

DELIVERABLE 1.2.2

FOOD  
MICRO  
SYSTEMS

UPDATE OF REPORT ON CURRENT FRAME  
OF PLAY OF MICROSYSTEMS  
FOR FOOD APPLICATIONS

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Coordinator ACTIA



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FoodMicroSystems aims at initiating the implementation of microsystems & smart miniaturised systems in the food sector by improving cooperation between suppliers and users of microsystems for food/beverage quality and safety.

The project runs from September 2011 to August 2013, it involves nine partners and is coordinated by ACTIA (Association de Coordination Technique pour l'Industrie Agro Alimentaire, France). More information on the project can be found at <http://www.foodmicrosystems.eu>.

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## Executive Summary

The objective of FoodMicrosystems WP1 is to carry out a study of the State of Play of the research activity on Micro and Nanosystems for Food applications and (when existing) the corresponding market outcomes from as many countries as possible. Following the methodology presented in Deliverable D 1.1, a survey has been carried out for determining key parameters of importance of the research and development of MST for food in the different European countries and of other important regions.

The search has first identified the main funding agencies potentially dealing with projects of Micro and Nanotechnologies applied to the Food sector in each of the countries considered and in Europe as a whole. Second, it has been investigated if the subject of MST for food has been particularly addressed in all those cases, and if being the case, if it has been covered by a specific programme and/or call, or such topic has been addressed under more generic S&T programmes.

From those programmes identified, the projects launched from 2004 to date have been screened and information about objectives, food target, MST technology developed or used, level of maturity of the research, and partnership involved have been extracted.

From the partnership of the identified projects, and from the information directly obtained from the questionnaires sent to contacts in different countries, a complete list of key actors has been elaborated. This list has given rise to a directory, which has been a specially relevant input for the work to be carried out within the FoodMicrosystems project dealing with future activities like workshops and roadmaps definition that require the involvement of experts well acquainted with the subject under study.

Additionally, a list of initiatives and events in the Food Sector and in the MST sector for which the introduction of the advantages of such technologies for food applications can be of interest, has been compiled. These events may also be useful for contacting new interested players, beyond those already identified in the survey, and thus for improving the project dissemination.

In summary, the information contained in this deliverable Del 1.2 allows a first analysis of the current research situation of the MST for food topic, and it is also the basis for the rest of activities proposed in the Workplan of the project, which has to end-up with an assesment of the opportunities and barriers and the elaboration of set of roadmaps for the technological developments for different food chains. The project also addresses dissemination and awareness-raising activities that will take advantage of the data collected in the present deliverable, too. Deliverable Del 1.2 mainly refers to scientific results and is complemented by Deliverable D 1.3 with similar data more related to industrial activities and marketable products.

## 1. Introduction

### Note for version 2

This document is the update of Del 1.2 as for July 2013. A new set of relevant European projects and reference researchers that have been funded in the last year and the associated key players has been included in the corresponding tables. Such R&D actors have also been included in the Food Microsystems Data Base for future dissemination and training activities.

### Objectives

The objective of FoodMicrosystems WP1 is to carry out a study of the State of Play of the research activity on Micro and Nanosystems for Food applications and (when existing) the corresponding market outcomes from as many countries as possible. This deliverable deals with the collection of information about programmes, projects, actors and events of relevance for the subject under study in the period of time roughly corresponding to FP6 and FP7.

The consortium of Food Microsystems is composed of different partners with different skills and background that have been involved in projects on MST and/or on Food in the past and have know-how in these fields. This activity of their own has also given them knowledge and contacts with different R&D groups and industries in the world dealing with the same activities. This knowledge has proved important to obtain the desired information on the State of Play which has been gathered by means of a survey.

### Preliminary assumptions

The search performed has been based on some preliminary assumptions:

- Despite Food research, Micro and nanotechnologies research, and related industrial activities are nowadays important in most of the world countries, the specific case of Micro & Nano for Food is not so equally developed in all world regions.
- Even within Europe (EU-27), not all countries have the same sensibility to the Food sector as an important application of Micro and Nano systems. An important outcome of the present project will be, in fact, the identification of the most relevant countries from this application point of view.
- Research and industrial activity in MST for Food may have been funded under international and national programs. The type of research and the objectives may be different in both cases. Thus, main international programmes in addition to the national ones have to be screened.
- It is expected that most of the information available in the different countries is only available in the language of the country. In these cases, the desired information will be difficult to be obtained.

- The degree of detail and structuration of the available information may be different depending on the country and/or on the programme.
- The perception of what is covered under the subject Micro and Nanotechnologies for Food, may be different in different countries, and also different for the MST experts and for the Food experts. In addition, there is a trend in some countries by which the research in microtechnology is being increasingly included in generic nanotechnology research programmes. Consequently, although our project does not contemplate 'pure' nano research, some nano labelled programmes launched recently may also include activities relevant to the subject under study. This has not happened at European level, as EC programmes are very specific and do not mix different technological sectors in the same call.
- There may be many technological developments coming from health and environment applications that can be potentially useful for the food sector too. This adaptation for food may follow a straightforward path or may still require an important extra work. It is not the first aim of this deliverable to identify such developments, but this information is considered of interest to be worked on as a further step of the survey if it is easily accessible.

### **Methodology summary**

The methodology proposed at the beginning of the Project has been detailed in a specific deliverable, D1.1. As the work has progressed, it has been adapted to the specific circumstances and quality of the data that we have been able to collect. As a summary, the methodology has followed these steps:

- Identification of the countries to be studied by the consortium according to their importance in the MST for Food international arena, but also taking advantage of the direct knowledge that the partners may have in different countries.
- Elaboration of a questionnaire for the different countries (including key ones outside EC). A clear definition of what is a Micro/nanosystem, and which foreseen relevant applications for food should not be missed from the beginning, was discussed by the consortium in the early beginning of the project in order to avoid misunderstandings during the survey. It was important to balance properly the questionnaire: on the one hand, it had to retrieve enough useful information but on the other one, it had to be kept simple enough to maximize the No. of responses since information is given on a free-will basis by researchers and other contacted persons outside the consortium.
- Preparation by each partner of a list of key contacts that could help on finding the information at national level in the countries selected. Distribution of the country coverage among the consortium partnership.
- Study, in parallel, of the EC programmes by the WP leader. Both industrial and basic/applied research programmes have been taken into account.

## **Relevant outcomes**

Different indicators have been defined in order to describe better the situation of the research conducted in the different European countries under national programmes or under common European funding programmes. The information obtained has been organized in a series of tables regarding funding sources, projects, actors and events, which are the *main content of the following sections*.

Our search has first identified the main funding agencies potentially dealing with projects of Micro and Nanotechnologies applied to the food sector in each of the countries considered and in Europe as a whole. Second, it has been investigated if the subject of *MST for food* has been particularly addressed in all those cases, and if being the case, if it has been covered by an specific programme and/or call, or such topic has been addressed under more generic S&T programmes.

From those programmes identified, the projects launched from 2004 to date have been screened and information about objectives, addressed food target, MST technology developed or used, level of maturity of the research, and partnership involved have been extracted.

From the partnership of the identified projects, and from the information directly obtained from the questionnaires sent to contacts in different countries, a complete list of key actors has been elaborated. This list has given rise to a directory, which has been an specially relevant input for those project WPs dealing with future activities like workshops and roadmaps definition that require the involvement of experts well acquainted with the subject under study.

Additionally, a list of initiatives and events in the Food Sector and in the MST sector, where the introduction of the advantages of such technologies for food applications can be of interest, has been compiled. These events may also be useful for contacting new interested players, beyond those already identified in the survey, and thus for improving the project dissemination.

In summary, the information contained in this deliverable allows a first analysis of the current situation of the MST for food topic, and it is also the basis for the rest of activities proposed in the Workplan of the project which has to end-up with an assesment of the opportunities and barriers, and the elaboration of set of roadmaps for the technological developments that different food chains will require to achieve the desired future industrial and commercial impact of the MST in the food sector. The project also addresses dissemination and awareness-raising activities that will take advantage of the data collected in the present deliverable, too.

## 2. Funding programmes and schemes

### 2.1 European programmes

In the next table the list of main international programmes contemplated is presented according to the funding agency and type of programme.

Funding Institution/ tool	Funding Programme	Subject
European Commission, 6 <sup>th</sup> and 7 <sup>th</sup> Framework Programme	ICT Theme	Collaborative research on Information and Communication Technologies, including MNBS
	KBBE Theme	Collaborative research on Knowledge Based Bio Economy, including Food Technologies
	NMP Theme	Collaborative research on Nanotechnologies, Materials and Production Technologies,
	Research For SME's	Bottom-up programme that supports small groups of innovative SMEs in solving technological problems and acquiring technological know-how. FP6
	SME's Capacities	Research for the Benefit of the SME's. FP7
	European Research Council	Grants for fundamental non collaborative research in all fields of knowledge. FP7
	NEST	Programme on New and Emerging Science and Technology. FP6
	INTEREG-III and IV	EU-funded programme that helps Europe's regions form partnerships to work together on common project that enable the regions involved to develop new solutions to economic, social and environmental challenges
	MNT ERA NET	Network of 21 national/regional ministries/ funding agencies which have coordinated their efforts to launch annual calls for R&D projects in the area of micro and nanotechnologies
	Marie Curie	Mobility of Researcher at European Level with specific research subjects, including food and MST
CIP Competitiveness and Innovation Framework Programme	With SME as its main target, CIP supports innovation activities (including eco-innovation), provides better access to finance and delivers business support services in the regions	
EUREKA	Eureka Projects	Normal industrial research small projects labelled by the Eureka organization and funded at national level
	Catrene Cluster	Specific Eureka projects on Micro/Nanoelectronics, with the special label of the Catrene Cluster
	Euripides Cluster	Specific Eureka projects on Microsystems and Packaging of electronics systems, with the special label of the Euripides Cluster
	Eurostars	Eureka Programme specially focused to Research carried out by and for SME's

## 2.2 National Programmes

In the next table, the summary of the situation of the different countries from which information is available is summarized. Main Programmes and National Agencies that have funded MST for food projects, or could do it in the future, are identified for 37 different countries, the EC members plus 10 other. This search has also been done in some more countries but they have not shown activity up to now (i.e. Chile, Colombia, Cyprus and Malta), and, thus, they are not reported. Finally, other countries of interest that may be studied in the future are Australia, New Zealand and Morocco. An effort to find key contacts in these countries will be done in the future.

Argentina
<p>In the last years Sectorial Fund programs up to 20 M US\$, for Academic-Industry consortia have supported some nanotechnology applications for nanoclays (packaging), nanoencapsulation, and nanosensors and MEMS, that may be used for the food industry.</p> <p>Under the Argentina - EU Programme for strengthening SMEs competitiveness and creation of employment in Argentina a programme was launched to foster SMEs use and development of new technologies, in particular in micro &amp; nanotechnologies to promote the transformation of traditional industries. It had four focal points: Agro-food, metal-mechanic, health and electronics industries to boost competitiveness and employment around knowledge-intensive SMEs.</p> <p>Finally, it is expected that the FAN (Nanotechnology Argentinean Foundation, <a href="http://www.fan.org.ar">www.fan.org.ar</a>) will launch in 2012 pre-seed projects for nano food application (MEMS, Lab on a chip, etc.)</p>
Austria
<p>No specific food funding program with respect to microsystems or electronics has been identified in Austria. There exist funding programs supporting joint research projects (universities/research organizations with industry) with an open scope so that also food related proposals can be submitted. For example: Bridge program, Basic funding program ("Basisprogramm"), FIT-IT (electronics and ICT related), etc.</p> <p>The main funding agencies for potential projects on the area are:</p> <ul style="list-style-type: none"> <li>- FFG (national Austrian funding organization) with a programme on Embedded Systems &amp; Semiconductors (<a href="http://www.ffg.at">http://www.ffg.at</a>)</li> <li>- FWF Austrian Science Fund. No special programme, only stand-alone projects, open to any subject (<a href="http://www.fwf.ac.at/en/index.asp">http://www.fwf.ac.at/en/index.asp</a>)</li> </ul>
Belgium
<p>There are not specific programmes but the Agency for Innovation by Science and Technology finances innovative projects, including MST, without any field limit :</p> <ul style="list-style-type: none"> <li>- <a href="http://www.iwt.be/english/funding">http://www.iwt.be/english/funding</a></li> </ul>

Bulgaria
<p>There are two sources of funding for R&amp;D projects in all scientific fields, including MST and Food, but without any priority:</p> <ul style="list-style-type: none"> <li>- National Science Fund (<a href="http://www.nsfb.net/">http://www.nsfb.net/</a>)</li> <li>- National Innovation Fund (<a href="http://www.mi.government.bg/bg/themes/nacionalen-inovacionen-fond-19-287.html">http://www.mi.government.bg/bg/themes/nacionalen-inovacionen-fond-19-287.html</a>)</li> </ul> <p>Both funds had no open calls in 2011. Research Institutes and companies have had to apply to European Programmes.</p>
Brazil
<p>No specific programmes on the <i>MST for Food</i> sector. However, there are two funding ministries that could support it:</p> <ul style="list-style-type: none"> <li>- Ministerio da Saúde (Ministry of Health) <a href="http://portalsaude.saude.gov.br/portalsaude/area/7/o-ministerio.html">http://portalsaude.saude.gov.br/portalsaude/area/7/o-ministerio.html</a></li> <li>- Ministry of research Ministerio da Ciência e Tecnologia. <a href="http://www.mct.gov.br/index.php">http://www.mct.gov.br/index.php</a></li> </ul> <p>Additionally, SUFRAMA, <a href="http://www.suframa.gov.br">www.suframa.gov.br</a>, a Public Agency in the Region in Manaus has been in charge of the development of Microsystems and Microelectronics activity in the region, being food one of the interesting potential applications.</p>
Canada
<p>The main National Agencies are:</p> <ul style="list-style-type: none"> <li>- Natural Science and Engineering Council (<a href="http://www.nserc-crsng.gc.ca/Index_eng.asp">http://www.nserc-crsng.gc.ca/Index_eng.asp</a>)</li> <li>- Canadian Foundation for Innovation (<a href="http://innovation.ca/en">http://innovation.ca/en</a>)</li> <li>- The Advanced Foods and Materials Network (<a href="http://www.afmnet.ca">www.afmnet.ca</a>).</li> </ul> <p>No specific programmes for <i>MST for food</i>.</p> <p>Moreover, the region of Alberta has Agriculture and Nanotechnologies as an important topics for their research, which may be funded by the Alberta Innovates agency (<a href="http://www.albertatechfutures.ca/nanoAlberta/Contact.aspx">http://www.albertatechfutures.ca/nanoAlberta/Contact.aspx</a>)</p>
China
<p>No specific programs have been launched in China, but different funding agencies may accept MST and MST for food projects. The main frameworks for supporting RTD in China are the Medium- and Long-term Science and Technology Development Plan (2006-2020), and the 11th Five-Year Plan (2006 - 2010). The main Funding Agency is the Ministry of Science and Technology (MOST) who drives the National High-tech R&amp;D Programme 863 (<a href="http://www.most.gov.cn/eng/programmes1/200610/t20061009_36225.htm">http://www.most.gov.cn/eng/programmes1/200610/t20061009_36225.htm</a>) and the National Basic Research Programme 973 (<a href="http://www.most.gov.cn/eng/programmes1/200610/t20061009_36225.ht">http://www.most.gov.cn/eng/programmes1/200610/t20061009_36225.ht</a>)</p> <p>Other agencies of interest are:</p> <ul style="list-style-type: none"> <li>- The Ministry of Education (MOE)</li> </ul>

[http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/moe\\_2792/](http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/moe_2792/). Also with the initiatives of the China Scholarship Council, <http://en.csc.edu.cn/>,

- The National Natural Science Foundation (NSFC). <http://www.nsf.gov.cn>.
- The Chinese Academy of Sciences. ([english.cas.cn](http://english.cas.cn))
- The National Development and Reform Commission (NDRC). <http://en.ndrc.gov.cn/>

**Czech Republic**

No specific programmes but possible funding of *MST for food* projects under the following actions:

- Programme of applied research and experimental development Alfa (2011-2016) of the Research and Development and Innovation System of the Czech Republic. ([www.isvav.cz](http://www.isvav.cz)).
- COST CZ, funding provider Ministry of Education, Youth and Sports (MEYS, MŠMT in Czech). [www.msmt.cz](http://www.msmt.cz)
- Institutional funding to Czech participants in the European Network for Integrating Novel Technologies for Food Processing (FP7) is provided by Ministry of Education, Youth and Sports, too.

**Denmark**

The Danish Agency for Science, Technology and Innovation (<http://en.fi.dk/>) is the main research council in Denmark.

Here the main program financing collaboration between SMEs and the university sector is the Danish Council for Strategic Research, with specific calls within Micro- and nanotechnology (<http://en.fi.dk/funding/calls/2012/strategic-research-2012-programme-commission-on-strategic-growth-technologies/>), Health, food and welfare (<http://en.fi.dk/funding/calls/2012/strategic-research-2012-health-food-and-welfare/>), Brazilian-danish strategic research cooperation within food science (<http://en.fi.dk/funding/calls/2012/brazilian-danish-strategic-research-cooperation-within-food-science/>).

**Estonia**

At the moment there are no specific initiatives for the area, but different funding opportunities from national and international (in the Nordic region) programmes have been identified as potential umbrellas for funding *MST for food* projects.:

- Estonian Rural Development Plan 2007-2013 (ERDP, <http://www.agri.ee/mak>), which aims at improving the competitiveness of the agricultural and forestry sector, the environment and the countryside and the quality of life in rural areas and diversifying the rural economy, taking into account the specific characteristics of Estonian rural life. In the 2007-2013 programming period the ERDP shall provide approximately 935 million EUR of public sector funds for supporting Estonian agriculture and rural areas.
- EEA Grants, Norway Grants (<http://www.eeagrants.org/id/1941.0;> <http://www.eeagrants.fin.ee/index.php?id=79860>, <http://www.eeagrants.fin.ee/index.php?id=79861> (in Estonian)) - no specific food- and microsystems-related funding opportunities, but some projects might fit in the following programme areas: a) Green Industry Innovation (funding of 6,000,000 euros, Ministry of Economic Affairs and Communications) – focused on ICT; b) Bilateral Research Cooperation between Norway and the Beneficiary States / EEA

countries and the Beneficiary States. The programme is still under construction and no particular areas have been agreed upon yet. It will be administered by the Estonian Science Fund.

- Central Baltic INTERREG IV-A Programme 2007-2013.  
<http://www.centralbaltic.eu/programme>. The Programme has safe and healthy environment as a priority among others. Total funding is 102 million € of ERDF until the end of 2013; the project requires at least 3 partners from 2 countries. It features yearly calls; the 6th call took place in summer 2011.
- Norden ([www.norden.org](http://www.norden.org)), a co-operation of the Nordic countries in several areas, including food. There are several financing schemes. Projects in the field of food safety may receive funding from the Nordic Working Group for Food Safety & Consumer Information (NMF);
- Enterprise Estonia: Support of technology investments for enterprises (open, <http://easbaas.5dvision.ee/?ID=7>); support of science activities for SMEs (open until 06.12.2011, <http://easbaas.5dvision.ee/?ID=345>); support for product development (open, <http://easbaas.5dvision.ee/?ID=301>); innovation vouchers (open, <http://easbaas.5dvision.ee/?ID=277>).
- Estonian-Latvian Programme: This programme is financed by the European Regional Development Fund (ERDF) and co-financed by national partners. The total ERDF budget available for commitments to projects during the period 2007 to 2013 amounts to 36 million of Euros, which is matched with public and private co-financing.  
<http://www.estlat.eu/>

### Finland

There are two funding agencies in Finland:

- The Academy of Sciences, also called Academy of Finland (<http://www.aka.fi/eng>), for basic and applied research. There are no periodic special calls for MST or *MST for food* but in 1999-2002 a programme called EMMA on Electronic Materials and Microsystems was launched, with projects more oriented towards generic technologies than on specific applications. In 2006-2010 the Programme FINNano was also launched on basic research on nanotechnologies, without specific application targets.
- TEKES, the Finnish Funding Agency for Technology and Innovation. (<http://www.tekes.fi>) which funds industrial projects. No prioritisation on their calls for *MST for food* or MST in general.

### France

There is one funding agency in France, the ANR (National Agency for Research) in charge of organization and management of calls of proposals for national programmes; its website is [www.agence-nationale-recherche.fr](http://www.agence-nationale-recherche.fr).

The Ministry of Higher Education and Research has launched a National Nanosciences Programme (PPN) that also includes MST technologies.

Funding targeting innovation for industry can be obtained with Oseo ([www.oseo.fr](http://www.oseo.fr)) at a national or a regional level through R&I projects.

### Germany

The Programme “Informations und Kommunikationstechnologien (IKT 2020)” has a sub

programme “Microsystems Technologies”, which partly covers Microsystems for food.

The programme publishes specific calls, about 2-3 per year, which cover different topics of Microsystems technologies and application areas. However, the relation with “food” is quite small.

The last call related to food was in 2006: Bekanntmachung Integrierte Mikrosysteme für biotechnologische Anwendungen (bioMST) Innovationsbereich Lebenswissenschaften Bekanntmachungsende: 13.01.2006,

<http://www.mstonline.de/foerderung/innovaber/detail?id=850>. The organisation was in charge of VDI/VDE Innovation + Technik GmbH. [www.vdivde-it.de](http://www.vdivde-it.de)

The Federal Ministry of Research and Education launched on April 2011 the call “Sicherung der Lebensmittel und Lebensmittelwarenketten“ within the programme “Forschung für die zivile Sicherheit“. The aim was funding projects for the protection of food and food chains facing criminal or terrorist attacks or accidents. Yet it was not exclusively dedicated to microsystems.

Overall there is no funding programme specifically addressing Microsystems for food, but calls are published within the Microsystems, Security, and other programmes that may related to *MST for food*.

### Greece

The main body that deals with funding of research in Greece, which may potentially support the *MST for Food* activity under generic calls is the Ministry of Development ([www.ypan.gr](http://www.ypan.gr)) under the supervision of the General Secretariat of Research and Technology (G.S.R.T.) of the Ministry of Development ([www.gsrt.gr](http://www.gsrt.gr)). The Ministry also controls the functioning of the Greek Research and Technology Network ([www.grnet.gr](http://www.grnet.gr)) which helps in the research and development of the communication and Information technologies throughout Greece.

### Hungary

The two main National Agencies or Councils with responsibilities for distributing funds directly to researchers, which may fund MST activities are :

- Hungarian Scientific Research Fund – OTKA - [www.otka.hu](http://www.otka.hu)
- Hungarian Academy of Sciences - HAS [www.mta.hu/index.php?id=406&type=0](http://www.mta.hu/index.php?id=406&type=0)

### Ireland

The Department of Agriculture, Food and the Marines ‘Food Institutional Research Measure’ (FIRM) has been in operation since 2000, and is the main programme for the funding of food research in Irish public research institutions. In the past, call topics related to Food Microsystems have included food safety and security of the food chain, food quality and manufacturing, the consumer and the food supply chain. Details on all projects supported by FIRM can be found on [www.relayresearch.ie](http://www.relayresearch.ie).

Areas of strength in Irish food research built up through the FIRM and through other Institutional / University research measures that relate to smart systems research for food applications include:

- Dairy Process Design and Control.
- Cereal process technology focusing on optimisation of formulations and processes for novel product development.

- A Hyperspectral Imaging System for the non-destructive assessment of mushroom quality and shelf life prediction and technologies to identify sub-standard batches of mushrooms.
- Smart packaging solutions to enhance the quality, safety and shelf-life of beverages and foods, ([www.packinmap.com](http://www.packinmap.com)).
- New assays for rapidly and cost effectively monitoring the growth of pathogenic organisms and the evolution of food spoilage.
- Development of rapid testing methods to detect anti-parasitic drugs residues in animal liver samples using a surface plasmon resonance (SPR) biosensor.

In addition, there are some other non-specific programmes to the sector like:

- **Enterprise Ireland**, which support no sector specific R&D programmes (researchers in 3<sup>rd</sup> level institutions with industry interests, spin outs, commercialization activities, collaboration with industry., see: [www.enterprise-ireland.com/en/Research-Innovation/Researchers/](http://www.enterprise-ireland.com/en/Research-Innovation/Researchers/) )
- **Science Foundation Ireland**, which has several programmes for basic research type of activities involving researchers based in 3<sup>rd</sup> level institutions: see more details Open and Close calls under: [www.sfi.ie/funding/funding-calls/closed-calls/](http://www.sfi.ie/funding/funding-calls/closed-calls/) .

#### Israel

The office of the Chief Scientist of the Ministry of Industry, Trade and Labour ([www.tamas.gov.il/CmsTamat/Rsrc/MadaanEnglish/MadaanEnglish.html](http://www.tamas.gov.il/CmsTamat/Rsrc/MadaanEnglish/MadaanEnglish.html)) supports several programs, some of which might be suitable for the food sector.

#### Italy

In Italy there have been specific programmes for Micro and Nano technologies in the past, and food applications have been addressed under these programmes, but no specific *MST for food* call has been launched. The main programmes and agencies for this kind of research are as follows:

- FIRB - Fondo per gli Investimenti della Ricerca di Base by Ministry for Research and University FIRB D.M. 8 MARZO 2001 PROGRAMMA STRATEGICO “NANOTECNOLOGIE, MICROTecnologie, SVILUPPO INTEGRATO DEI MATERIALI”
- FISR – Fondo Integrativo Speciale per la Ricerca by Ministry for Research and University TEMA n. 2: Nanotecnologie e microsistemi
- MADESS II – Materiali e Dispositivi per l’Elettronica a Stato Solido by CNR
- PON – Programma Operativo Nazionale by Ministry for Research and University and Ministry for Economic Development
- Accordo di Programma Quadro in materia di “Ricerca Scientifica” nella Regione Puglia, by Puglia Region
- PRIN - Programmi di ricerca di Rilevante Interesse Nazionale by Ministry for Research and University

All these programmes may be found in a website ([www.ricercaitaliana.it](http://www.ricercaitaliana.it)) belonging to the Ministry of Education, Universities and Research (Ministerio dell’Istruzione, dell’Università e della Ricerca, or MIUR)

#### Japan

Since the creation of the Michromachine Center in 1991, MST projects are funded in Japan

under specific programmes usually sponsored by NEDO (New Energy and Industrial Technology Development Organization) from the METI Ministry of Economy. Currently running programmes, continuation of MEMS–ONE (2004-2006) and FINE-MEMS (2006-2008) are the following:

- Beans Programme (2008-2012): Bio Electrochemical Autonomous Nano Systems (<http://www.beanspj.org>)
- Green Sensor Network Project (2011-2014): on Wireless Sensor Solutions.

However, no projects with applications to the food sector have been addressed yet under these programmes.

On the other hand, Japan launched from 2002 to 2007 a Food Nanotechnology Project (Ministry of Agriculture, Forestry and Fisheries, Japan), [http://www.naro.affrc.go.jp/org/nfri/yakudachi/foodnanotech/index\\_e.html](http://www.naro.affrc.go.jp/org/nfri/yakudachi/foodnanotech/index_e.html), which in principle funded activities for the food sector rather related to the Nanotechnologies than to Microtechnologies although the combination of both was also possible.

### Korea

Korea R&D basic and applied programmes are being funded by the NRF National Research Foundation ([www.nrf.re.kr](http://www.nrf.re.kr)), which is part of the Ministry of Education, Science and Technology.

The ministry of Knowledge and Economy ([www.mke.go.kr](http://www.mke.go.kr)) also supports more Industrial like programmes.

MST research is funded in these programmes but with no specific call. Food applications may be part of the projects.

