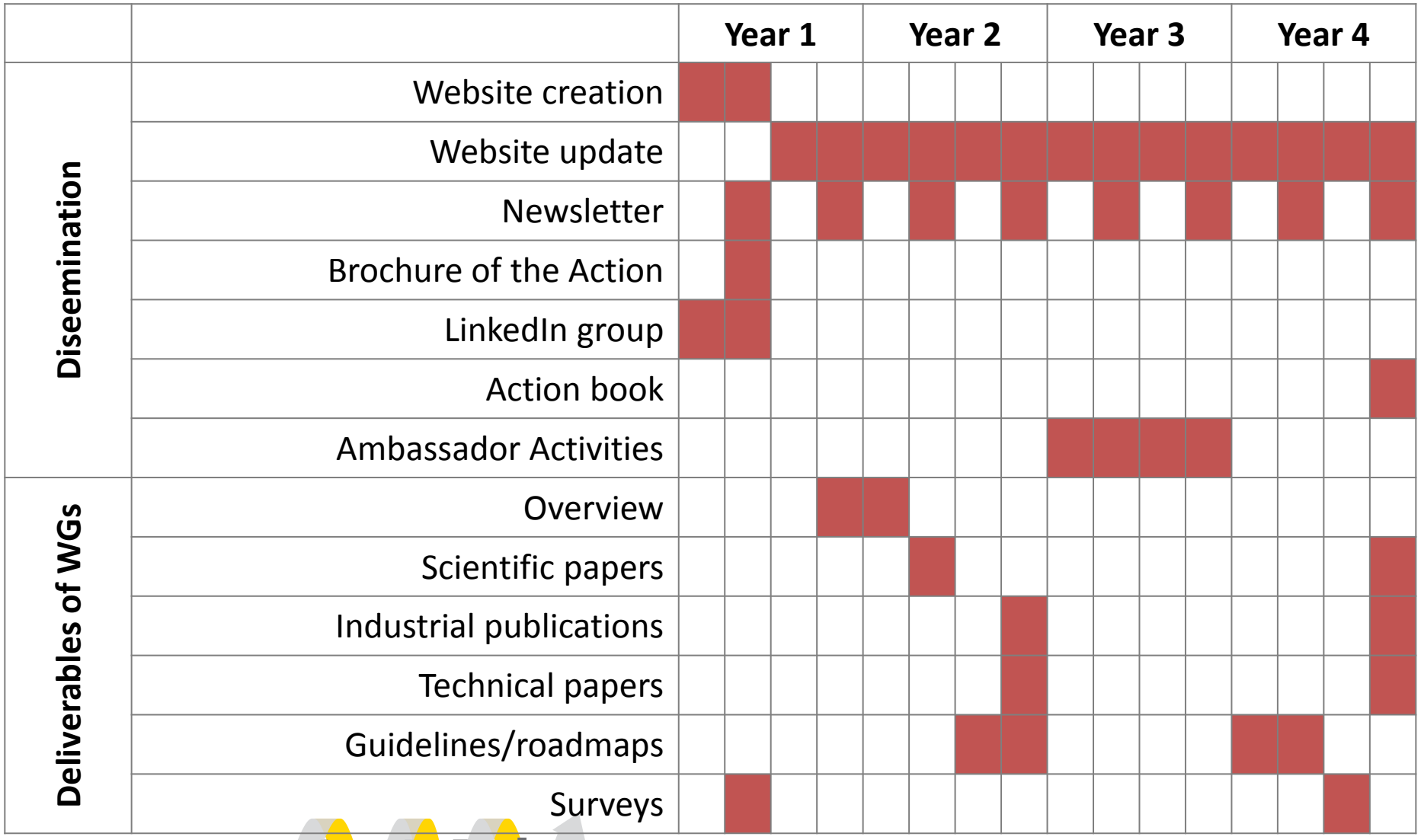
WG4 ANTICIPATED OUTCOMES

- All information generated during the Action will establish **a reference point and database for future research** and development in the area of active and intelligent fibre-based packaging and products. It will identify which technical, social, economic and legislative factors to focus on and the possibilities/limitations for successful introduction to market.
- Deliverables will be in the form of a **better knowledge** of the industry and society, but **also new products in the market**, and **less fear from the consumer** on the topic.
- **Website** including: at least one video pod-cast per partner to explain parts of the project or to show results.
- **Publications** (via Editorial Board)
- **List** of publications, collaborations, project proposals (even if not accepted), exchange of researchers, filled positions, etc, even if only remotely linked to the Action.

