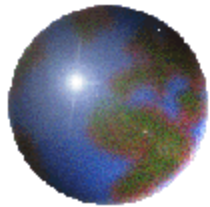


***Cibus Tec 2014, Fiera di Parma***

**Parma, October 29, 2014**



# **Research and Innovation opportunities in the Agri-food sector in Italy and Europe**

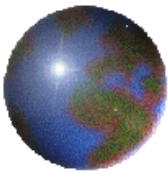
**Fabio Fava**

DICAM, School of Engineering, University of Bologna

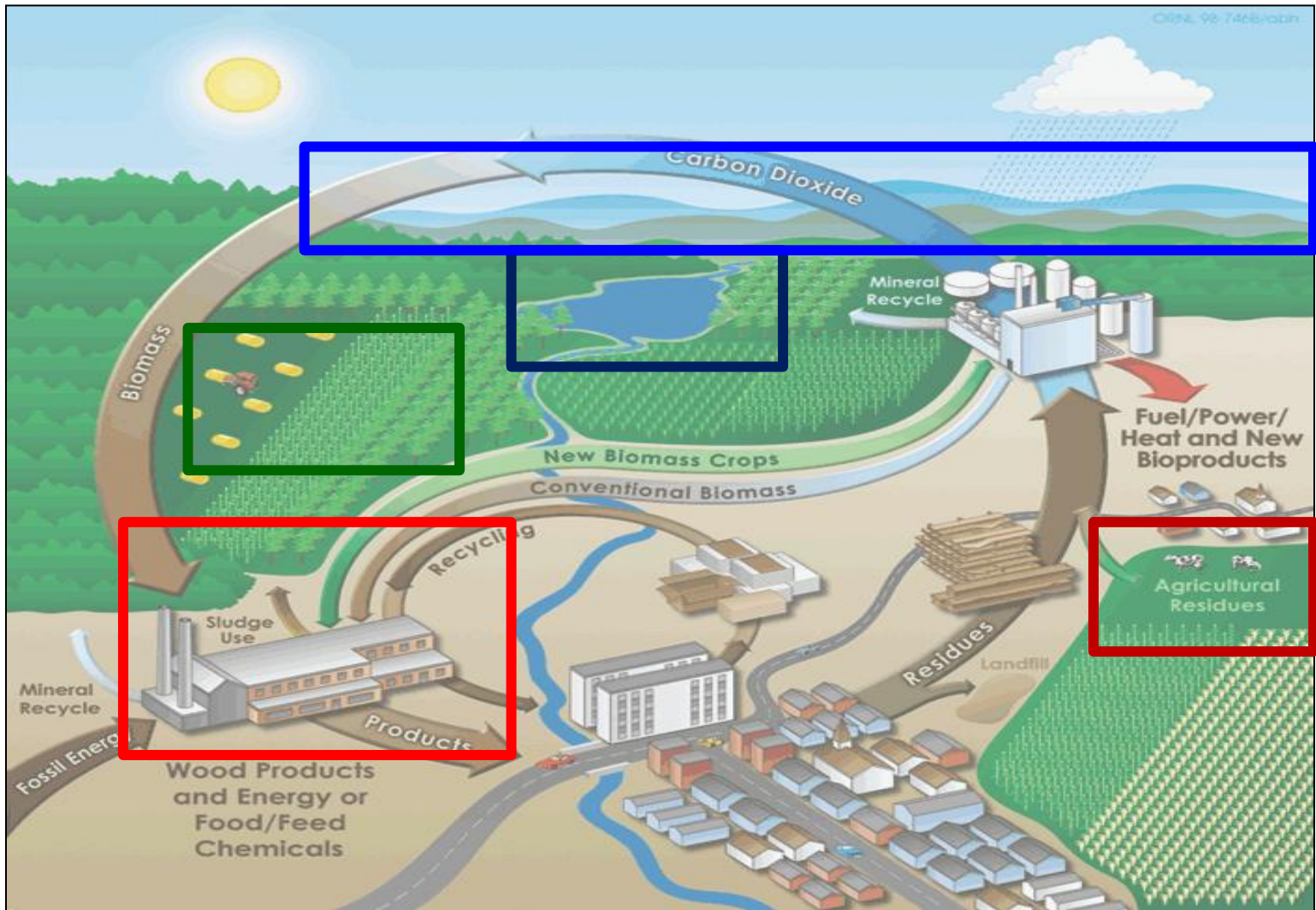
&

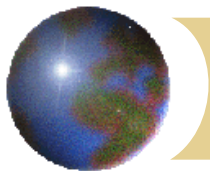
Italian Representative, Horizon2020 Societal Challenge 2 "European Bioeconomy Challenges: Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research"

(E-mail: [fabio.fava@unibo.it](mailto:fabio.fava@unibo.it))



# The Agri-food sector

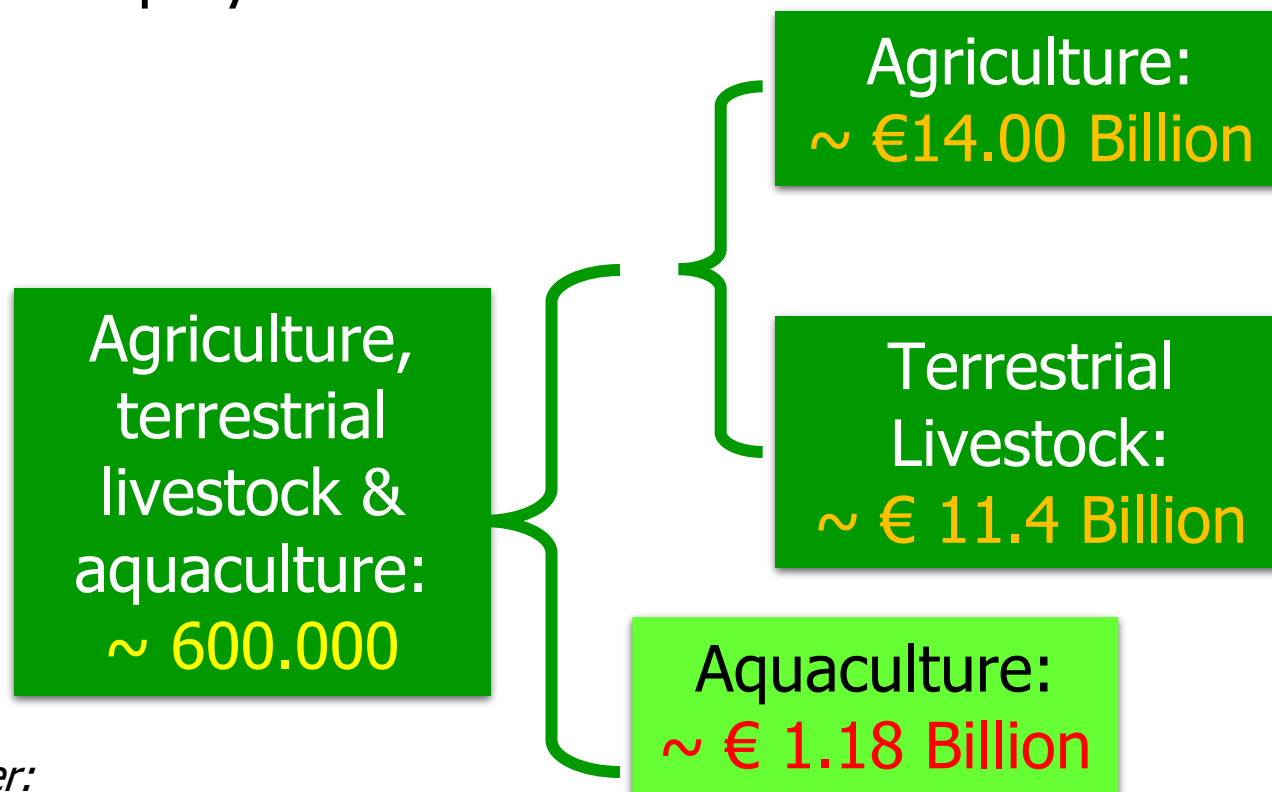




# The Italian Agriculture and Livestock

Employment

Annual Turnover



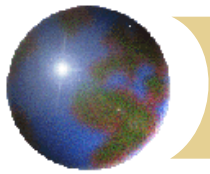
After:

**Indagine continua sulle forze di lavoro (fdl)**

<http://siqua.istat.it/SIQual/visualizza.do?id=5000098&refresh=true&language=IT>

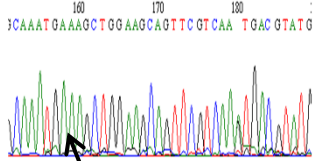
**Produzione, consumi intermedi e valore aggiunto di agricoltura, silvicoltura e pesca (Nace rev.2)**