### Latvia

No specific programmes on *MST for Food*. The system for higher education and research in those topics is under the authority of two Ministries: Ministry of Agriculture (<http://www.zm.gov.lv>), and Ministry of Education and Science (<http://www.izm.gov.lv>). This last one manages the whole process of science and technology in Latvia.

### Lithuania

No programmes or projects for device applications in the food sector were funded by the Ministry of Education and Science (<http://www.smm.lt/en/>). The National program "Healthy and secure food" is being funded (2011-2015) by means of EU Structural Funds, but the *MST for food* activities are not specifically included in the programme.

### Luxembourg

The main organisations related to the Research and Innovation are the Ministère de l'Enseignement Supérieur et de la Recherche, the Département Recherche et Innovation (<http://www.etat.lu>) and Luxinnovation ([www.luxinnovation.lu](http://www.luxinnovation.lu)).

No specific *MST for food* call has been launched up to now.

### Malta

Set up in 1988, the Malta Council for Science and Technology ([www.mcst.gov.mt](http://www.mcst.gov.mt)) is the

national advisory body to Government on Science and Technology policy, with an emphasis on research and innovation.

MCST's work focuses on:

- advising the Government on science, technology, research and innovation policy
- coordinating EU and international links in science, research and innovation
- encouraging and supporting participation in FP7 as the National Contact Organisation
- running the National Research and Innovation (R&I) Programme
- promoting science popularization and outreach

No specific *MST for food* call has been launched up to now.

### Mexico

There is no specific programme on *MST for food*. However, the CONACYT agency ([www.conacyt.mx](http://www.conacyt.mx)) opens annual calls for scientific and technological projects that are not specific but open to any technology and application. *MST for food* projects may be potentially funded under this umbrella. EU-Mexico calls are also funded by CONACYT for the Mexican partners.

Another institution called FUMEX promotes the use of MST technologies and the collaboration on this field between USA and Mexico, but no specific activity for the food sector has been launched up to now.

### The Netherlands

There are no specific programmes dealing only with smart systems in food. However, there are initiatives that could cover them. The main ones are :

- MicroNed ([www.microned.nl](http://www.microned.nl)).
- NanoNed ([www.nanoned.nl](http://www.nanoned.nl)).
- Nano4Vitality ([www.nano4vitality.nl](http://www.nano4vitality.nl)).
- Wageningen UR – IPOP BioNano. ([www.biont.wur.nl/UK/IPOP/](http://www.biont.wur.nl/UK/IPOP/)).
- NanoNextNL. (<http://www.nanonextnl.nl>).

### Norway

The main funding agency in Norway is the Research Council of Norway : ([http://www.forskingsradet.no/en/Home\\_page/1177315753906](http://www.forskingsradet.no/en/Home_page/1177315753906))

FRINATEK programme: Funding is available for basic research projects in Mathematics, Physical Science and Technology. Scientific merit is the most important criterion in determining which projects will be awarded grants. No specific programmes on MST applied to the food sector have been identified up to now.

BIONAER Programme: The overall thematic area of the programme encompasses agriculture, forestry and nature-based value chains as well as seafood and marine biomass, from the time raw materials are taken out of the sea until they reach the consumer. Focus areas are primarily linked to the concept of the bioeconomy and to the achievement of closed-loop systems.

### Poland

The main agency in charge of project funding in Poland is the Ministry of Science and Higher education (<http://www.nauka.gov.pl>).

<p>Only generic programmes are available, which may consider the research of <i>MST for food</i>.</p>
<p><b>Portugal</b></p>
<p>The FCT (<a href="http://www.fct.pt/">http://www.fct.pt/</a>) Foundation for the Science and Technology from the Ministry of Science and Education is the main project funding agency in the country. Programmes are usually open and generic and no <i>MST for food</i> call has been launched up to now.</p> <p>In 2007 the programme PORTUGAL- NANO was launched with potential applications but no call on <i>MST for food</i> was funded.</p>
<p><b>Romania</b></p>
<p>The National Research Council (CNCS) is the Romanian organization that supports fundamental research in all fields of science. The research supported by CNCS is selected through competitive, merit-based review. CNCS is a consultative body of the Minister of Education and Science (<a href="http://www.cncs-uefiscdi.ro">http://www.cncs-uefiscdi.ro</a>). No specific <i>MST for food</i> call has been launched up to now.</p>
<p><b>Russia</b></p>
<p>In Russia there are several sources of financial support for the research and development in a variety of fields, including micro- and nano-systems that could be also applied to food control and safety. Among these organisations, the following ones may be highlighted:</p> <ul style="list-style-type: none"> <li>- Russian Fund for Fundamental Investigations (<a href="http://www.rfbr.ru">www.rfbr.ru</a>). Provides research grants of aprox. 15,000€/year in many fields including micro and nano systems</li> <li>- Foundation for Promotion of Small Enterprises in Science and Technology (<a href="http://www.fasie.ru">www.fasie.ru</a>). There is a special programme (Ref. N33) “Environmentally sound technologies to resource-saving production and processing” that includes research in “Safety and quality control of agricultural raw materials and food: Ref. N 33.4.4.” The Foundation gives grants up to 50,000€ per year to SMI for a variety of commercially-oriented R &amp; D, provided co-financing projects by the SMI receiving the grant.</li> <li>- RusNano (<a href="http://www.rusnano.com">www.rusnano.com</a>). Provide financial support to very large projects (10-20 millions €) in the field of nanotechnologies More information can be found in <a href="http://www.rusnano.com/Home.aspx?dummy=634553200470960000">http://www.rusnano.com/Home.aspx?dummy=634553200470960000</a>.</li> <li>- Ministry of Education and Science of Russian Federation (<a href="http://eng.mon.gov.ru/">http://eng.mon.gov.ru/</a>). This ministry includes Federal Agency of Science and Innovations (<a href="http://www.fasi.gov.ru/">http://www.fasi.gov.ru/</a>) which elaborates the governmental policy in the field of nanotechnologies. They have elaborated the “Nanotechnology development program in the Russian Federation till 2015”.</li> <li>- Russian Foundation for Technological Development (RFTD). Ministry of Industry, Science and Technology of the Russian Federation (<a href="http://www.rftr.ru/">http://www.rftr.ru/</a>). There is a programme “Development of a new generation of devices based on microelectromechanical systems (microsystems and micromachines)”</li> </ul>
<p><b>Slovakia</b></p>
<p>The VEGA of Slovak Ministry of Education and Research and Development Supporting Agency is the scientific agency which generically supports research projects. The VEGA is also an auxiliary body of the presidium of the Slovak Academy of Sciences (SAS) for projects selected for funding from institutional finance resources under two sub-chapters of the State Budget:</p>

(a) the University-based science and technology, and (b) the Slovak Academy of Science.  
[http://evega.minedu.sk/e-vega/\(S\(oe2f4w55e5ngdv55o5lvebb4\)\)/Default.aspx](http://evega.minedu.sk/e-vega/(S(oe2f4w55e5ngdv55o5lvebb4))/Default.aspx)  
 No MST for food activities have been specifically programmed.

**Slovenia**

ARRS is the Slovenian Research Agency ([www.arrs.gov.si](http://www.arrs.gov.si)). It is an independent public funding organization that performs tasks relating to the National Research and Development Programme and creation of European Research Area. No MST for food activities have been specifically programmed.

**Spain**

There are no specific programmes on *MST for Food* or MST in general. This type of activity is usually funded under generic programmes on Electronics (including, Micro and Nanoelectronics and Microsystems).

In the past the Agriculture Ministry has had some funding capabilities but since the creation of the Ministry of Science and Innovation, all the basic and applied research has been managed under the National R&D&i Programme, driven by that ministry, which at the beginning of 2012 has become a State Secretary of the Ministry of Economy and Competitiveness ([www.mineco.es](http://www.mineco.es)). The two main programmes are the one for basic and fundamental research and the one for applied research and innovation, whose aim is to set-up the Spanish Strategy for the Innovation. In these programmes the MST and Micro and Nanoelectronics are topics of interest but with no specific priority.

Finally, pure industrial research in the MST area is funded by the Ministry of Industry, Energy and Tourism ([www.minetur.es](http://www.minetur.es)) under the Avanza Programme.

**Sweden**

The main funding agencies in Sweden are :

- VINNOVA - Sweden's Innovation Agency <http://www.vinnova.se/en/>
- Swedish Research Council <http://www.vr.se/inenglish.4.12fff4451215cbd83e4800015152.html>
- Swedish Foundation for Strategic Research <http://www.stratresearch.se/en/>

Vinnova, the first one, is usually handling MST. In agrofood applications, activity in Wireless Sensor Networks deployment for cow monitoring is reported; despite it is not exactly a food production application.

**Switzerland**

The Swiss National Science Foundation (SNSF, <http://www.snf.ch>) offers a wide range of research funding schemes which are open to scientists and academics of any nationality working in Switzerland. With few exceptions (mainly for research programmes), the topics and scope of the research can be defined by the researchers themselves.

The CTI Agency, Commission for Technology and Innovation (<http://www.kti.admin.ch>) also offers potential funding to MST projects under the Nano-Tera programme ([www.nano-tera.ch](http://www.nano-tera.ch)). Within the programme, a project on MST for the food impact on health was launched with the NUTRICHIP acronym, but it is not a pure MST for food project.

Turkey
<p>Research is managed by the Ministry of Science, Industry and technology (<a href="http://www.sanayi.gov.tr">http://www.sanayi.gov.tr</a>). No specific programmes have been launched for MST for Food or MST. Funding Programmes are generic. Era Net projects also funded by the Turkish Ministry are coordinated by TUBITAK, the Scientific and Technological Research Council of Turkey (<a href="http://www.fp7.org.tr">www.fp7.org.tr</a>).</p>
United Kingdom
<p>The main funding agency for MST projects is EPSRC, the Engineering and Physical Sciences Research Council (<a href="http://www.epsrc.ac.uk">www.epsrc.ac.uk</a>). DTI or BIS Department of Business and Skills (<a href="http://bis.gov.uk">bis.gov.uk</a>) is another agency dealing with more industrial like research. Within it DTI has established a MST-Network with a specific call for MST projects without any reference to food as a prioritised target.</p>
USA
<p>DARPA (<a href="http://www.darpa.mil">www.darpa.mil</a>), the Defense Advanced Research Projects Agency is the agency of the United States Department of Defense responsible for the development of new technology for use by the military. DARPA has been responsible for funding the development of many technologies being Micro and Nanotechnologies one of them.</p> <p>USDA also launched the NIFA Nanotechnology programme (<a href="http://www.nifa.usda.gov/nanotechnology.cfm">http://www.nifa.usda.gov/nanotechnology.cfm</a>). This programme typically supports around 10-12 grants that utilize nanotechnology in food science. It has supported work on development of biosensors for food safety detection; nanoscale delivery systems for nutraceuticals and antimicrobial agents; nanoengineered packaging materials; education in nanotechnology and foods.</p> <p>Finally, the National Science Foundation NSF (<a href="http://www.nsf.gov">www.nsf.gov</a>) also supports fundamental R&amp;D and Scholarships in all fields of interest.</p>

### 3. Research projects

A complete study of the main projects that have been launched to our knowledge in the field of MST for Food has been carried out. The search has been done for the main European Programmes and also at national level.

The main information of interest collected from the projects is:

- The food area addressed,
- The MST technology used/developed
- If the MST tech and the food application are the key developments of the proposal or they are collateral fields of interest.
- The proximity to the market of the product/technology/process developed.
- The budget (to evaluate the importance of the action)
- The project coordinator and partnership (to identify industrial and R&D key partners of different countries that are active also at international level).

This search has only been done in depth for projects funded under European programmes, as these are the only ones facilitating public information on the web that is useful, complete, and in English. Thus, these European projects have been comprehensively reported by preparing a summary table for each project. On the other hand, the only information available in English for projects coming from the national programmes (usually oriented to fundamental research) has been, in most cases, the title and the main researcher contact. Thus, as the amount of information was much smaller those projects are summarized all together in a single table. In nearly all cases, it has been impossible to know the budget allocated, or to obtain any abstract in English. For this reason they have been thematically tentatively organized from the key words given in the title.

Moreover, the industrial/scientific outcomes and the dissemination channels used by the involved consortiums have not been easy, or possible, to identify at this stage with the information available. A second iteration for trying to get more information from the websites available for the coordinator groups has been attempted. However, in nearly all cases the websites of the institutions and/or groups involved have not been useful for finding the projects of interest or for extracting any useful information from them.

Finally, it has to be stated that only pure *MST for food* projects have been taken into account. Nevertheless, an important activity of research in areas with some connection have been identified. For instance some of these collateral subjects identified through the questionnaire and worth mentioning are:

- MST in agriculture or related to environment issues
- MST or wireless sensor networks (WSN) for sensing the behaviour of fish in aquaculture

- MST or WSN for monitoring physiological parameters of cattle
- MST for detecting food allergies (which are, in fact, health projects)
- Pure nano-materials in food. Coatings to control bioavailability of components in food products.
- Active/functional packaging (without electronics or MST components)
- Tools for food production that may include “macro-sensors” but not MST based ones.
- Logistics, traceability and RFIDs without sensing capabilities
- Pure ICT data processing for Food Process Control projects not involving sensing capabilities

Also, many R&D activities done for other fields different than food may have application to our field of interest. However, if those projects have not specified any activity on the field, or have not shown or pointed to any potential food application, they have not been considered in this study. This is something to be considered in the analysis of technologies of D2.1.

### 3.1 European research projects

In the next table, a list of the projects found in different European programmes is presented. As these projects may be considered of higher importance and also the available information is much more complete than for national programmes, dedicated tables for each one have been filled in, and are presented below this initial summary table. The projects are presented in order being first most related to the ICT programme, and then the ones from the other themes of the Framework programme and finally the Eureka programmes. Among each section, the newest projects are the ones presented first.

No.	Programme	Acronym	Title
1	FP7-ICT-2011.3.2 Smart components and Smart systems integration	LOVE-FOOD	Love wave fully integrated Lab-on-Chip platform for food pathogen detection
2	FP7-ICT-2011.3.2 Smart components and Smart systems integration	FOODSNIFFER	FOOD Safety at the point-of-Need via monolithic spectroscopic chip identifying harmful substances in frEsh pRoduce
3	FP7-NMP-2008-1.2-1 Pilot lines to introduce nanotechnology-based processes into the value chain of existing industries	MAGPRO <sup>2</sup> LIFE	Advanced Magnetic nanoparticles deliver smart Processes and Products for Life
4	FP7-SME-2008-1 Research for the benefit of SMEs	SENSBIOSYN	Biosensors and Sensors for the industrial biosynthesis process of widely used commercial antioxidants: nutraceuticals as additives for food and aquaculture promoting public health and safety
5	FP7-PEOPLE-2011-IAPP Marie Curie Industry- Academia Partnerships and Pathways	IMPRESS	IMPRoved food safety monitoring through Enhanced imaging nanoplasmonics

No.	Programme	Acronym	Title
6	FP7-PEOPLE-2011-CIG Marie Curie Career Integration Grants	FLEXSENS	Chemical Sensors for the 21st Century
7	FP7-ICT-2009.3.9 Microsystems and Smart Miniaturized Systems	ARROWS	Advanced interfaced microsystems research for analysis of real-world clinical, food, environmental and waste Samples
8	FP7-ICT-2009.3.9 Microsystems and Smart Miniaturized Systems	SMART-EC	Heterogeneous integration of autonomous smart films based on electrochromic transistors
9	FP7-Call ICT-2009.3.3 – Flexible, organic and large area electronics	LOTUS	Low-cost highly conductive high resolution structures for flexible large area electronics by high throughput low temperature processing
10	FP7- ICT-2009.3.3 Flexible organic and large area electronics	CHIP2FOIL	Ultra thin chip integration process for low cost communicative polymer foils
11	FP7- ICT-2007.3.6 Micro/nanosystems	LABONFOIL	Laboratory skin patches and smartcards based on foils and compatible with a smart-phone
12	FP7-ICT-2007.3.6 Micro/Nanosystems	MICROFLUID	Micro-fabrication of polymeric lab-on-a-chip by ultrafast lasers with integrated optical detection
13	FP6- NMP-2004-IST-NMP-2 Bio-sensors for Diagnosis and Healthcare	OPTOLABCARD	Laboratory skin patches and smartcards based on foils and compatible with a smart-phone
14	FP6-IST-2002-2.3.1.2 Micro and nano-systems	GOODFOOD	Food safety and quality monitoring with microsystems
15	FP7-KBBE-2010-3.2-04 Innovative aquatic biosensors	RADAR	Rationally Designed Aquatic Receptors integrated in label-free biosensor platforms for remote surveillance of toxins and pollutants
16	FP7-KBBE-2009-3-6-02 Nanobiotechnology: functionalized membranes	MEM-S	Bottom-up design and fabrication of industrial bio-inorganic nano-porous membranes with novel functionalities based on principles of protein self-assembly and biomineralization
17	FP7-KBBE-2008-2-3-01 Exploring the micro- structure of foods	INSIDEFOOD	Integrated sensing and imaging devices for designing, monitoring and controlling microstructure of foods
18	FP7-KBBE-2007-2-3-04 Nano-devices for quality assurance, food safety and product properties	NANODETECT	Development of nanosensors for the detection of quality parameters along the food chain
19	FP6-FOOD-2003-T5.1 New approaches towards monitoring and preventing chemical contaminants in food products	BIOCOP	New Technologies to Screen Multiple Chemical Contaminants in Foods
20	FP6-FOOD-2004-T0 Realizing ERA objectives - Promotion of SME participation - Stimulating international co-operation	BIODET	Networking in the application of biosensors to pesticide detection in fruits and vegetables
21	FP6-FOOD-2003-T5.3 Development of cost- effective tools for risk management and traceability systems for zoonotic agents and marine biotoxins in seafood	BIOTOXMARIN	Development of novel analytic tools for the detection of marine biotoxins
22	FP6-2005-FOOD	TRACEBACK	Integrated system for a reliable traceability of food supply

No.	Programme	Acronym	Title
			chains
23	FP7- NMP-2008-1.1-1 Converging sciences and technologies (nano, bio, info and/or cogni)	BOND	Bioelectronic Olfactory Neuron Device
24	FP6 - SME Horizontal research activities involving SMEs	SENBACK	Development of a Multisensor for the Supervision of Durable Bakery Products
25	FP6 - SME-1 Co-operative Research	BUGCHECK	A Rapid Hand-Held Analyser for Control of Microorganisms in the Complete Meat Supply Chain
26	EUREKA-CATRENE Cluster	PASTEUR	Perishable Management through Smart Tracking of Lifetime and Quality with RFID
27	EUREKA	RFID-SENSOR-LABEL	UHF RFID Battery Assisted Semi Passive Sensor Label
28	EUREKA	M-FRESH-SENS	Fresh Meat Optical Detection
29	EUREKA	MICROTARGETS	DNA Chip Technologies for Food and Environmental Controls (GMOs, Plants, Animal Species and Micro-Organisms)
30	INTERREG	FoBoS	Sharing Molecular Techniques for Food-borne Detection
31	ERA-NET MNT	PESTIPLAT	Integrated Platform for Pesticides Detection

Individual tables of the main European projects identified are presented below. In addition to relevant project information, they include an assessment section which includes a classification of the type of project (basic, applied or industrial research), the target food sector (fruit, beverages, vegetables, meat, fish or packaging) if the project is specific, the main MST technology developed and used for the purpose and if food is the main target of the project or is one potential side application. The assessment also includes the number of industrial partners over the total number, in order to evaluate the industrial weight of the project, and if the research is a follow-up of another project.

1	Project Description						
Programme	FP7-ICT-2011.3.2 Smart components and Smart systems integration				Reference	317742-STREP	
Acronym	LOVE-FOOD		Web site	<a href="http://love-food-project.eu">http://love-food-project.eu</a>			
Title	Love wave fully integrated Lab-on-Chip platform for food pathogen detection						
Start date	2012-09-01	Duration	36 m	Cost	3.94 M euro	Funding	3. M euro
Summary	The project is aimed at developing a fully integrated lab-on-chip microsystem platform, performing multimodal analysis of several analytes combining nucleic acid and whole bacteria detection. The system will allow directly and without prior culture the identification in one single run of a multiplicity of pathogens and their specific sequences responsible will be targeted and identified. The heart of this system will be an acoustic detection biochip incorporating an array of Love wave acoustic sensors, integrated with a microfluidic module. This detection platform will be combined with a micro-processor, which, alongside with magnetic beads technology and a micro-PCR module will be responsible for performing sample pre-treatment, bacteria lysis, nucleic acid purification and amplification as well as whole bacteria detection. Automated, multiscale manipulation of fluids in complex microchannel networks will be combined with novel sensing principles developed by some of the partners.						

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Assesment					
Project type	Applied research	No. industrial partners	2/6		
Food Sector	Not specific	MST Technology	Microfluidics, Lab-on a chip (LOC), SAW		
Fully MST for Food ? (core, main, potential)	Main application to food safety & quality	Follow-up project?	No		

2	Project Description						
Programme	FP7-ICT-2011.3.2 Smart components and Smart systems integration			Reference	318319-STREP		
Acronym	FOODSNIFFER		Web site	www.foodsniffer.eu			
Title	FOOD Safety at the point-of-Need via monolithic spectroscopic chip identifying harmful substances in frEsh pRoduCe						
Start date	2012-09-01	Duration	36 m	Cost	4.00 M euro	Funding	2.98 M euro
Summary	<p>FOODSNIFFER is field-deployable and simple-to-use as a result of the integration of three major innovations:</p> <p>(i) The transducer itself, an all-silicon fully integrated optoelectronic platform.</p> <p>(ii) The innovative design of the wafer-scale microfluidics and filtration systems.</p> <p>(iii) The development of a low-power reader.</p> <p>FOODSNIFFER is a complete business solution which will be demonstrated in three areas of great importance to European society and regulators, viz. the detection of pesticide residues, mycotoxins and allergens in selected food categories in order to demonstrate field-based detection of harmful species at low concentrations, which is a feat unattained so far by any point-of-need system.</p>						
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<b>Assesment</b>			
Project type	Applied research	No. industrial partners	4/10
Food Sector	Not specific	MST Technology	Microfluidics, Optoelectronics
Fully MST for Food ? (core, main, potential)	Main application to food safety	Follow-up project?	No

<b>3</b>		<b>Project Description</b>					
Programme	FP7 -NMP-2008-1.2-1 - Pilot lines to introduce nanotechnology-based processes into the value chain of existing industries				Reference	229335-IP	
Acronym	MAGPRO2LIFE		Web site	<a href="http://www.magpro2life.eu/">http://www.magpro2life.eu/</a>			
Title	Advanced Magnetic nanoparticles deliver smart Processes and Products for Life						
Start date	2009-07-01	Duration	48 m	Cost	11.4 M euro	Funding	7.4 M euro
Summary	The main objective of the MagPro2Life project is to scale-up innovative nanotechnology based processes defined in the previous NanoBioMag Project, funded by the EU under the FP6 programme (NMP3-CT-2005-013469), to pilot-line-scale and demonstrate those for bio, food and pharma applications. Link to market needs is represented by a preliminary product selection of natural soy based nutraceuticals or pharmaceuticals like Bowman-Birk Inhibitor (BBI), a proteases inhibitor for MS-treatment, and Lunasin which is in discussion to have anti-carcinogenic properties as well as recombinant proteins and nucleic acids (Fragment-Antibody-Binding and Phytase). The Consortium is driven by the potential the magnetic separation technology has for improving the value-chain in industrial production for emerging biotech, food and pharma markets.						
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<b>Assesment</b>			
Project type	Applied research	No. industrial partners	5/15
Food Sector	Not specific	MST Technology	Nanoparticle Magnetic Separation
Fully MST for Food ? (core, main, potential)	Main application to food processing	Follow-up project?	Yes (FP6-Nanobiomag)

4	<b>Project Description</b>						
Programme	FP7-SME-2008-1 Research for the benefit of SMEs				Reference	232522-STREP	
Acronym	SENSBIOSYN		Web site	<a href="http://www.sensbiosyn.com/">http://www.sensbiosyn.com/</a>			
Title	Biosensors and Sensors for the industrial biosynthesis process of widely used commercial antioxidants: nutraceuticals as additives for food and aquaculture promoting public health and safety						
Start date	2009-11-01	Duration	24 m	Cost	1.3 M euro	Funding	0.95 M euro
Summary	<p>The purpose of this 2-years project is to develop sensors and biosensors for on-line monitoring growth parameters of industrial bioprocesses for the production of algal biomass and antioxidant compounds such as Xanthophylls. As a model for the design and in-field testing, the following industrial process and culture system have been selected: the natural production of Astaxanthin from the green microalga Haematococcus pluvialis in a tubular photobioreactor.</p> <p>SENSBIOSYN intends to offer a solution to the lack of existing devices able to provide online rapid automatic and reliable information on active compounds accumulation profile and efficacy during their biosynthesis. The proposed project will bring the following competitive advantages to microalgae companies: Increased production - online monitoring will ease decision about time of harvest and culture performance.</p>						
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<b>Assesment</b>					
Project type	Applied research	No. industrial partners	2/5		
Food Sector	Food additives	MST Technology	Electrochemical and optical sensors, microfluidics.		
Fully MST for Food ? (core, main, potential)	Main application to food processing	Follow-up project?	No		

5	<b>Project Description</b>						
Programme	FP7-PEOPLE-2011-IAPP Marie Curie Industry-Academia Partnerships and Pathways				Reference	286262	
Acronym	IMPRESS		Web site				
Title	IMPRoved food safety monitoring through Enhanced imaging nanoplasmonicS						
Start date	2011-10-01	Duration	48 m	Cost	0.59 M euro	Funding	0.59 M euro
Summary	<p>The objective of the IMPRESS project is to develop an affordable, portable, multiplexing and flexible Surface Plasmon Resonance (SPR) biosensor device (the IMPRESSOR), based on Plasmons nanotechnology expertise, to obtain a fast impression of the quality and safety of food. This system will be constituted by two fundamental elements:</p> <p>1) A disposable biochip customized for the detection of a set of parameters of the quality of the food (e.g. the detection of a set of allergens, toxins or antibiotics) and</p> <p>2) an electronic reading system enabling the dispensing and the analytical screening of the food sample and the electronic evaluation, storage and communication of the results.</p>						
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<b>Assesment</b>							
Project type	Applied research	No. industrial partners	2/2				
Food Sector	Not specific	MST Technology	Surface Plasmon Resonance				
Fully MST for Food ? (core, main, potential)	Main application to food quality & safety	Follow-up project?	No				

6		Project Description					
Programme	FP7-PEOPLE-2011-CIG Marie Curie Career Integration Grants				Reference	293538	
Acronym	FLEXSENS		Web site				
Title	Chemical Sensors for the 21st Century						
Start date	2011-09-01	Duration	48 m	Cost	0.1 M euro	Funding	0.1 M euro
Summary	FlexSens aims to develop extremely versatile sensing strategies that can be used for the widespread generation of chemical information. The flexibility of the platform, then, refers to its ability to adapt to different environments, conditions and users. Two main research lines will be explored. In the first one, the project will explore the incorporation of sensors in objects used in our everyday life, especially textiles. In the second one, extremely cheap, disposable paper printed sensors will be generated. The enabling technology will be a combination of recent progress in carbon nanotubes potentiometric sensing and printed electronics using carbon nanotubes inks. The end goal of FlexSens is to provide a battery of analytical approaches that can converge with existing and emerging social and technological trends to help in the solution of urgent social needs in many diverse areas, such as healthcare, environmental analysis, food production, etc.						
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Project type	Applied research		No. industrial partners		0/0		
Food Sector	Not specific		MST Technology		Carbon Nanotubes, flexible electronics.		
Fully MST for Food ? (core, main, potential)	Potential application to food production		Follow-up project?		No		