TIMETABLE


Year 1
Year 2
Year 3
Year 4
Coordination
SG meetings
MC meetings
WGs meetings
EB meetings
KTC meetings
Events
Kick-off meeting
Conferences
Expert and Innovation Workshops
Industrial Expectations Workshops
Exchange & training
Training schools
Exchange of researchers
STSMs

TIMETABLE


Year 1
Year 2
Year 3
Year 4
Diseemination
Website creation
Website update
Newsletter
Brochure of the Action
LinkedIn group
Action book
Ambassador Activities
Deliverables of WGs
Overview
Scientific papers
Industrial publications
Technical papers
Guidelines/roadmaps
Surveys

GOALS

- State of the art and current scientific developments will be assessed so scientific research can take into account all the boundary conditions for implementation of the developments
- Boundary conditions (social, technological, economical, ecological, political) for successful market introduction will be inventoried and assessed
- A selection will be made of the most promising scientific developments with the highest success rate regarding acceptation and implementation

SECONDARY GOALS 1ST YEAR

- Increase awareness of ActInPak's activities among industrial and scientific community
- Definition of the current state of the art for the different scientific topics covered by the WGs
- Definition of the work plan for the different WG activities
- Document clarifying definitions (combined output): *e.g. what does fibre based packaging mean*
- Increase collaboration among participating countries
- Contribute to the training of ESRs in the field of active packaging

MILESTONES

- Key partners in all steps of value chain identified (e.g. missing food producers) and contacted
- Strong link with industrial partners established (M6)
- Relevant research projects identified (M6)
- First inventory of factors infuencing market introduction (M12)
- Create awareness amongst policy makers (M25-48)
- Most promising solutions identified (M36)
- Guidelines to overcome challenges (M24)

BUDGET

- €129.000 for GP1 (1/6/2015 – 31/5/2016)

Grant Period: 1	
A. COST Networking Tools	
Meetings	96,620
Training Schools	0
STSMs	10,000
Dissemination	4,500
OERSA	1,000
B. Total Science Expenditure	112,120
C. FSAC (max 15% of B)	16,818
D. Total Expenditure	**128,938**

STSM POSSIBILITIES

- Aim to increase collaborations through exchange of researchers, contributes to the scientific objectives of ActInPak, allowing participants to learn new techniques and to have access to data/instruments/methods not available in their own institution.
- To be completed before 1-6-2016!

- More info: Marco Giacinti B. or STSM leaflet (to be distributed after the meeting)

NEXT MEETINGS

- 9-10 November 2015, Athens: cancelled
- 17 November 2015, Utrecht:
  - change of date compared to WPB!
  - WP2+4 meeting including industry
- Spring meeting (MCM3 + WGs)
  - 3/2015 ?
  - Slovenia / Poland / ….
  - To be decided in MC meeting; suggestions?

9C. UTRECHT MEETING 17-11-2015

	Time	Event
17 November 2015	9:00 - 13:00	WG2+4 working session Presentations of participants, Feedback from September meeting, work according to work plan (WG leaders)
	14:00-17:30	Business speed dates with industry 'How to gain a successful market implementation of active and intelligent packaging' An interactive business speed date session where, in 2-3 hours, industrial attendees will have the opportunity to meet experts from leading European research institutes, get to know their work, and exchange views on a personal level. Industry can benefit from this session by being able to express their issues with active and intelligent packaging and to make sure the researchers work on the right topics. Furthermore, this personal and easy accessible approach makes it easy to identify the opportunities for your own business.
	18:00-20:00	AIPIA welcome reception 'industry meets science'

- 15% discount on fee for AIPIA conference 18-19 November 2015 for COST participants via code XE11B 5AA4 92C4 2862
- Reimbursement budget for ~18 people
- Mainly for WG2+4 and industry participants!

WEBSITE DEMO

- Homepage: http://weingerl.si/demo/actinpak/
- WG subpage: http://weingerl.si/demo/actinpak/wg1.html
- Members: http://weingerl.si/demo/actinpak/members.html
- Joining/Participate: http://weingerl.si/demo/actinpak/members-sign.html
- List of events: http://weingerl.si/demo/actinpak/events.html
- Single event: http://weingerl.si/demo/actinpak/single-event.html
- Resources: http://weingerl.si/demo/actinpak/resources.html

LinkedIn

- Join us on LinkedIn:

https://www.linkedin.com/grp/home?gid=8254568&trk=my_groups-tile-grp

- Also subgroups for each working group

Traveling Exhibition

- To display products / demos
- Focus on different topics related to the meeting and location?
- Perhaps combined with a public exhibition
- Final, bigger exhibition
- Can be combined with video pod-casts and other social media dissemination!
- Focus towards industry and public

- Example: COST FP1104 Paper Evolutions

TRAVEL REIMBURSEMENT

- Don't forget to fill in your TRR within 30 days after this meeting and upload all relevant documents before submitting
- Receipts should specify amount, date and location.
- Please be aware of all the rules, available for download on the reimbursement page
- Have some patience with the e-COST page ;)

- Questions? fp1405@bumaga.nl

cost
EUROPEAN COOPERATION
IN SCIENCE AND TECHNOLOGY

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