



SoilMan

Ecosystem services of soil biota in agriculture



Ecosystem services driven by the diversity of soil biota – understanding and management in agriculture

Martin Potthoff, Guenola Peres and the full SoilMan-Team

Funded projects final conference, 12-13 November 2019, Brussels

BiodivERsA COFUND Call (2015-2016)

« Understanding and managing biodiversity dynamics to improve ecosystem functioning and delivery of ecosystem services in a global change context: the cases of soils and sediments, and land- river and sea-scapes »

CONSORTIUM DESCRIPTION

	Name	Organisation	Country	Funded by	Skills
1	Martin Potthoff, Holger Bergmann, Stefan Scheu	University of Göttingen (UGoE)	Germany	BMBF	Soil ecology (arthropods, genetics, economy, soil science, agronomy)
2	Guénola Pérès, Annegret Nicolai	Agrocampus Quest Rennes (ACO)	France	ANR	Soil ecology (earthworms, gastropods), aggregate stability , agronomy, ecological economy
3	Vincent Hallaire	INRA, Rennes	France	ANR	Soil sciences (physical, chemical), agronomy
4	Stefan Schrader, Martin Jansen	Thünen-Institute Braunschweig	Germany	BMBF	Soil ecology (enchytraeids, earthworms), bioregulation , soil sciences, social economy, economic modelling
5	Blanca B. Landa, Jose Gomez	IAS/CSIC, Cordoba	Spain	MINECO	Crop protection, soil sciences, soil suppressiveness , fungi-bacteria diversity , agronomy, ecosystem services
6	Jan Bergström, Astrid Taylor	Swedish University of Agricultural Sciences (SLU)	Sweden	FORMAS	Soil ecology (invertebrates, earthworms), biotic interactions , plant performance , multi-functionality of soil
7	Daniel Gouzeau	University of Rennes (UR1)	France	ANR	Soil ecology (earthworms), website, economy, law and policy sciences
8	Mignot Sandra	University of Cluj-Napoca (USVM)	Romania	UNIK/ODI	Soil ecology, microbial activity, agronomy
9	Maarja Öpik	University of Tartu	Estonia	ETAG	arbuscular mycorrhizal fungi , DNA-based fungal diversity,
1a	Ulfert Graefe, Anneke Beylich	FRB	Germany	BMBF	Enchytraeids
2a	Hervé Morgane	Univ. of Göttingen, Univ. of Rennes	Germany, France	ADEME/ Univ. Rennes	ecological economics

In total:

- 19 working groups in 6 countries
- Bridging life science to social economics and law
- Creating knowledge for science and citizens (stakeholders and the public)



PROJECT DESCRIPTION

The backbone of SoilMan turned out to be a simple equation

A for B = B for A

soil biodiversity works for agriculture
when
agriculture cares about soil biodiversity



PROJECT DESCRIPTION

Identification and Quantification

- What practices support or detract soil biota and their performance?
- Who is doing what and how much? (*as a service or disservice*)

Preferences, Perceptions and Trade-offs

- Translating the impacts of soil biota into values for production, environmental and human health and well-being.

Communication and Implementation

recommendations for soil biota supporting

- soil management practices (farm level)
- governance tools (EU, policy level)