7		Project Description					
Programme	ICT-2009.3.9 Microsystems and Smart Miniaturised Systems				Reference	257669	
Acronym	ARROWS		Web site		http://www.arrows-online.eu		
Title	Advanced interfaced micro-systems Research for analysis of Real-world clinical, food, environmental and Waste Samples						
Start date	2010-07-01	Duration	36 m	Cost	4.34 M euro	Funding	3.3 M euro
Summary	The goal of ARROWS is to develop a micro-engineered platform for the analysis of real-world samples from the food, drink and healthcare industries. The principle deliverable will be a chip-scale capillary electrophoresis/liquid chromatography mass spectrometer (CE/LC-MS) that matches the performance of today's mainframe systems. The ARROWS innovation is to integrate and interface multiple chip technologies into a platform capable of analysing messy, sticky biological matrices like tissue, food, blood and urine.						
Coordinator							
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Project type	Applied research	No. industrial partners	1/6	
Food Sector	Not specific	MST Technology	Microfluidics	
Fully MST for Food ? (core, main, potential)	Main application to food safety	Follow-up project?	No	

8	<b>Project Description</b>						
Programme	FP7-ICT-2009.3.9 Microsystems and Smart Miniaturised Systems				Reference	258203	
Acronym	SMART- EC		Web site	http://www.smart-ec.eu			
Title	Heterogeneous integration of autonomous smart films based on electrochromic transistors						
Start date	2010-09-01	Duration	48 m	Cost	7.26 M €	Funding	5.1 M €
Summary	SMART-EC aims at the development of self powered (energy harvesting and storage) EC device integrating EC thin film transistor component on a flexible substrate for energy saving, comfort and security in automotive, e-cards and smart packaging sectors. The objective is to overcome the current limitations related to low switching time and manufacturing costs; the switching time can be reduced (<1s)...						
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<b>Assessment</b>			
Project type	Applied research	No. industrial partners	8/13
Food Sector	Not specific	MST Technology	RFID with temperature sensors
Fully MST for Food? (core, main, potential)	main application to food traceability	Follow-up project?	No

9	<b>Project Description</b>						
Programme	FP7- ICT-2009.3.3 Flexible organic and large area electronics				Reference	248816- STREP	
Acronym	LOTUS			Web site	<a href="http://www.lotus-fp7.eu/">http://www.lotus-fp7.eu/</a>		
Title	Low-cost highly conductive high resolution structures for flexible large area electronics by high throughput low temperature processing						
Start date	2010-01-01	Duration	36 m	Cost	5.52 M euro	Funding	3.7 M euro
Summary	<p>The LOTUS proposal addresses the urgent need for a technology to produce the highly conductive patterns required for high throughput large volume manufacturing of flexible large area electronics. While all printed electronics need electric wiring LOTUS specifically targets the applications the most advanced towards commercialization: flexible thin-film photovoltaics, RFIDs, and OLEDs for lighting. The general objective is to provide a simple, low cost, energy efficient, environmentally friendly and R2R compatible platform to produce highly conductive structures with high resolution. Moreover, it will be beneficial to any flexible electronics including thin-film transistors, power converters, flexible batteries, printed sensors for biomedical use (point-of-care) and food protection/freshness applications.</p>						
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<b>Assessment</b>			
Project type	Applied research	No. industrial partners	4/10
Food Sector	Not specific	MST Technology	Flexible electronics
Fully MST for Food ? (core, main, potential)	Main application to food quality	Follow-up project ?	No

10	<b>Project Description</b>						
Programme	FP7-Call ICT-2009.3.3 – Flexible, organic and large area electronics				Reference	248160-STREP	
Acronym	Chip2Foil		Web site	<a href="http://www.chip2foil.eu/">http://www.chip2foil.eu/</a>			
Title	Ultra thin chip integration process for low cost communicative polymer foils						
Start date	2010-01-01	Duration	36 m	Cost	4.67 M €	Funding	2.98 M €
Summary	<p>Chip2Foil main aim: to develop a technology platform for high speed, low cost placement and interconnection of ultra thin chips on thin polymer foils within a high volume, reel-to-reel production concept. This competence allows realising a broad variety of disposable communicative packages. These packages provide increased interaction between the packed product, the package and the user through near-field communication systems, allowing improved intelligent control of the logistic process of high volume applications like medicine and food. The chosen demonstrator is a Smart Blister package, which monitors the medicine taking behaviour of patients to ensure therapy compliance. Therapy non-compliance is a severe ethical and economic problem, leading to considerable numbers of casualties per year and high health care cost.</p>						
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<b>Assessment</b>			
Project type	Applied research	No. industrial partners	4/7
Food Sector	Not specific	MST Technology	Flexible electronics
Fully MST for Food? (core, main, potential)	potential application to food safety	Follow-up project?	No

11	Project Description						
Programme	FP7- ICT-2007.3.6 Micro/nanosystems			Reference	224306- IP		
Acronym	LABONFOIL		Web site	<a href="http://www.labonfoil.eu/">http://www.labonfoil.eu/</a>			
Title	Laboratory skin patches and smartcards based on foils and compatible with a smart-phone						
Start date	2008-05-01	Duration	48 m	Cost	7.19 M€	Funding	5.3 M €
Summary	<p>Conventional analytical methods often require a large sample volume and complicated time-consuming protocols. The objective of this project is to develop ultra low cost laboratories on chips (LOC) without penalisation in time response, sensitivity or simplicity of use. The user will obtain the test results using a very popular interface (a smartphone) and a set of Labcards and Skin Patches where the sample preparation and detection take place.</p> <p>The project will validate the Labcard in three applications:</p> <ul style="list-style-type: none"> <li>(i) climate prediction by sea CO2 absorption through algae detection,</li> <li>(ii) Salmonella and Campylobacter typing in slaughter houses and farms and</li> <li>(iii) Colorectal Cancer monitoring using blood; and the Band Patch in Cocaine consume in professional drivers through sweat.</li> </ul>						
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Assessment			
Project type	Applied research	No. industrial partners	4/13
Food Sector	meat	MST Technology	Microfluidics, Lab-on a chip (LOC)
Fully MST for Food? (core, main, potential)	main application to food safety	Follow-up project?	No

12	Project Description						
Programme	FP7- ICT-2007.3.6 Micro/Nanosystems				Reference	224205-STREP	
Acronym	MICROFLUID			Web site	http://www.ifn.cnr.it/microfluid/index.html		
Title	Micro-fabrication of polymeric lab-on-a-chip by ultrafast lasers with integrated optical detection						
Start date	2008-06-01	Duration	36 m	Cost	4.49 M euro	Funding	3.2 M euro
Summary	Lab-on-chips (LOCs) are microsystems capable of manipulating small (micro to nanoliters) amounts of fluids in microfluidic channels with dimensions of tens to hundreds of micrometers: they have a huge application potential in many diverse fields, ranging from basic science (genomics and proteomics), to chemical synthesis and drug development, point-of-care medical analysis, food and environmental monitoring.						
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Assessment							
Project type	Applied research		No. industrial partners		1/9		

Food Sector	Not specific	MST Technology	Microfluidics
Fully MST for Food? (core, main, potential)	Potential applic. to food safety/quality	Follow-up project?	No

13	Project Description						
Programme	FP6- NMP-2004-IST-NMP-2 Bio-sensors for Diagnosis and Healthcare			Reference	16727- IP		
Acronym	OPTOLABCARD		Web site	www.optolabcard.eu/			
Title	Laboratory skin patches and smartcards based on foils and compatible with a smart-phone						
Start date	2005-09-01	Duration	36 m	Cost	2 975 502 €	Funding	1 649 901 €
Summary	The emergence of new pathogens or variations has created recently severe threats to human health (E.coli O157:H7, SARS, the avian-flu disease). The gravity of the problem resides on the fact that their impact and spreading is growing dramatically due to the ongoing increase in worldwide human mobility in combination with trade in livestock, and food products.						
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Assessment							
Project type	Applied research		No. industrial partners	3/9			
Food Sector	meat		MST Technology	Microfluidics, Lab-on a chip (LOC), optical biosensors			
Fully MST for Food? (core, main, potential)	main application to food safety		Follow-up project?	Yes (Lab on foil)			

14	Project Description						
Programme	FP6-IST-2003-2.3.1.2 Micro and nano-systems			Reference	508773-IP		
Acronym	GOODFOOD		Web site	www.goodfood-project.org			
Title	Food safety and quality monitoring with microsystems						
Start date	01/01/2004	Duration	42 m	Cost	18 M €	Funding	10.5 M€

<b>Summary</b>	<p>GoodFood aims at developing the new generation of analytical methods based on Micro and Nanotechnology (MST and MNT) solutions for the full safety and quality assurance along the complete food chain in the agrofood industry. Current and future concerns related to agrofood safety and quality will increasingly require a multidisciplinary and universal approach based on the massive use of simple detection systems able to be used "near to the foodstuff". Nowadays the technology used to assess food safety and quality relies in lab solutions that are bulky, costly, punctual and time consuming. On the contrary, GoodFood approach will comply, through the development of innovative MST solutions, with the needs of ubiquity, low cost and low power, fast response, simple use and fully interconnection to the decisional bodies. A multidisciplinary integration of know how and technology is required for addressing the broad requirements of the agrofood field. An Integrated Project is proposed to keep such a global view. The Project aims at the vertical integration of Micro and Nano Technologies from the land to the market. The main demands identified by the agrofood sector will be the applications that will drive the technological developments within GoodFood. The proposed solutions are integrated under an Ambient Intelligence approach, which will allow fully interconnection and communication of multisensing systems. Good Food vision is 'to bring the lab to the foodstuff'.</p>
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<b>Assessment</b>			
<b>Project type</b>	Applied research	<b>No. industrial partners</b>	11/29
<b>Food Sector</b>	Dairy, Fruit and Fish	<b>MST Technology</b>	Physical, Chemical and Biosensors, Microfluidics, RFID, WSN
<b>Fully MST for Food? (core, main, potential)</b>	Core application to food safety/quality	<b>Follow-up project?</b>	No

15	<b>Project Description</b>						
<b>Programme</b>	FP7-KBBE-2010-4.3.2-04 Innovative aquatic biosensors			<b>Reference</b>	265721-SMALL		
<b>Acronym</b>	RADAR		<b>Web site</b>	<a href="http://www.fp7-radar.eu/">http://www.fp7-radar.eu/</a>			
<b>Title</b>	Rationally Designed Aquatic Receptors integrated in label-free biosensor platforms for remote surveillance of toxins and pollutants						
<b>Start date</b>	2011-01-01	<b>Duration</b>	48 m	<b>Cost</b>	3.9 M euro	<b>Funding</b>	2,93 M euro
<b>Summary</b>	<p>RADAR aims to develop a robust, sensitive, and versatile label-free, biosensor platform for spot measurements and on-line monitoring of toxins and pollutants in food production processes and in the aquatic environment.</p> <p>The integration of the label-free detection sensors with an on-line automated sample handling and a wireless communication system will yield a best-in-class biosensor platform for robust, specific and sensitive detection of EDCs and PAHs in difficult operating conditions.</p>						
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Project type	Applied research	No. industrial partners	2/7
Food Sector	Dairy, Beverages	MST Technology	Biosensor, WSN
Fully MST for Food? (core, main, potential)	Core application to food safety/quality	Follow-up project?	No

16	<b>Project Description</b>						
Programme	FP7-KBBE-2009-3-6-02 Nanobiotechnology: functionalised membranes			Reference	244967-SMALL		
Acronym	MEM-S		Web site	<a href="http://www.eu-mem-s.de/">http://www.eu-mem-s.de/</a>			
Title	Bottom-up design and fabrication of industrial bio-inorganic nano-porous membranes with novel functionalities based on principles of protein self-assembly and biomineralization						
Start date	2010-01-01	Duration	36 m	Cost	3.65 M €	Funding	2.82 M €
Summary	<p>The goal of this project is to design and fabricate - based on molecular biology inspired approaches - nano-porous bio-inorganic membranes with novel functionalities for industrial application.</p> <p>The new technique will be exploited by three research-based SMEs and the end user involved in the project, in microfluidics based sample processing and micro-array development, in industrial nanosieves, as well as in sensors in drinking water systems.</p>						
<b>Coordinator</b>							
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<b>Assessment</b>							
Project type	Applied research	No. industrial partners	2/8				

Food Sector	Dairy, Beverages	MST Technology	MEMS membranes
Fully MST for Food? (core, main, potential)	Core application to food safety/quality	Follow-up project?	No

17		Project Description					
Programme	FP7-KBBE-2008-2-3-01 Exploring the micro-structure of foods	Reference	226783				
Acronym	INSIDEFood	Web site	www.insidefood.eu/				
Title	Integrated sensing and imaging devices for designing, monitoring and controlling microstructure of foods						
Start date	2009-05-01	Duration	48 m	Cost	3.84 M €	Funding	2.83 M €
Summary	<p>The main S&amp;T objective of InsideFood is to provide technological solutions for sensing the microstructure of foods. The project will develop and combine X-ray nano- and microtomography, nuclear magnetic resonance spectroscopy, magnetic resonance imaging, optical coherence tomography, acoustic emission and time- and space-resolved reflectance spectroscopy.</p> <p>The research is aimed to bring closer to the market on-line sensors for microstructure analysis and to provide tools for process design and optimization.</p>						
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Assessment							
Project type	Applied research	No. industrial partners		4/12			
Food Sector	Generic	MST Technology		Physical Sensors &			

			Systems
Fully MST for Food? (core, main, potential)	Core application to food safety/quality	Follow-up project?	No

18	Project Description						
Programme	FP7-KBBE-2007-2-3-04 Nano-devices for quality assurance, food safety and product properties			Reference	211906- SMALL		
Acronym	NANODETECT		Web site	https://secure.fera.defra.gov.uk/nanodetect/			
Title	Development of nanosensors for the detection of quality parameters along the food chain						
Start date	2008-09-01	Duration	36 m	Cost	2.67 M €	Funding	2.11 M €
Summary	In NANODETECT, the nanoreaction technology will be used to develop on-line and off-line monitoring systems (sensors) which combine the expertise of sensitive molecular biological processes with the potency of nanotechnology for application in liquid process food streams. The nanosensors will interact with information technology tools and thus contribute to improved quality control systems within small and large industries.						
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Assessment							
Project type	Applied research	No. industrial partners		4/9			
Food Sector	Generic	MST Technology		Physical Sensors & Systems			
Fully MST for Food? (core, main, potential)	Core application to food safety/quality	Follow-up project?		No			

19	Project Description						
Programme	FP6-FOOD-2003-T5.1 New approaches towards monitoring and preventing chemical contaminants in food products				Reference	6988- IP	
Acronym	BIOCOP			Web site	www.biocop.org/		
Title	New Technologies to Screen Multiple Chemical Contaminants in Foods:						
Start date	2005-01-01	Duration	69 m	Cost	13.73 M €	Funding	9.62 M €
Summary	<p>Chemical contaminant monitoring in foodstuffs is a highly important and complex issue. A huge investment in time and effort is placed on these activities by regulatory and industrial laboratories. As demands from consumers and regulators grow to improve the quality and safety of food the need for improved technologies has never been greater. The Biocop proposal has been constructed to supply regulators, consumers and industry with long-term solutions to the complex problems associated with chemical contaminants. A range of new technologies such as transcriptomics, proteomics and biosensors will be utilised within the project. These new approaches are based on measuring effect rather than on measuring single target compound concentrations. The biomarker and fingerprinting concept is key to this strategy. Substantial advances in sample preparation will be achieved using novel procedures such as aptamers, microwave assisted extraction and pressurised liquid extraction.</p>						
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Project type	Applied research	No. industrial partners	
Food Sector	Generic	MST Technology	Biosensors & Systems
Fully MST for Food? (core, main, potential)	Main application to food safety	Follow-up project?	No

20	Project Description		
Programme	FP6-FOOD-2004-T0 Realising ERA objectives - Promotion of SME participation - Stimulating international co-operation - Linking with Candidate Countries - Supporting policy	Reference	43136- SSA

	development - Stimulating exploitation.				
Acronym	BIODET		Web site	www.biodet.eu/	
Title	Networking in the application of biosensors to pesticide detection in fruits and vegetables				
Start date	2006-11-01	Duration	24m	Cost	446781 EURO
				Funding	446781 EURO
Summary	<p>Fresh fruit and vegetables may be harmful due to the presence of pesticide wastes, whose ingestion is the source of a number of diseases (Pesticide Action Network UK, Briefing 3, December 2005). Consequently, European countries have defined the Maximum Residue Limits (MRLs) permitted for a wide range of pesticide-product combinations. Additionally, Regulation (EC) 396/2005 has established the need to harmonise Community provisions concerning MRLs in/on food and feed of plant origin. So far, agrofood SMEs have outsourced MRL controls, which has proved to be a time and money consuming process. Biosensor-based systems represent an alternative to perform those quantitative measurements of pesticides in a fast, automatic, cost-effective manner.</p> <p>The overall objective of this proposal is to reach the highest level of consumer health protection by stimulating the transference of research breakthroughs in biosensors to potential end users (administration, agrofood traders and machinery manufacturers), while accomplishing current legislation. In order to achieve this objective, BIODET will study SME requirements in order to carry out this type of on-site MRL controls within their quality control process. Afterwards, the product data and market requirement data will be analysed. Finally, the conclusions drawn from this analysis will establish the basis to assemble and disseminate future strategies among key stakeholders.</p>				
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<b>Assessment</b>					
Project type	Applied research		No. industrial partners	2/5	
Food Sector	Fruits & Vegetables		MST Technology	Biosensors	
Fully MST for Food? (core, main, potential)	Core application to food safety		Follow-up project?	No	

21	<b>Project Description</b>			
Programme	FP6-FOOD-2003-T5.3 Development of cost-effective tools for risk management and traceability systems for zoonotic agents and marine biotoxins in seafood		Reference	513967-SMALL
Acronym	BIOTOXMARIN		Web site	http://www.biotoxmarin.de
Title	Development of novel analytic tools for the detection of marine biotoxins			

<b>Start date</b>	2005-01-01	<b>Duration</b>	36 m	<b>Cost</b>	2.02 M€	<b>Funding</b>	1.33 M€
<b>Summary</b>	<p>The contamination of seafood with algal toxins can cause severe neuronal and gastrointestinal disorders but also allergies in human. Sporadic outbreaks of poisoning by ingestion of shellfish which have accumulated marine biotoxins have become a world-wide problem. The economic consequences caused by the production of marine biotoxins during algal blooms in the coastal regions are enormous. In this project, fast, simple and cost-effective detection methods for marine biotoxins in seafood as well as patient sera will be developed, based on the application of high-affinity capture antibodies and novel artificial receptor mimics against the toxins. The applicants already succeeded in raising antibodies against okadaic acid, a diarrhetic shellfish poisoning (DSP) toxin. This promising strategy will now be extended to other groups of relevant toxins causing paralytic shellfish poisoning (PSP), neurotoxic shellfish poisoning (NSP) or amnesic shellfish poisoning (ASP). The new tools for the detection (and quantification) of marine biotoxins developed in the proposed project are based on the application of the new Polymer Instruction technology and the highly sensitive Integrated Optical Grating Coupler (IOGC) biosensor technology, and the use of high-affinity antibodies.</p>						
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<b>Assessment</b>							
<b>Project type</b>	Applied research	<b>No. industrial partners</b>	5/8				
<b>Food Sector</b>	Fruits & Vegetables	<b>MST Technology</b>	Biosensors				
<b>Fully MST for Food? (core, main, potential)</b>	Core application to food safety	<b>Follow-up project?</b>	No				

22	<b>Project Description</b>						
<b>Programme</b>	FP6-2005-FOOD				<b>Reference</b>	036300-IP	
<b>Acronym</b>	TRACEBACK		<b>Web site</b>	www.traceback-ip.eu			
<b>Title</b>	Integrated system for a reliable traceability of food supply chains						
<b>Start date</b>	2007-01-01	<b>Duration</b>	48 m	<b>Cost</b>	15.5 M€	<b>Funding</b>	9.7M €
<b>Summary</b>	<p>The main objective of the TRACEBACK project is to develop a well functioning generic system for traceability and information handling within food chains. The project deals</p>						

	<p>with traceability along entire food chains, and is divided into a number of different work packages covering different aspects of traceability. Some of the most important objectives are summarised below: A) Analysing and defining the food chains and identifying weak and sensitive points in the chains where there are risks for contamination or loss in quality of the final product. B) Development of sensors and devices for sensing technique for monitoring, identifying and avoiding specific contamination or situations that might cause damage and loss of quality in food chains. C) The development of a system for compiling and handling information generated from the sensors used in the food chain. D) Teaching and training of potential users of the devices and the information system. E) Economic assessment of the feasibility of traceability technique in commercial situations.</p> <p>Pilot testing of the traceability system in commercial companies constituting whole food chains. F) Creating an industrial platform for communicating results from the project directly to the industry. The platform is also meant to stimulate industrial implementation, innovation and feedback concerning traceability.</p>				
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<b>Assessment</b>			
Project type	Applied research	No. industrial partners	14/28
Food Sector	All sectors	MST Technology	Sensors and RFID
Fully MST for Food? (core, main, potential)	Core application to food traceability	Follow-up project?	No

23	<b>Project Description</b>						
Programme	FP7- NMP-2008-1.1-1 Converging sciences and technologies (nano, bio, info and/or cogni)				Reference	228685- Small	
Acronym	BOND			Web site	www.bondproject.org/		
Title	Bioelectronic Olfactory Neuron Device						
Start date	2009-10-01	Duration	36 m	Cost	3.39 M €	Funding	2.6 M €
Summary	<p>The present project proposes a new bioelectronic nose based on olfactory receptors in order to mimic the animal nose. For this aim, micro/nano, bio and information technologies will converge to develop an integrated bioelectronic analytical nanoplatform based on olfactory receptors for odour detection. Briefly, the basis of the nanobioplatform will be the olfactory receptors, prepared in the form of nanosomes immobilized onto the nanotransducers (NANO and BIO).</p> <p>Recently, the use of smell in different fields has been rediscovered due to major advances in odour sensing technology and artificial intelligence. However, current electronic noses, based on electronic sensors, have significant limitations concerning sensitivity, reliability and selectivity, amongst others. These limitations are at the basis of recurrent troubles of this technology to reach essential applications in different areas, such as food safety, diagnosis, security, environment.</p>						
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Project type	Applied research	No. industrial partners	1/8		
Food Sector	Generic Project	MST Technology	Biosensors, e-noses		
Fully MST for Food? (core, main, potential)	Main application to food safety	Follow-up project?	No		

24	<b>Project Description</b>						
Programme	FP6 - SME Horizontal research activities involving SMEs				Reference	513073	
Acronym	SENBK			Web site			
Title	Development of a Multisensor for the Supervision of Durable Bakery Products						
Start date	2004-09-03	Duration	24 m	Cost	546.810 €	Funding	283.304 €
Summary	<p>During the production of durable baked goods (hard biscuits, crackers, crisp bread, rusk, ice-cream waffles, etc) and after baking, it is necessary to supervise certain product parameters in well-defined periods of time in order to ensure that the products fulfil the required quality and appearance standards (weight, moisture, physical dimensions, colour). Nowadays, in craft bakeries, the product samples are taken manually from the production line by the operators and then inspected. This inspection consists in most cases just on moisture determination and on the measurement of the product physical dimensions. These parameters are then used to determine the conformance of the product. The determination of the colour, a very important attribute for the consumer, if determined, is done visually. These methods are therefore subjective and not precise enough. The use of more accurate techniques is usually limited to large companies due in one hand to the high costs of more complex and precise devices and in the other hand due to the lack of skilled personnel able to use them. There is an evident need for the development of low cost, user-friendly instrument suitable for at-line use by small and medium size bakeries. The aim of the proposed project is to develop a modular sensor inspection system - SENBAK - for the continuous and automatic supervision of the quality parameters of durable baked goods in production lines. The development of the SENBAK system will be oriented for its use in small and medium size enterprises, in order to provide them with an easy to use and precise tool for product quality control. The SENBAK system will be a low cost system, rugged, simple, able to withstand the harsh condition in bakeries and to make automatic, fast and accurate quality inspection of durable baked goods.</p>						
<b>Coordinator</b>							

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<b>Assessment</b>					
Project type	Research for SMEs	No. industrial partners		6/7	
Food Sector	Fruits & Vegetables	MST Technology		Optical Sensors	
Fully MST for Food? (core, main, potential)	Core application to food quality	Follow-up project?		No	

25	<b>Project Description</b>						
Programme	FP6 - SME-1 Co-operative Research			Reference	17969		
Acronym	BUGCHECK		Web site	<a href="http://cric-projects.com/front/index.jsp?idProject=4">http://cric-projects.com/front/index.jsp?idProject=4</a>			
Title	A Rapid Hand-Held Analyser for Control of Microorganisms in the Complete Meat Supply Chain						
Start date	2005-09-01	Duration	30 m	Cost	1.61 M €	Funding	0,92 M €
Summary	<p>Foodborne pathogens in processed ready-to-eat products pose a serious threat to consumers with compromised immune system. Sensitive, specific and rapid detection of such pathogens is thus essential at production level to prevent their entrance into the human food chain. Conventional microbiological detection methods simply take too long (2 to 7 days) to detect and identify pathogens in food and no real time data is available. Other traditional testing methods, such as ELISA, are also relatively costly and time-consuming. Traditional methods require taking of a product sample and its posterior culturing until sufficient microorganisms have been generated to enable ready detection on culture plates. There is a clear need for a rapid, handheld, easy to use and cost effective microbiological analyser which is tailored and well suited to the needs of the meat industry to enable its use on the processing floor thus allowing rapid process control testing. A biosensor based approach presents a promising and sensitive alternative tool for the detection of low numbers of cells in a question of minutes (with no need for enrichment steps) as opposed to days.</p>						
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Assessment			
Project type	Applied research	No. industrial partners	12/14
Food Sector	Meat mainly	MST Technology	Biosensors
Fully MST for Food? (core, main, potential)	Core application to food safety	Follow-up project?	No

26		Project Description			
Programme	EUREKA- CATRENE Cluster	Reference	CT 204		
Acronym	PASTEUR	Web site			
Title	Perishable Management through Smart Tracking of Lifetime and Quality with RFID				
Start date	2009/07/01	Duration	36 m	Cost	Funding
Summary	This project aims at exploring and developing RFID-based sensor platform technology, which will be demonstrated in an intelligent package monitoring the environmental conditions of perishable goods in the supply chain between production and consumer and therefore guaranteeing a more effectively product's quality. The PASTEUR project thereby addresses the need to increase on-line knowledge on the traceability of individual products and the demand to increase the accessibility of the information about these products for the consumer end-user. Key differentiators in the technologies to be developed are ultra-low power and extreme low cost.				
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Project type	Industrial Research	No. industrial partners	20/27
Food Sector	Not specific	MST Technology	Chemical and Bio sensors, RFID, WSN
Fully MST for Food? (core, main, potential)	Core application to food safety and traceability	Follow-up project?	No

27	Project Description						
Programme	EUREKA				Reference	E! 5867	
Acronym	RFID Sensor Label			Web site			
Title	UHF RFID Battery Assisted Semi Passive Sensor Label						
Start date	01-Dec-2010	Duration	24 m	Cost	0.88 M €	Funding	
Summary	The objective is to develop low cost multiple usage UHF Battery Assisted Passive RFID Sensor Labels for tracking and controlling of environment sensitive products such as fresh food, frozen food and medical supplies.						
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Assessment							
Project type	Industrial Research		No. industrial partners	2/2			
Food Sector	All		MST Technology	Physical and chemical sensors, RFID			
Fully MST for Food? (core, main, potential)	Core application to food safety		Follow-up project?	No			