[http://dati.istat.it/Index.aspx?DataSetCode=DCCN\\_VAAGSIPET](http://dati.istat.it/Index.aspx?DataSetCode=DCCN_VAAGSIPET)



# Italian agriculture: main R&I needs

Breeding for resistance

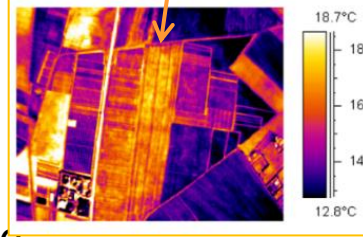


Marker Assisted Selection

Integrated Pest Management

Improved nutritional value & food security

Precision farming



Agro-ecological Modelling

Energy efficiency

Management and decision support systems

Improved fertilizers



Greenhouse efficiency

Traceability Authentication

Byproducts for biorefineries

Mycotoxin control

Biofactories of specialty products

Crop rotation

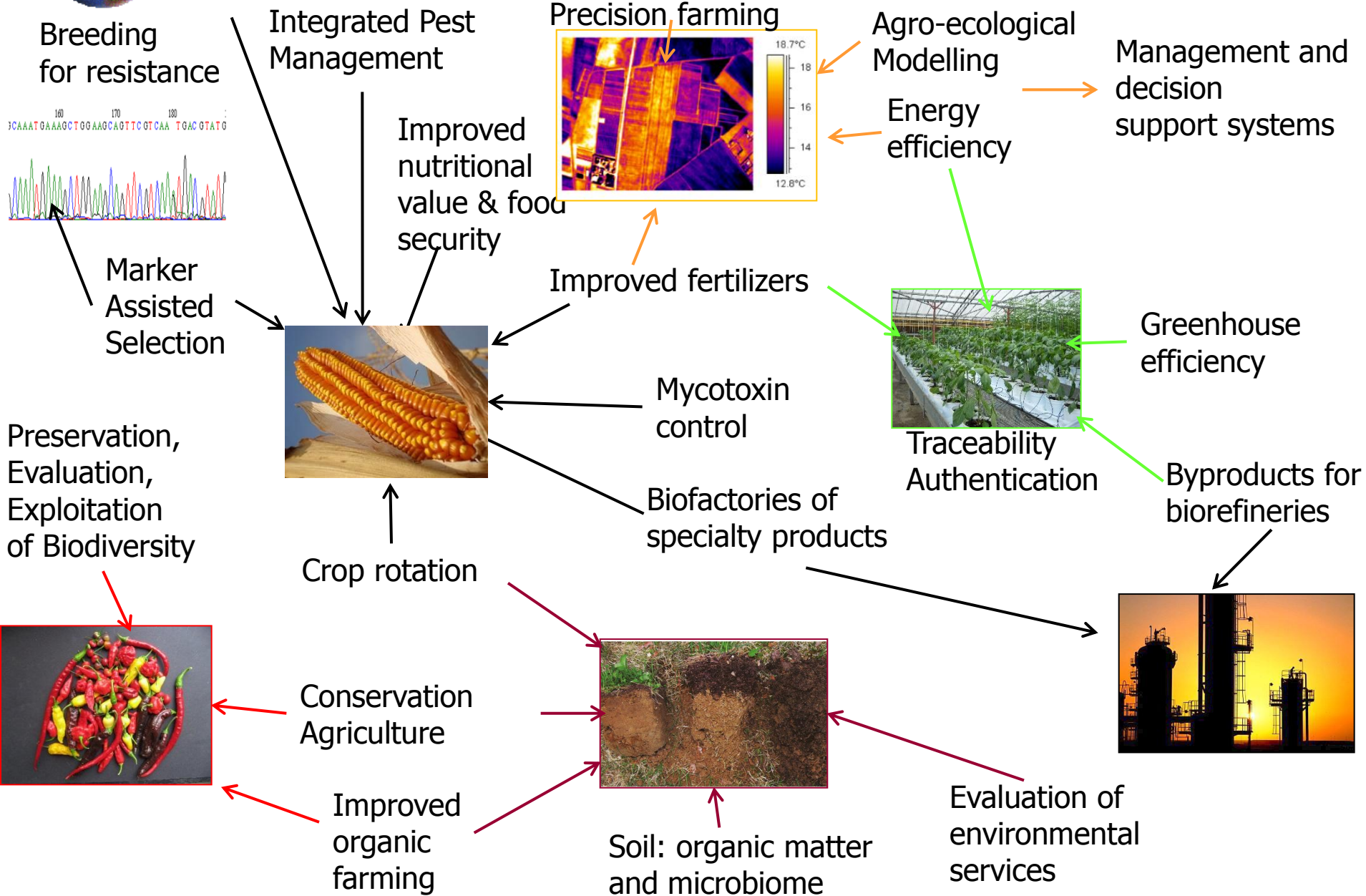
Conservation Agriculture

Improved organic farming

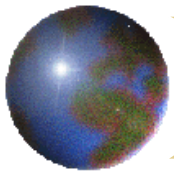
Soil: organic matter and microbiome

Evaluation of environmental services

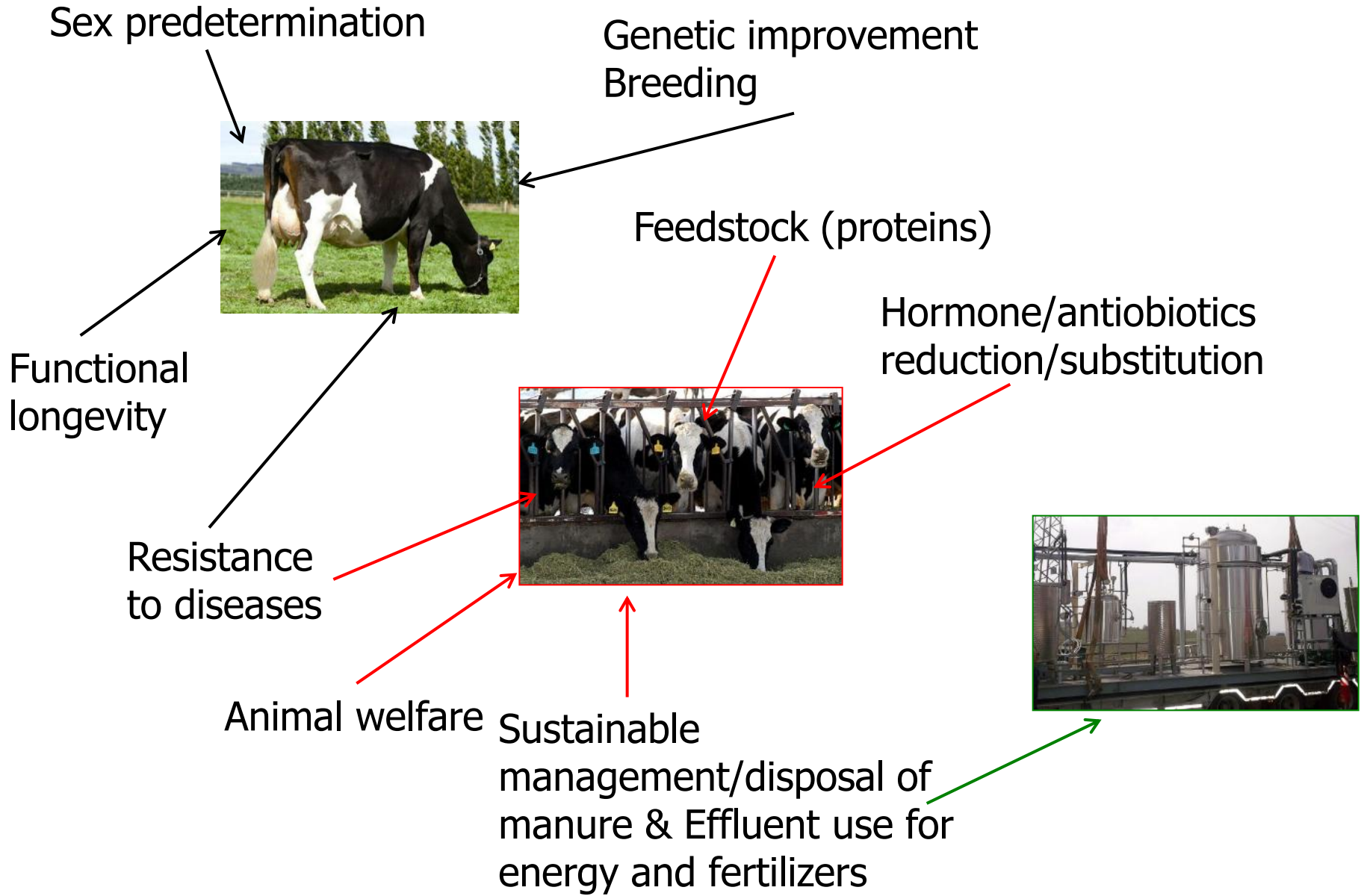
Preservation, Evaluation, Exploitation of Biodiversity