SCIENTIFIC OUTPUTS

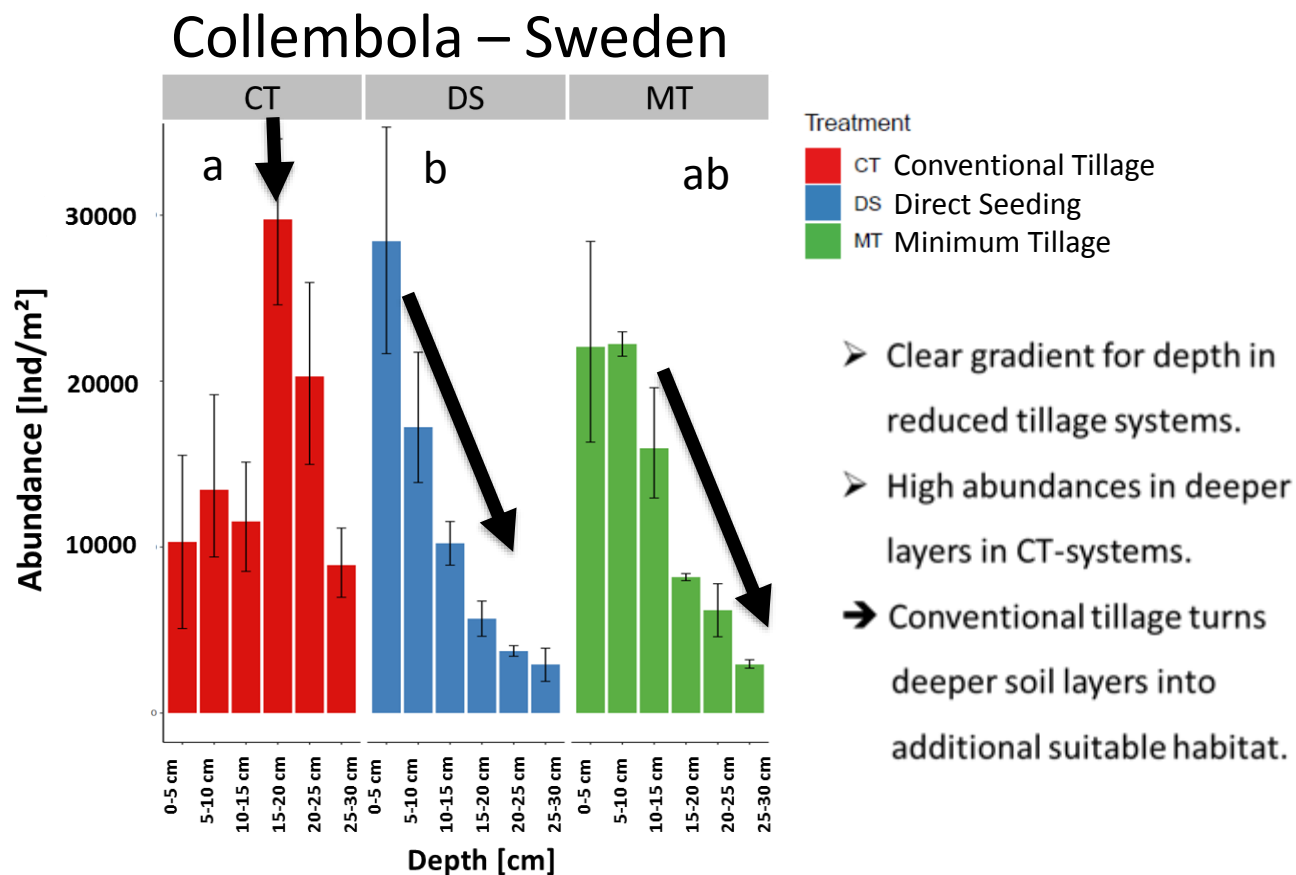
Identification and Quantification

- **Database:** Soil biota linked to soil management and soil characteristics (5 countries)
 - **LTOs** = controlled long-term field experiments
 - **Field network** = real farm system approach
 - **+ field and lab experiments** on biota performance
- **Basic scientific papers on:**
 - Organisms vs. soil management practices
 - Trait specific effects of soil management
 - Effects on suppression of pathogens and pests
 - Genetic vs. morphologic species



SCIENTIFIC OUTPUTS

Identification and Quantification



SCIENTIFIC OUTPUTS

Quantification of soil biota performance

Field and lab based experiments to quantify soil biota performance:



Functions and services

- bioturbation
- soil aggregation
- pathogen repression
- detoxification
- nutrient release
- carbon turnover



SCIENTIFIC OUTPUTS

Quantification of soil biota performance

The service of pathogen repression and detoxification:

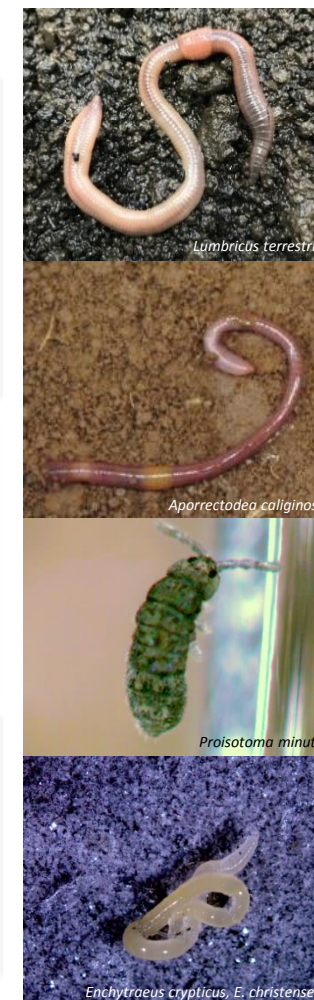
Soil biodiversity = Mitigation of soil-borne plant pathogens and mycotoxin contamination

Main results:

Acceleration of *Fusarium* toxin degradation in crop residues by up to 300% by earthworms

Conclusion:

Promotion of fungivorous soil fauna shifts the ecosystem service/disservice balance towards services (detoxification)



SCIENTIFIC OUTPUTS

Preferences, Perceptions and Trade-offs



Towards valuation of biodiversity in agricultural soils: A case for earthworms[☆]

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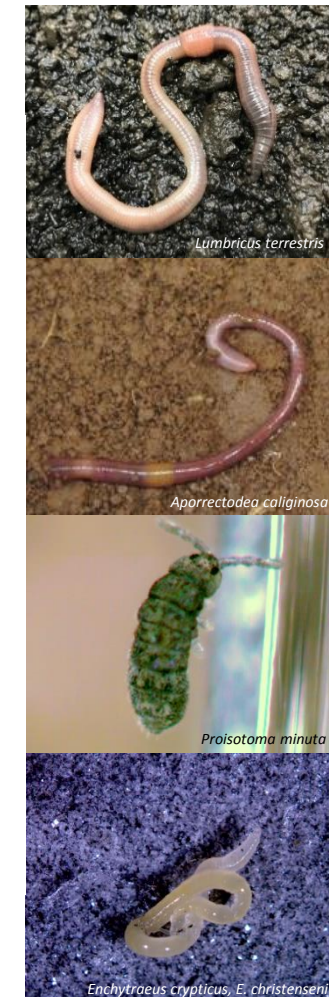
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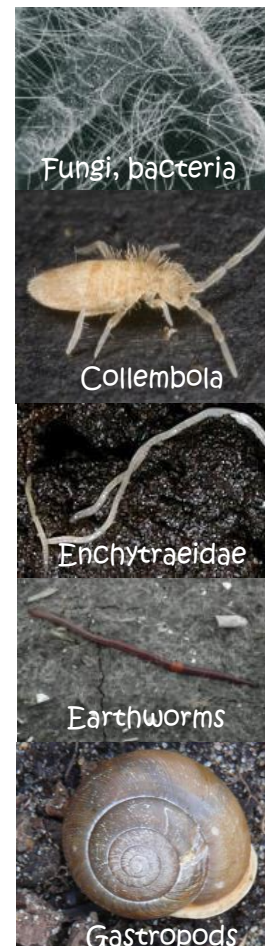
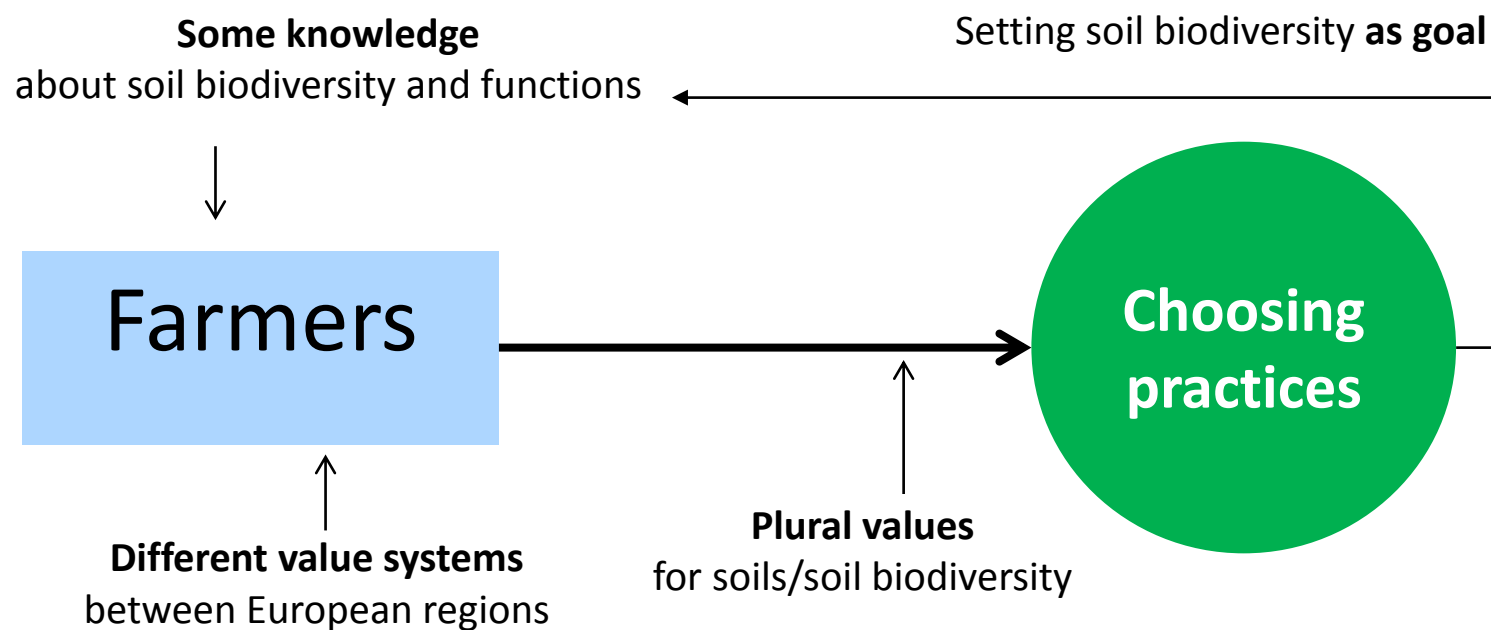
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SCIENTIFIC OUTPUTS