28	Project Description						
Programme	EUREKA				Reference	E! 4961	
Acronym	M-FRESH-SENS			Web site			
Title	Fresh Meat Optical Detection						
Start date	31-Aug-2009	Duration	36 m	Cost	0.9 M €	Funding	
Summary	To produce an optical sensor that will determine the freshness of the packaged meat product. The M-FRESH-SENS sensor will represent a new product on the market that will significantly reduce the return flow of products just before the expiration date.						
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Assessment							
Project type	Industrial research		No. industrial partners	3/4			
Food Sector	Meat		MST Technology	Optical sensors			
Fully MST for Food? (core, main, potential)	Core application to food safety		Follow-up project?	No			

29	Project Description					
Programme	EUREKA			Reference	E ! 2476	
Acronym	MICROTARGETS		Web site			
Title	DNA Chip Technologies for Food and Environmental Controls (GMOs, Plants, Animal Species and Micro-Organisms)					
Start date	13/02/2001	Duration	36 m	Cost	4.85 M€	Funding
Summary	To produce an optical sensor that will determine the freshness of the packaged meat product. The M-FRESH-SENS sensor will represent a new product on the market that will significantly reduce the return flow of products just before the expiration date.					
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Assessment						
Project type	Industrial research		No. industrial partners	2/5		
Food Sector	Raw materials		MST Technology	Biosensors, DNA chips		
Fully MST for Food? (core, main, potential)	Core application to food safety/quality		Follow-up project?	No		

30	Project Description					
Programme	Innovation for Welfare Programme. INTERREG programme co-funded by the European Union through the European Regional Development Fund			Reference		
Acronym	FoBos		Web site	<a href="http://www.innovation4welfare.eu/297/subprojects/fobos.html">http://www.innovation4welfare.eu/297/subprojects/fobos.html</a>		
Title	Sharing Molecular Techniques for Food-borne Detection					
Start date	01/01/2007	Duration	36m	Cost		Funding
Summary	FoBoS, coordinated by the University of Milan and developed in the food thematic area, aims to address the improvement of the quality of life by developing and implementing a good practice for foodborne pathogen early detection. The main objective is to analyze, implement and transfer a DNA-array based protocol in order to improve the effectiveness of regional food safety policies. A DNA chip is used for this purpose.					
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Project type	Industrial research	No. industrial partners	5/8
Food Sector	Dairy	MST Technology	Biosensors, DNA chips
Fully MST for Food? (core, main, potential)	Potential application to food safety. Project more on protocols	Follow-up project?	No

31	Project Description					
Programme	ERA-NET MNT			Reference	7-035/2011	
Acronym	PESTIPLAT		Web site			
Title	Integrated Platform for Pesticides Detection					
Start date	01/11/2010	Duration	36 m	Cost	1,005,725 €	Funding
Summary	<p>The platform for pesticides detection to be used in food security monitoring (fruits, vegetables, drinking water, milk etc.) and agriculture research laboratories will be a user friendly tool able to perform measurements in 10 minutes time, to diagnose the pesticide presence, to alert and to record data for monitoring and statistical purposes, addressing important issues within the food security.</p> <p>The project's main objective consists in developing the platform for pesticides detection, including four identical modules each of them containing the following compounds: biosensor, temperature and pH sensors, microfluidic module, fluids delivery control, heating system, computer interface and data acquisition of the sensors network.</p>					
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<b>Assessment</b>			
Project type	Applied research	No. industrial partners	2/4
Food Sector	Fruits & Vegetables, beverages, dairy	MST Technology	Biosensors, Physical sensors, microfluidics
Fully MST for Food? (core, main, potential)	Core application to food safety	Follow-up project?	No

## Other European Programmes

In addition to the programmes studied at European level, there are other organizations and agencies that are also related at least at promoting the use of the MST technologies and spreading their use in the food sector. They are mainly the two sectorial European Technological Platforms: Food for Life (<http://etp.ciaa.be>) and EPoSS (<http://www.smart-systems-integration.org>) on Smart Systems. Their member list may be also a source of research activity, companies and institutions involved in European research projects. However, none of the ETPs have set up any specific working group on MST for food, and thus, in principle, all the active partners in the field are already identified in the respective projects already found.

The High Tech Europa Network of Excellence (<http://www.hightecheurope.eu/the-project.html>) is another support organization that deals with networking for the integration of novel technologies for food processing. No list of projects specific on MST for food is provided, despite the website is also of interest.

## Conclusions from the European Projects search:

A few conclusions follow after a first analysis of the information obtained from the European projects identified. A deeper technological insight is to be done in D2.1.

- A small amount of projects related to *MST for Food* have been found in the main EC programmes of FP6 and FP7, in Eureka and also in other satellite programmes.
- Most of the projects were found in applied technologies focused programmes (mainly from the European Commission).
- Fewer and smaller projects, more industrially focused, have been found in Eureka Programme and Catrene Cluster. In some other industrial programmes (Euripides, Eurostars, CIP...) no projects have been found, despite Food and Environment are topics covered (not specifically) in these MST programmes
- In most of the projects, the industrial component is low, especially in the projects of FP6 and FP7. Nearly all projects are managed by R&D institutions and not by SMES or large companies. Industrial leadership only happened in Eureka projects.
- Most of the EC projects identified in relation with *MST for food* do not have food as main application, but rather as a collateral potential application (they are

mostly focused in health issues). GoodFood in ICT was a project fully dedicated to food as the only target.

- Most of the projects are not specific for a given food chain. However, in those projects that specify a food chain, Fruit&Vegetables, Meat and Dairy are the main sectors addressed.
- Biosensors, Microfluidics and RFIDs are the technologies more studied and developed in the projects identified. Also Flexible Electronics and Physical and Chemical Sensors have been considered.
- Coordinators and partners are spread in many countries across Europe (Coordinators come from 10 countries while there are partners from 17 countries in the identified projects). However, it is clear that there are some countries (not only in the Mediterranean area), such as Germany and UK, in which the R&D activity in the field is more important.
- The No. of STREP projects is much larger than of Integrated or Large Projects, which means that most of the projects only try to solve a specific and small problem with a specific technology, but do not try to create broad technological platforms to some more generic problems.
- Only one project (Lab-on-foil) may be considered as a follow-up of another one (Optolabcard) and Ikerlan is the only institution that repeats twice with the role of coordinator. However, in both cases food applications is not the main target. This means that despite there has been some funding interest for the Food sector a complete strategy of funding ideas from the basic research to the demonstration phase does not exist.

In conclusion, from the small amount of research funded at European level in the past decade, we can see that there is a need of cross cooperation between institutions and programmes to ensure a better support to the research in a field of such importance for the consumers.

### 3.2 National Research projects

The main projects on MST for food production applications identified in the different countries studied are summarized in this section in table format.

As already stated, only developments and applications based on microsystems or MST in the food production area are listed.

The information at country level has been much more difficult to obtain, because the quality and quantity of information available in official websites is very poor. Additionally, the difficulty of processing that information has been also dependent on the language of origin, and thus on the capability of using national contacts for helping on that search.

In spite of the difficulties, and although probably incomplete, the obtained information is considered indicative enough and useful to identify trends such as main countries, main actors and food sectors of interest, etc.

It can be seen from the gathered information that dairy, fruits&vegetables, beverages and meat are the main food sectors addressed. From the point of view of the technologies developed, biosensors, e-noses, e-tongues, RFIDs and flexible electronics are usually studied together with microfluidics and MEMS microsieves.

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
Argentina	DCI-ALA/2009/021-953 <sup>1</sup>	Foster SMEs from the Andes. Transformation of traditional industries four focal points: Agro-food, metal-mechanics and electronics industries to knowledge-intensive SMEs get better competitiveness and more employment. Includes Food.	2009 -2012 19,8 M Euros	Generic	Generic Programme	Generic Programme	Programme for improving competitiveness
Austria	Consens: Contactless (RFID) Sensing Project.	The MEMS part aims at passive sensing elements for monitoring the transport chain of food	24M	Generic	Logistics and Traceability	RFID with sensors	Industrial
Austria	Foundations and Applications of Miniaturized Rheometers <sup>2</sup>	Micro-fabrication technologies and in particular microsystems technology (MST) with potential application to food production		Generic	Food production quality and safety.	Generic	Basic research
Belgium	BioFlex <sup>3</sup>	New form of packaging and interconnection of implantable electronics	2005-2009	Generic	Packaging	Flexible electronics	
Belgium	Innovative spectroscopy techniques for tropical fruits in Vietnam <sup>4</sup>	Innovative spatially-resolved spectroscopy techniques for non-destructive internal quality inspection of tropical fruits in Vietnam. Obtaining the structural as well as the compositional information of tropical fruits in Vietnam by applying innovative spatially-resolved spectroscopy techniques		Fruits	Food quality	MEMS	
Canada	Novel Biosensors for Food-Related Applications	A new class of biosensor, one based on variants of DNA that are engineered to sense the presence of specific biological molecules... Such sensors may be not only more sensitive than current ones, they may	2003-2007	Generic	Safety	DNA Biosensors	Basic

<sup>1</sup> [www.comunidadandina.org](http://www.comunidadandina.org)

<sup>2</sup> <http://www.fwf.ac.at/en/abstracts/abstract.asp?L=E&PROJ=L103>

<sup>3</sup> <http://www.cmst.be/projects/bioflex/Welcome.html>

<sup>4</sup> <http://www.biw.kuleuven.be/biosyst/mebios/biophotonics/projects>

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
		be small enough to be implanted in situ in food products.					
<b>Czech Republic</b>	Research and development of sensor system for determination of diacetyl in beer <sup>5</sup>	a/ technology optimization of sensor elements based on porous silicon, b/ development of applicable molecular, polymer or biological systems with molecular recognition properties for selective detection of vicinal diketones, c/ development of methods for effective functionalization of silicon nanocrystals in porous silicon with molecular recognition systems developed ad c/. d/ development of methods for determination of diacetyl content by means of optical sensor based on functionalized porous silicon. e/ implementation of measuring equipment for determination of diacetyl content in beer.	2011-13	Beverages	Safety	Chemical sensors, e-nose	Applied
<b>Czech Republic</b>	Technologies for routine measurement of meat quality parameters and controlled process of meat maturation.	On the base of applied research, the aim of the project is to develop and prove technologies for routine controlling of chemical, nutritional, sensoric and technological quality of meat and technologies for optimal maturation of meat	2011-2014	Meat	Quality	Physical, chemical and Bio sensors	Applied
<b>Czech Republic</b>	Optical biosensor system for the	Development of the system and technology for quick determination of antibiotics in raw milk based on	2008 -2010	Dairy	Safety	Optical Biosensors	Applied

<sup>5</sup> <http://www.isvav.cz/projectDetail.do?rowId=TA01011363>

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
	detection of antibiotics in milk <sup>6</sup>	immobilized enzymes and an optical sensor					
<b>Czech Republic</b>	Optical biosensor system for the detection of antibiotics <sup>7</sup>	Development and testing of a laboratory prototype for an optical biosensor system for the detection of antibiotics in milk	2011	Dairy	Safety	Biosensors	Basic
<b>Germany</b>	The intelligent container: Linked intelligent objects in logistics <sup>8</sup>	The 'Intelligent Container' stands for novel transport systems with the ability to measure, analyze and to intervene during transports by truck, rail, ship or plane. The focuses of the applications are transports of foods which are sensitive to ambience parameter. The new approaches have the goal to reduce losses caused by spoilage of transported goods. This will lead to additional values for the affected companies, generate more food safety for consumers and reduce pollution.	2010-2013	Generic	Logistics	Physical and Gas Sensors and WSN	Applied and Industrial
<b>Germany</b>	Food chain management <sup>9</sup>	Maintaining the joy of eating: Safe and high-quality food is becoming more and more important to consumers, making it an existential factor in competition among manufacturers and retailers. Existing analysis technology, however, is not		Fruit, meat	Quality and Safety	ICT, Physical Sensors	

<sup>6</sup>

<https://www.etis.ee/portaal/projektiAndmed.aspx?RadioButton3=False&RadioButton2=False&RadioButton1=True&TextBoxSearchByCategory=optilise%20anduriga&lang=et&FromUrl0=projektiInfo.aspx>

<sup>7</sup>

<https://www.etis.ee/portaal/projektiAndmed.aspx?RadioButton3=False&RadioButton2=False&RadioButton1=True&TextBoxSearchByCategory=optilise%20anduriga&lang=et&FromUrl0=projektiInfo.aspx>

<sup>8</sup> <http://www.intelligentcontainer.com/en/home.html>

<sup>9</sup> <http://www.mikroelektronik.fraunhofer.de/en/press-media/microelectronics-news/article/food-chain-management-maintaining-the-joy-of-eating.html>

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
		in widespread use. The aim of the Food Chain Management research project is, therefore, to create an IT system that will provide information on requirements and potential technology for use in the food chain.					
Germany	LocoChrom	Low Cost Gas Chromatography using sensor arrays for rapid test methods for food		Generic	Quality and Safety	Gas sensors, microchromatographers	
Germany	AnALyT Automated on-site pathogen analysis for food and drinking water <sup>10</sup>	Development of a microfluidic device for fast and automated pathogen detection in food or drinking water.		Meat and beverages	Safety	Biosensors microfluidics	applied
Germany	Spatial temperature profiling by semi-passive RFID loggers for perishable food transportation <sup>11</sup>	To study and identify the most suitable implementation for the monitoring of refrigerated transport of perishable goods by means of RFID, in order to analyze the transport chain and detect weaknesses		Fish	Quality	RFID, sensors	applied
Ireland	Food e-nose <sup>12</sup>	Handheld Intelligent Food Safety Control Instrument using Electronic Nose Sensors	2002-2004	Generic	Safety	Chemical sensors. e-nose	Commercialisation project
Ireland	relayresearch <sup>13</sup>	Manufacture, application and assessment of smart packaging concepts consisting of novel nanoparticle and gas sensor technologies in conventional food packaging systems	2008-2012	Packaging	Quality in Packaging	Gas sensors	FIRM funded project

<sup>10</sup> [http://www.imtek.de/anwendungen/index\\_en.php](http://www.imtek.de/anwendungen/index_en.php)

<sup>11</sup> <http://www.sciencedirect.com/science/article/pii/S0168169908001993>

<sup>12</sup> <http://www2.ul.ie/pdf/752560031.pdf>

<sup>13</sup> [www.relayresearch.ie](http://www.relayresearch.ie)

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
Ireland	relayresearch <sup>14</sup>	New analytical systems for quality and safety assessment of packaged foods based on optical oxygen sensing	2006-2009	Packaging	Quality and Safety	Chemical sensors	FIRM funded project
Italy	NASO-LAT	Development of a semiconductor thin films based Electronic Nose for the quality control of dairy products		Dairy	Quality	Chemical sensors. E-nose	
Italy	DAMA I	Close cycle productive system for the manufacturing of cheese	2001-2004	Dairy	Production	Bio-sensors	
Italy	DAMA II	Automatic systems for the selection and manipulation of fruit at high level of maturation	2001-2004	Fruit	Quality	Chemical sensors. E-nose	
Italy	MINICONTAL	Development of innovative miniaturised devices for food control	2003-2007				
Italy	SINSIAF	Modelling of an Integrated System for managing of food security in the chain of wheat	2003-2007				
Italy	SmartLabels <sup>15</sup>	Innovative integrated microelectronic systems and management systems to track food products	2007-2011		Logistics	RFID with sensors	
Italy	Development of innovative miniaturized devices for control of food <sup>16</sup>	An analytical approach to the recognition of volatile chemical species through	2005-2006	Wine	Quality	Gas sensors e-nose	Industrial
Italy	Innovative Integrated Microelectronic	The goal of this research activity is the implementation of microelectronic systems and management systems for the tracing of food products,		Generic	Logistics	ICT And physical sensors	Applied

<sup>14</sup> [www.relayresearch.ie](http://www.relayresearch.ie)

<sup>15</sup> <http://ims.unipv.it/SmartLabels/>

<sup>16</sup> <http://www.optel.it/ita/laboratorio/attivita.html>

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
	Systems and Management Systems to Track Food Products <sup>17</sup>	through the use of low-cost miniaturized devices and tracking/tracing systems					
Japan	Food Nanotechnology Project	Development of Nanotechnology and Materials for Innovative Utilizations of Biological Functions''	2002-2007	Generic	Safety	Nanomaterials, Biosensors	Basic
Japan	Food Nanotechnology Project <sup>18</sup>	Development of food processing and evaluation technologies at nanometer scale	2007-2012	Generic	Food Processing	Sensors	Basic
The Netherlands	MicroNed-SMACT-II-B <sup>19</sup>	Micro-Engineering of Supramolecular Assemblies	2004-2010	Generic	Safety		
The Netherlands	MicroNed-SMACT-II-C	Sensing and Diagnostics on a Chip	2004-2010	Generic	Safety		
The Netherlands	MicroNed-SMACT-II-D	Dynamic Micro Fractionation	2004-2010	Dairy	Dairy, Production	MEMS microsieves	
The Netherlands	MicroNed-SMACT-II-H	Emulsification	2004-2010	Dairy	Production	MEMS microsieves	industrial
The Netherlands	e-Nose <sup>20</sup>	Electronic nose for novel foods, biosafety, health & environmental monitoring	2008-2011	Generic	Safety	e-nose	
The Netherlands	NanoNextNL-5A <sup>21</sup>	Food process monitoring and product quality assessment	2010-2015	Generic	Production, Quality		

<sup>17</sup> <http://ims.unipv.it/SmartLabels/>

<sup>18</sup> [http://www.naro.affrc.go.jp/org/nfri/yakudachi/foodnanotech/index\\_e.html](http://www.naro.affrc.go.jp/org/nfri/yakudachi/foodnanotech/index_e.html)

<sup>19</sup> [www.microned.nl/Research/Smact.html](http://www.microned.nl/Research/Smact.html)

<sup>20</sup> [www.biont.wur.nl/UK/IPOP/](http://www.biont.wur.nl/UK/IPOP/)

<sup>21</sup> [www.nanonextnl.nl/themes/food.html](http://www.nanonextnl.nl/themes/food.html)

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
The Netherlands	NanoNextNL-5D	Microdevices for structuring and isolation	2010-2015	Generic	Production, Quality		
The Netherlands	Nano4Vitality <sup>22</sup>	Applications of micro and nanotechnologies in the food and health sector	2006-2011	Generic	Safety		
The Netherlands	Biomimetics <sup>23</sup>	To develop an electronic tongue capable to identify chemical substances in food samples, as well as, taste characteristics quantification and its relation with human responses		Chocolate	Quality	e-nose	applied
Poland	Electrochemical immunosensors <sup>24</sup>	The development of electrochemical immunosensors and genosensors for the detection of Plum Pox Virus (PPV) and Prunus Necrotic Ringspot Virus (PNRSV) in plant materials"	2009-2012	Vegetables	Safety	Biosensors	applied
Poland	Transduction layers <sup>25</sup>	Development of transduction layers for construction of biosensors used in food quality control, medical diagnostics and natural environmental monitoring	2010-2013	Generic	Quality	Biosensors	applied
Portugal	Safefcf. Ptdc/agr-ali/111687/2009 <sup>26</sup>	A novel approach to control pathogen contamination and enhance safety and quality on fresh-cut fruit -.	2009-2011	Fruit	Safety	Biosensors	applied
Portugal	PTDC/AGR-ALI/113953/2009	Microarray-based detection of antibiotic resistance and virulence factors genes of Escherichia coli and salmonella spp. Isolated from food-producing animals and processed food	2009-2011	Meat	Safety	Biosensors	applied
Portugal	PTDC/AGR-ALI/100492/2008	Development of a phage-based product to control salmonella and campylobacter in foodstuffs and food	2008-2010	Production, Meat	Safety	Phage-based product	applied

<sup>22</sup> [www.nano4vitality.nl](http://www.nano4vitality.nl)

<sup>23</sup> <http://www.biw.kuleuven.be/biosyst/mebios/biosensors-home/research-topics/biomimetics.html>

<sup>24</sup> <http://www.biosensors.pan.olsztyn.pl/index.php/grants.html>

<sup>25</sup> <http://www.biosensors.pan.olsztyn.pl/index.php/grants.html>

<sup>26</sup> <http://www.fct.pt/apoios/projectos>

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
	PHAGEFOODSAFE	processing surfaces.					
Portugal	PTDC/AGR-ALI/102803/2008	Electronic Tongue For Food Analysis	2008-2010 €115,480	Generic	Quality	E-tongue Chemical sensors	applied
Portugal	NANO/NMED-SD/0140/2007	Integrated Lab On Chip Platforms For Diagnostics in Health and Food	2007-2009 €129,254	Generic	Safety	Lab-on-Chip	applied
Romania	BIOMICROTECH <sup>27</sup> : Miniaturized biosensor microtechnology for fast detection of contaminations from food	Development of miniaturized biosensors technology integrated in microfluidic chips, for the detection in the ng/L domain of organophosphorus insecticides from food (milk, juices from fruits and vegetables)	2008-2011	Dairy, Fruit Juices, vegetables	Safety	Biosensors Microfluidics.	applied
Romania	IMUNOSENSE <sup>28</sup> : Miniaturized immunosensor arrays technology, for herbicide detection	Development of the technology of the fabrication of immunosensor arrays integrated with optic and electric detection, in the ng/L domain for herbicide in alimentation products and water.	2007-2010	Generic	Safety	Biosensors	
Romania	New piezoelectric sensors based on $\alpha$ -quartz type materials, for safety and quality control food industry <sup>29</sup>	Creating and improving a prototype of the piezoelectric sensor, perceptible to ammonia or organic amines and also the control and monitoring apparatus suitable for food industry.	2007-2010	Generic	Quality and Safety	Biosensors	

<sup>27</sup> <http://www.imt.ro/biomicrotech>

<sup>28</sup> <http://www.imt.ro/imunosense>

<sup>29</sup> [http://www.icmct.uvt.ro/pag\\_web\\_senzali/start.html](http://www.icmct.uvt.ro/pag_web_senzali/start.html)

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
Romania	SCREENFOOD <sup>30</sup> : Bioanalytical system for detection of pesticide residues in complex matrices of food	Development of new techniques based on novel biosensors, among other solutions, for the pesticide detection in food	2007-2010	Generic	Safety	Biosensors	
Romania	PORFSENS: Porphyrins based sensors and microsensors for analysis of pharmaceutical compounds, compounds of clinical importance and food	Eight disposable stochastic dot sensors based on porphyrins and modified diamond or carbon pastes were employed for the assay of ascorbic acid in pharmaceutical, beverages, and biological samples.	2007-2010	Beverages	Safety	Gas Chemical sensors	
Spain	Magneto-plasmonic Nanostructures for High Sensitivity Biosensors.	Study and fabrication of magnetic nano materials with magnetoplasmonic activity and their application in a new biosensor concept with higher sensitivity levels than those currently available. The devices can be used for detecting illegal substances (e.g. the presence of antibiotics in milk, anabolic steroids, etc.).	2005-2008	Dairy	Safety	Biosensors	basic
Spain	BIODET. Networking in the application of biosensors to pesticide detection		2006-2008	Fruit, Vegetables	Safety	Biosensors	industrial

<sup>30</sup> <http://www.chimie.unibuc.ro/cercetare/laborq/SCREENFOOD.pdf>

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
	in fruits and vegetables						
Spain	Rapid and portable methods to microbiological control in food industry.	A biosensor based approach presents a promising and sensitive alternative tool for the detection of low numbers of cells in a question of minutes (with no need for enrichment steps).	2006-2008	Generic	Safety	Biosensors	basic
Spain	Development of a micro-nano-biotechnological platform to realise on-chip integrated microsystems to detect and identify bacteria in strategic industrial sectors.	Biological Microsystems for the detection of several types of microorganisms. This research has been based on the use of nano and micro-technologies allowing the achievement of advanced impedimetric biosensors and opto-biochemical devices, as well as the integration of such sensing tools –using advanced interconnection and encapsulation techniques- in microfluidic platforms.	2006-2008	Generic	Safety, Production	Biosensors, Optical systems, Microfluidics	basic
Spain	Providing milk supply chain with a rapid, portable and cost effective biosensor for multi-pathogen detection in milk.	Development of a multi-pathogen detection equipment and the protocols required for a new health management system in farms.	2006-2008	Dairy	Safety	Biosensors	applied
Spain	Development and demonstration of amperometric immunosensors for the multidetection of veterinary	Development of amperometric immunosensors for the simultaneous multidetection of veterinary antibiotic residues. This investigation will be developed in feedstuff, raw food products (milk, egg and meat) and animal hair.	2009-2011	Dairy, Meat	Safety	Biosensors	applied

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
	antibiotic residues.						
Spain	Development of probes for the construction of a biochip able to detect microbial wine spoilage.	Development of a tool for detection of wine spoilage microorganisms. The technique is based on hybridisation of total DNA, isolated from wine and amplified by PCR, with specific fluorescent probes.	2007-2009	Beverages and Dairy	Quality and Safety	Bosensors	applied
Spain	Development of advanced analysis microsystems by means of micro/nano sensors and optical detectors integration.	Integration of electrochemical biosensors and optical systems of detection using microelectronics technology and lithographic technology on the basis of PDMS (poly dimethylsiloxane).	2007-2010	Wine, Beverages	Quality	E-tongues Optical chemical sensors, biosensors, microfluidics. CNT's	applied
Spain	Implementation of a bioanalytical system with new impedimetric biosensors.	Development of demonstration equipment for biochemical analysis of drugs residues in foodstuff samples with high analytical efficiency in order to improve the safety of food products and that could be integrated onto the full food production.	2009-2011	Generic	Safety	Chemical and biosensors	DDemonstration
Spain	System of sampling and fast detection of Listeria monocytogenes by means of optical biosensor for the food industries.	Optical biosensors for their application in the food industry.	2008- 2009	Generic	Safety	Optical biosensors	applied
Spain	MULTIHORT: Advanced techniques for the	To explore physical techniques for the on-line assessment of the quality of fresh horticultural products, especially green vegetables:	2009-2011	Vegetables	Safety	Optical devices, biosensors	applied

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
	assessment of quality and safety of fresh and fresh-cut vegetables	spectrofotometric, multispectral and hypersepctral vision, and, further, metabonomics and specialised bioanalytical biosensors for detection of residues in sampling.					
Spain	Development of a micro-nano-biotechnological platform to realise on-chip integrated microsystems to detect and identify bacteria in strategic industrial sectors.	This project proposes to innovate from the analytical point of view and control with an approach based on on-chip sensor devices for single use	2009-2011	Meat	Safety	Biosensors, lab-on-a chip	applied
Spain	Amperometric Biosensors's design based on carbon nanotubes functioned with arenediazonium ions and its Food-Processing Applications.	Preparation of stable and robust devices, using different types of immobilization of the biological component in the development of the sensors phases on surfaces, previously functioned and modified with Nanostructures materials, which were capable of giving electrochemical answers (transduction system) very different and they were allowing the rapid and trustworthy monitoring of chemical parameters of food interest.	2007-2008	Generic	Safety and Process control	Chemical and biological sensors	applied
Spain	Meatsense <sup>31</sup>	The aim of the project is to develop a multiplexed biosensor adapted to the food industry requirements capable of detecting two o more bobine meat bacterial pathogens, which will allow the dinamization of the sample control process.	2008	Meat	Safety	Biosensors	industrial
Spain	Molecular and	To develop new portable, fast, sensible, integrated	2008-2011	Meat	Safety	Microfluidics,	applied

<sup>31</sup> [gtq.imb-cnm.csic.es/ca/publicaciones/proyectos/desarrollo-una-plataforma-biosensores-para-aplicaciones-en-industria-agroali](http://gtq.imb-cnm.csic.es/ca/publicaciones/proyectos/desarrollo-una-plataforma-biosensores-para-aplicaciones-en-industria-agroali)

Country	Acronym/Title of the project	Description	Period/Budget	Food Sector	Food Application	Microsystem technology	Research type
	Immunochemical based Biosensors Development for Pathogen Detection <sup>32</sup>	lab-on-a-chip based devices, developed to manage with the agro industry microbiology quality control necessities.				Lab-on- a chip	
Sweden	Development of an electrical biosensor using nanowire transistors and microfluidics <sup>33</sup>	An electrical measurement without the need for adding fluorescent molecules simplifies the instrumentation needed and a portable biosensor is envisaged. The detection is based on the extreme sensitivity of the channel current on charges at the gate of miniaturized MOS transistors made of silicon nanowires	2008-2011	Generic	Safety	Biosensors, microfluidics	applied
Switzerland	CCMX-LOC: Lab-on-a-Chip for analysis and diagnostics <sup>34</sup>	The aim of the project is to explore various research aspects of the Lab-on-a-Chip (LOC) concept, focusing on materials, design, microfabrication and experimentation of novel types of miniaturized analysis systems in the following application domains: <ul style="list-style-type: none"> <li>• In vitro diagnostics</li> <li>• Food analysis</li> <li>• Monitoring of the environment (e.g., air, water)</li> </ul>	2006-2008	Milk and Dairy mostly	Safety	Lab on a Chip, Microfluidics	applied

\* Research programme containing several research projects

<sup>32</sup> <http://www.irta.cat/es-es/RIT/Projectes/paginas/ProjectDisplayPage.aspx?UrlCode=874>

<sup>33</sup> <http://www.acreo.se/en/Technology-Areas/Nano-electronics/Projects/Current-Projects/Nanowire/>

<sup>34</sup> [http://www.ccmx.ch/index.php?eID=tx\\_nawsecured1&u=0&file=fileadmin/user\\_upload/downloads/Project\\_descriptions/12\\_lab\\_on\\_a\\_chip.pdf&t=1336770345&hash=8b9b940712f88cb0cb89cd61dda02a818c88bd8e](http://www.ccmx.ch/index.php?eID=tx_nawsecured1&u=0&file=fileadmin/user_upload/downloads/Project_descriptions/12_lab_on_a_chip.pdf&t=1336770345&hash=8b9b940712f88cb0cb89cd61dda02a818c88bd8e)

## 4. Actors

A list of key actors that have been found as partners of national or international projects is summarized in the next table. The list has been complemented with additional groups that have been identified through the questionnaires sent to contacts in different countries. The list of key actors will be used as a reference list for disseminating project results and also for being used as potential contacts for the work to be done in the other workpackages of the project.