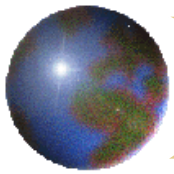






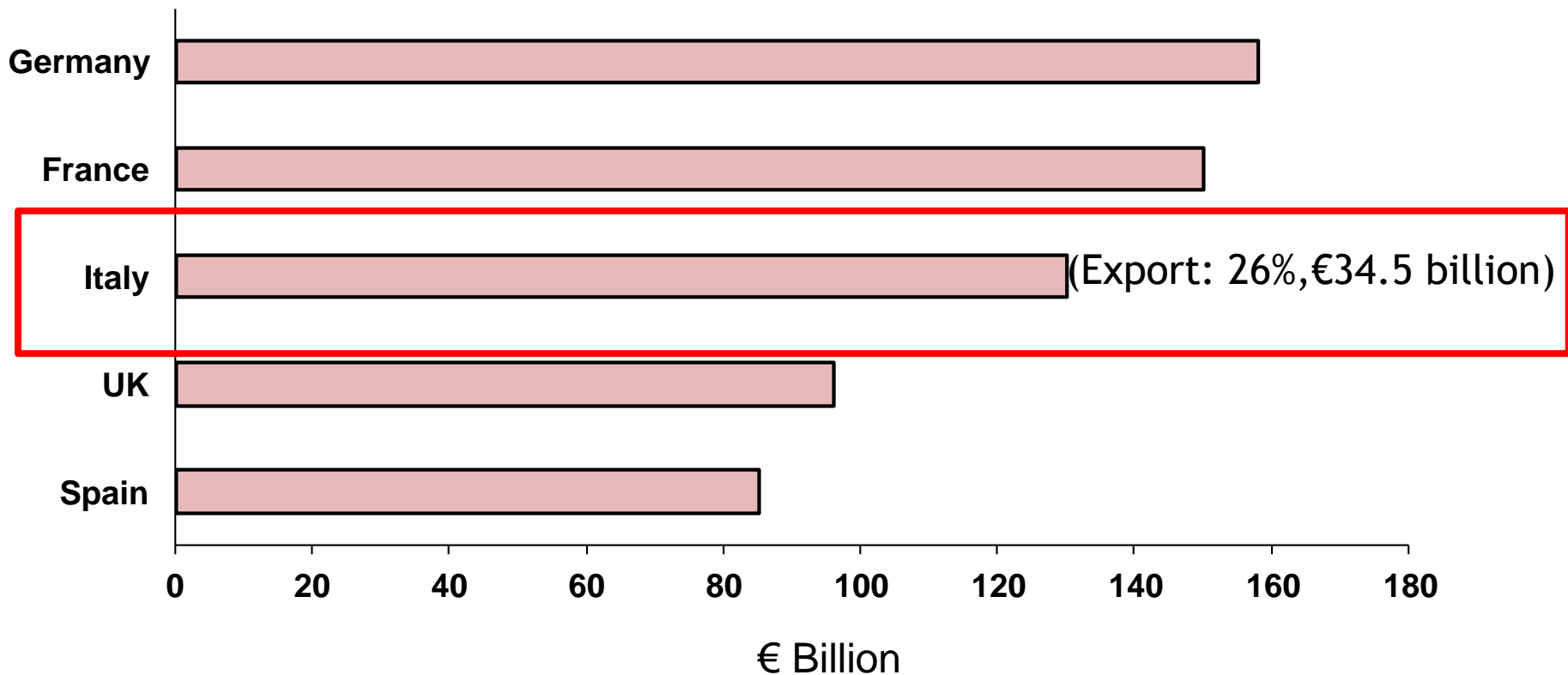
# Italian terrestrial livestock: main R&I needs



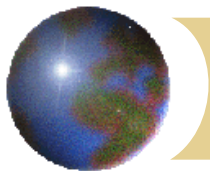


# Italian food industry (a)

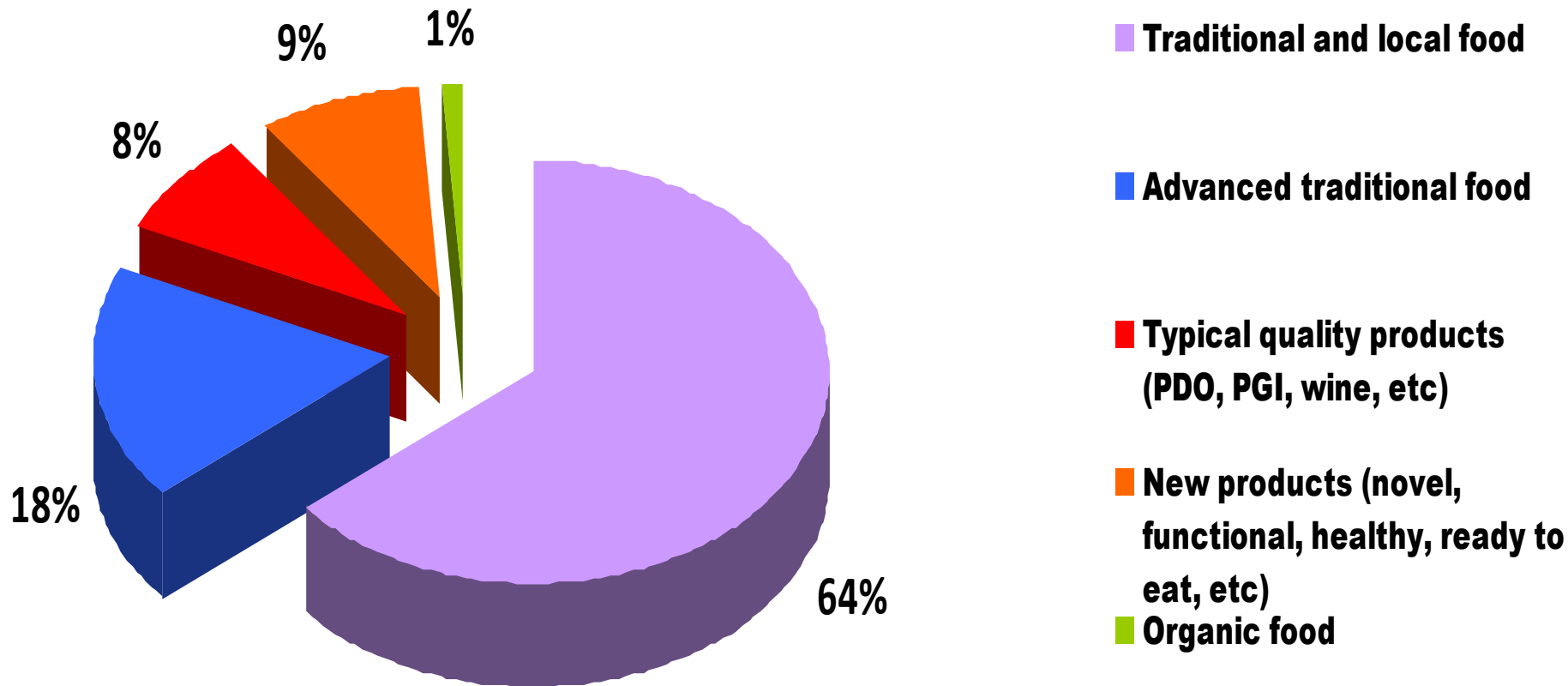
Top 5 Member States in terms of food & drink industry turnover, 2013\* (€ billion)