Preferences, Perceptions and Trade-offs



SOCIETAL / POLICY OUTPUTS

Communication and Implementation

Policymakers

Policy briefs

Farmers

Knowledge exchange

**Next gen.
researchers**

Education

**Scientific
experts**

Knowledge exchange

Citizens

Public events

SoilMan

Ecosystem services of soil biota in agriculture

SOCIETAL / POLICY OUTPUTS

Communication and Implementation



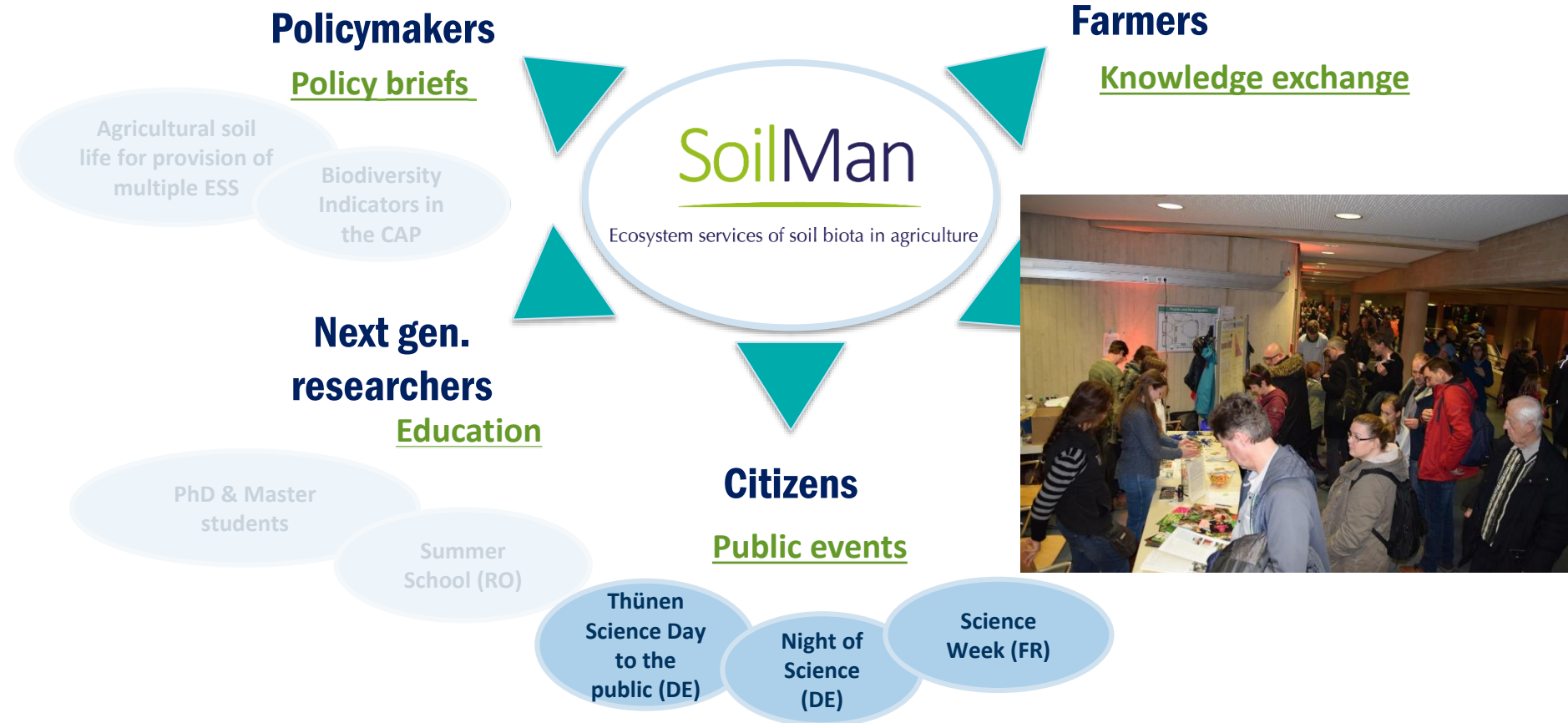
SOCIETAL / POLICY OUTPUTS

Communication and Implementation



SOCIETAL / POLICY OUTPUTS

Communication and Implementation



