



Simone Maccaferri (Italy)



Breakout Session II
'Applying to Horizon Europe Work Programme'
EIP-AGRI brokerage event
'Get involved in the EU Mission: A Soil Deal for Europe'



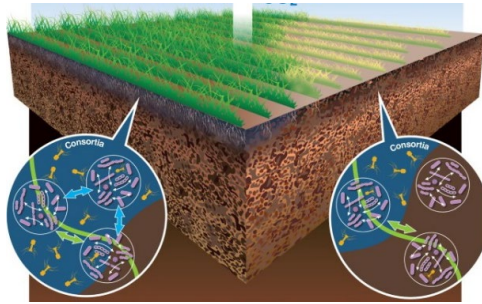
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Hands on experience: the H2020 CIRCLES project

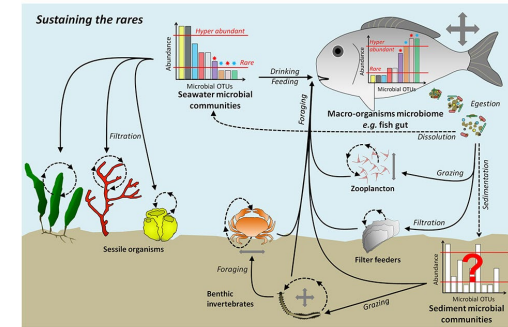
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ALL MACRO-ORGANISMS POPULATING OUR PLANET EXISTS AS HOLOBIONTS



Holobionts are defined as animals, plants or insects together with associated microorganisms living on them (known as microbiomes)

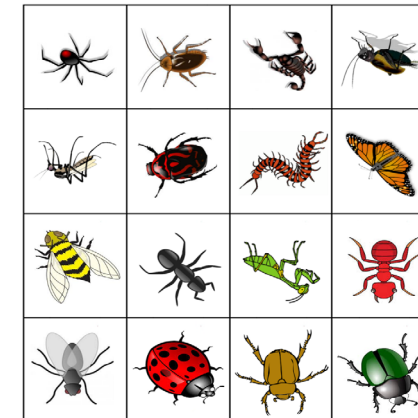


• 10^{12} CFU/g
• up to 1.5 kg

the most dense bacterial ecosystem on our planet

organized in a ecosystem of highly interconnected microbes

The human torso diagram highlights the gut. The 'Microbial Social Network' diagram shows interconnected microbes. The comic panel shows a landscape with a speech bubble: 'YOU CALL THIS DIVERSITY?'.



we are 90% bacteria, 10^{13} – 10^{14} habits our body and the great majority of these microorganisms is hidden in the gastrointestinal tract



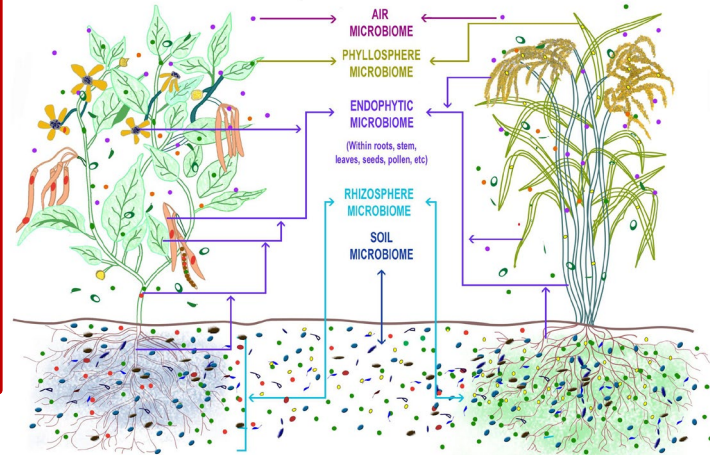
MICROBIOME ROLES IN PLANTS

INCREASED AGRICULTURAL SUSTAINABILITY AND PRODUCTIVITY

- Enhance plant nutrient uptake and efficiency
- Enhance plant defense against pathogens and pests
- Increase plant water-use efficiency
- Improve plant capacities to grow in degraded habitats (*desert bacteria protect food crops from salt toxicity*)
- Produce climate ready crops

INCREASED FOOD QUALITY

- Produce higher nutritional quality food
- Reduce microbial contaminants
- Suppress storage pathogens and enhance food products' shelf-life
- Minimize allergens and toxins