The information of interest of the identified groups is mainly related to the area of research, and when known, the webpage and contact data of the key person for potential further contacts in relation to future surveys, dissemination results, information campaigns, workshops and other outreach actuations of the project.

In addition to groups from the MST field that have worked in food applications, groups from the food area potentially interested in the use of MST have also been identified in some countries. Although this last group of actors are not the primary target of our search, it is also valuable information and they have been also listed in a second table. These contacts will be useful for workshops, roadmaps and other dissemination actions, too.

For a more complete view of the state of play in each country, those actors identified as European project partners are highlighted in blue bold.

Industrial members in research projects and others with market presence complement this search of main actors. However, they are not listed in this document but in the corresponding tables of Deliverable 1.3.

From the information provided in the tables, it can be seen that there is not a direct relation among countries with a lot of national activity and countries with partners with important international activity. It is true that in some cases these two aspects coincide. Nevertheless, in some countries we found that the activity seemed to be carried out preferably at national level, while for other countries the research of *MST for food* has been done mostly at international level.

## 4.1 Main research groups of Electronics and MST that have worked for the Food Production applications

In the next table the main groups identified for the countries considered are presented with a short description of their field of activity. The groups that have worked in the European projects presented in table 2.C are highlighted in blue bold. In those cases the title and project description is repeated in the activity box for a better comprehension of the field covered by the project.

Country	Name of the group	Activity/Project	Main Researcher	Website
Argentina	INTI: Instituto Nacional de Tecnología Industrial. Dpto Electronica	Gas sensor development and microsystems for different applications	Liliana Fraggi lili@inti.gob.ar	www.inti.gob.ar
Austria	Institute for Integrated Sensor Systems	Research on sensor topics	Franz Kohl Franz.Kohl@oeaw.ac.at	www.iiss.oeaw.ac.at/index.html
Austria	Johannes Kepler University Linz Institute for Microelectronics and Microsensors.	Research on sensors and MST	Bernhard Jakoby Bernhard.jakoby@jku.at	www.ime.jku.at
Austria	Technical University of Wien Institute of Sensor- and Actuatorsystems	Optical and Physical Sensors and MST for liquids properties. Applications to food	Michiel Vellekoop Vellekoop@tuwien.ac.at	www.isas.tuwien.ac.at/idx.php
Belgium	Centre for Microsystems Technology (TFCG Microsystems Lab)	Microsystems integration, design and technology research: advanced packaging, stretchable interconnect, utcp, polymer structuring and microfluidics, optical interconnect and laser technology, smart power, display technology	Prof. Jan Vanfleteren  Jan.Vanfleteren@elis.UGent.be	www.cmst.be/index.html
Belgium	IMEC	<b>Chip2Foil Project: Ultra thin chip integration process for low cost communicative polymer foils.</b>  <b>Thin-film electronic devices on flexible plastic foil for intelligent food packaging.</b>  <b>Sensor system for industrial applications</b>	<b>Jan Genoe</b> Jan.Genoe@imec.be  <b>Ruud Vullers</b> Ruud.Vullers@imec-nl.nl	<b>www2.imec.be/be_en/research.html</b>

Country	Name of the group	Activity/Project	Main Researcher	Website
Belgium	Katholieke Universiteit Leuven	INSIDEFood Project: Integrated sensing and imaging devices for designing, monitoring and controlling microstructure of foods  PASTEUR Project: Perishable mAnagement through Smart Tracking of lifEtime and quality with RFID	VEREEKEN Maria Prof. Bart Nicolai bart.nicolai@biw.kuleuven.be	www.kuleuven.be
Belgium	Katholieke Universiteit Leuven. Division of Mechatronics, Biostatistics and Sensors (MeBioS)		Jeroen Lammertyn jeroen.lammertyn@biw.kuleuven.be	www.biw.kuleuven.be/biosyst/mebios
Belgium	Katholieke Universiteit Leuven  ESAT Group	Development of novel bio-molecular detection concepts for food applications		www.esat.kuleuven.be/
Belgium	Katholieke Universiteit Leuven  MICAS Group		Robert Puers Robert.Puers@esat.kuleuven.be	www.esat.kuleuven.be/micas/
Belgium	UCL- SMALL - Sensors, Microsystems and Actuators Laboratory of Louvain	Research on sensors and MST	Laurent Francis Laurent.Francis@uclouvain.be	www.uclouvain.be/en-small.html
Brazil	CSEM Brasil	MST for precision agriculture and livestock to develop technological systems for crop monitoring and to set-up an applied-research facility in nanotechnology, microsystems and sensors	Tiago Maranhão Alves	www.csembrasil.com.br
Brazil	CTI-Campinas Center For the Information Technologies	Chemical Sensors for food	Jacobus Swart jacobus.swart@cti.gov.br	www.cti.gov.br
Brazil	Institute for Technological Research IPT – Instituto de Pesquisas Tecnológicas	Use of microtechnologies for the improvement of chemical, parma, medical and food production processes	Wagner Aldeia waldeia@ipt.br	www.ipt.br/solucoes/176-intensificacao_de_processos_atraves_de_microtecnologia.htm
Brazil	Suframa	Micro-nanotech for environment, food,...	Hernan Valenzuela hernan@suframa.gov.br	www.suframa.gov.br

Country	Name of the group	Activity/Project	Main Researcher	Website
Brazil	Unicamp	Biosensors	Lauro Tatsuo Kubota kubota@iqm.unicamp.br	www.unicamp.br
Bulgaria	Institute of Electronics	Applied physics and engineering, such as high technology material fabrication, treatment and analysis, nanosciences and nanotechnologies, nanoelectronics, photonics, optoelectronics, quantum optics, environmental monitoring, biomedical photonics and food applications		www.ie-bas.dir.bg
China	Microsystem Research Centre of Chongqing University	Low-cost and portable food control systems	Wen Zhiyu wzy@cqu.edu.cn	coe.cqu.edu.cn/msc/
China	Research Institute of micro/nano Science & Tech. Shanghai Jiaotong University	Magnetic sensors and micro systems based on micro- and nano-magnetic tags for the rapid detection of pathogenic bacteria in food among other applications	Yong Zhou yzhou@sjtu.edu.cn	mnri.sjtu.edu.cn
Czech Republic	Brno University of Technology	Design, modeling and fabrication of novel MEMS structures utilizing carbon nanotubes - proceedings - Microelectronics packaging conference	Radimir Vrba vrbar@feec.vutbr.cz	www.vutbr.cz
Czech Republic	University of Pardubice	<b>LOVE-FOOD Project: Love wave fully integrated Lab-on-Chip platform for food pathogen detection</b>	Zuzana Bilkova Zuzana.Bilkova@upce.cz	www.upce.cz/
Denmark	Danmarks Tekniske Universitet	<b>LABONFOIL Project: Laboratory skin patches and smartcards based on foils and compatible with a smart-phone</b>	Niels FREESE Niels.Freese@mic.dtu.dk	www.dtu.dk
Denmark	MIC-DTU	<b>OPTOLABCARD Project: Laboratory skin patches and smartcards based on foils and compatible with a smart-phone</b>	Anders Wolff aw@mic.dtu.dk	www.mic.dtu.dk
Estonia	University of Tartu, Faculty of Science and Technology, Sensor technology research group	Sensors for food and other applications	Toonika Rinken toonika.rinken@ut.ee	www.tuit.ut.ee

Country	Name of the group	Activity/Project	Main Researcher	Website
Finland	VTT Teknologian Tutkimuskeskus	<p><b>ARROWS:</b> Advanced interfaced micro-systems Research for analysis of Real-wOrld clinical, food, environmental and Waste Samples</p> <p><b>FOODSNIFFER - FOOD Safety at the point-of-Need via monolithic spectroscopic chip identiFying harmFul substances in frEsh pRoduce</b></p>	<p>Eija HYVÖNEN eija.hyvonen@vtt.fi</p> <p>Kari Tukkiniemi Kari.tukkiniemi@vtt.fi</p>	<a href="http://www.vtt.fi">www.vtt.fi</a>
France	CEA- Commissariat a l'Energie Atomique	<b>GOODFOOD Project:</b> Food Safety and Quality Monitoring with Microsystems	Hubert Jeanson Hubert.Jeanson@cea.fr	<a href="http://www.cea.fr">www.cea.fr</a>
France	CEA- Commissariat a l'Energie Atomique	<b>SMART-EC Project:</b> Heterogeneous integration of autonomous smart films based on electrochromic transistors	Stephanie Thollon stephanie.thollon@cea.fr	<a href="http://www.cea.fr">www.cea.fr</a>
France	CEA - LETI	Technological Centre specialized in NEMS and MEMS and their applications to biology, healthcare and photonics	<p>Arcamone Julien julien.arcamone@cea.fr</p> <p>Philippe Liatard philippe.liatard@cea.fr</p>	<a href="http://www-leti.cea.fr/">www-leti.cea.fr/</a>
France	IETR Univ. Rennes Groupe Microélectronique, IETR, UMR 6164 du CNRS	Electronic Sensors for the chemical speciesd detection for health, environment and food among others	Daniel Thouroude Daniel Thouroude@univ-rennes1.fr	<a href="http://www.ietr.org">www.ietr.org</a>
France	Universite Claude Bernard Lyon 1	<b>BOND Project:</b> Bioelectronic Olfactory Neuron Device	Nicole Jaffrezic-Renault jaffrez@univ-lyon1.fr	<a href="http://www.univ-lyon1.fr">www.univ-lyon1.fr</a>
France	Institut Curie	<b>LOVE-FOOD Project:</b> Love wave fully integrated Lab-on-Chip platform for food pathogen detection	Stéphanie Descroix stephanie.descroix@espci.fr	<a href="http://www.curie.fr">www.curie.fr</a>

Country	Name of the group	Activity/Project	Main Researcher	Website
France	Institut d'Electronique, de Microélectronique et de Nanotechnologie	IEMN is a research institute with equipment for design, fabrication and characterization of devices	Campistron Pierre pierre.campistron@univ-valenciennes.fr  Carlier Julien julien.carlier@iemn.univ-lille1.fr  Nassar Georges  Nongaillard Bertrand	www.univ-valenciennes.fr
Germany	Chemnitz University	PASTEUR Project: Perishable mAnagement through Smart Tracking of lifetime and quality with RFID	Reinhard Baumann reinhard.baumann@mb.tu-chemnitz.de	www.tu-chemnitz.de/mb/PrintMedienTech/pminstitut/staffdetail.php?user=151
Germany	FhG- IPM Fraunhofer-Gesellschaft Zur Foerderung Der Angewandten Forschung E.V	GOODFOOD Project: Gas sensor development for food applications  Other Projects: LocoChrom, FoodChainManagement	Jürgen Wöllenstein juergen.woellenstein@ipm.fraunhofer.de	www.ipm.fraunhofer.de
Germany	FhG-IZM Fraunhofer-Gesellschaft Zur Foerderung Der Angewandten Forschung E.V	PASTEUR Project: Perishable mAnagement through Smart Tracking of lifetime and quality with RFID  FreshScan: Portable optical system for monitoring meat freshness	Christof Landesberger christof.landesberger@izm-fraunhofer.de  Rolf.Thomasius rolf.thomasius@izm.fraunhofer.de	www.izm.fraunhofer.de
Germany	FhG- ZV Fraunhofer-Gesellschaft Zur Foerderung Der Angewandten Forschung E.V	LOTUS Project: Low-cost highly conductive high resolution structures for flexible large area electronics by high throughput low temperature processing	Maximilian Steiert maximilian.steiert@zv.fraunhofer.de	www.fraunhofer.de
Germany	FhG- ZV Fraunhofer-Gesellschaft Zur Foerderung Der Angewandten Forschung E.V	LABONFOIL Project: Laboratory skin patches and smartcards based on foils and compatible with a smart-phone	Walter KRAUSE walter.krause@zv.fraunhofer.de	www.fraunhofer.de
Germany	FhG Fraunhofer-Gesellschaft Zur Foerderung Der Angewandten Forschung E.V	SMART-EC Project: Heterogeneous integration of autonomous smart films based on electrochromic transistors	Christoph SCHULTE@fraunhofer.de	www.fraunhofer.de
Germany	IMTEK University of Freiburg Laboratory for MEMS	PESTIPLAT Project: Integrated Platform for Pesticides Detection	Roland Zengerle zengerle@imtek.de	www.imtek.de

Country	Name of the group	Activity/Project	Main Researcher	Website
Germany	Hahn-Schickard-Gesellschaft for Applied Research e.V.	Lab-on-a-Chip	Nils Paust nils.paust@imtek.de	www.imtek.de
Germany	Institut fuer Mikrotechnik Mainz GMBH	MICROFLUID Project: Micro-fabrication of polymeric lab-on-a-chip by ultrafast lasers with integrated optical detection	Sabine Brunklaus brunklaus@imm-mainz.de	www.imm-mainz.de
Germany	Max Plank Society for the Advancement of Science	TRACEBACK Project: Integrated system for a reliable traceability of food supply chains.  Molecular Spectroscopy  Integrated evanescent wave optic sensors	Bernhard Menges menges@mpip-mainz.mpg.de	www.mpg.de
Germany	Universitaet Bremen	NANODETECT Project: Development of nanosensors for the detection of quality parameters along the food chain	Walter Lang wlang@imsas.uni-bremen.de	www.uni-bremen.de
Germany	CiS Forschungsinstitut für Mikrosensorik und Photovoltaik GmbH	Industry-oriented research institution focused on microsensors, microsystem technology and photovoltaics.	Arndt Steinke asteinke@cismst.de	www.cismst.de
Germany	Enabling MNT	Provider of Business Development support, Engineering Services and Marketing in MNT	Patric Salomon patric@enablingmnt.com	www.enablingmnt.com
Germany	University of Freiburg – Faculty of Engineering		Richard Rietzel rietzlr@tf.uni-freiburg.de  Andreas Steffen steffena@tf.uni-freiburg.de  William Glover gloverw@tf.uni-freiburg.de	www.tf.uni-freiburg.de

Country	Name of the group	Activity/Project	Main Researcher	Website
Greece	NCSR Demokritos - IMEL	<p>GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems</p> <p>Biosensors and Biochips</p> <p>LOVE-FOOD Project: Love wave fully integrated Lab-on-Chip platform for food pathogen detection</p> <p>FOODSNIFFER - FOOD Safety at the point-of-Need via monolithic spectroscopic chip identifying harmful substances in fresh produce</p>	<p>Christos Tsamis ctsamis@imel.demokritos.gr</p> <p>Konstantinos Misiakos misiakos@imel.demokritos.gr</p> <p>Angeliki Tserepi atserepi@imel.demokritos.gr</p> <p>Ioannis Raptis raptis@imel.demokritos.gr</p> <p>Eleni Makarona elmak@imel.demokritos.gr</p>	imel.demokritos.gr
Greece	NTUA - National Technical University Athens	BIOFOS – FP7 project under negotiation	Ioanna Zergioti zergioti@central.ntua.gr	www.central.ntua.gr
Greece	FORTH - Foundation For Research And Technology Hellas	LOVE-FOOD Project: Love wave fully integrated Lab-on-Chip platform for food pathogen detection	gizeli@imbb.forth.gr	http://www.imbb.forth.gr/
Ireland	Tyndall Research Center University Cork College - UCC	GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems	Mary Manning mary.manning@tyndall.ie	www.tyndall.ie
Ireland	Tyndall Research Center University Cork College - UCC	BOND Project: Bioelectronic Olfactory Neuron Device	Clodhna Horan Vladimir Ogurtsov vladimir.ogurtsov@tyndall.ie	www.tyndall.ie
Ireland	Tyndall Research Center University Cork College - UCC	ARROWS Project: Advanced interfaced micro-systems Research for analysis of Real-world clinical, food, environmental and Waste Samples	Conor Delaney conor.delaney@tyndall.ie	www.tyndall.ie
			Eric Moore Eric.moore@tyndall.ie	

Country	Name of the group	Activity/Project	Main Researcher	Website
Israel	The Hebrew University Of Jerusalem	LOTUS Project: Low-cost highly conductive high resolution structures for flexible large area electronics by high throughput low temperature processing	Jane TURNER janet@savion.huji.ac.il	www.huji.ac.il
Italy	CNR-IMM-Lecce	GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems	Pietro Siciliano <a href="mailto:Pietro.siciliano@imm.cnr.it">Pietro.siciliano@imm.cnr.it</a>  Luca Francioso <a href="mailto:Luca.Francioso@imm.cnr.it">Luca.Francioso@imm.cnr.it</a>  Simonetta Capone <a href="mailto:Simona.capone@le.imm.cnr.it">Simona.capone@le.imm.cnr.it</a>	www.imm.cnr.it
Italy	CNR-IMM- Bologna	GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems	Giancarlo Cardinali <a href="mailto:cardinali@bo.imm.cnr.it">cardinali@bo.imm.cnr.it</a>  Stephano Zampolli <a href="mailto:zampolli@bo.imm.cnr.it">zampolli@bo.imm.cnr.it</a>	www.imm.cnr.it
Italy	CNR- IFAC	Optical devices Development of optical methodologies for testing quality of food	Anna Mignani <a href="mailto:A.G.Mignani@ifac.cnr.it">A.G.Mignani@ifac.cnr.it</a>	www.ifac.cnr.it
Italy	CNR-IFN	MICROFLUID Project: Micro-fabrication of polymeric lab-on-a-chip by ultrafast lasers with integrated optical detection	Roberto Osellame <a href="mailto:roberto.osellame@ifn.cnr.it">roberto.osellame@ifn.cnr.it</a>  Lorenzo Spinelli	www.ifn.cnr.it
Italy	FBK- IRST Fondazione Bruno Kessler	GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems.  Sensors, Electronics Nose, MEMS, Wireless Sensors Network Materials and Technological processes, Microfluidics	Leandro Lorenzelli <a href="mailto:lorenzel@fbk.eu">lorenzeli@fbk.eu</a>  Alessia Mortari <a href="mailto:mortari@fbk.eu">mortari@fbk.eu</a>	www.fbk.eu.it
Italy	MIDRA	GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems	Gianfranco Manes <a href="mailto:presidente@csiaf.unifi.it">presidente@csiaf.unifi.it</a>	www.csiaf.unifi.it

Country	Name of the group	Activity/Project	Main Researcher	Website
Italy	Politecnico di Milano	MICROFLUID Project: Micro-fabrication of polymeric lab-on-a-chip by ultrafast lasers with integrated optical detection	Stefania Grotti stefania.grotti@polimi.it	www.polimi.it
Italy	Politecnico di Milano	BOND Project: Bioelectronic Olfactory Neuron Device	Marco Sampietro Marco.Sampietro@polimi.it	www.polimi.it
Italy	Politecnico di Milano	INSIDEFOOD Project: Integrated sensing and imaging devices for designing, monitoring and controlling microstructure of foods	Rinaldo Cubeddu Alessandro Torricelli alessandro.torricelli@polimi.it	www.polimi.it
Italy	Politecnico di Torino	SMART-EC Project: Heterogeneous integration of autonomous smart films based on electrochromic transistors	Claudia Roveglia Claudia.roveglia@polito.it	www.polito.it
Italy	Scuola Superiore Sant'Anna	GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems	Barbara Mazzola barbara.mazzola@iit.it	www.sssup.it
Italy	Universita di Pavia	Electronics for sensors Design of a smart label for monitoring the preservation conditions of food	Piero Malcovati piero.malcovati@unipv.it	sms.unipv.it
Italy	Universita Di Roma Tor Vergata	BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods	Giuseppe PALLESCHI giuseppe.palleschi@uniroma2.it	www.uniroma2.it
Italy	Universita di Roma Tor Vergata	Sensors for artificial systems. Organic Materials for the development of Electronic Nose and Tongue	Arnaldo D'Amico damico@eln.uniroma2.it	www.uniroma2.it
Italy	Universita del Salento	BOND Project: Bioelectronic Olfactory Neuron Device	Lino REGGIANI lino.reggiani@unile.it	www.unisalento.it
Italy	University of Salento, Lecce	Automation Organic Materials for the development of Electronic Nose and Tongue	Antonio Grieco antonio.grieco@unisalento.it	www.unisalento.it

Country	Name of the group	Activity/Project	Main Researcher	Website
Italy	CNR - IC	<b>SENSBIOSYN: Biosensors and Sensors for the industrial biosynthesis process of widely used commercial antioxidants: nutraceuticals as additives for food and aquaculture promoting public health and safety</b>	Giuseppina Rea giuseppina.rea@ic.cnr.it	<a href="http://www.ic.cnr.it">www.ic.cnr.it</a>
Japan	National Food Research Institute - Nanobiotechnology Unit	The aims of the Nanobiotechnology unit are the micro/nano-scale imaging and structural analyses of food and bio-samples. The developments of technologies to evaluate food and bio-samples are the target.	Shigeru Sugiyama	<a href="http://www.naro.affrc.go.jp/org/nfri/english/organization/kougaku/nanobio.html">www.naro.affrc.go.jp/org/nfri/english/organization/kougaku/nanobio.html</a>
Japan	University of Tsukuba	Research on the following major research areas, forseeing the development of novel foods: - Micro / nanoengineering for advanced bioresources processing - Micro / nanochannel technology for advanced food processing - Formulation of food micro / nanodispersions and evaluation of their gastrointestinal digestion	Mitsutoshi Nakajima	<a href="http://www.agbi.tsukuba.ac.jp/~chien/e/staff/food.html">www.agbi.tsukuba.ac.jp/~chien/e/staff/food.html</a>
Japan	Isao Kobayashi	Development of microchannel emulsification and their application technologies We are developing a novel technology for efficiently producing stable emulsion droplets of uniform size (1-100 micron in diameter) using grooved and straight-through microchannel arrays.	isaok@affrc.go.jp	<a href="http://www.naro.affrc.go.jp/org/nfri/english/organization/kougaku/sentan.html">www.naro.affrc.go.jp/org/nfri/english/organization/kougaku/sentan.html</a>
Japan	Marcos A. Neves	- Microtechnology for new food processing and functional food - Effective utilization of food processing waste for value addition	marcos.neves.ga@u.tsukuba.ac.jp	<a href="http://www.agbi.tsukuba.ac.jp/~chien/e/staff/food.htm">www.agbi.tsukuba.ac.jp/~chien/e/staff/food.htm</a>

Country	Name of the group	Activity/Project	Main Researcher	Website
The Netherlands	Holst Center – IMEC Stichting	PASTEUR: Perishable mAnagement through Smart Tracking of lifEtime and quality with RFID  Electrochemical sensing of ethylene in food	Marcel Zevenbergen	<a href="http://www.imec-nl.nl">www.imec-nl.nl</a>
The Netherlands	Holst Centre -TNO	PASTEUR Project: Perishable mAnagement through Smart Tracking of lifEtime and quality with RFID  Chip2Foil Project: Ultra thin chip integration process for low cost communicative polymer foils	Jeroen van den Brand	<a href="http://www.holstcentre.nl">www.holstcentre.nl</a>
The Netherlands	Holst Centre -TNO	LOTUS Low-cost highly conductive high resolution structures for flexible large area electronics by high throughput low temperature processing	MEINDERS Erwin R. erwin.meinders@tno.nl  Egbert-Jan Sol egbert-jan.sol@TNO.nl	<a href="http://www.tno.nl">www.tno.nl</a>
The Netherlands	Radboud University Nijmegen	Microfluidics, microreactors, encapsulation		<a href="http://www.ru.nl">www.ru.nl</a>
The Netherlands	Stichting Dienst Landbouwkundig Onderzoek	NANODETECT Project: Development of nanosensors for the detection of quality parameters along the food chain  RADAR Project: Rationally Designed Aquatic Receptors integrated in label-free biosensor platforms for remote surveillance of toxins and pollutants	Jelte Beeuwe ZEILSTRA	<a href="http://www.wur.nl">www.wur.nl</a>
The Netherlands	Stichting Energieonderzoek Centrum Nederland	LOTUS Project: Low-cost highly conductive high resolution structures for flexible large area electronics by high throughput low temperature processing	Jochen LÖFFLER loffler@ecn.nl	<a href="http://www.ecn.nl">www.ecn.nl</a>