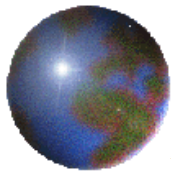


**Over than 6.845 companies and 385.000 employees**



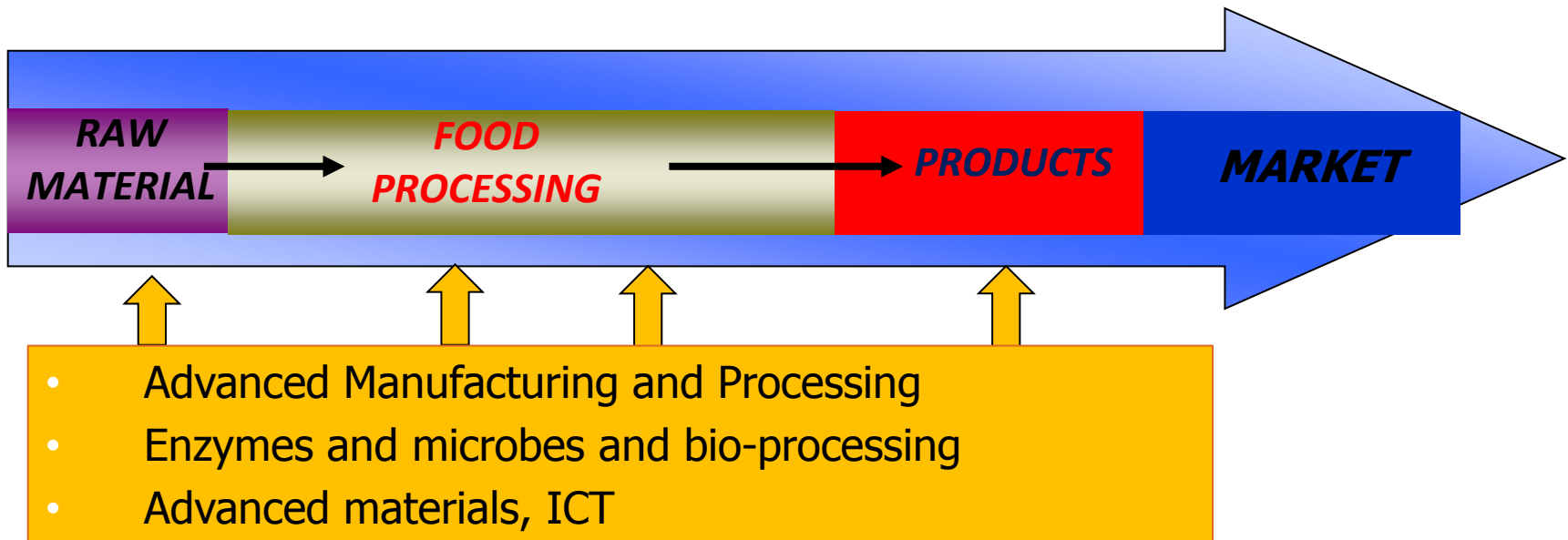
# Italian food industry (b)



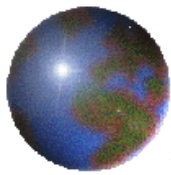


# Italian Food Industry: main R&I needs (a)

- New foods with specific nutritional needs;
- New knowledge and products for combating obesity and ageing;
- Typical quality products (DOP, IGP,STG, etc.);
- Develop Products affordable in price / quality ratio;
- Develop strategies and tools for authentication of food products and combating counterfeiting and imitations;
- Improve resource efficiency/environmental sustainability: lower food losses, water and energy use, more efficient processing, lower byproduct and waste production; biodegradable packaging, etc.

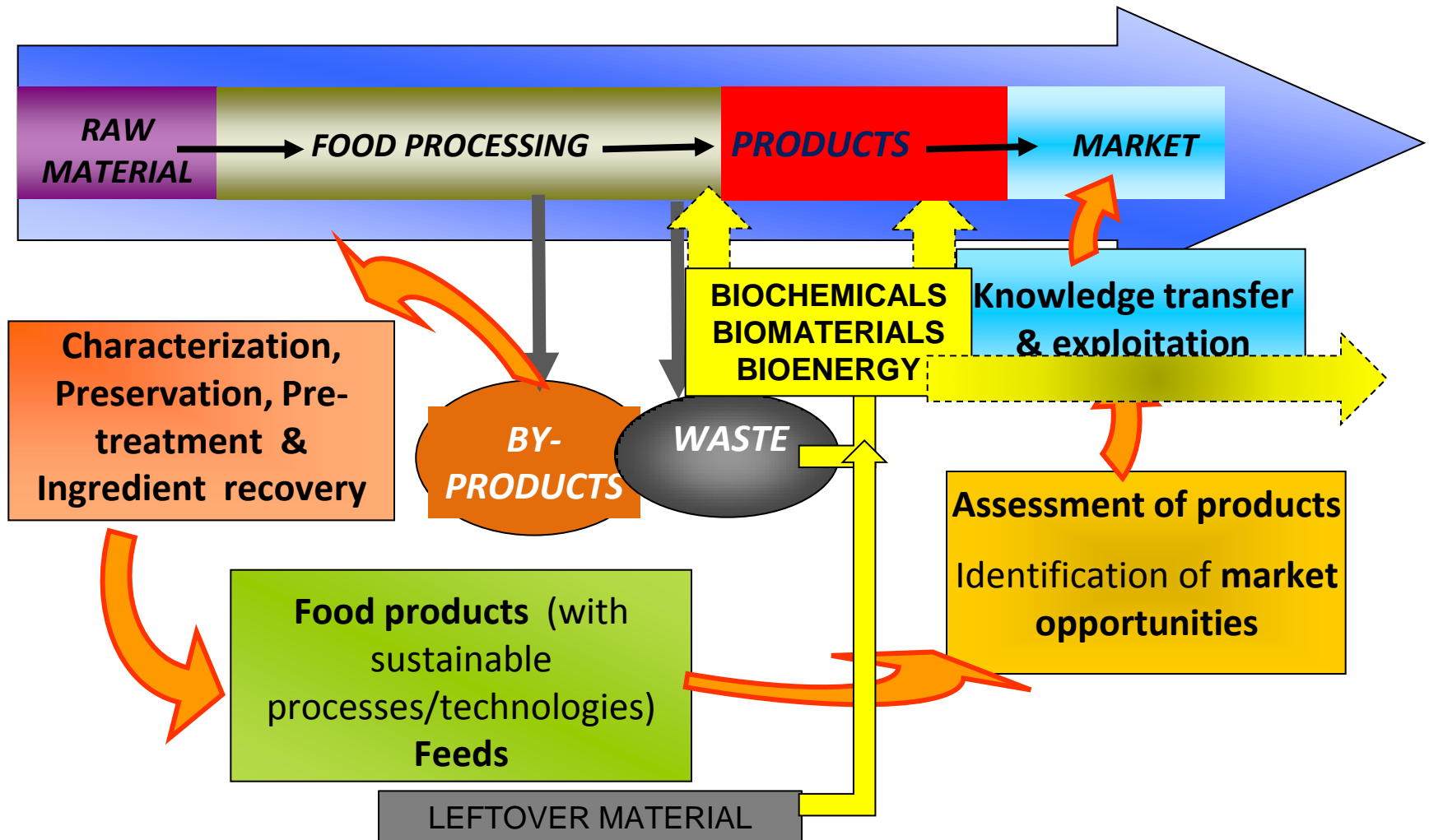


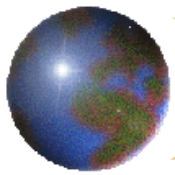




# Italian Food Industry: main R&I needs (b)

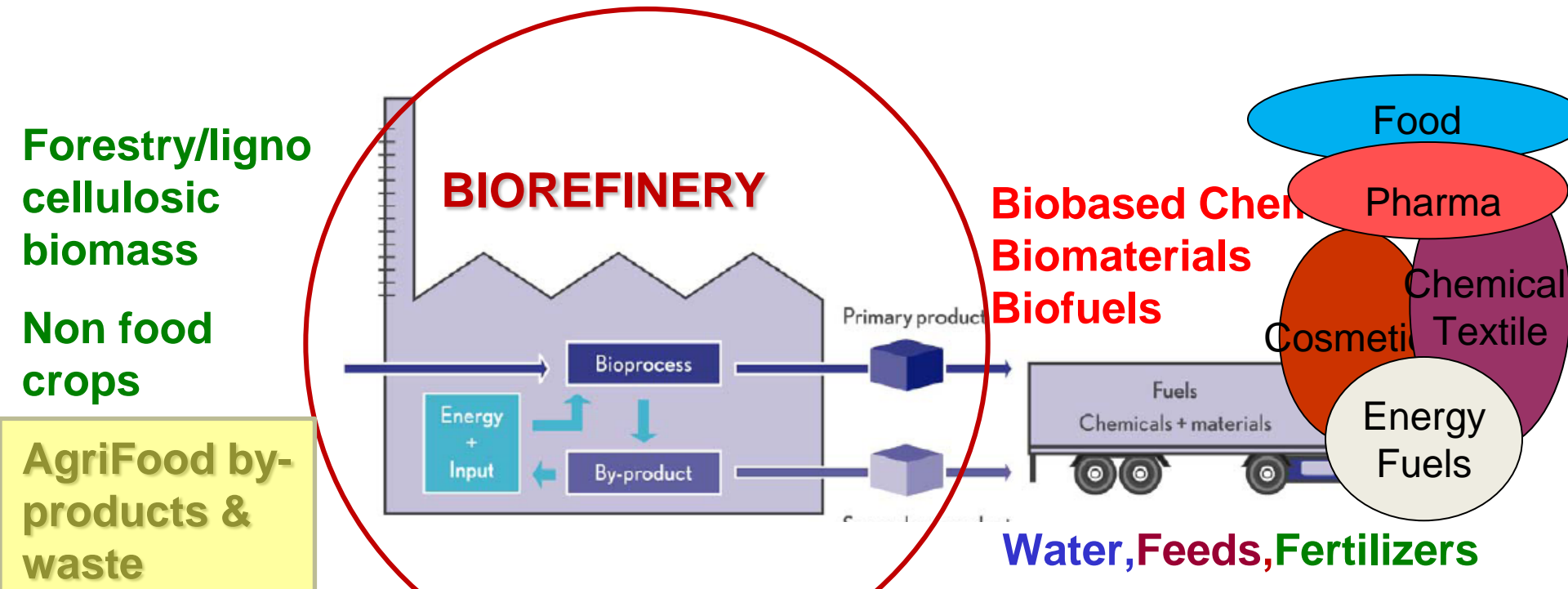
Improve resource efficiency and environmental sustainability via integrated valorization of processing byproducts and waste





