



**Panos Ilias (Belgium)**



**Breakout Session I: 'Lighthouses and living labs'**  
EIP-AGRI brokerage event  
'Get involved in the EU Mission: A Soil Deal for Europe'

# A user-centered innovation for Soil management in the new CAP

8 June 2022

EIP-AGRI Brokerage event 'Get involved in the EU  
Mission: A Soil Deal for Europe'.

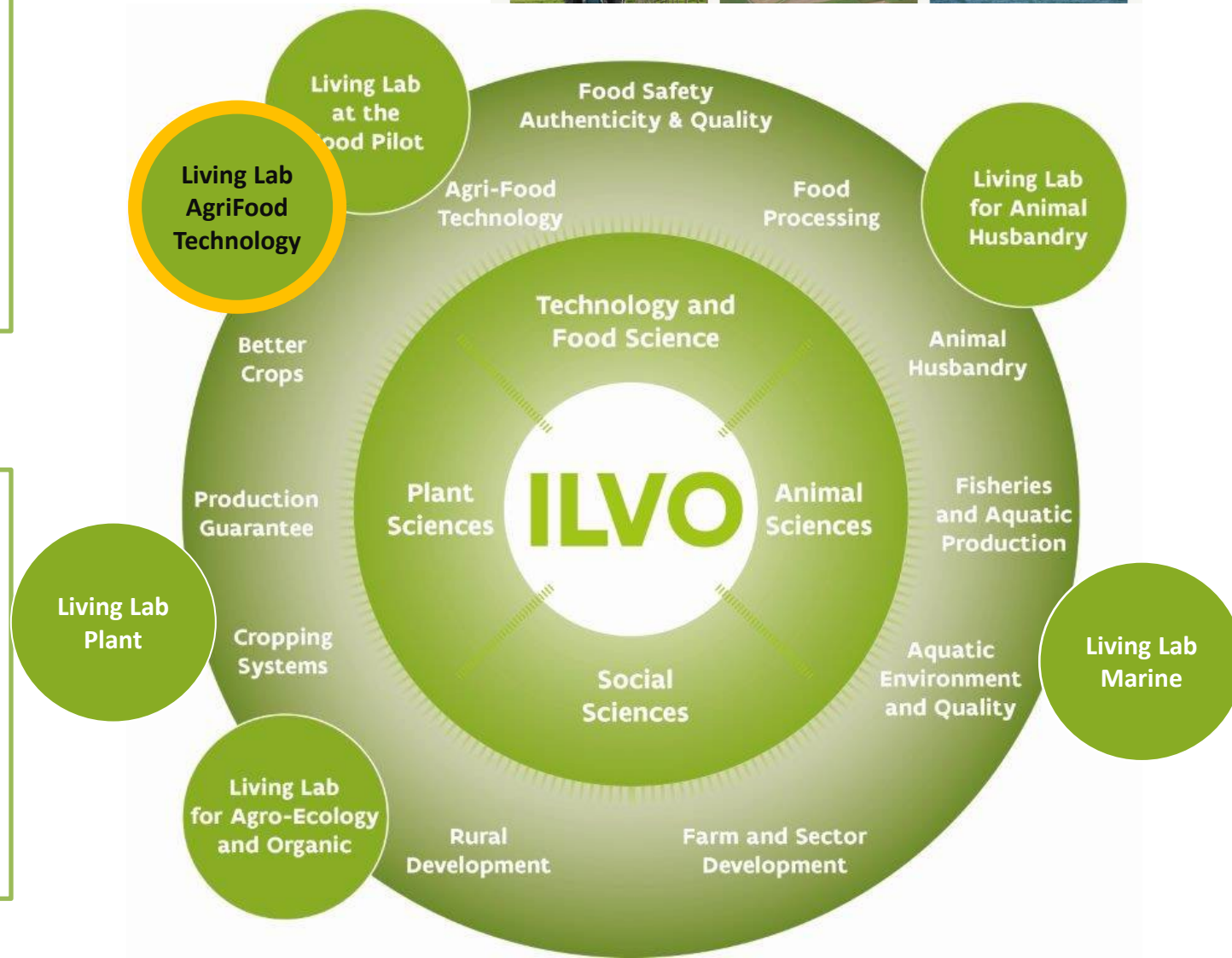


## ABOUT ME:

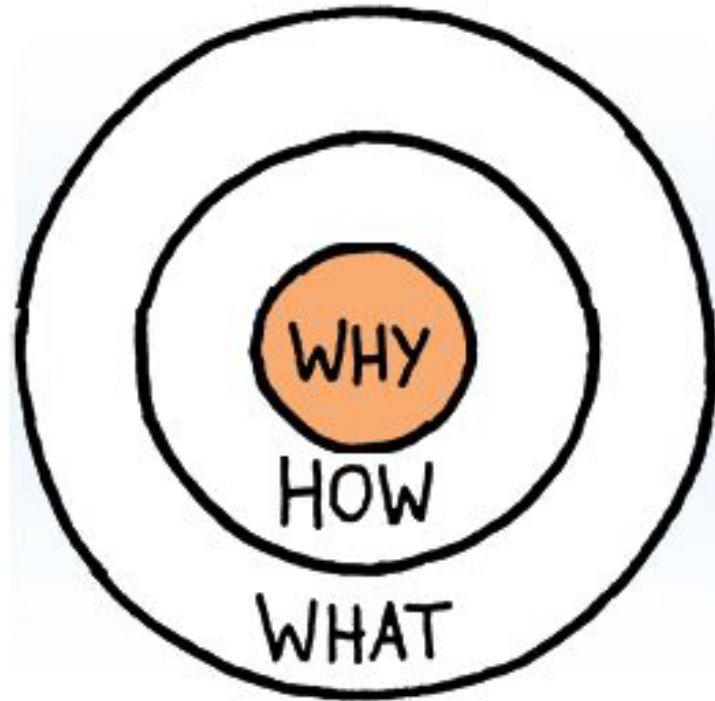
- Researcher at ILVO, PhD GeoAI
- Smart Farming, Data Sharing, Data Spaces & Platforms
- Support our ecosystem to bring valuable products for the end-users
- BDVA TF.AgriFood Leader

## ABOUT ILVO:

- Flanders Research Institute for Agriculture, Fisheries and Food.
- Linked to the Flemish government.
- Research line: Healthy crops, animals and soils for healthy food.
- “Living labs” as an instrument



# Let's start with the why?



Why do we need  
End User Centric Innovation?

# Technological industry keep up with high grow rates

**#1 Artificial Intelligence.**  
AI /Machine Learning / Deep Learning

**#2 Internet of Things.**  
IOT , IIOT, Sensors & Wearables

**#3 Mobile/Social Internet**  
Advancements - Search/Social/ Messaging/Livestreams

**#4 Blockchain.**  
Distributed Ledger Systems, Apps, Infrastructure, Technologies  
Cryptocurrencies & DApps

**#5 Big Data.**  
+ Predictive Analytics

**#6 Automation**  
Information, Task, Process, Machine, Decision & Action

**#7 Robots**  
Cons./Comm./Indus., Robots, Drones & Autonomous Vehicles

**#8 Immersive Media**  
-VR/ #AR/ #MR/ 360°/ Video?Gaming