Country	Name of the group	Activity/Project	Main Researcher	Website
The Netherlands	Technische Universiteit Delft.  Dept. of Precision and Microsystems Engineering	Chip2Foil: Ultra thin chip integration process for low cost communicative polymer foils  PASTEUR Project: Perishable mAnagement through Smart Tracking of lifetime and quality with RFID	Marcel Tichem <a href="mailto:m.tichem@tudelft.nl">m.tichem@tudelft.nl</a>  Theresia Twickler <a href="mailto:t.m.g.twickler@tudelft.nl">t.m.g.twickler@tudelft.nl</a>	<a href="http://www.tudelft.nl">www.tudelft.nl</a>
The Netherlands	Technical University of Eindhoven	PASTEUR Project: Perishable mAnagement through Smart Tracking of lifetime and quality with RFID	Eugenio Cantatore <a href="mailto:e.cantatore@tue.nl">e.cantatore@tue.nl</a>	<a href="http://www.tue.nl">www.tue.nl</a>
The Netherlands	University of Amsterdam	Sensing systems		<a href="http://www.english.uva.nl/start.cfm">www.english.uva.nl/start.cfm</a>
The Netherlands	University of Leiden	Sensors for food applications		<a href="http://www.leiden.edu">www.leiden.edu</a>
The Netherlands	University of Twente: BIOS- Group	Lab-on-a-chip	Albert vd Berg <a href="mailto:a.vandenberg@utwente.nl">a.vandenberg@utwente.nl</a>	<a href="http://www.utwente.nl/ewi/bios">www.utwente.nl/ewi/bios</a>
The Netherlands	University of Twente: Membrane Technology Group	Filtering and fractionation	Nijmeijer <a href="mailto:d.c.nijmeijer@utwente.nl">d.c.nijmeijer@utwente.nl</a>	<a href="http://www.utwente.nl/tnw/mtg/">www.utwente.nl/tnw/mtg/</a>
The Netherlands	University of Twente: Physics of Fluids	Micro and nanofluidics	Lohse <a href="mailto:d.lohse@utwente.nl">d.lohse@utwente.nl</a> Prof. Blank	<a href="http://pof.tnw.utwente.nl">pof.tnw.utwente.nl</a>
The Netherlands	University of Twente: MESA+	Micro and nanotechnology	<a href="mailto:d.h.a.blank@utwente.nl">d.h.a.blank@utwente.nl</a>	<a href="http://www.utwente.nl/mesaplus">www.utwente.nl/mesaplus</a>
The Netherlands	U. Twente. Transducers Science and Technology	3D nano- and microfabrication based on top down lithography methods	Henri Jansen <a href="mailto:h.v.jansen@utwente.nl">h.v.jansen@utwente.nl</a>  Pele Leussink <a href="mailto:p.j.leussink@utwente.nl">p.j.leussink@utwente.nl</a>	<a href="http://www.utwente.nl/ewi/tst/">www.utwente.nl/ewi/tst/</a>
The Netherlands	Trustfood Stichting	FOODSNIFFER: FOOD Safety at the point-of-Need via monolithic spectroscopic chip identifying harmful substances in fresh produce	Eric Smith <a href="mailto:Eric.smith@trustfood.org">Eric.smith@trustfood.org</a>	<a href="http://www.trustfood.org">www.trustfood.org</a>
The Netherlands	NXP	PASTEUR Project: Perishable mAnagement through Smart Tracking of lifetime and quality with RFID	Romano Hoofman	<a href="mailto:romano.hoofman@nxp.com">romano.hoofman@nxp.com</a>

Country	Name of the group	Activity/Project	Main Researcher	Website
The Netherlands	Enabling MNT	Provider of Business Development support, Engineering Services and Marketing in MNT	Henne van Heeren henne@enablingmnt.com	www.enablingmnt.com
Poland	ITE- Institute of Electron Technology	<b>OPTOLABCARD Project: Laboratory skin patches and smartcards based on foils and compatible with a smart-phone:</b>	Jan Dziuban dziuban@ite.waw.pl	www.ite.waw.pl
Poland	Politechnika Wroclawska	Laboratory skin patches and smartcards based on foils and compatible with a smart-phone	Rafal Walczak rafal.walczak@pwr.wroc.pl	www.pwr.wroc.pl
Poland	Warsaw Univ.of Technology, Division of Microsystems and Measurement Systems	Wireless distributed sensor system for monitoring enviromental conditions for food plants.	Ryszard Jachowicz R.Jachowicz@ise.pw.edu.pl	www.ise.pw.edu.pl/msrg
Poland	Jagiellonian University	<b>FOODSNIFFER: FOOD Safety at the point-of-Need via monolithic spectroscopic chip identiFying harmFul substances in frEsh pRoduce</b>	Andrzej Budkowski ufbudkow@cyf-kr.edu.pl	http://www.uj.edu.pl
Portugal	INESC- Instituto de engenharia de sistemas e computadores - microsistemas e nanotecnologias	Integrated Lab On Chip Platforms For Diagnostics	Paulo Jorge Peixeiro Freitas	inescmn/inesc/ist/utl
Portugal	INL Braga	Environment Monitoring, Security And Food Quality Control	Jose Rivas Jose.Rivas@Inl.Int	www.inl.int
Portugal	Uninova - Instituto De Desenvolvimento De Novas Tecnologias	<b>SMART-EC Project: Heterogeneous integration of autonomous smart films based on electrochromic transistors</b>	Rodrigo Martins rm@uninova.pt	www.uninova.pt
Portugal	Universidade de Aveiro	Electronic Tongue For Food Analysis.	Alisa Mikhailovna Rudnitskaya	www.ua.pt
Romania	IMT. National Institute for Research and Development in Microtechnologies	<b>PESTIPLAT Project: Integrated Platform for Pesticides Detection</b>  Micro-Biosensors for toxins detection on glass substrate Impedimetric Microbiosensors for toxins	Carmen Moldovan carmen.moldovan@imt.ro	www.imt.ro
Romania	National Institute for Laser, Plasma and Radiation Physics	<b>MAGPRO2LIFE: Advanced Magnetic nanoparticles deliver smart Processes and Products for Life</b>	Ion Morjan Ion.morjan@inflpr.ro	www.inflpr.ro

Country	Name of the group	Activity/Project	Main Researcher	Website
Romania	National Institute for Research and Development of Isotopic and Molecular Technologies	MAGPRO2LIFE: Advanced Magnetic nanoparticles deliver smart Processes and Products for Life	Adrian Bot Adrian.bot@itim-cj.ro	www.itim-cj.ro
Slovenia	IOS, Institut za okoljevarstvo in senzorje, d.o.o.	M-FRESH-SENS Project: Fresh Meat Optical Detection	Mrs. ALENKA RIBIC alenka.ribic@ios.si	www.ios.si
Spain	CSIC- CENIM National Center of Metallurgic Research	Intelligent Sensors for the on-line control of food processing	José Ignacio Robla jrobla@cenim.csic.es	www.cenim.csic.es
Spain	CSIC- CNM	BUGCHECK Project: A Rapid Hand-Held Analyser for Control of Microorganisms in the Complete Meat Supply Chain  PASTEUR Project: Perishable mAnagement through Smart Tracking of lifEtime and quality with RFID	Francesc Xavier Muñoz Francescxavier.munoz@imb-cnm.csic.es  Javier del Campo Javier.delcampo@csic.es	www.imb-cnm.csic.es
Spain	CSIC- CNM	GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems Gas and optical sensors for food safety and quality monitoring	Carles Cané Carles.Cane@imb-cnm.csic.es  Luis Fonseca Luis.fonseca@im-cnm.csic.es  Marc Salleras Marc.salleras@imb-cnm.csic.es	www.imb-cnm.csic.es
Spain	CSIC- CNM	BOND Project: Bioelectronic Olfactory Neuron Device	Joan Bausells joan.bausells@imb-cnm.csic.es	www.imb-cnm.csic.es
Spain	CSIC- CNM	Biosensors and micro-nano-biotechnological platforms for bacteria identification	Andrey Bratov Andrey.Bratov@cnm.es	www.imb-cnm.csic.es

Country	Name of the group	Activity/Project	Main Researcher	Website
Spain	CSIC- CNM	E-Tongue and rapid portable chemical methods for food production control  Implementation of a bioanalytical system with new impedimetric biosensors.	Cecilia Jiménez Cecilia.jimenez@imb-cnm.csic.es  Manuel Gutiérrez Manual.gutierrez@imb-cnm.csic.es	www.imb-cnm.csic.es
Spain	CSIC-IFA: Applied Physics Institute.	<b>GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems</b>  Gas sensors and e-nose for food quality	Carmen Horrillo carmenhorrillo@ifa.cetef.csic.es  José Pedro Santos Blanco Jp.santos@csic.es	www.ifa.csic.es
Spain	GAIKER	<b>LABONFOIL Project: Laboratory skin patches and smartcards based on foils and compatible with a smart-phone</b>	Oscar Salas salas@gaiker.es	www.gaiker.es
Spain	ICFO	Magneto-plasmonic Nanostructures for High Sensitivity Biosensors	Gonçal Badenes badenes@icfo.es	www.icfo.es
Spain	Ikerlan S.Coop	<b>LABONFOIL Project Laboratory skin patches and smartcards based on foils and compatible with a smart-phone</b>  <b>OPTOLABCARD Project: Laboratory skin patches and smartcards based on foils and compatible with a smart-phone</b>	Kepa Mayora KMayora@ikerlan.es  Jesus Ruano JMRuano@ikerlan.es  Aitor Ezquerria AEzkerra@ikerlan.es	www.ikerlan.es
Spain	UAB. Autonomous University of Barcelona  Sensors and Biosensors Group	New biological transducer methods applied to food safety	Salvador Alegret salegret@gsb.uab.es  Manel del Valle Manel.delvalle@gmail.com  Xavi Cetó Xavier.ceto@uab.cat	www.uab.es http://einstein.uab.es/_c_gr_gsb
Spain	UAH. University of Alcalá Group of: Analítics and Chemical Engineering	Development and demonstration of amperometric immunosensors for the multidetection of veterinary antibiotic residues	Elena Dominguez elena.dominguez@uah.es	www.uah.es

Country	Name of the group	Activity/Project	Main Researcher	Website
Spain	UB. University of Barcelona	<p><b>GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems</b></p> <p>Gas sensors and Chromatographic microsystems for food process control</p>	<p>Joan Ramon Morante Morante@el.ub.es</p> <p>Albert Romano: albert.romano@ub.edu</p> <p>Mauricio Moreno mauricio.moreno@ub.edu</p> <p>Santiago Marco smarco@el.ub.es</p>	www.ub.edu
Spain	UB. University of Barcelona	<b>BOND Project: Bioelectronic Olfactory Neuron Device</b>	Josep Samitier jsamitier@ub.edu	www.ub.edu
Spain	UCA. Cádiz University	New electrochemical biosensors based on modified nanomaterials for food analysis.	José Luis Hidalgo de Cisneros jluis.hidalgo@uca.es	www.uca.es
Spain	UCM. Complutense University Madrid	Biosensors for food safety	José Manuel Pingarrón pingarro@quim.ucm.es	ww.ucm.es
Spain	<p>UEx. University of Extremadura.</p> <p>Dept. Electronics Engineering. Ingeniería Eléctrica, Electrónica y Automática</p>	Signal processing of Sensors and Microsystems for Food	Jesús Lozano jesuslozano@unex.es	www.unex.es
Spain	<p>UPC: Polytechnics University of Catalunya.</p> <p>GSS: Sensors Systems Group</p>	Ultrasonic instrumentation for industrial applications and non-destructive evaluation of food.	<p>Javier García javier.garcia-alvarez@upc.edu</p> <p>Jordi Salazar Soler Jorger.salazar@upc.edu</p> <p>Juan Antonio Chávez-Domínguez Juan.antonio.chavez@upc.edu</p>	petrus.upc.es/gss
Spain	<p>UPC. Universitat Politècnica De Catalunya</p> <p>GDS: Semiconductor devices Group</p>	<b>GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems</b>	Angel Rodríguez arm@eel.upc.es	www.upc.edu

Country	Name of the group	Activity/Project	Main Researcher	Website
Spain	UPM. Universidad Politecnica de Madrid	INSIDEFood Project: Integrated sensing and imaging devices for designing, monitoring and controlling microstructure of foods	Gonzalo LEÓN Prof. Pilar Elorza Barreiro pilar.barreiro@upm.es	www.upm.es
Spain	URV. Universitat Rovira I Virgili	GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems.  Gas sensing systems	Eduard Llobet eduard.llobet@urv.cat	www.urv.cat
Spain	UVa. Universidad De Valladolid	GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems	José Antonio de Saja Sáez sajasaez@fmc.uva.es Mari Luz Rodriguez mluz@uva.es	www.uva.es
Sweden	Acreeo AB	SMART-EC Project: Heterogeneous integration of autonomous smart films based on electrochromic transistors	Michael Loglund Michael.logdlund@acreeo.se Dag Ilver dag.ilver@imego.com Cristina Rusu cristina.rusu@acreeo.se	www.acreeo.se
Sweden	SSENCE	GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems	Tina Krantz-Rülcker tinkr@ifm.liu.se	www.ifm.liu.se/applphys/s-sence
Switzerland	CSEM : Centre Suisse D'Electronique et de Microtechnique SA	MICROFLUID Project: Micro-fabrication of polymeric lab-on-a-chip by ultrafast lasers with integrated optical detection		www.csem.ch
Switzerland	CSEM : Centre Suisse d'Electronique et de Microtechnique SA	ARROWS Project: Advanced interfaced micro-systems Research for analysis of Real-wOrld clinical, food, environmental and Waste Samples	Philip GLOCKER philipp.glocker@csem.ch	www.csem.ch
Switzerland	CSEM : Centre Suisse d'Electronique et de Microtechnique SA	RADAR Project : Rationally Designed Aquatic Receptors integrated in label-free biosensor platforms for remote surveillance of toxins and pollutants	SEITZ Peter peter.seitz@csem.ch	www.csem.ch

Country	Name of the group	Activity/Project	Main Researcher	Website
Switzerland	CSEM :Centre Suisse d'Electronique et de Microtechnique SA	<b>GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems Optical Biosensors for antibiotics detection in Milk</b>	<b>Guy Voirin</b> Guy.voirin@csem.ch	<a href="http://www.csem.ch">www.csem.ch</a>
Switzerland	EPFL	<b>GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems</b>	<b>Martin Gijs</b> Martin.Gijs@epfl.ch	<a href="http://www.epfl.ch">www.epfl.ch</a>
Switzerland	EPFL. Samlab. The Sensors, Actuators and Microsystems Laboratory	Wireless sensor networks, Gas sensors on flexible substrates	Nico de Rooij nico.derooij@epfl.ch	<a href="http://samlab.epfl.ch">samlab.epfl.ch</a>
Switzerland	ETH-Zurich	Development of On-line Micro Sensors for Rheological and Structural Properties of Foods  <b>MAGPRO2LIFE: Advanced Magnetic nanoparticles deliver smart Processes and Products for Life</b>	<b>Erich J. Windhab</b> erich.windhab@hest.ethz.ch	<a href="http://www.ifnh.ethz.ch/vt">www.ifnh.ethz.ch/vt</a>
Switzerland	Neode	Scientific and Technological Business Park	Didier Mauroy d.mauroy@biofield.ch	<a href="http://www.neode.ch">www.neode.ch</a>
USA	University of Massachusetts	Biosensor design. MicroTAs, Lab on a chip for food.	Sam Nugen snugen@foodsci.umass.edu	<a href="http://www.umass.edu/biosensors">www.umass.edu/biosensors</a>
USA	University of Cincinnati	Microfluidics and Lab-on a chip for Point of Care detection in food.	Chong Ahn chong.ahn@uc.edu	<a href="http://www.biomems.uc.edu">www.biomems.uc.edu</a>
USA	University of Purdue. CFSE. Centre for Food Safety Engineering	High efficiency food pathogen screening with biosensors	Arun Bhunia bhunia@purdue.edu	<a href="http://www.cfse.purdue.edu">www.cfse.purdue.edu</a>
USA	University of Auburn. Materials Engineering & The Auburn Food Safety Engineering Center	Gold Sensor Platforms for the rapid detection of Salmonella in Food	Bryan A. Chin bchin@eng.auburn.edu	<a href="http://www.eng.auburn.edu/matl">www.eng.auburn.edu/matl</a>

#### 4.2 Groups from the Food & Packaging Areas with activities on the use of Sensors and MST Devices and Systems as end users

The same type of information is provided for the groups involved in the field of MST for food but from the bio, and food and packaging points of view, and not directly active in MST development. Partners participating in the list of European projects identified are also highlighted in blue bold.

Country	Name of the group	Activity/Project	Main Researcher	Website
Austria	Boku – Univ. of natural resources and applied life sciences, Vienna. Department for Agrobiotechnology	BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods	Rudolf Krska rudolf.krska@boku.ac.at	www.boku.ac.at
Austria	Universitaet fuer Bodenkultur Wien	MEM-S Project: Bottom-up design and fabrication of industrial bio-inorganic nano-porous membranes with novel functionalities based on principles of protein self-assembly and biomineralization	Uwe B. Sleytr uwe.sleytr@boku.ac.at	www.boku.ac.at
Belgium	Centre d'Economie Rurale	BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods	Philippe Delahaut delahaut.cerdha@skynet.be	www.cergroupe.be
Belgium	Joint Research Centre	iBIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods	Joerg Stroka Joerg.stroka@ec.europa.eu	ihcp.jrc.ec.europa.eu
Belgium	Joint Research Centre	RADAR Project: Rationally Designed Aquatic Receptors integrated in label-free biosensor platforms for remote surveillance of toxins and pollutants	Iain Formosa iain.formosa@ec.europa.eu	ihcp.jrc.ec.europa.eu
Belgium	Liege University	BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods	Edwin de Pauw E.DePauw@ulg.ac.be	www.ulg.ac.be
Brazil	Department of Microbiology of the Institute of Biomedical Sciences of the University of São Paulo	Food processing		www.icb.usp.br/bmm
Bulgaria	CANRI The Food Research and Development Institute	Nationally accredited laboratory for testing of foods, beverages, waters and cosmetics.	Pavlina Paraskova pparaskova@canri.org	www.canri.org
Bulgaria	Center for Technology Transfer "Maritza" - Plovdiv	The Center is created with the financial support of PHARE programme in Bulgaria in 2007. Its main role is to foster the coordination between the researchers in the agro field and the agricultural producers in Bulgaria.		www.tto-maritsa.org
Bulgaria	Institute of Cryobiology and food technologies	The Institute of Cryobiology and Food Technology is an organization for scientific investigations, applied research, extension service and auxiliary activity in the field of cryobiology and lyophilization, food and beverage technologies, foods and beverages quality and safety, food irradiation and biologically active substances for plant-growing, in the frames of the competence of the Agricultural Academy.	Boris Bojilov  Ljubomir Angelov  Valentin Bachvarov	www.ikht.bg
Bulgaria	Institute of General and Inorganic Chemistry	The environmental aspect of the Institute's activities comprises studies on		www.igic.bas.bg/index_en.html

Country	Name of the group	Activity/Project	Main Researcher	Website
		the preparation of new adsorbents and catalysts for low-temperature removal of harmful and toxic emissions from industry and transport.		
Bulgaria	Institute for Horticulture and Canned Foods	Non-destructive NIR technology for fruit and vegetable internal quality assessment, eliminating the skin disturbing effect NIQAT	Dr Raina Chalucova cic @ evro.net	<a href="http://www.ikht.bg/">http://www.ikht.bg/</a>
Bulgaria	Institute of Organic Chemistry with Center for Phytochemistry	Since its foundation the Institute has been playing an important role in Bulgaria as a leading scientific institution in the field of organic chemistry. The international recognition gained by the Institute was acknowledged by the foundation of the Centre of Phytochemistry for scientific and applied research and training of scientists in 1977 within a joint project of the Bulgarian Government, UNDP and UNESCO.		<a href="http://www.orgchm.bas.bg/index_en.html">www.orgchm.bas.bg/index_en.html</a>
Bulgaria	Laboratory of "Chemistry of Lipids"	Chromatographic and spectrometric analyses of lipids are performed, mostly of fatty acids, acylglycerols and sterols in edible fats and oils, food additives, pharmaceutical and cosmetic products.	Nedjalka Yanishlieva nelly@orgchm.bas.bg	<a href="http://www.orgchm.bas.bg/cl_en.html">www.orgchm.bas.bg/cl_en.html</a>
Bulgaria	Laboratory "Organic Synthesis and Stereochemistry"	Development of efficient and flexible routes for synthesis of multifunctional organic compounds – intermediates, building blocks and target compounds possessing biological activity	Vladimir Dimitrov tel. +359 2 9606 157 fax +359 2 8700 225	<a href="http://www.orgchm.bas.bg">www.orgchm.bas.bg</a>
Bulgaria	Laboratory "Organic Reactions of Microporous Materials"	The scientific activity of the laboratory is concentrated in the field of synthesis, modification and catalysis on micro and mesoporous materials of different type.	Christo Minchev tel. +359 2 9606 111	<a href="http://www.orgchm.bas.bg/ormm_en.html">www.orgchm.bas.bg/ormm_en.html</a>
Bulgaria	Laboratory "Structural Organic Analysis"	The basic research topics are in the interdisciplinary field of the structural organic analysis, carried out experimentally (by means of vibrational spectroscopy and X-ray diffraction) as well as theoretically (on the basis of modern non-empirical quantum-chemical methods).	Ivan Juchnovski tel. +359 2 9606 118 fax: +359 2 8700 225	<a href="http://www.orgchm.bas.bg/soa_en.html">www.orgchm.bas.bg/soa_en.html</a>
Bulgaria	University of Food Technology - Plovdiv FP7 National Contact Point Department of Biotechnology	The Department is challenged by the task of creating new technologies and procedures for the production of various bio-products useful in the fields of food and cosmetics industry and for solving the problems of environmental pollution.		<a href="http://www.uft-bio.com/en/index_en.htm">www.uft-bio.com/en/index_en.htm</a>
Canada	Dalhousie University			<a href="http://www.dal.ca">www.dal.ca</a>
Canada	Health Canada	<b>BIOCOP Project; New Technologies to Screen Multiple Chemical Contaminants in Foods</b>	<b>Samuel Ben Rejeb</b> samuel_benrejeb@hc-sc.gc.ca	<a href="http://www.hc-sc.gc.ca/">www.hc-sc.gc.ca/</a>

Country	Name of the group	Activity/Project	Main Researcher	Website
Canada	McGill University			<a href="http://www.mcgill.ca">www.mcgill.ca</a>
Canada	National Institute for Nanotechnology- University of Alberta	Integration of nano-scale devices and materials into complex nanosystems that can be put to practical use.		<a href="http://www.ualbertacentennial.ca/organization/affiliated/nint.html">http://www.ualbertacentennial.ca/organization/affiliated/nint.html</a>
Canada	St. Francis Xavier			<a href="http://www.stfx.ca/">www.stfx.ca/</a>
Canada	University of British Columbia			<a href="http://www.ubc.ca">www.ubc.ca</a>
Canada	University of Guelph	* Inorganic Chemistry * Physics * Organic Chemistry * Quantum Computing * Nanotech Engineering * Physical Chemistry		<a href="http://www.nano.uoguelph.ca/cgi-bin/ucon.exe?ac=v_page&amp;pa=UZYGE5">www.nano.uoguelph.ca/cgi-bin/ucon.exe?ac=v_page&amp;pa=UZYGE5</a>
Canada	University of Saskatchewan	Food science and applied microbiology, both of which involve the application of science and technology in pre- and post-harvest agriculture and in adding "value" to our primary agriproducts.		<a href="http://agbio.usask.ca/foodbio-research#8">agbio.usask.ca/foodbio-research#8</a>
Canada	University of Toronto			<a href="http://www.utoronto.ca">www.utoronto.ca</a>
China	Antibody Engineering Center of Jinan University (cooperation with the Department of optoelectronic Engineering of Jinan University)	The OTC Residue Detection Based on Surface Plasmon Resonance.  Antibody detection in food applications.	Yong Tang	<a href="http://biot.jnu.edu.cn">biot.jnu.edu.cn</a>
China	School of Biosystems Engineering and food Sciences, Zhejiang University	New micro-/nano materials and equipments for the rapid food test	Jian Wu wujian69@zju.edu.cn	<a href="http://www.caefs.zju.edu.cn/en">www.caefs.zju.edu.cn/en</a>
Czech Republic	Food Research Institute Prague	Methods for the determination of the physical properties of foods	Milan Houska  milan.houska@mhkanlux.cz	<a href="http://www.vupp.cz/envupp/department360.htm">www.vupp.cz/envupp/department360.htm</a>
Czech Republic	Institute of Chemical Technology, Prague	Active packaging, nanotechnology	Dalimil Šnita Dalimil.Snita@vscht.cz  Jaroslav Dobias Jaroslav.Dobias@vscht.cz	<a href="http://www.vscht.cz">www.vscht.cz</a>
Czech Republic	Masarykova Univerzita	<b>BIODET: Networking in the application of biosensors to pesticide detection in fruits and vegetables</b>	Petr Skladal skladal@chemi.muni.cz	<a href="http://www.muni.cz">www.muni.cz</a>
Czech Republic	Technology Centre AS CR,	Nanotechnology and food, nano safety	Jitka Kubatova kubatova@tc.cz	<a href="http://www.tc.cz">www.tc.cz</a>
Czech Republic	Univerzita Karlova v Praze / Matematicko-fyzikální fakulta	Research and development of sensor system for determination of diacetyl in beer	Juraj Dian Juraj.Dian@mff.cuni.cz	<a href="http://www.isvav.cz">www.isvav.cz</a>
Czech Republic	Vysoká škola chemicko-technologická v Praze	<b>BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods</b>	Jana Hajslova jana.hajslova@vscht.	<a href="http://www.vscht.cz">www.vscht.cz</a>

Country	Name of the group	Activity/Project	Main Researcher	Website
			cz	
Czech Republic	University of Pardubice	LOVE-FOOD Project: Love wave fully integrated Lab-on-Chip platform for food pathogen detection	Zuzana Bilkova Zuzana.Bilkova@upce.cz	www.upce.cz/
Denmark	DFVF-DTU National Food Institute	OPTOLABCARD Project: Laboratory skin patches and smartcards based on foils and compatible with a smart-phone	Dang Duong Bang ddb@dfvf.dk	www.dfvf.dk
Denmark	Danmarks Tekniske Universitet	MAGPRO2LIFE: Advanced Magnetic nanoparticles deliver smart Processes and Products for Life	Timothy Hobley tjho@food.dtu.dk	www.dtu.dk
Estonia	Bio-Competence Centre of Healthy Dairy Products	Improvement of raw milk; biotechnological methods for creating probiotic bacteria	Ene Tammsaar ene.tammsaar@tptak.ee  Andre Veskioja aveskioja@gmail.com	www.tptak.ee
Estonia	Competence Center of Food and Fermentation Technologies (CCFFT)	Advanced microorganism cultivation technologies; systems biology of microorganisms; food stability, quality and healthiness.	Urmas Sannik urmas@tftak.org	web.tftak.eu
Estonia	Estonian Research Institute for Agriculture (ERIA)	The field of activities includes basic and applied research, development and innovation activities in growing, post-harvest processing and maintaining of crops, animal feeding and welfare, as well as studying the use of agricultural machinery and technology	Edvin Nugis edvin.nugis@eria.ee Marge Malbe marge.malbe@eria.ee	www.eria.ee/www/en
Estonia	Estonian University of Life Sciences Dept. Food sciences and Hygiene, Institute of Veterinary Medicine and Animal Sciences	FoBos Project: Sharing molecular techniques for food-borne detection  All aspects of the “from farm to fork” production and processing chain of animal products	Avo Karus avo.karus@emu.ee  Arvi Koik Arvi.Koik@emu.ee	vl.emu.ee
Estonia	Tallinn University of Technology, Faculty of Chemical and Materials Technology, Department of Food Processing	New technologies, food safety, quality management etc.	Raivo Vokk raivov@rocketmail.com  Signe Adamberg signe.adamberg@gmail.com  Toomas Paalme tpaalme@staff.ttu.ee	www.ttu.ee/departments-of-food-processing
Estonia	University of Tartu	Among other things food microbiology etc	info@ut.ee	www.ut.ee/en
Estonia	Tartu Biotechnology Park	R&D institutions in the fields of biotechnology, medicine and veterinary medicine	Mariann Nolvak mariann@biopark.ee	www.biopark.ee
Estonia	Olustvere MTK	School specialized on food production, from raw materials, processing and cooking	Eve Klettenberg eveklettenberg@gmail.com	www.olustvere.edu.ee
Finland	MTT Agrifood Research	TRACEBACK Project: Integrated system	Hannu Jt. Korhonen	www.mtt.fi/