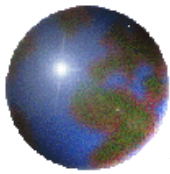
# Biobased Industry/Biorefineries

Towards a bio-based society: an integrated, multipurpose biorefinery



GHG emissions reduction in EU: ~50% (compared to fossil alternatives) by 2020

EU bio-based market: €200 billion by 2020



# Italian Biobased Industry/Biorefineries

**Private investments: more than €1.0 billion; 1600 people employed.**

## PIEMONTE

- R&D CENTRE BIOPLASTICS AND BIOCHEMICALS FROM RRM (NOVARA)
- R&D CENTRE CHEMISTRY FROM RENEWABLES (NOVARA)
- R&D CENTRE BIOCHEMICALS PROCESSES AND TECHNOLOGIES (RIVALTA SCRIVIA - AL)
- PILOT PLANT FATTY ALCOHOL (RIVALTA SCRIVIA - AL)
- PILOT PLANT BIOMONOMERS (NOVARA)
- DEMO PLANT GREEN GLYCOL (RIVALTA SCRIVIA - AL)
- INDUSTRIAL PLANT LIGNOCELLULOSIC BIOETHANOL (CRESCENTINO - VC)
- FLAGSHIP SUCCINIC ACID (CASSANO SPINOLA - AL)

## SARDEGNA

- 1 FLAGSHIP AZELAIC ACID AND PELARGONIC ACID (PORTO TORRES - SS)
- 1 FLAGSHIP BASIS FOR BIOLUBRICANTS AND BIOADDITIVES FOR RUBBER R&D CENTRE

## LOCATION TBD

EXPERIMENTAL CROPS AND DEMO PLANTS FOR EXTRACTION OF NATURAL RUBBER AND OTHER VALUABLE PRODUCTS (RESINS ETC.)

## LOMBARDIA

- R&D CENTRE GREEN CHEMISTRY PROCESS ENGINEERING AND BIOLUBRICANTS (MANTOVA)
- R&D CENTRE BIOLUBRICANTS (SAN DONATO MILANESE - MI)
- PILOT PLANT FOR BIOBASED BUTADIENE (SAN DONATO MILANESE - MI)

## VENETO

- FLAGSHIP 1,4 BDO FROM RRM (ADRIA - RO)

## EMILIA ROMAGNA

- R&D CENTRE BIOELASTOMERS (RAVENNA)

## UMBRIA

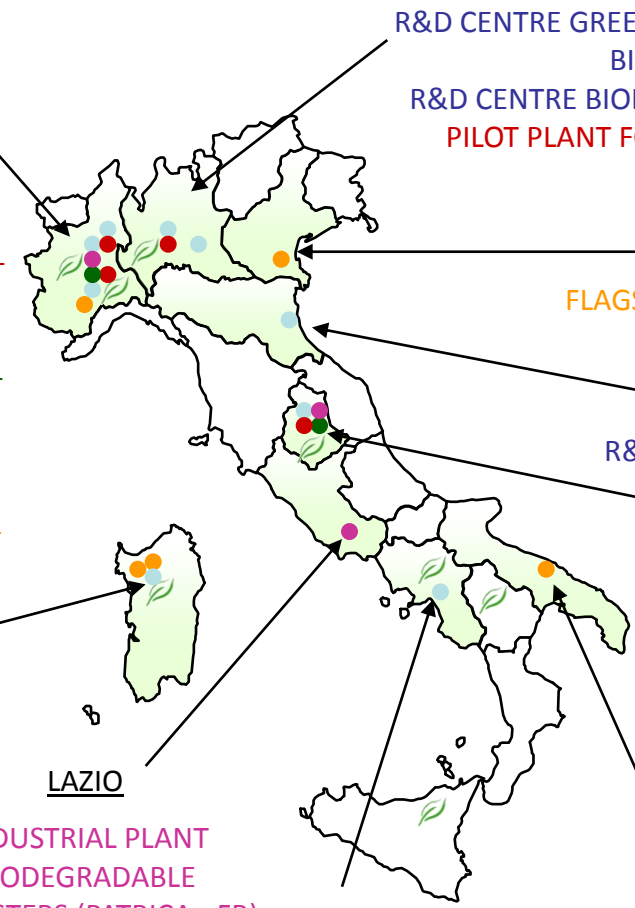
- R&D CENTRE, PILOT AND DEMO PLANTS ON OLEAGINOUS CROPS AND BIOLUBRICANTS FROM LOCAL CROPS (TERNI)
- INDUSTRIAL PLANT BIOPLASTICS BASED ON STARCH AND POLYESTERS FROM VEGETABLE OILS (TERNI)

## PUGLIA

- FLAGSHIP AVIATION FUEL (MODUGNO - BA)

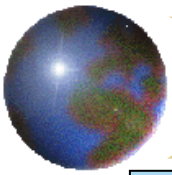
## CAMPANIA

- BIOTECHNOLOGICAL R&D CENTRE (PIANA DI MONTE VERNA - CE)