SUSTAINABLE INTENSIFICATION OF AGRICULTURE

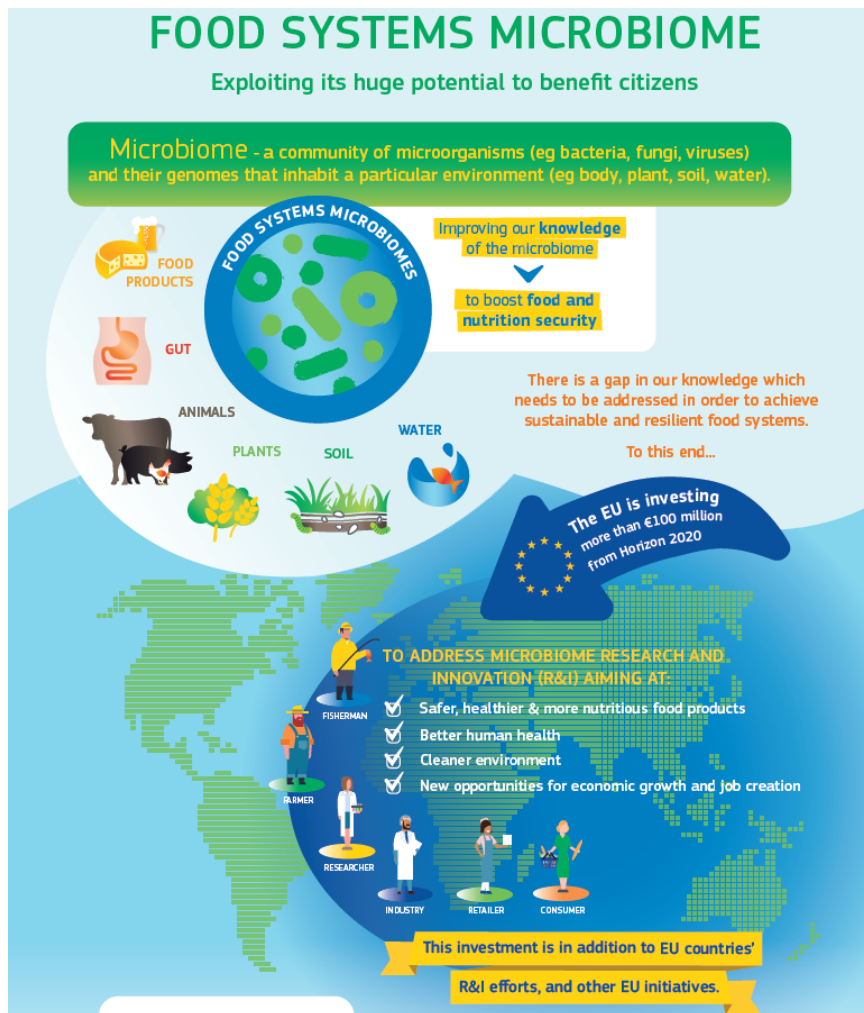
- Maximize value of lands for food production
- Reduce reliance on external nutrient and agrichemical inputs
- Environmental sustainability
- Food security
- Poverty alleviation

CLIMATE CHANGE MITIGATION

- Reduced reliance on fossil fuel inputs in agriculture
- Decreased N₂O flux
- Increased soil carbon storage