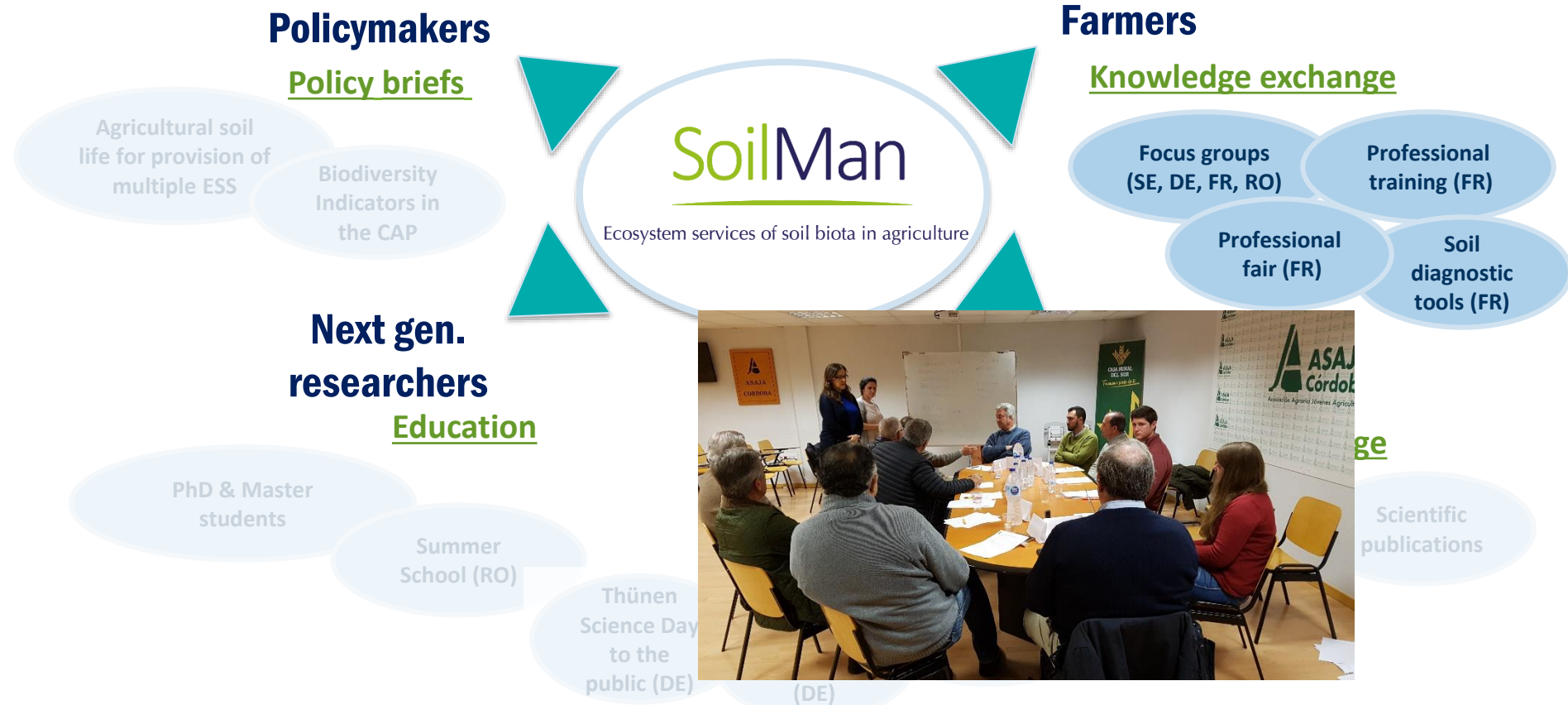
SOCIETAL / POLICY OUTPUTS

Communication and Implementation



SOCIETAL / POLICY OUTPUTS

Communication and Implementation



Communication and Implementation



- **Policymakers**
- **Next gen. reseachers**
- **Scientific experts**
- **Farmers**
- **Citizens**

Stakeholder workshop Brussels
25 stakeholders, 2 interactive sessions

SoilMan Conference (DE)
*“Soil Biota driven Ecosystem
Services in European Agriculture”*



ACKNOWLEDGEMENTS

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