Country	Name of the group	Activity/Project	Main Researcher	Website
	Finland	for a reliable traceability of food supply chains	hannu.j.korhonen@mtt.fi	
Finland	University Of Turku	BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods	Timo Lövgren timo.lovgren@utu.fi	www.utu.fi/
France	Agence Francaise de Securite Sanitaire des Aliments	BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods	Pascal Sanders p.sanders@fougeres.afssa.fr	www.afssa.fr/
France	AgroParisTech	Large research organisation in the food sector		www.agroparistech.fr
France	Biodymia	Bioengineering and Microbial Dynamics at Food Interfaces	Catherine Joly catherine.joly@univ-lyon1.fr	biodymia.univ-lyon1.fr
France	C.N.R.S.-ESA 7076,Universite P. & M. Curie (lab. Jean Maetz)	MICROTARGETS Project: DNA CHIP Technologies for food and environmental controls (GMOS, plants, animal species and micro-organisms)	Christen Richard christen@unice.fr	unice.fr
France	CTCPA	Technical center in the food sector with specialization in packaging in fruits and vegetables sector	Patrice Dole pdole@ctcpa.org	www.ctcpa.org
France	ENSAIA	Large research organisation covering the whole field of Food Science	Muriel Jacquot muriel.jacquot@ensaia.inpl-nancy.fr	www.ensaia.inpl-nancy.fr
France	Institut National de la Recherche Agronomique	BOND Project : Bioelectronic Olfactory Neuron Device	Edith Pajot Edith.Pajot@jouy.inra.fr	www.inra.fr
France	LNE	Research organization particularly in food packaging	Catherine Sauvageot catherine.sauvageot-loriot@lne.fr	www.lne.fr
France	National Veterinary School of Nantes	BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods	François André andre@vet-nantes.fr	www.oniris-nantes.fr  www.vet-nantes.fr
France	Universite de Bretagne Occidentale	BIOTOXMARIN Project: Development of novel analytic tools for the detection of marine biotoxins	Germaine Dorange germaine.dorange@univ-brest.fr	www.univ-brest.fr
France	Universite de Burgundy	Large research organisation in the food sector	Frédéric Debeaufort Frederic.Debeaufort@u-bourgogne.fr	www.u-bourgogne.fr
France	Universite de Clermont-Ferrand, Fac. de pharmacie Lab. de bacteriologie virologie, groupe de rech. bact. Intest.	MICROTARGETS Project: DNA CHIP Technologies for food and environmental controls (GMOS, plants, animal species and micro-organisms)	Christiane Forestier christiane.forestier@u-clermont1.fr	www.u-clermont1.fr
France	Universite de Montpellier	Large research organisation in the food sector	Nathalie Gontard gontard@univ-montp2.fr	umr-iate.cirad.fr www.fedap.univ-montp2.fr
France	Universite Pierre et Marie Curie - Paris	MEM-S Project: Bottom-up design and fabrication of industrial bio-inorganic nano-porous membranes with novel	Elena Billi-Rizza Thibaud Coradin thibaud.coradin@up	www.upmc.fr

Country	Name of the group	Activity/Project	Main Researcher	Website
		<b>functionalities based on principles of protein self-assembly and biomineralization</b>	<b>mc.fr</b>	
France	VetAgroSup	Large research organisation in the food sector	Isabelle Chevallier i.chevallier@vetagro-sup.fr	www.vetagro-sup.fr/
France	Welience	Research organisation in the food sector	Anne Endrizzi anne.endrizzi@welience.com	www.welience.com/
France	Institut Pasteur	<b>LOVE-FOOD Project: Love wave fully integrated Lab-on-Chip platform for food pathogen detection</b>	<b>Bruno Dupuy bruno.dupuy@pasteur.fr</b>	<b>www.pasteur.fr</b>
France	ACTIA-ASSO	Association for Technical Coordination for Agro-Food Industry	Christophe Cotillon c.cotillon@actia-asso.eu	www.actia-asso.eu
France	Vitaverna	Promotes bilateral cooperations between China and France in a variety of green technologies	Jun Li prunush208@gmail.com	vitaverna.com
France	Technical Centre for Conservation of Agro Products	Research and services for Agrofood industry	Alain Mimouni amimouni@ctcpa.org	www.ctcpa.org
France	OSEO Innovation	Provide assistance and financial support to French SMEs and VSEs in the most decisive phases of their life cycle : start up, innovation, development, business transfer / buy out	Ariane Voyatzakis ariane.voyatzakis@oseo.fr	www.oseo.fr
France	Reveu de l'Industrie Agroalimentaire	Magazine for AgroFood Industry	Isabelle Gattegno i.gattegone@gfa.fr	www.ria.fr
France	laboratoire national de métrologie et d'essais	Certification and Analysis Laboratory	Marianne Ramaz marianne.ramaz@lne.fr	www.lne.fr
France	IFBM – Institut Français des Boissons, de la Brasserie et de la Malterie	R&D on Food Analysis	Maxime Petitcolin maxime.petitcolin@ifbm-qualtech.com	www.qualtech-groupe.com
Germany	Fraunhofer Institute for Molecular Biology and Applied Ecology	Reference analysis for food applications (GC) Projects: Locochrom, FoodChainManagement	Mark Bücking mark.buecking@ime.fraunhofer.de	www.ime.fraunhofer.de
Germany	Friedrich-Schiller-Universitaet Jena	<b>LOTUS Project: Low-cost highly conductive high resolution structures for flexible large area electronics by high throughput low temperature processing</b>	<b>Ulrich S. Schubert ulrich.schubert@uni-jena.de</b>	<b>www.uni-jena.de</b>
Germany	Institut für Agrar - und Stadt-ökologische Projekte	<b>TRACEBACK Project: Integrated system for a reliable traceability of food supply chains</b>	<b>Kerstin Röhrich kerstin.roehrich@agrar.hu-berlin.de</b>	<b>www.agrar.hu-berlin.de</b>
Germany	Iww Rheinisch Westfälisches Institut für Wasserforschung Gemeinnützige GmbH	<b>MEM-S Project: Bottom-up design and fabrication of industrial bio-inorganic nano-porous membranes with novel functionalities based on principles of protein self-assembly and biomineralization</b>	<b>Klaus-Dieter Neumann Hans-Curt Flemming g.schaule@iww-online.de</b>	<b>www.iww-online.de</b>

Country	Name of the group	Activity/Project	Main Researcher	Website
Germany	Johannes Gutenberg-Universität. Institut für physiologische chemie abteilung angewandte molekulardiologie	BIOTOXMARIN Project: Development of novel analytic tools for the detection of marine biotoxins	Heinz Schröder C. hschroed@uni-mainz.de	www.uni-mainz.de
Germany	Universitätsmedizin der Johannes Gutenberg-Universität Mainz	MEM-S Project: Bottom-up design and fabrication of industrial bio-inorganic nano-porous membranes with novel functionalities based on principles of protein self-assembly and biomineralization	Werner Müller wmueller@mail.uni-mainz.de	www.unimedizin-mainz.de
Germany	Verein zur Foerderung des Technologietransfers an der Hochschule Bremerhaven e.v.	NANODETECT Project: Development of nanosensors for the detection of quality parameters along the food chain  SENBAK Project: Development of a multisensor for the supervision of durable bakery products	Werner Mlodzianowski gf@ttz-bremerhaven.de  Ester Navarro navarro@ttz-bremerhaven.de	www.ttz-bremerhaven.de
Germany	TU Bergakademie Freiberg	MAGPRO2LIFE: Advanced Magnetic nanoparticles deliver smart Processes and Products for Life	Urs Peuker Urs.peuker@mvtat.tu-freiberg.de	http://tu-freiberg.de/fakult4/mvtat/
Germany	Karlsruher Institut fuer Technologie	MAGPRO2LIFE: Advanced Magnetic nanoparticles deliver smart Processes and Products for Life	Matthias Franzreb matthias.franzreb@kit.edu	www.ifg.kit.edu
Germany	FZMB GmbH Forschungszentrum Fur Medizintechnik Und Biotechnologie	MAGPRO2LIFE: Advanced Magnetic nanoparticles deliver smart Processes and Products for Life	Sabine Maedler	forschungszentrum@fzmb.de
Ireland	Centre for Food Safety, University College Dublin	Food Safety Research	Seamus Fanning	www.ucd.ie
Ireland	Dublin Institute of Technology	Shelf-life and hyperspectral imaging, ozonation and other technologies to extend shelf life of fruit juices	Jesus Frias, PJ Cullen	www.dit.ie
Ireland	Teagasc Moorepark National Food Research Centre	Infant milk formula manufacture; imaging; technologies to optimise quality of manufactured cheese	Mark Felon Mark Auty Phil Kelly	www.teagasc.ie
Ireland	Teagasc Ashtown Food Research Centre	High pressure processing for convenience meat applications; technologies to enhance the quality of snack-foods; technologies to reduce the incidence of pathogenic organisms in animal carcasses	Paul Allen, Eimear Gallagher , Geraldine Duffy	www.teagasc.ie
Ireland	Teagasc.The National Food Centre. Agriculture & food development Authority	TRACEBACK Project: Integrated system for a reliable traceability of food supply chains  BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants	Pat Daly pat.daly@teagasc.ie  Michael O'keeffe @teagasc.ie	www.teagasc.ie

Country	Name of the group	Activity/Project	Main Researcher	Website
		<b>in Foods</b>		
Ireland	University College Dublin	<p><b>BUGCHECK Project: A Rapid Hand-Held Analyser for Control of Microorganisms in the Complete Meat Supply Chain.</b></p> <p>Imaging systems to assess quality, Process technologies to extend shelf life</p> <p><b>MAGPRO2LIFE: Advanced Magnetic nanoparticles deliver smart Processes and Products for Life</b></p>	<p><b>Paul WHYTE</b> <a href="mailto:paul.whyte@ucd.ie">paul.whyte@ucd.ie</a></p> <p><b>Da Wen Sun</b> <a href="mailto:dawen.sun@ucd.ie">dawen.sun@ucd.ie</a></p> <p><b>James Lyng</b> <a href="mailto:james.lyng@ucd.ie">james.lyng@ucd.ie</a></p> <p><b>Donal Doolan</b> <a href="mailto:Donal.doolan@ucd.ie">Donal.doolan@ucd.ie</a></p>	<a href="http://www.ucd.ie">www.ucd.ie</a>
Ireland	University of Limerick	Processing and packaging optimisation to minimise loss of nutrients from fruit & veg; technology for the rapid detection and enumeration of spoilage organisms in foods	<p><b>David O'Beirne</b> <a href="mailto:david.o'beirne@ul.ie">david.o'beirne@ul.ie</a></p> <p><b>Martin Wilkinson</b> <a href="mailto:Martin.Wilkinson@ul.ie">Martin.Wilkinson@ul.ie</a></p>	<a href="http://www.ul.ie">www.ul.ie</a>
Ireland	University College Cork	Intelligent packaging systems; lux technology to monitor growth of spoilage organisms	(Dr. Joe Kerry, Prof. Colin Hill)	<a href="http://www.ucc.ie">www.ucc.ie</a>
Israel	Ben-Gurion University Of The Negev	<b>SENSBIOSYN: Biosensors and Sensors for the industrial biosynthesis process of widely used commercial antioxidants: nutraceuticals as additives for food and aquaculture promoting public health and safety</b>	<b>Sammy Boussiba:</b> <a href="mailto:sammy@bgu.ac.il">sammy@bgu.ac.il</a>	<a href="http://web2.bgu.ac.il/algal/">http://web2.bgu.ac.il/algal/</a>
Italy	CNR - ICRM. Istituto di Chimica del Riconoscimento Molecolare	<b>TRACEBACK Project: Integrated system for a reliable traceability of food supply chains</b>	<b>Marcella Chiari</b> <a href="mailto:marcella.chiari@icrm.cnr.it">marcella.chiari@icrm.cnr.it</a>	<a href="http://www.icrm.cnr.it">www.icrm.cnr.it</a>
Italy	CNR- ISPA. Institute for Science of Food Production	<b>GOODFOOD Project: Study of Food qualification and specification. Food markers</b>	<p><b>Antonio Logrieco</b> <a href="mailto:antonio.logrieco@ispa.cnr.it">antonio.logrieco@ispa.cnr.it</a></p> <p><b>Angelo Visconti</b></p>	<a href="http://www.ispa.cnr.it">www.ispa.cnr.it</a>
Italy	Universita degli Studi Di Napoli Federico II	<b>BIOTOXMARIN Project: Development of novel analytic tools for the detection of marine biotoxins</b>	<b>Ernesto Fattorusso</b> <a href="mailto:fattoru@unina.it">fattoru@unina.it</a>	<a href="http://www.international.unina.it">www.international.unina.it</a>
Italy	University of Milan. Department of Animal Pathology, Hygiene and Veterinary Public Health.	<b>FoBos Project: Sharing molecular techniques for food-borne detection</b>	<b>Fabrizio Cecilian</b> <a href="mailto:fabrizio.cecilian@unimi.it">fabrizio.cecilian@unimi.it</a>	<a href="http://www.unimi.it">www.unimi.it</a>
Italy	University of Parma	<b>TRACEBACK Project: Integrated system for a reliable traceability of food supply chains</b>	<b>Nelson Marmioli</b> <a href="mailto:nelson.marmioli@unipr.it">nelson.marmioli@unipr.it</a>	<a href="http://www.unipr.it">www.unipr.it</a>
Latvia	Faculty of Food Technology, Latvia University of Agriculture	Cereal, Fruit and Vegetable Processing. Food Microbiology, Food Quality. Food Industry. Education	<b>Dr. Inga Ciprovica</b> <a href="mailto:Inga.Ciprovica@llu.lv">Inga.Ciprovica@llu.lv</a>	<a href="http://www.ptf.llu.lv">www.ptf.llu.lv</a>
Latvia	Institute of Food Safety, Animal Health and Environment - "BIOR"	This is a newly formed public research institution with a derived public person's legal status. The Institute has assumed	<b>Jelena Avsejenko</b> <a href="mailto:jelena.avsejenko@bi">jelena.avsejenko@bi</a>	<a href="http://www.bior.gov.lv/en">http://www.bior.gov.lv/en</a>

Country	Name of the group	Activity/Project	Main Researcher	Website
		all functions of the National Diagnostic Centre and part of the Latvian Fish Resources Agency functions.	or.gov.lv	
Latvia	Pure Horticultural Research Centre	technological solutions for commercial horticulture through scientific investigations	Dr. agr. Liga Lepse liga.lepse@puresdis.lv	<a href="http://www.puresdis.lv/Pures-DPC.htm">http://www.puresdis.lv/Pures-DPC.htm</a>
Lithuania	Lithuanian Institute of Horticulture	*Investigations of fruit, berry and vegetable quality; *Optimization of their storage and methods of processing; *Development of biologically valuable products, using the biovariety of orchard and garden plants.	Dr. Audrius Sasnauskas	<a href="http://www.lsdil.lt/en/index.html">www.lsdil.lt/en/index.html</a>
Lithuania	Vilnius University. Institute of Biochemistry	<b>BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods</b>	Rolandas MESKYS rolandas.meskys@bchi.vu.lt	<a href="http://www.bchi.vu.lt">www.bchi.vu.lt</a>
The Netherlands	AMOLF	Fundamental research on complex molecular and material systems		<a href="http://www.amolf.nl">www.amolf.nl</a>
The Netherlands	National Institute for Public Health and the Environment	<b>BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods</b>	Hans Van Egmond hp.van.egmond@rivm.nl	<a href="http://www.rivm.nl">www.rivm.nl</a>
The Netherlands	NIZO Food Research	Food product innovations and process development		<a href="http://www.nizo.com">www.nizo.com</a>
The Netherlands	PRI-Bioscience	Sensors, electronic nose, detection of volatiles	Maarten Jongsma maarten.jongsma@wur.nl	<a href="http://www.pri.wur.nl/UK/research/bioscience">www.pri.wur.nl/UK/research/bioscience</a>
The Netherlands	RIVM	Government organisation, one of the activities is safety of applications of nanotechnologies in food		<a href="http://www.rivm.nl/English">www.rivm.nl/English</a>
The Netherlands	TNO-Healthy Living	Food & nutrition	Niek Snoeij niek.snoeij@tno.nl	<a href="http://www.tno.nl">www.tno.nl</a>
The Netherlands	Stichting Dienst Landbouwkundig Onderzoek	<b>NANODETECT Project: Development of nanosensors for the detection of quality parameters along the food chain</b>  <b>RADAR Project: Rationally Designed Aquatic Receptors integrated in label-free biosensor platforms for remote surveillance of toxins and pollutants</b>  <b>IMPRESS: IMPROVED food safety monitoring through Enhanced imaging nanoplasmonicS</b>	Jelte Beeuwe Zeilstra	<a href="http://www.wur.nl">www.wur.nl</a>
The Netherlands	Stichting Dienst Landbouwkundig Onderzoek, Rikilt - Institute Of Food Safety	<b>BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods</b>	Michel W.f. Nielen michel.nielen@wur.nl  Samuel Heenan samuel.heenan@wur.nl	<a href="http://www.wur.nl">www.wur.nl</a>

Country	Name of the group	Activity/Project	Main Researcher	Website
			Armoud Togtema arnoud.togtema@wur.nl  Hans Bouwmeester hans.bouwmeester@wur.nl	
The Netherlands	Utrecht University. Faculty of Veterinary Medicine	<b>BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods</b>	<b>Aldert Anthonie Bergwerff</b> a.a.bergwerff@uu.nl	<a href="http://www.uu.nl/faculty/veterinarymedicine">www.uu.nl/faculty/veterinarymedicine</a>
The Netherlands	University of Groningen	Encapsulation and structuring		<a href="http://www.rug.nl">www.rug.nl</a>
The Netherlands	University of Maastricht	Food structuring		<a href="http://www.maastrichtuniversity.nl">www.maastrichtuniversity.nl</a>
The Netherlands	University of Leiden	Sensors for food applications		<a href="http://www.leiden.edu">www.leiden.edu</a>
The Netherlands	U. Twente. Nanobiophysics	Measurement and detection principles	Prof. Subramaniam v.subramaniam@utwente.nl	<a href="http://www.utwente.nl/tnw/nbp">www.utwente.nl/tnw/nbp</a>
The Netherlands	Wageningen Universiteit	<b>MEM-S: Bottom-up design and fabrication of industrial bio-inorganic nano-porous membranes with novel functionalities based on principles of protein self-assembly and biomineralization</b>	<b>Jos TEUNISSEN</b> <b>Karin Schroen</b> karin.schroen@wur.nl	<a href="http://www.wur.nl">www.wur.nl</a>
The Netherlands	Wageningen University UR	Applications of micro and nanotechnologies in a.o. food and nutrition	Prof. Zuilhof han. zuilhof@wur.nl	<a href="http://www.wur.nl">www.wur.nl</a>
The Netherlands	Wageningen University UR  Laboratory for Organic Chemistry	Organic chemistry, surface modification, nanostructuring	Remko Boom Remko.Boom@wur.nl	<a href="http://www.orc.wur.nl/">www.orc.wur.nl/</a> UK
The Netherlands	Wageningen University UR. Food Process Engineering	Food process development, emulsification, fractionation, structuring	Prof. Zuilhof han. zuilhof@wur.nl	<a href="http://www.fpe.wur.nl/">www.fpe.wur.nl/</a> UK
The Netherlands	WU-Food Physics	Structure texture relationships	Prof. vd Linden  Erik.vanderLinden@wur.nl	<a href="http://www.fph.wur.nl/">www.fph.wur.nl/</a> UK
The Netherlands	WU- Product Design and Quality Management	Product innovation, packaging	Prof. van Boekel	<a href="http://www.pdq.wur.nl/">www.pdq.wur.nl/</a> UK
The Netherlands	WU-Laboratory for Physical Chemistry and Colloid Science	Supramolecular assembly	Prof. Cohen Stuart  Martien.CohenStuart@wur.nl	<a href="http://www.pcc.wur.nl/">www.pcc.wur.nl/</a> UK
The Netherlands	WU-Food Chemistry	Molecular properties and interactions of key food components within the food matrix	Prof. Gruppen  Harry.Gruppen@wur.nl	<a href="http://www.fch.wur.nl/">www.fch.wur.nl/</a> UK

Country	Name of the group	Activity/Project	Main Researcher	Website
The Netherlands	WU-Rikilt	Residues in food and safety of nano-ingredients  <b>FOODSNIFFER - FOOD Safety at the point-of-Need via monolithic spectroscopic chip identifying harmful substances in fresh produce</b>	Hans Bouwmeester hans.bouwmeester@wur.nl  Willem HAASNOOT Willem.Haasnoot@wur.nl	www.rikilt.wur.nl
The Netherlands	WU-FBR-FFC	Fresh, food and chains	Annemieke Beers annemieke.beers@wur.nl  Verena Eisner verena.eisner-schadler@wur.nl	www.fbr.wur.nl/ UK/about/organisation/ organisation+chart/FreshFoodChains/
The Netherlands	Wageningen UR	<b>PASTEUR Project: Perishable mAnagement through Smart Tracking of lifetime and quality with RFID</b>	<b>Toine Timmermans</b> toine.timmermans@wur.nl	www.wur.nl
Norway	SINTEF	Multidisciplinary research and technology centre	Kevin Frank Kevin.frank@sintef.no	www.sintef.no
Poland	Institute of Logistics and Warehousing	<b>TRACEBACK Project: Integrated system for a reliable traceability of food supply chains</b>	<b>Tomasz Dowgielewicz</b> tomasz.dowgielewicz@ilim.poznan.pl	www.ilim.poznan.pl
Poland	Szkola Główna Gospodarstwa Wiejskiego	<b>INSIDEFOOD Project: Integrated sensing and imaging devices for designing, monitoring and controlling microstructure of foods</b>	<b>Ewa Jakubczyk</b> kizop@sggw.pl	www.sggw.pl
Poland	The Institute of Animal Reproduction and Food Research PAS	The physico-chemical investigations on the molecular recognition processes based on the formation of supramolecular host-guest complexes, occurring at the border of aqueous and organic phase, and their application for: (i) chemical sensors for food analysis, (ii) as a tool for investigation of proteins interaction with small organic molecules and DNA are the main research objectives of the Department.	Jerzy Radecki radecki@pan.olsztyn.pl  Hanna Radecka hanna.radecka@pan.olsztyn.pl	www.biosensors.pan.olsztyn.pl
Portugal	Universidade do Algarve	Control Pathogen Contamination And Enhance Safety And Quality On Fresh-Cut Fruit	Carla Alexandra Alves Afonso Nunes	www.ualg.pt
Portugal	Universidade de Coimbra	Microarray-Based Detection Of Antibiotic Resistance And Virulence Factors Genes Of Escherichia Coli And Salmonella Spp.	Nuno Ricardo Furtado Dias Mendonça	www.uc.pt
Portugal	Universidade do Minho	Phagefoodsafesafe - development of a phage-based product to control salmonella and campylobacter in foodstuffs and food processing surfaces.	Joana Cecilia Valente de Rodrigues Azeredo	www.uminho.pt
Romania	National Institute of	Mechanization technologies and	Ion Pirna	www.inma.ro

Country	Name of the group	Activity/Project	Main Researcher	Website
	Research - Development for Machines and Installations Designed to Agriculture and Food Industry - INMA Bucharest	technical equipments for food industry	pirna@inma.ro	
Romania	University of Agricultural Science and Veterinary Medicine Cluj-Napoca, Dept. of Chemistry and Biochemistry for Agro-food			<a href="http://www.usamvcluj.ro/index_en.html">http://www.usamvcluj.ro/index_en.html</a>
Romania	University Politehnica of Bucharest, Laboratory for Quality Control of environment and food			<a href="http://www.chim.pub.ro/LCCP/index.html">http://www.chim.pub.ro/LCCP/index.html</a>
Romania	University of Agricultural Science and Veterinary Medicine Cluj-Napoca, Dept. of Chemistry and Biochemistry for Agro-food			<a href="http://www.usamvcluj.ro/index_en.html">http://www.usamvcluj.ro/index_en.html</a>
Romania	Academia Romana - Filiala Timisoara	<b>MAGPRO2LIFE: Advanced Magnetic nanoparticles deliver smart Processes and Products for Life</b>	Ladislau Vekas cctfa@acad-tim.tm.edu.ro	<a href="http://acad-tim.tm.edu.ro/cccta/">http://acad-tim.tm.edu.ro/cccta/</a>
Romania	National Institute of Research and Development for Biological Sciences	<b>SENSBIOSYN: Biosensors and Sensors for the industrial biosynthesis process of widely used commercial antioxidants: nutraceuticals as additives for food and aquaculture promoting public health and safety</b>	Simona Carmen Litescu slitescu@dbio.ro	<a href="http://www.dbio.ro.eu/">http://www.dbio.ro.eu/</a>
Slovenia	Nacionalni Institut za Biologijo	<b>RADAR Project: Rationally Designed Aquatic Receptors integrated in label-free biosensor platforms for remote surveillance of toxins and pollutants</b>	Potocnik Franc	<a href="http://www.nib.si">www.nib.si</a>
Spain	AINIA- Technological Center on Food Research. Dept of Instrumentation and Automatics	<b>BUGCHECK Project: A Rapid Hand-Held Analyser for Control of Microorganisms in the Complete Meat Supply Chain</b>  <b>BIODET Project: Networking in the application of biosensors to pesticide detection in fruits and vegetables</b>  <b>TRACEBACK Project: Integrated system for a reliable traceability of food supply chains</b>	Ricardo Díaz rdiaz@ainia.es  Jackie Sanchez-Molero jsanchez@ainia.es	<a href="http://www.ainia.es">www.ainia.es</a>
Spain	AINIA-Ingeniería y Procesos	Development of nanoencapsulate for alimentary use	jgarcia@ainia.es	<a href="http://www.ainia.es">http://www.ainia.es</a>
Spain	AZTI Foundation	<b>GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems</b>	Begoña Pérez bperez@suk.azti.es  Begoña Alfaro balfaro@suk.azti.es	<a href="http://www.azti.es">www.azti.es</a>