FOOD SYSTEMS MICROBIOME IN H2020



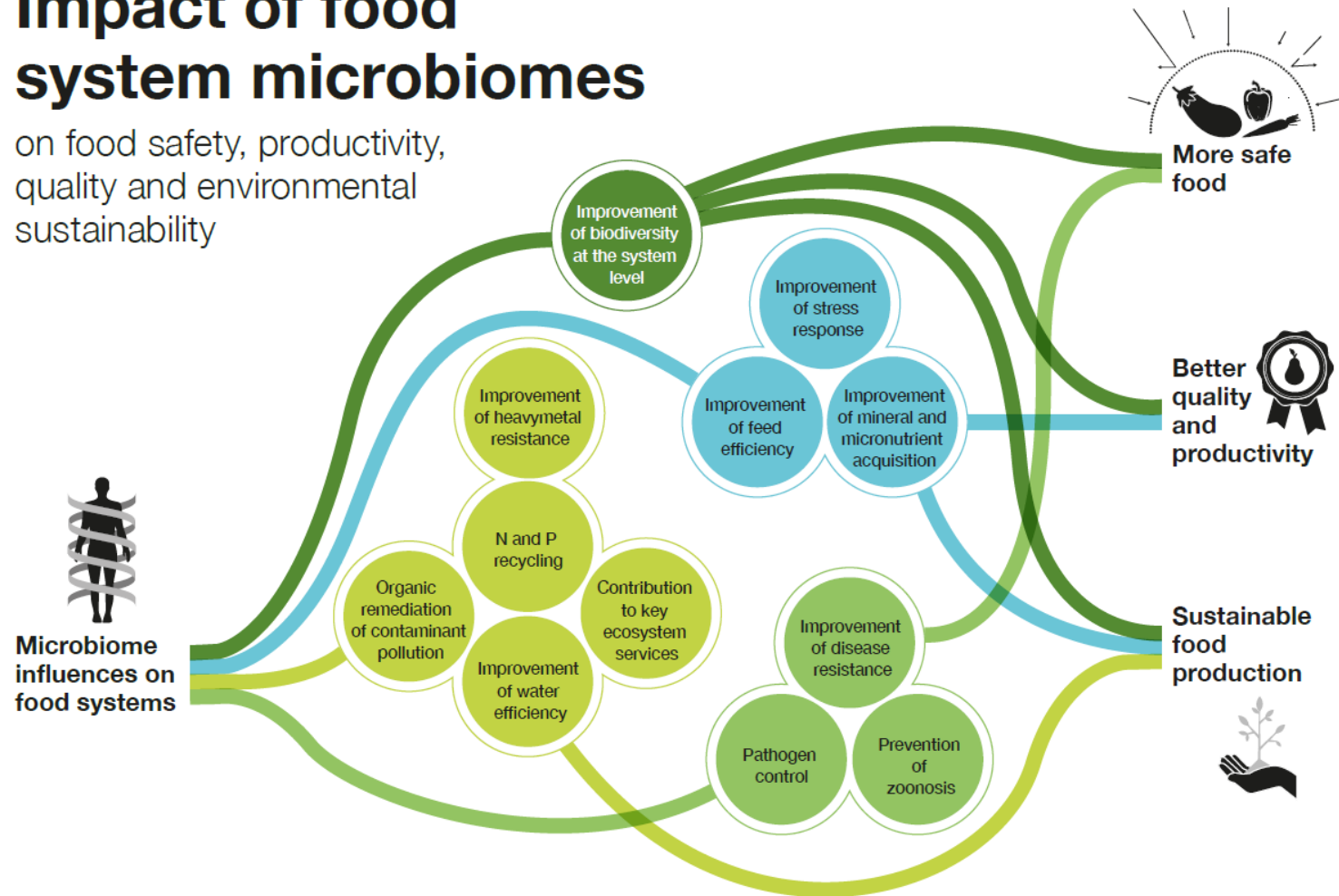
PROJECTS	DESCRIPTION
CIRCLES - Controlling Microbiomes Circulations for Better Food Systems https://circlesproject.eu/	2018-2023, EUR 10 M. CIRCLES will establish a new integrated economic system of products and services, proposing new food value chains based on microbiome knowledge.
HOLOFOOD - Holistic solution to improve animal food production https://www.holofood.eu/	2019-2022, EUR 10 M. Holistic solution to improve animal food production through deconstructing the biomolecular interactions between feed, gut microorganisms and animals in relation to performance parameters.
MASTER - Microbiome Applications for Sustainable food systems https://www.master-h2020.eu/	2019-2023, EUR 10 M. Microbiome Applications for Sustainable food systems through Technologies and Enterprise
SIMBA - Sustainable innovation of microbiome applications in food system https://simbaproject.eu/	2018-2022, EUR 10 M. SIMBA contribute to harness complex soil and marine microbial communities (microbiomes) for the sustainable production of food
MicrobiomeSupport - Towards coordinated microbiome R&I activities https://www.microbiomesupport.eu/	2018-2022, EUR 3.5 M. Platforms for collaboration and coordination of microbiome-related R&I programmes in Europe and worldwide. Carry out a mapping exercise at international level.