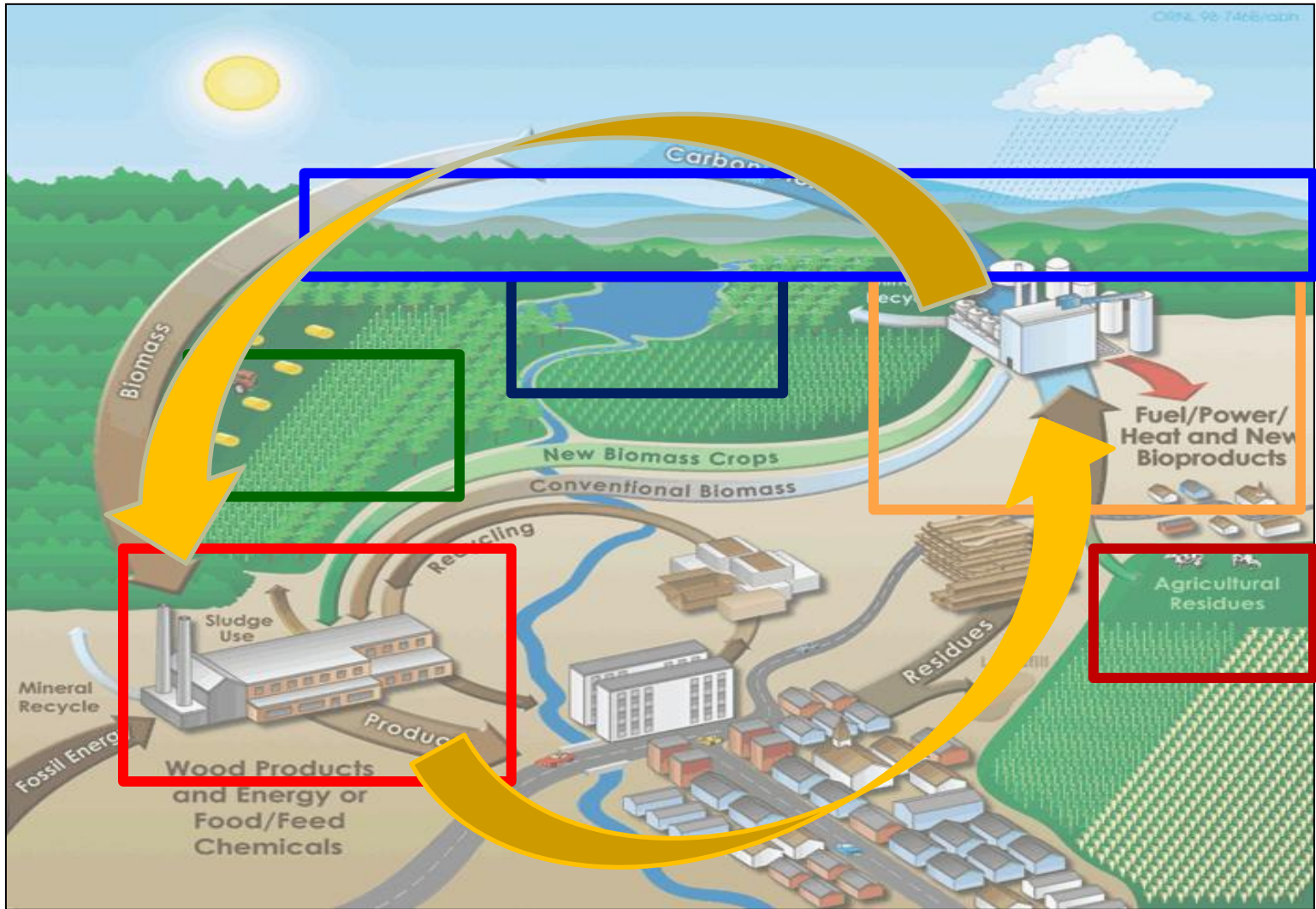


- EXPERIMENTAL FIELDS (8)
- R&D CENTRES (9)
- PILOT PLANTS (4)
- DEMO PLANTS (2)
- INDUSTRIAL SITES (3)
- FLAGSHIPS (5)

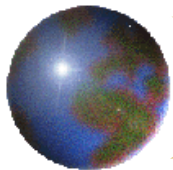
(courtesy of C. Bastioli)



# The Italian Bioeconomy

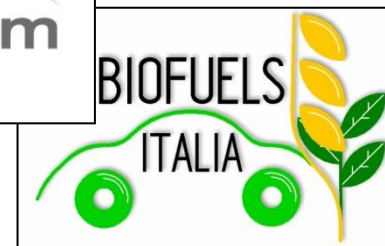




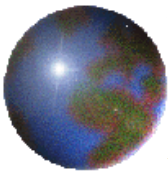


# Drivers for Italian Agro-food sector

PNR, Fondo Europeo di Sviluppo Regionale (FESR), Fondo Sociale Europeo (FSE); Fondo europeo agricolo per lo sviluppo rurale (FEASR), Fondi Sociali di Coesione (FSC).



## PIATTAFORME TECNOLOGICHE REGIONALI



# HORIZON 2020

**HORIZON 2020: The EU  
Commission research and  
innovation funding  
programme (~79 Billion,  
2014-2020)**





# Horizon2020 opportunities for Agri-Food sector



## Excellent Science

- **European Research Council**
- **Future and Emerging Technologies**
- **Marie Curie Actions**
- **Research Infrastructure**

## Industrial Leadership

- **Leadership in enabling and industrial technologies**
- **Access to risk finance**
- **Innovation in SMEs**

## Societal Challenges

1. **Health, demographic change and wellbeing**
2. **Food security, sustainable agriculture, marine and maritime research & bioeconomy**
3. **Secure, clean and efficient energy**
4. **Smart, green and integrated transport**
5. **Climate action, resource efficiency and raw materials**
6. **Inclusive, innovative and reflecting societies**
7. **Secure societies**

# Societal challenges



**Tackling societal challenges for a better society**



**1. Health, demographic change and wellbeing (7.472 Bln)**

**2. Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the bioeconomy (3.851 Bln)**

**3. Secure, clean and efficient energy (5.931 Bln)**

**4. Smart, green and integrated transport (6.339 Bln)**

**5. Climate action, resource efficiency and raw materials (3.081 Bln)**

**6. Inclusive, innovative and reflective societies (1.310 Bln)**

**7. Secure societies (1.695 Bln)**

# Societal Challenge 2: Food Security, Sustainable Agriculture and Forestry, Marine and Maritime and Inland Water Research and the Bioeconomy (a)

## Activities:



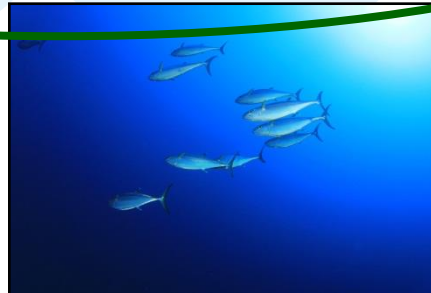
**Agriculture and forestry**

**Agri-food sector for a safe and healthy diet**

**Aquatic living resources**

**Bio-based industries and bioeconomy**

**Marine and maritime research**



# Societal Challenge 2: Food Security, Sustainable Agriculture and Forestry, Marine and Maritime and Inland Water Research and the Bioeconomy (b)

## Objectives:

- Productive and resource-efficient primary production systems
- Sufficient supplies of safe and high quality food and bio-based products, including bioenergy
- Competitive and low carbon supply chains.

**Making the best from our biological resources  
accelerating the transition to a sustainable European bioeconomy**



**EU Bioeconomy Strategy**

# Horizon 2020 SC2 : WP, Budget & Calendar

Publication of first calls: 11 December 2013

## Budget

<b>CALLS</b>	2014	<b>2015</b>
<b>Sustainable Food Security</b>	138,0 M€	<b>110,5 M€</b>

## Deadlines in 2014 and 2015:

- **Two-stage** (RIA, IA):

2014: 12/03/2014                      and                      26/06/2014

**2015: 24/02/2015                      and                      11/06/2015**

- **Single-stage** (CSAs, ERANETs):

2014: 26/06/2014

**2015: 11/06/2015**





## NAMASTE - EU

**New Advances in the integrated Management  
of food processing wAste in India and Europe:  
use of Sustainable Technologies for the Exploitation  
of by-products into new foods and feeds**

KBBE-2009-2-7-02 “Valorization of by-products in food processing”  
Collaborative project (small/medium scale) in coordination with DBT (India)

2010-2013; € 1.5 M; 7 partners from 6 EU Countries (3 companies )



# Main objective & justification

To develop the scientific/industrial background for producing new food products from citrus and wheat processing by-products.

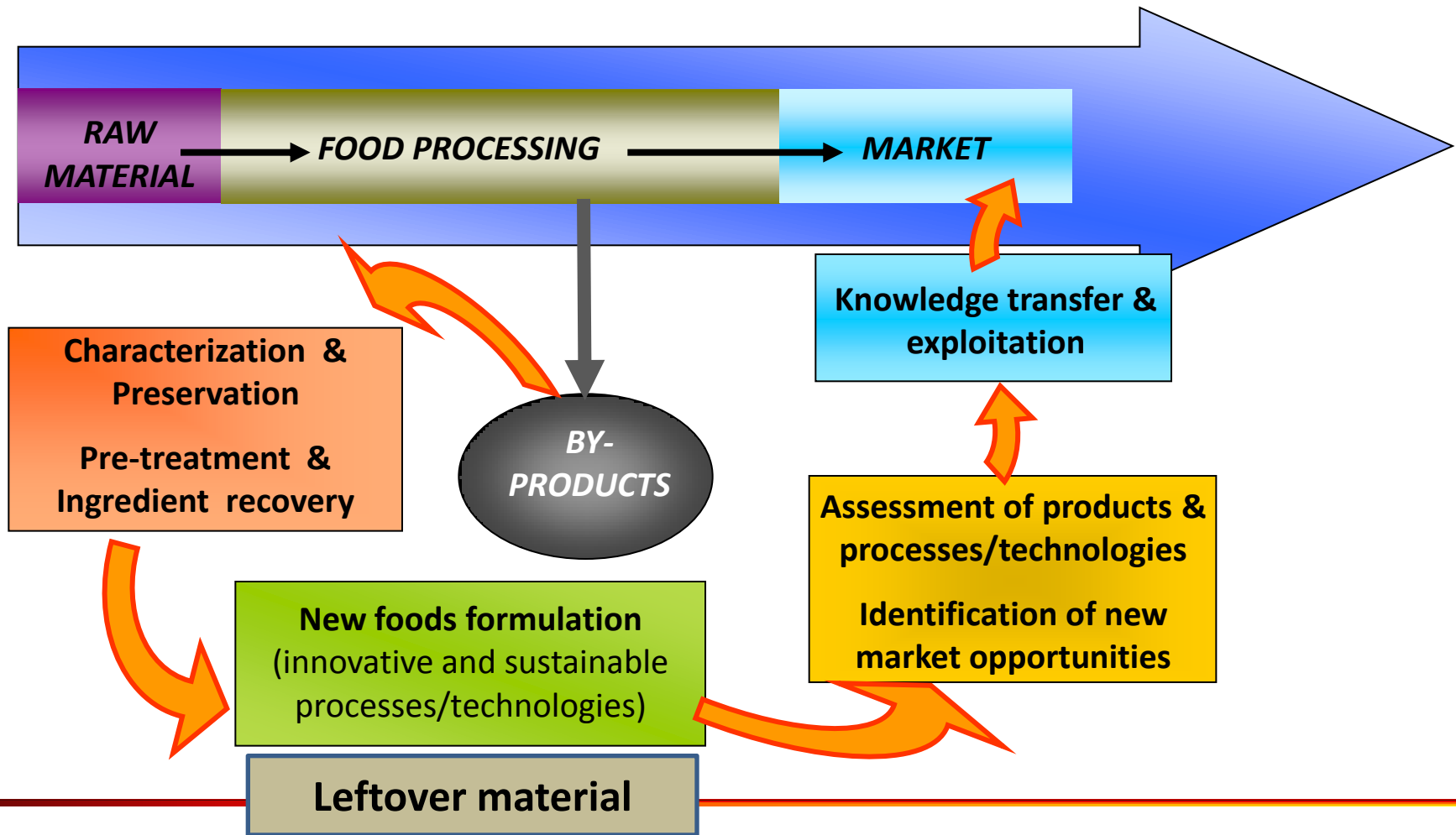
- Citrus byproducts and wheat bran are extensively produced in Europe (~1 and 10 MT/y, respectively) where they are only partially and poorly valorized (e.g., pectins, chemicals and solvents, feeds) and largely disposed in landfills (with relevant costs and environmental problems);
- They are good sources of compounds useful for the human health (i.e., fibers, prebiotics, vitamins, antioxidants, etc.) exploitable in new food formulation
- The modern lifestyle requires “ready to eat” foods based on ingredients with health-promoting properties.