Country	Name of the group	Activity/Project	Main Researcher	Website
			Alejandro Barranco abarranco@azti.es	
Spain	BIOEF: Fundación Vasca de Innovación e Investigación Sanitarias	<b>OPTOLABCARD Project: Laboratory skin patches and smartcards based on foils and compatible with a smart-phone:</b>	Idoia Mínguez minguez@bioef.org	<a href="http://www.bioef.org">www.bioef.org</a>
Spain	CARTIF Foundation – Division. Chem and Food	Development of new technological processes for the food industry	F.Ragut fragut@cartif.es	<a href="http://www.cartif.es">http://www.cartif.es</a>
Spain	CERPTA- UAB Food Technology Plant	Application of Sensors for NEW FOOD PRODUCTION TECHNOLOGIES	Contact: Buanaventura Guamis	<a href="http://www.cerpta.com/">http://www.cerpta.com/</a>
Spain	CSIC- IIM Institute of Marine Research	Intelligent Sensors for the on-line control of food processing.	Antonio Alvarez antonio@iim.csic.es	<a href="http://www.iim.csic.es">www.iim.csic.es</a>
Spain	CSIC-IQAC: Institute of Advanced Chemical Technology	Biosensors for pathogens, pesticides, antibiotics	Pilar Marco mpmqob@iiqab.csic.es  Francisco Sanchez fjsqob@iiqab.csic.es	<a href="http://www.iqac.csic.es">www.iqac.csic.es</a>
Spain	European Community Reference Laboratory On Marine Biotoxins	<b>BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods</b>	Ana Martínez María Luisa Rodríguez-Velasco crlmb@msc.es	<a href="http://www.aesan.mssi.gob.es">www.aesan.mssi.gob.es</a>
Spain	GAIKER	<b>OPTOLABCARD Project: Laboratory skin patches and smartcards based on foils and compatible with a smart-phone</b>	Garbiñe Olabarria olabarria@gaiker.es	<a href="http://www.gaiker.es">www.gaiker.es</a>
Spain	IRTA-Ingeniería y Procesado de Alimentos	Evaluation of packaging systems based on nanocomposites with antimicrobial and microwave susceptor capacity to improve the quality and safety of meat products.	pierre.picouet@irta.es	<a href="http://www.irta.cat">www.irta.cat</a>
Spain	IRTA	Rapid, portable and cost effective biosensor for multi-pathogen detection in milk.	Alejandro Bach Ariza	<a href="http://www.irta.es">http://www.irta.es</a>
Spain	IRTA	Sensors for meat quality control	Angels Oliver Nuria Panella	<a href="http://www.irta.es">www.irta.es</a>
Spain	IRTA: Research Institute of Agrofood Technologies  Dept. Rumiantes	Providing milk supply chain with a rapid, portable and cost effective biosensor for multi-pathogen detection in milk.		<a href="http://www.irta.cat">www.irta.cat</a>
Spain	IRTA - Monells	Food Safety	Massimo Castellari massimo.castellari@irta.cat	<a href="http://www.irta.cat">www.irta.cat</a>
Spain	IRTA	Food Technology	Begonya Marcos begonya.marcos@irta.cat	<a href="http://www.irta.cat">www.irta.cat</a>

Country	Name of the group	Activity/Project	Main Researcher	Website
Spain	NEIKER-Biotecnología Molecular	Biotechnology to control and ensure the quality in the production of wine (BIOVITIS).	Sonia Castañón de la Torre scdelatorre@neiker.net	<a href="http://www.neiker.net">http://www.neiker.net</a>
Spain	TEKNIKER	<b>GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems</b>  <b>NIR sensor for detecting proteins and fats in dairy fluids.</b>	<b>Santos Merino</b> smerino@tekniker.es  <b>Carlos Zuazo</b> czuazo@tekniker.es  Deitze Otaduy Deitze.otaduy@tekniker.es	<a href="http://www.tekniker.es/">www.tekniker.es/</a>
Spain	UAB-Universitat Autònoma de Barcelona. Department of Animal and Food Science	<b>FoBos Project: Sharing molecular techniques for food-borne detection</b>	<b>Armand Sánchez</b> armand.sanchez@uab.cat  Manuel Castillo Zambudio manuel.castillo@uab.es  Martin Buffa Martin.buffa@uab.es	<a href="http://www.uab.es/">www.uab.es/</a>  <a href="http://www.cerpta.com">www.cerpta.com</a>  <a href="http://www.cerpta.com">www.cerpta.com</a>
Spain	Universidad Politécnica de Madrid	Advanced techniques for the assessment of quality and safety of fresh and fresh-cut vegetables.	marga rita.ruiz.altisent@upm.es	<a href="http://www.upm.es">www.upm.es</a>
Spain	UPM: Polytechnics University of Madrid.	Intelligent sensor systems for the in-line quality control of food	Pilar Barreiro Elorza  gi.lpftag@upm.es	<a href="http://www.upm.es">www.upm.es</a>
Spain	UPV-Universidad Politécnica De Valencia	<b>BIODET Project: Networking in the application of biosensors to pesticide detection in fruits and vegetables</b>	<b>Angel Montoya</b> amontoya@eln.upv.es	<a href="http://www.upv.es">www.upv.es</a>
Spain	USC-Universidade de Santiago de Compostela	<b>BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods</b>	<b>Luis M. Botana</b> luis.botana@usc.es	<a href="http://www.usc.es">www.usc.es</a>
Spain	US University of Sevilla- Ingeniería Química	Application of nanotechnology and product engineering for recovery of agricultural and food products.	jmrodri@us.es	<a href="http://www1.us.es/centrosydep/departamentos/index.php?depart=1061">www1.us.es/centrosydep/departamentos/index.php?depart=1061</a>
Spain	UV. University of Valencia. Group of Microbiology and Ecology	Development of probes for the construction of a biochip able to detect microbial wine spoilage.	Sergi Ferrer Sergi.Ferrer@uv.es  Carmen Berbegal de Gracia carmen.berbegal@uv.es	<a href="http://www.uv.es/enolab">www.uv.es/enolab</a>
Spain	UVA: University of Valladolid	E-tongue systems for food quality and safety	Mari Luz Rodríguez mluz@eis.uva.es  José Antonio de Saja sajasaez@fmc.uva.es	<a href="http://www.uva.es">www.uva.es</a>

Country	Name of the group	Activity/Project	Main Researcher	Website
Spain	UVIGO: University of Vigo Dept of Analytical and Food. Group of Electroanalysis and Biosensors	Amperometric Biosensors's design based on carbon nanotubes functioned with arenediazonium ions and its Food-Processing Applications.	Elisa González Romero eromero@uvigo.es	www.uvigo.es
Spain	UVIGO-Ingeniería Química (Grupo Investigación Ingeniería Química)	Development of membrane technologies for the production and purification of prebiotic food ingredients.	jcparajo@uvigo.es	webs.uvigo.es/grupo_eq2/
Spain	Universidad De Salamanca	<b>MAGPRO2LIFE: Advanced Magnetic nanoparticles deliver smart Processes and Products for Life</b>	Paulo Augusto pauloaugusto@usal.es	aplicama.usal.es
Spain	Chemical Department - University of Almeria	<b>FOODSNIFER - FOOD Safety at the point-of-Need via monolithic spectroscopic chip identifying harmful substances in fresh produce</b>	Amadeo R. FERNANDEZ-ALBA amadeo@ual.es	www.ual.es
Spain	Universitat Rovira i Virgili	<b>FLEXSENS: Chemical Sensors for the 21st Century</b>	Rosa Solà Alberich rosa.sola@urv.cat	www.urv.cat
Spain	ACC10	Catalan Government Agency to promote catalan enterprises	Marc Gràcia Solé mgracia@acc10.cat  Cristina Penya cpenya@acc10.cat	www.acc10.cat
Spain	ASCAMM	Techological Centre	Ricard Jimenez Buendia science@ascamm.com	www.ascamm.com
Spain	UAB Research Park	Private non-profit research foundation	Virginia Cousté Virginia.couste@uab.cat	Parc.uab.es
Spain	Matgas 2000 AIE	non-profit research organization	Patricia Ruiz Nicolás ruiznip@matgas.org  Sandra Pardilla Marceliano spardilla@matgas.org	www.matgas.org
Spain	Triptolemos	non-profit private foundation promoting food industry	Yvonne Colomer ycolomer@triptolemos.org	www.triptolemos.org
Sweden	Swedish University of Agricultural Sciences Faculty	<b>BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods</b>	Hans Pettersson hans.pettersson@slu.se  Rolf Larsen rolf.larsen@vv.slu.se	www.slu.se
Switzerland	Fondazione Per L'istituto Di Ricerca In Biomedicina	<b>RADAR Project: Rationally Designed Aquatic Receptors integrated in label-free biosensor platforms for remote surveillance of toxins and pollutants</b>	Giorgio Nosedà info@irb.usi.ch	www.irb.ch
Switzerland	University of Zürich	<b>BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods</b>	Hanspeter Naegeli naegelih@vetpharm.unizh.ch	www.uzh.ch

Country	Name of the group	Activity/Project	Main Researcher	Website
Switzerland	Global Life and Sciences	Mobile point-of-care (POC)	Didier Mauroy d.mauroy@biofield.ch	www.globallifeandsciences.com
Thailand	Department of Livestock Development	BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods	Sasitorn KANARAT skanarat@hotmail.com	www.dld.go.th/
Turkey	Akdeniz University - CREM	TRACEBACK Project: Integrated system for a reliable traceability of food supply chains	Ahmet Ali Koc alikoc@akdeniz.edu.tr	www.akdeniz.edu.tr
United Kingdom	Campden & Chorleywood Food Research Association	SENBAC Project: Development of a multisensor for the supervision of durable bakery products	Juan Manuel Alava info@campden.co.uk	www.campden.co.uk
United Kingdom	Cranfield University	GOODFOOD Project: Food Safety and Quality Monitoring with Microsystems	Steven John Setford s.j.setford@cranfield.ac.uk	www.cranfield.ac.uk
United Kingdom	Imperial College Of Science Technology And Medicine	LOTUS Project: Low-cost highly conductive high resolution structures for flexible large area electronics by high throughput low temperature processing	Brooke Alasya b.alasya@imperial.ac.uk	www3.imperial.ac.uk
United Kingdom	Queen's University of Belfast Department of Veterinary Science	BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods	Heather Anderson Chris Elliott chris.elliott@qub.ac.uk	www.qub.ac.uk
United Kingdom	Scottish Newcastle Molecular Biology Research Centre. Technical Centre os Scottish Courage.	MICROTARGETS Project: DNA CHIP Technologies for food and environmental controls (GMOS, plants, animal species and micro-organisms)	Jeff Hodgson jeff.hodgson@scbrw.co.uk	www.newcastle.edu.au
United Kingdom	The Secretary of State for Environment, Food and Rural Affairs	BIOCOP Project: New Technologies to Screen Multiple Chemical Contaminants in Foods	Matthew Sharman matthew.sharman@fera.gsi.gov.uk	www.defra.gov.uk
United Kingdom	The Secretary of State for Environment, Food and Rural Affairs	NANODETECT Project: Development of nanosensors for the detection of quality parameters along the food chain	Paul Whitfield paul.whitfield@fera.gsi.gov.uk	www.defra.gov.uk
United Kingdom	The Secretary of State for Environment, Food and Rural Affairs	ARROWS Project: Advanced interfaced micro-systems Research for analysis of Real-wOrld clinical, food, environmental and Waste Samples	Joanne Baker +44-1904462319	www.defra.gov.uk
United Kingdom	University of Birmingham	MAGPRO2LIFE: Advanced Magnetic nanoparticles deliver smart Processes and Products for Life	Owen R.T. Thomas o.r.t.thomas@bham.ac.uk	http://www.birmingham.ac.uk
USA	University of Massachusetts	Nano-based delivery systems	D.J. McClements mcclements@foodsci.umass.edu	www.umass.edu/foodsci/faculty/mcclementsPubs.html
USA	University of Massachusetts	Nano-modification of packaging	J. Goddard goddard@foodsci.umass.edu	www.umass.edu/foodsci/faculty/goddardPubs.html
USA	Rutgers University	Nano-based delivery systems	Q Huang qhuang@aesop.rutgers.edu	lifesci.rutgers.edu/~molbiosci/faculty/huang.html

## 5. Initiatives and events that may bridge smart / microsystems and food applications

Next, a list of events, conferences, fairs, networks, etc. are identified, mainly in Europe, related to Microtechnologies and Food Sectors. As many of these events are periodic the output of this part of the search is to see which areas and technologies are covered and according to that, to determine which are the more interesting events to be addressed for dissemination of results, awareness-raising campaigns and community building actions.

The identification of events will continue during the whole life of the project, and participation on them will take place once the first results of the project are available.

Country	Event	Type	Description	Year	Website
Argentina	NANOMERCOSUR 2011	Scientific Congress and industrial fair	organizer Nanotechnology Argentinean Foundation	every two years	<a href="http://encuentro.nano.fan.org.ar/">http://encuentro.nano.fan.org.ar/</a>
Argentina	Nano-Safe 2012 including Agrofood regulations.	Conference	organizer Nanotechnology Argentinean Foundation		<a href="http://www.nanosafe.org">www.nanosafe.org</a>
Belgium	Smart Systems Integration	international communication platform	Part of the activities of EPoSS	5-6 March 2011	<a href="http://www.smart-systems-integration.org/public/news-events/events">www.smart-systems-integration.org/public/news-events/events</a>
Belgium	“Research and Innovation Collaboration in the Food Industry Sector”	Eureka Conference	EUREKA Academy event	24 November 2011	<a href="http://www.eurekanetwork.org/showevent?p_r_p_564233524_articleId=1174393&amp;p_r_p_564233524_groupId=10137">www.eurekanetwork.org/showevent?p_r_p_564233524_articleId=1174393&amp;p_r_p_564233524_groupId=10137</a>
Bulgary	Day of Food and Beverage Industry and National Conference	Conference and Fair		November, 29-30 <sup>th</sup> , 2011	<a href="http://www.ufi-bg.com/news.php?NewsID=131">www.ufi-bg.com/news.php?NewsID=131</a>
Bulgary	First workshop on food safety	Workshop	The Joint Genome Centre organised and hosted the event,	21st September	<a href="http://www.uni-sofia.bg/index.php/eng/news/hot_news/bon_appetit">www.uni-sofia.bg/index.php/eng/news/hot_news/bon_appetit</a>
Canada	Nanotechnology.	Network	Nano Ontario is a 4th		<a href="http://www.nanoontario">www.nanoontario</a>

	Network of Ontario		pillar organization of academic, government, industrial, and finance community members with a mutual interest in the development of the province's potential in nano technology.		<a href="http://o.ca/index.php?page=about">o.ca/index.php?page=about</a>
<b>China</b>	Network on monitoring of food quality and safety during the production process	Network-China/Germany	The Fraunhofer ENAS and the Microsystems Research Centre of the Chongqing University (China) establish the network based on common works in the field of spectroscopy		
<b>Czech Republic</b>	Czech Technology Platform for Food (CTPP)	Platform			<a href="http://www.ctpp.cz">www.ctpp.cz</a>
<b>Czech Republic</b>	FOODNET	Network			<a href="http://www.ip-adress.com/ip_tracer/foodnet.cz">www.ip-adress.com/ip_tracer/foodnet.cz</a>
<b>Czech Republic</b>	Food Safety Information Center (ICBP)	Network			<a href="http://www.foodsafety.cz">www.foodsafety.cz</a>
<b>Czech Republic</b>	Transfer Workshop on Packaging Technologies	Workshop		2010	<a href="http://www.dil-ev.de/...technologietransfer-workshop-">www.dil-ev.de/...technologietransfer-workshop-</a>
<b>Czech Republic</b>	Brokerage event SALIMA 2010	International Food Fair		2010	<a href="http://www.bvv.cz/en/salima/">www.bvv.cz/en/salima/</a>
<b>Estonia</b>	Food/Feed Quality, Safety and Risks in Agriculture“ FLAVOURE Conference	International Conference	This conference aims to demonstrate the role of research in developing new technologies which able to ensure food/feed quality as well as to identify and reduce the risk factors in production chain.	2011	<a href="http://www.flavoure-project.eu//projects/flavoure/events/flavoure-conference">www.flavoure-project.eu//projects/flavoure/events/flavoure-conference</a>
<b>France</b>	SISQA	Fair	International Food Quality Assurance Week - Food Quality Trade Fair	Annual	<a href="http://www.expodatabase.com/aussteller/messen/">www.expodatabase.com/aussteller/messen/</a>
<b>Germany</b>	Pestizidanalytik“	National Seminar	Gesellschaft Deutscher Chemiker,	2011	<a href="http://www.gdch.de">www.gdch.de</a>

			Frankfurt		
Germany	Anuga	Food Trade	The world's leading food fair for the retail trade and the food service and catering market	2011	<a href="http://www.anuga.de/de/anuga/home/index.php">http://www.anuga.de/de/anuga/home/index.php</a>
Germany	TechnoPharm	Trade Fair	International Trade Fair for Life Science Process Technologies, Pharma - Food - Cosmetics	2011	<a href="http://www.technopharm.de">http://www.technopharm.de</a>
Germany	Biotechnica	Fair	Europe's leading trade fair for biotechnology and the life sciences	2011	<a href="http://www.biotechnica.de">www.biotechnica.de</a>
Germany	Food ingredients Europe	Fair	International Exhibition and Conference on Food Ingredients, Product Development and Quality Control	2011	<a href="http://www.expodatabase.com/aussteller/messen">www.expodatabase.com/aussteller/messen</a>
Germany	Fruit Logistica	Fair	FRUIT LOGISTICA is the world of fresh produce	2012	<a href="http://www.fruitlogistica/englisch/At_a_glance/index.html">www.fruitlogistica/englisch/At_a_glance/index.html</a>
Germany	IFFA	Technology meats Business			<a href="http://iffa.messefrankfurt.com/frankfurt/en/besucher/willkommen.html">iffa.messefrankfurt.com/frankfurt/en/besucher/willkommen.html</a>
Germany	BioTOP Berlin-Brandenburg :	Network	Network for all questions pertaining to biotechnology in the Berlin-Brandenburg region.		<a href="http://www.biotop.de">www.biotop.de</a>
Italy	Technological District in Agro-Food (DARE) in Puglia Region, city of Foggia	Research Cluster			<a href="http://www.darepuglia.it">www.darepuglia.it</a>
Italy	Technological District in HighTech (DHITECH) in Puglia Region, city of Lecce	Research Cluster			<a href="http://www.dhitech.it">www.dhitech.it</a>
Italy	Annual Conference of the Italian Association on Sensors and Microsystems (AISEM)	National Conference			
Japan	Food Microscience Network	Network	Network which gathers professionals working on food		<a href="http://www.mics-net.org">www.mics-net.org</a>

			science and related fields, including physical chemistry and polymer chemistry, among others		
<b>Japan</b>	<p>ICOFANS 2010</p> <p>International Conference on Food Applications of Nanoscale Science</p> <p>Hosted by the Japan Society for Food Engineering and International Society of Food Applications of Nanoscale Science (SFANS)</p>	<p>Conference</p> <p>Chairperson: Mitsutoshi Nakajima</p>	<p>organized every year by an executive committee composed of Professors and researches from various universities and research institutes from Japan), as well as from private sector e.g. FUJIFILM Corporation, Toshiba Corporation,</p>	2010	<p><a href="http://www.nanotechexpo.jp/en">www.nanotechexpo.jp/en</a></p>
<b>Latvia</b>	<p>Baltic Conference on Food Science and Technology</p> <p>"Innovations for food science and production"</p>	<p>Conference</p>		2011	<p><a href="http://eng.llu.lv/?ri=4633">http://eng.llu.lv/?ri=4633</a></p>
<b>Latvia</b>	<p>The 8th meeting of the Nordic Biosafety Network</p>	<p>Workshop</p>	<p>the Institute of Food Safety, Animal Health and Environment "BIOR</p>	2011	<p><a href="http://www.nordicbiosafety.org">www.nordicbiosafety.org</a></p>
<b>Latvia</b>	<p>Lithuanian Network on Food Quality and Safety</p>	<p>Network</p>			<p><a href="http://cordis.europa.eu/fetch?CALLER=FP6_PROJ&amp;ACTION=D&amp;DOC=594&amp;CAT=PROJ&amp;QUERY=1170700730852&amp;RCN=75140">http://cordis.europa.eu/fetch?CALLER=FP6_PROJ&amp;ACTION=D&amp;DOC=594&amp;CAT=PROJ&amp;QUERY=1170700730852&amp;RCN=75140</a></p>
<b>The Netherlands</b>	<p>MinacNed</p>	<p>Network</p>	<p>branch organisation of micro and nanotechnology applications</p>		<p><a href="http://www.minacned.nl">www.minacned.nl</a></p>
<b>The Netherlands</b>	<p>MicroNanoConferentie</p>	<p>Conference</p>			<p><a href="http://www.google.es/url?sa=t&amp;rct=j&amp;q=micronanocnferentie%20the%20netherlands">http://www.google.es/url?sa=t&amp;rct=j&amp;q=micronanocnferentie%20the%20netherlands</a></p>
<b>The Netherlands</b>	<p>VMT Food Event</p>	<p>Brokerage event</p>			<p><a href="http://www.vmt.nl/vmtfoodevent">www.vmt.nl/vmtfoodevent</a></p>
<b>Poland</b>	<p>Polagra-Tech International Trade Fair of Food</p>	<p>Fair</p>	<p>Exhibition of Machines for the Food Industry</p>	2011 Annual	<p><a href="http://www.expo-database.com/au-ssteller/messen/s">http://www.expo-database.com/au-ssteller/messen/s</a></p>

	Processing Technologies				how.php
<b>Spain</b>	Alimentaria	Food Fair	The second most important in Europe	2012 and every two years	www.alimentaria-bcn.com/
<b>Spain</b>	Barcelona Tecno Alimentaria BTA	Food Industry Fair	Machines and Instrument for Food Production	2012 and every 2 years	http://www.bta-bcn.com/
<b>Spain</b>	Ibernam Network	Network of of Sensor Groups			www.inernam.es
<b>Spain</b>	Genesis Red	Spanish TP			www.genesisred.es
<b>Spain</b>	Food-for-Life Spain	Spanish TP			www.foodforlife-spain.es
<b>Thailand</b>	THAIFEX	Fair	International Trade Fair covering Food & Beverage, Food Catering, Food Technology,		http://www.worldfoodasia.com/
<b>USA</b>	Institute of Food Technologists (IFT) Conferences	Food Institution organising conferences and events in the food area	Food Science and Technology	Periodic	http://www.ift.org/meetings-and-events/

## 6. Discussion and conclusions

From the **point of view of the gathering of information**, it can be concluded that to conduct such a study is a complicated matter. Since a significant volume of information relies on the action of people freely contributing from outside the consortium, the time, depth and comprehensiveness of the responses are quite variable. In some cases, there has been a misunderstanding of what *MST for food* is, and what is not, and information outside the scope has been received mixed with interesting information. In conclusion, a lot of post-processing has been necessary to reach a minimum amount of information with a level of detail adequate for the project objectives.

The search on projects has been the pivotal point of the whole study. This search has only been done in depth for those projects funded under European programmes, as they were the only ones facilitating public information on the web that is useful, complete, and in English. The information at country level has been much more difficult to obtain, because the quality and quantity of information available in official websites is very poor. Additionally, the difficulty of processing that information has been also dependent on the language of origin, and thus on the capability of using national contacts for helping on that search.

In spite of the difficulties, and although probably incomplete, the obtained information is considered indicative enough and useful to identify trends such as main countries, main actors, and technologies and food sectors of interest.

Some conclusions can be extracted **from the analysis of the information gathered**. Despite the European food sector is the second biggest manufacturing sector in Europe with more than 300.000 companies employing around 4.3 million persons and generating an annual turnover of around 1 trillion Euros, technological offer and demand have not met yet fruitfully in the MST domain.

On the side of the demand, food industry is a traditional and conservative industry mostly dealing with low margin/commodity products reluctant to take a proactive role in new technologies that have no fast RoI. On the offer side, not many products are available, not even related to more mature MST technologies.

Not much dedicated research has been done either. At national level, not many countries have specific programmes for MST, so virtually none has had any *MST for food* calls. At European level, the framework programme has a good record of funding MST projects. Unfortunately, although food as a topic has been kept appearing in such calls, *MST for food* has never merited a dedicated call. As a result not many food oriented MST projects have been funded, and in many of those cases food appears not as a main application but as a collateral one. In summary, altogether with environmental applications, food has played a secondary role when compared with health related applications within ICT, which is the theme traditionally cover microsystems research. Beyond that, punctual examples of research of ‘sensors’ for food can be found in KBBE and NMP, but, overall, such an

effort has not been as structured and coordinated as the potential of MST and the importance of the food sector in Europe deserve.

In any case, the technological opportunities are still there. The sector is facing several simultaneous challenges that require innovation and new technological solutions: the food industry needs to guarantee food safety, improve process control and the quality of the food products, and decrease its impact on the environment while continuing to provide affordable food supply to a growing population.

Because of the mentioned lack of synchrony between offer and demand, no self organised commercial relationship between MST providers and the food sector is expected to arise soon. An intermediate step is needed that provides the appropriate scenario for community building. It must be rooted in research and development, and involve research priorities aligned to industry interests to ease innovation avenues in this domain. It is possible that the orientation of the research done in MST has not always focused on the main interests of food industry. Perhaps under the bias of the public authorities' interest and consumers concern, such research has been most oriented towards safety issues, which are not necessarily of easy implementation or of more immediate economic reward for industries. MST based process control and advanced manufacturing shall not be overlooked.

H2020 may be an opportunity for that goal. In our opinion it will be beneficial that in the future framework a programme articulated around the micro-nano-biosystems community reunites and coordinates previous disperse effort in ICT, KBBE and NMP. Such programme shall represent a sustained effort in a defined period of time with the aim of:

- increasing the awareness of the end-user industry,
- taking into consideration the appropriate role of this industry, mostly SME of limited R&D capacity, in the consortiums,
- fostering a better interconnection of players in MST for food innovations (specially with food technologists, which have a technology mindset and closer contacts with food industry and could act as mediators and multipliers of MST advantages if the industry itself proves a difficult audience),
- delineating the most promising applications to develop, and
- helping to ascertain which business models will be more appropriate for exploitation.
- Independently of the existence of specific calls, the table also summarizes the number of countries that have funded, to the knowledge of the consortium, key groups working in "MST for food" national projects or activities as presented in section 4.

In the next table, a summary of the information presented in this document is presented. The table summarises the information achieved for each country but also it reports on the countries that have institutions acting as coordinators or at least participating in the European projects studied in section 3.1. Such information is also an indicator of the importance of the MST for Food R&D activity in each country.

Country	Specific Program on MST for Food? YES/NO	National projects in MST for Food	Key actors of the MST sector with food applic.	Key actors of the Food/Bio/Pack sectors using MST	Coordinators of European Projects	MST Partners in European Projects	Food/Bio/Packaging Partners in European Projects
Argentina	YES(2012)		X				
Austria	NO	X	X	X			X
Belgium	NO	X	X	X	X(1)	X	X
Brazil	NO		X	X			
Bulgaria	NO	X	X	X			
Canada	NO	X		X			X
China	NO		X	X			
Czech Republic	NO	X	X	X			X
Denmark	NO		X	X		X	X
Estonia	NO		X	X			X
Finland	NO		X	X		X	X
France	NO		X	X	X(1)	X	X
Germany	NO	X	X	X	X(5)	X	X
Greece	NO		X			X	
Hungary	NO						
Ireland	YES	X	X	X		X	X
Israel	NO				X(1)		
Italy	NO	X	X	X	X(5)	X	X
Japan	YES	X	X				
Korea	NO						
Latvia	NO			X			
Lithuania	NO			X		X	
Luxembourg	NO						
Malta	NO						
México	NO						
The Netherlands	NO	X	X	X	X(3)	X	X
Norway	NO						
Poland	NO	X	X	X		X	X
Portugal	NO	X	X	X		X	

Country	Specific Program me on MST for Food? YES/NO	National projects in MST for Food	Key actors of the MST sector with food applic.	Key actors of the Food/Bio/ Pack sectors using MST	Coordinat ors of European Projects	MST Partners in European Projects	Food/Bio/ Packaging Partners in European Projects
Romania	NO	X	X	X	X(1)	X	X
Russia	NO						
Slovakia	NO						
Slovenia	NO		X	X	X(1)	X	X
Spain	NO	X	X	X	X(6)	X	X
Sweden	NO		X	X		X	X
Switzerland	NO	X	X	X	X(1)	X	X
Turkey	NO						X
United Kingdom	NO				X(1)		
USA	YES		X	X			