CIRCLES - UNLOCKING THE POTENTIAL OF MICROBIOMES FOR SUSTAINABLE FOOD PRODUCTION

Impact of food system microbiomes

on food safety, productivity, quality and environmental sustainability



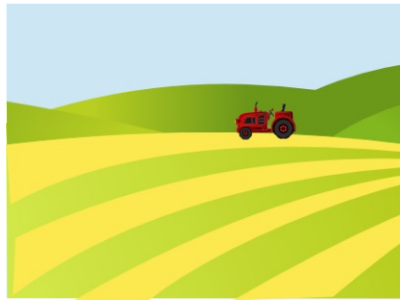
<https://www.circlesproject.eu/>



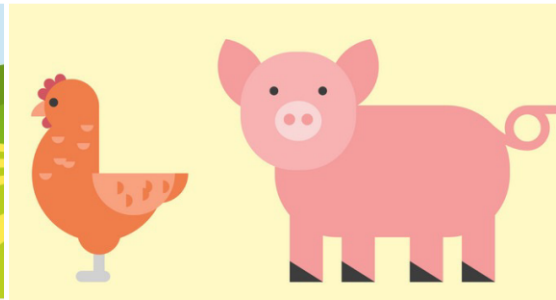
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CIRCLES - UNLOCKING THE POTENTIAL OF MICROBIOMES FOR SUSTAINABLE FOOD PRODUCTION

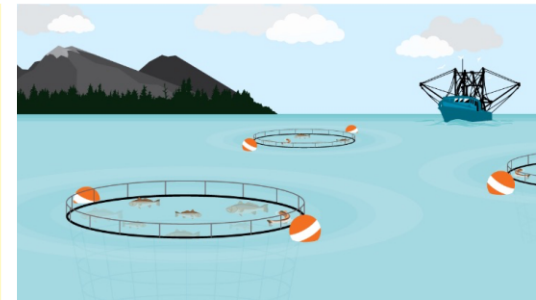
CIRCLES will provide Smart Microbiome Food Systems (SMFSs) for 7 food chains relevant to the EU market



Spinach – Tomatoes
Romania, Italy, Spain



Poultry – Pigs
Italy



Atlantic salmon; Seabream; Fisheries
Ireland, UK, Norway; Spain, Italy,
Greece



A new paradigm of food production based on microbiomes biotechnology



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SOME EXAMPLES: THE LAB IN THE FIELD APPROACH IN TOMATO AND SPINACH FOOD CHAINS



- 1) On the “lab-in-the-field” sites, researchers study the outcomes of plant-microbiome interactions under real-world settings. DNA sequencing methods (i.e. 16S, Next Generation and ITS Sequencing) are performed to assess microbiome dynamics and circulations in specific food systems. Genetic and molecular drivers of plant microbiomes are observed to identify healthy producing plants and less-healthy producing plants.
- 2) Get information on what microbiome components are unique to areas of particular interest such as yield or nutritional content. This data will ultimately help in designing and implementing Smart Microbiome Modulators (SMMs) – naturally occurring microbes that are used to restore the healthy microbiome of plants. The SMMs have great potential because they are applicable to numerous food systems besides tomato and spinach.



SOME EXAMPLES: SOIL HEALTH



Decreasing soil erodibility in a circular manner by using organic sludges that are produced as side streams by the pulp and paper industry.

- Evaluation of the best organic sludges in term of effect on cereal yield, soil carbon content and fungal and bacterial composition.
- Contributes to CIRCLES' goal of delivering new and healthier food applications through microbiome research.

Rasa K, Pennanen T, Peltoniemi K, et al. Pulp and paper mill sludges decrease soil erodibility. *J. Environ. Qual.* 2021;50:172–184. <https://doi.org/10.1002/jeq2.20170>