To **develop** and **assess technological protocols** for the sustainable conversion of citrus by-products and wheat bran into food ingredients and new food products

➔ to improve the **sustainability** of the fruit/cereal processing industry and create **new competitiveness** and **market opportunities** for EU food Industry

# The approach



# Wheat bran exploitation



Wheat bran

Stabilization  
(close environment, humidity <70% w/w)

Treatment with tailored mix of hydrolytic enzymes



Dietary fibers (fermented with *Lactobacillus* and other probiotics)

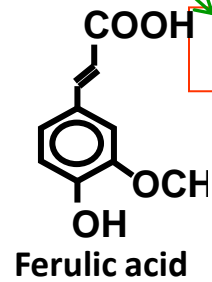


Oligosaccharidic fractions (with prebiotic activities)

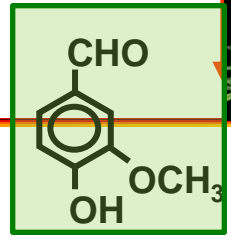


oligosaccharide

Extracts

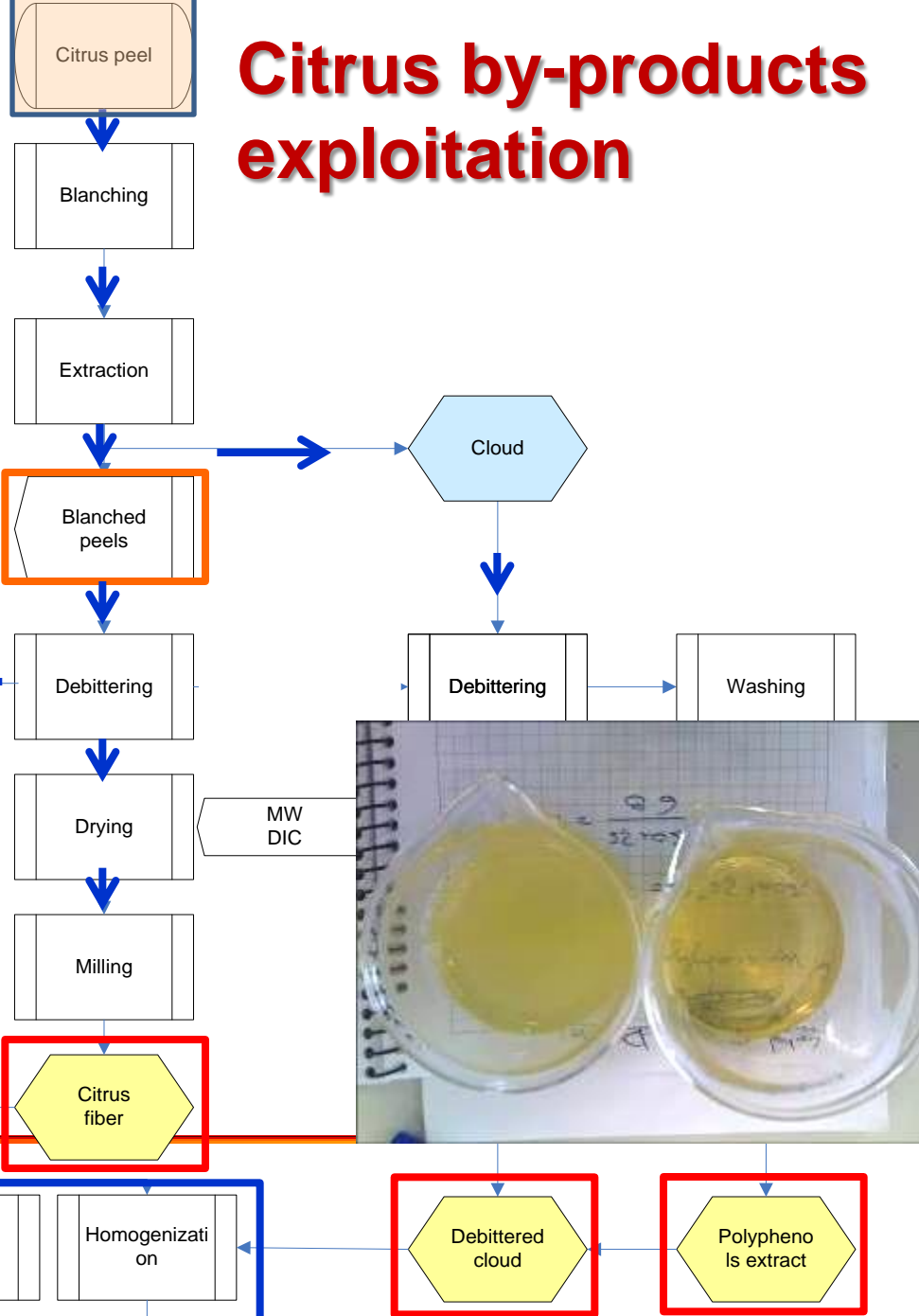


*P. fluorescens*  
*Amycolatopsis* sp.



Vanillin

# Citrus by-products exploitation





# NAMASTE EU: new food products



Beverage with citrus fibers



Citrus-based snack



Citrus-based Muffin



Fermented bran bakery products



Fibre enriched dessert



Citrus Paste filled bakery products



HPH Citrus paste

# NAMASTE: Summary & Conclusions

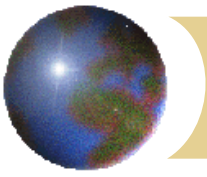
The production pathways is more environmentally impacting and costly than conventional procedures (i.e., pellet production for animal feed);

However, the environmental and economical sustainability is achieved if more valuable products are obtained from the same valorization pathway;

NAMASTE demonstrated the technical feasibility of the production of safe and healthy ingredients and new “ready to eat” food products from citrus and wheat processing by-products

It paves the way for novel approaches to the management of such products with benefits for the sustainability and competitiveness of the European cereal and fruit processing industry.