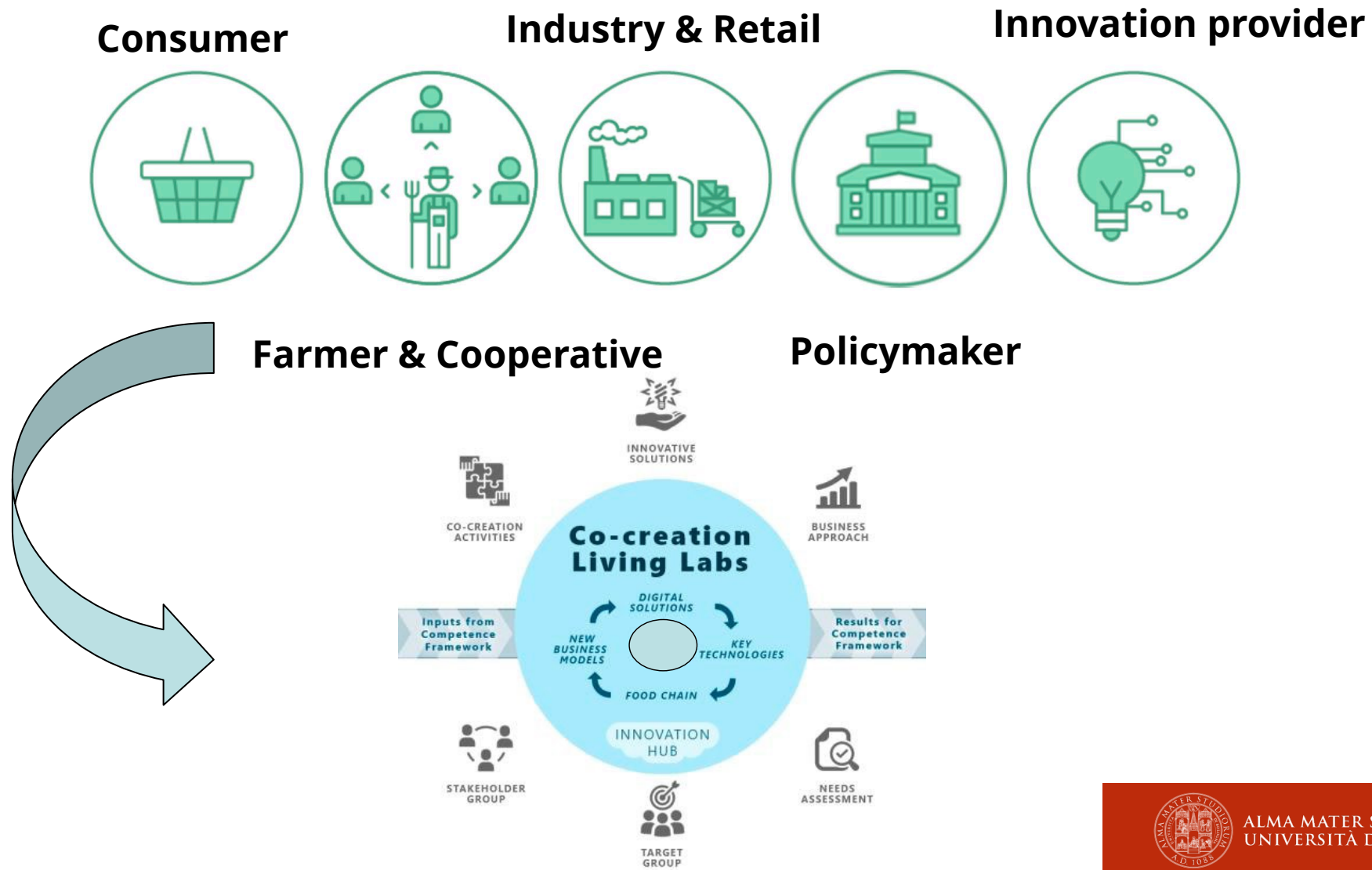
HOW TO CREATE A COMPETITIVE PROPOSAL

2. OPEN SCIENCE BY DESIGN



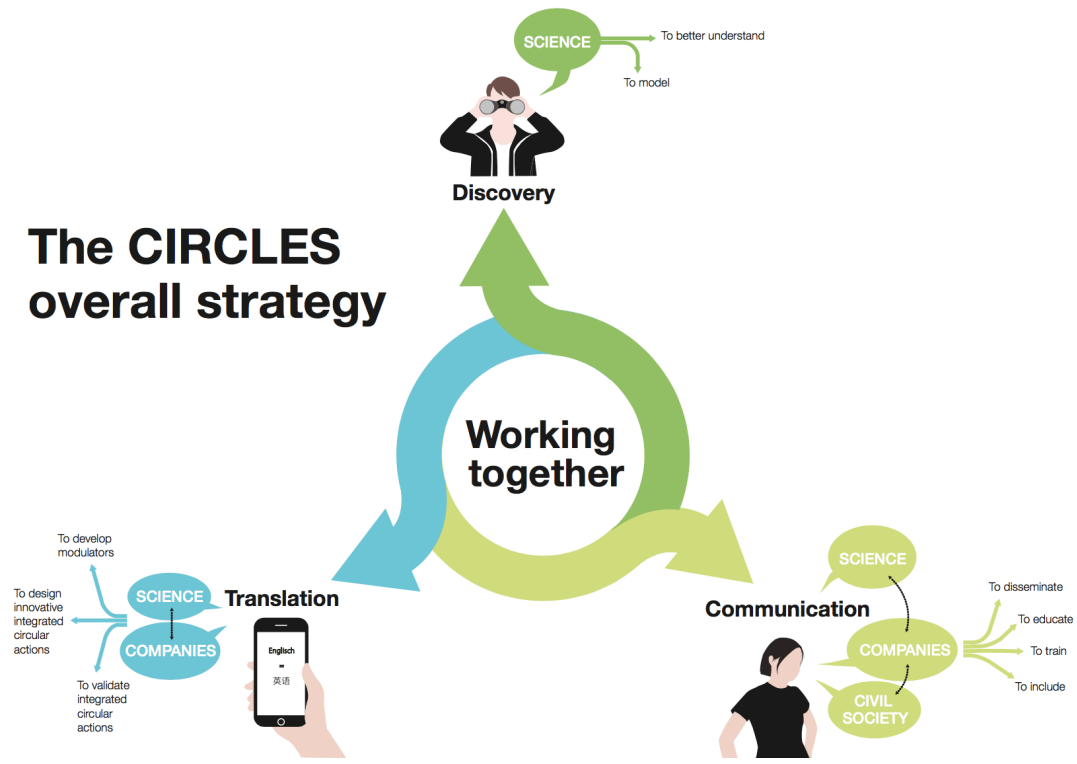
HOW TO CREATE A COMPETITIVE PROPOSAL

1. Full chain approach that might leverage on co-creation tools



HOW TO CREATE A COMPETITIVE PROPOSAL

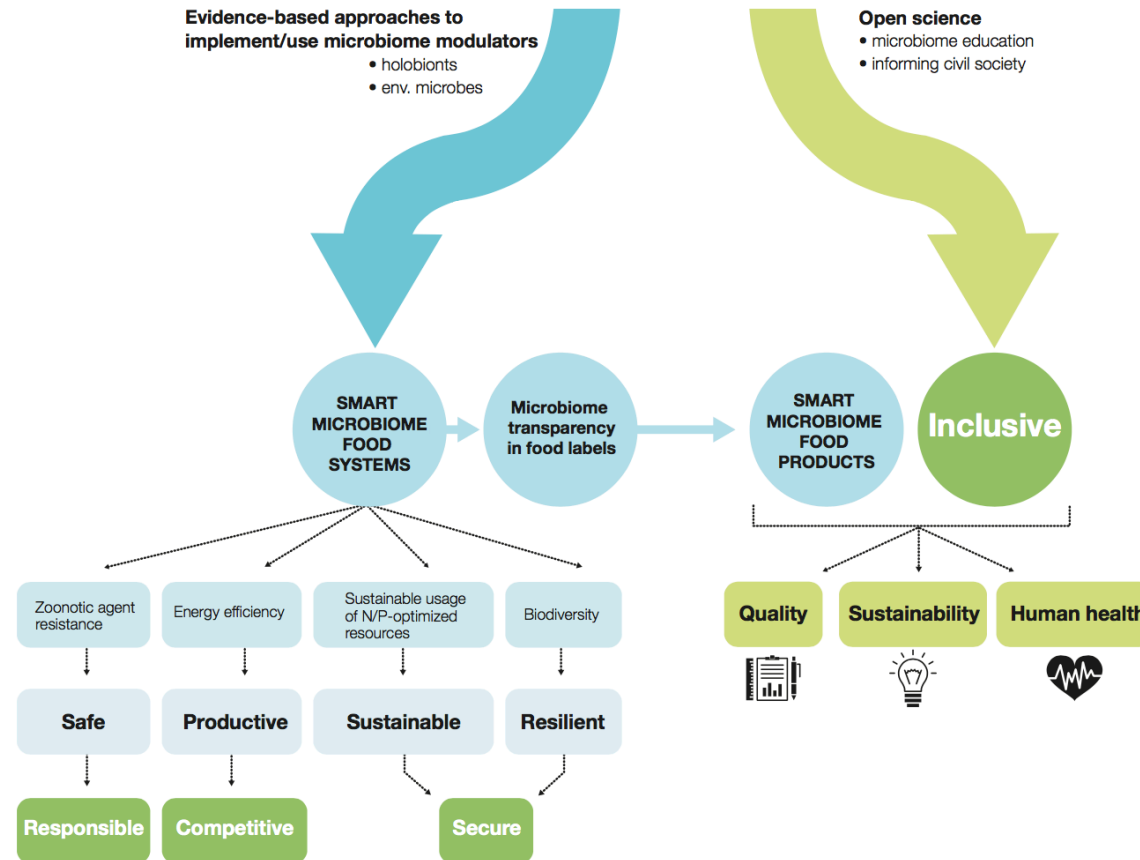
2. Two key issues are part of the strategy: a science-to-companies translation phase to exploit the CIRCLES microbiome knowledge and a communication and public engagement phase where an open, dynamic and free dialogue between companies, stakeholders, civil society and scientists is engaged.