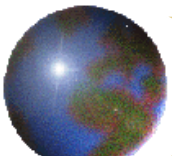


# Agri-food & bioeconomy

*Thank You!*



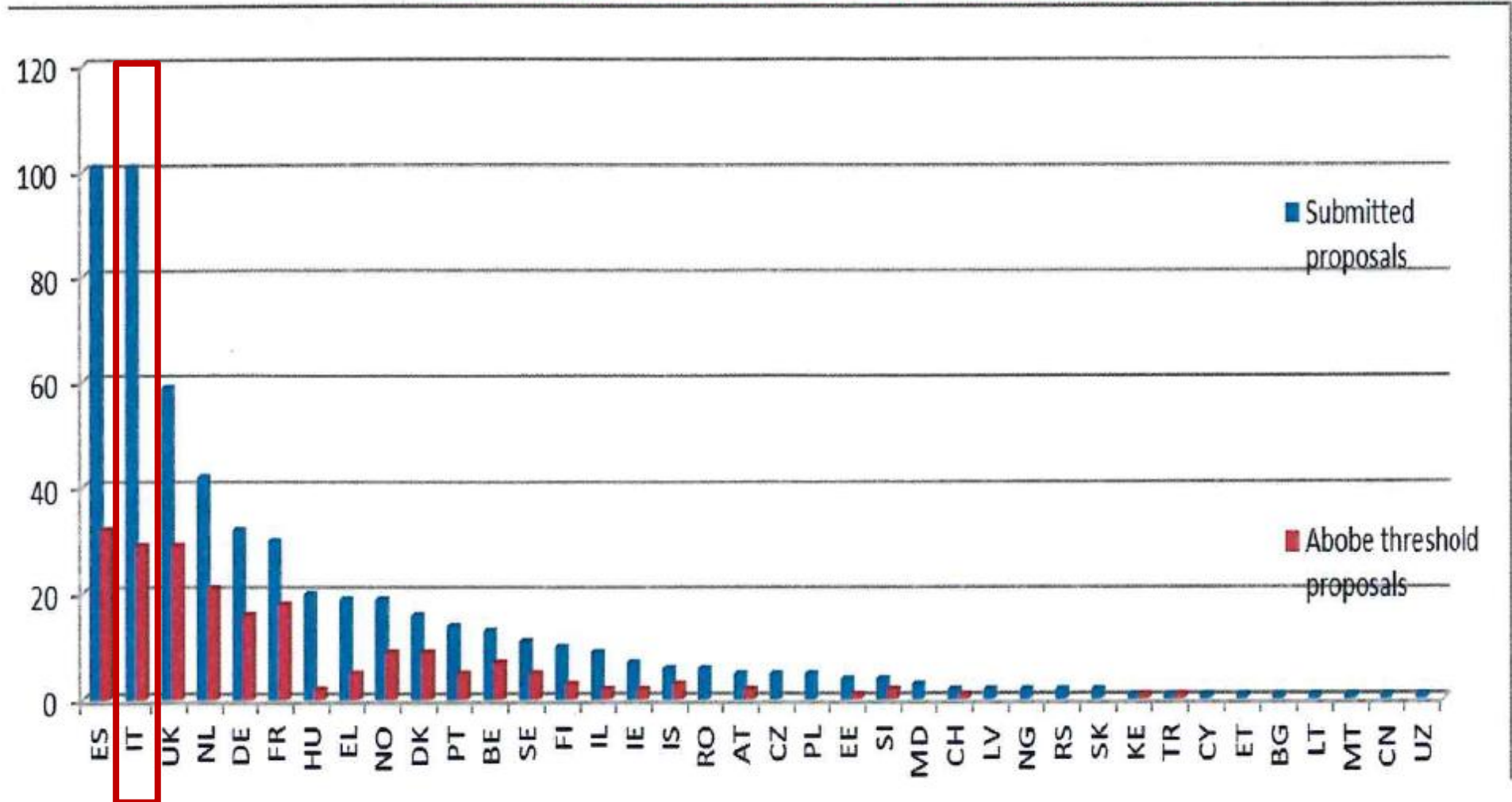
**The Future is Bio-Based**



# Results of the 1<sup>st</sup> phase, 2014 WP

Commission

## 1<sup>st</sup> stage Evaluation Results – all SC2 calls 2014 Coordinators by Countries





# Additional opportunities for Agri-food and Bioeconomy

European  
Commission

## A Public-Private Partnership on Bio-Based Industries

Realising the European Bio-economy Potential

BIC-Member States Dialogues

Supported by



Bio-based Industries  
Consortium





# Call for Sustainable Food Security (a)

Budget 2014: € 138,0 Mil

**2015: € 110,5 Mil**

The ***Sustainable food production systems*** priority will be given in 2014 to minimizing pre-harvest losses (including in aquaculture and fisheries), improving soil management and genetic resources supporting agricultural diversity and regional products, while 2015 will be on improved livestock and crop productivity and genetics for sustaining agriculture.

□ **SFS-1-2014/2015: Sustainable terrestrial livestock production** (*1st on genetics/nutrition/alternative feedstocks; 2nd on vaccination swine, poultry, ruminants; China suggested; 3rd sustainability and socio-economical and farming community impacts of different EU animal productions*)

□ **SFS-2-2014/2015: Sustainable crop production** (*precise farming, nutrients, water*)

□ **SFS-3-2014: Practical solutions for native and alien pests affecting plants** (*2 topics: 1st integrated strategies combating pests and invasive species agro, orthiculture and forest; 2nd on organic farming EU-China initiative*)

□ **SFS-4-2014: Soil quality and function** (*impacts of land use and management on soil properties and function and in turn on crop productivity and yields*) (*China and third country suggested*)

□ **SFS-5-2015: Strategies for crop productivity, stability and quality** (*smart approaches and tools for improving identification, the introduction of useful genetic variation in crops etc –bridging- to improve productivity, tolerance vs environmental stress*)



# Call for Sustainable Food Security (b)

**SFS-6-2014:** Sustainable intensification pathways of agro-food systems in Africa

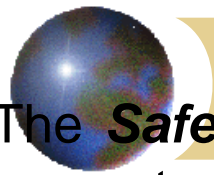
**SFS-7-2014/2015:** Genetic resources and agricultural diversity for food security, productivity and resilience (*description, assessment, management of local/traditional crop, forest, livestock resources for agriculture and food chain; management –acquisition, conservation and characterization- and sustainable use of genetic resources*)

**SFS-8-2014/2015:** Resource-efficient eco-innovative food production and processing (*resource efficiency, improved products quality and sustainability food SMEs*)

**SFS-9-2014:** Towards a gradual elimination of discards in European fisheries (*innovative tech and practices for reducing unwanted catches and discards*)

**SFS-10-2014/2015:** Tackling disease related challenges and threats faced by European farmed aquatic animals (*detection and cure of parasite in conventional and organic aquaculture; pathogens, including virus, vs major mollusc species*)

**SFS-11-2014/2015 (CSA):** Implementation of an Ecosystem-based approach for European aquaculture (*initiatives and tools to support aquaculture in Europe; existing and new tools for predicting and assessing aquaculture production and sustainability*)



# Call for Sustainable Food Security (c)

The *Safe food and healthy diets and sustainable consumption* section supports food safety and sustainable/competitive food production (2014), and nutrition 2015:

**SFS-12-2014:** Assessing the health risks of combined human exposure to multiple food-related toxic substances (*new tools for assessing risk for multiple toxicants across differing life stages*)

**SFS-13-2015:** Biological contamination of crops and the food chain (*technical, managing and organizational solution for reducing of risk of mycotoxins along feed and food chains*)

**SFS-14-2014/2015:** Authentication of food products (*development of methods and protocols for detecting undesired processing and adulteration in the oil production; 3<sup>rd</sup> Countries; exchange of info and cooperation on the identification of future R&I and tools for confirming authenticity*)

**SFS-15-2014:** Proteins of the future (*new/improved, assessed chains to produce proteins*)

**SFS-16-2015:** Tackling malnutrition in the elderly (*dietary fiber to prevent and treat malnutrition in elderly*)

**SFS-17-2014:** Innovative solutions for sustainable novel food processing (*prototyping, testing, demonstrating, piloting more sustainable solutions*)

Other opportunities can be found also under Work Programme of the Societal Challenges 1 on 'Health, Demographic Change and Wellbeing'.





# Call for Sustainable Food Security (d)

The *Global drivers of food security* section focuses on improving the understanding of current and future drivers of food security for 2014 the contribution of the small farming sector in 2015.

**SFS-18-2015:** Small farms but global markets: the role of small and family farms in food and nutrition security

SFS-19-2014: Sustainable food and nutrition security through evidence based EU agro-food policies (*two topics: 1<sup>st</sup> development of indicators and analytical tools for improving monitoring food and nutrition securities in different countries; 2<sup>nd</sup>: assessing issues impacting the agrofood sector in EU*)

**SFS-20-2015:** Sustainable food chains through public policies: the cases of the EU quality policy and of public sector food procurement

Other opportunities can be found also under Work Programme of the Societal Challenges 5 on 'Climate Action, Resource Efficiency and Raw Materials'; as in

WASTE 2 – 2014: A systems approach for the reduction, recycling and reuse of food waste

**WASTE 7 - 2015:** ensuring sustainable use of agricultural waste, co-products and by-products.