HOW TO CREATE A COMPETITIVE PROPOSAL

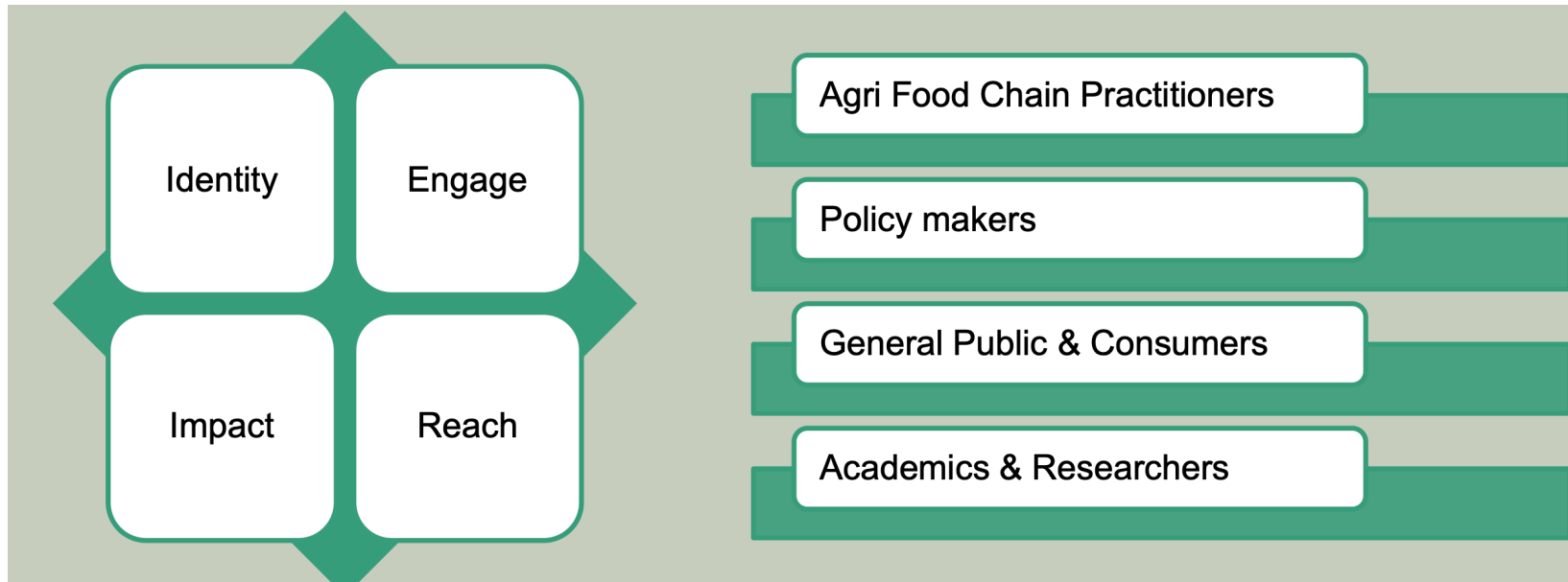
3. OPEN SCIENCE BY DESIGN

The CIRCLES overall concept



HOW TO CREATE A COMPETITIVE PROPOSAL

4. A reliable consortium!





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Thanks for your attention!

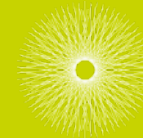
www.unibo.it

EIP-AGRI brokerage event **'Get involved in the EU Mission:** **A Soil Deal Europe** **8-9 June 2022, Brussels, Belgium**

All information on the brokerage event is available on
www.eip-agri.eu

on the event webpage:
<https://ec.europa.eu/eip/agriculture/en/event/eip-agri-brokerage-event-%E2%80%99get-involved-eu-mission>

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