**#9 Mobile Technologies**  
Infrastructure, networks, standards, services & devices

**#10 Cloud Computing,**  
SaaS, IaaS, PaaS & MESH Apps

**#11 3D Printing**  
Additive Manufacturing & Rapid Prototyping

**#12 CX**  
Customer Journey, Experience Commerce & Personalization

**#13 EnergyTech**  
Efficiency, Energy Storage & Decentralized Grid

**#14 Cybersecurity**  
Security, Intelligence Detection, Remediation & Adaptation

**#15 Voice Assistants**  
Interfaces, Chatbots & Natural Language Processing

**#16 Nanotechnology**  
Computing, Medicine, Machines + Smart Dust

**#17 Collaborative Tech.**  
Crowd, Sharing, Workplace & Open Source Platforms & Tools

**#18 Health Tech.**  
Advanced Genomics, Bionics & Health Care Tech.

**#19 Human-Computer Interaction**  
Facial/Gesture Recognition, Biometrics, Gaze Tracking

**#20 Geo-spatial Tech,**  
GIS, GPS, Mapping & Remote Sensing, Scanning, Navigation

**#21 Advanced Materials**  
Composites, Alloys, Polymers, Biomimicry, Nanomanufacturing

**#22 New Touch Interfaces**  
Touch Screens, Haptics, 3D Touch, Paper, Feedback & Exoskeletons

**#23 Wireless Power**

**#24 Clean Tech.**  
Bio-/Enviro-Materials + Solutions, Sustainability, Treatment & Efficiency

**#25 Quantum Computing**  
+ Exascale Computing

**#26 Smart Cities**  
+ Infrastructure & Transport

**#27 Edge/Computing**  
+ Fog Computing

**#28 Faster, Better Internet**  
Broadband incl. Fiber, 5G, Li-Fi , LPN and LoRa

**#29 Proximity Tech**  
Beacons, .RFID, Wi-Fi, Near-Field Communications & Geofencing

**#30 New Screens**  
TVs, Digital Signage, OOH, MicroLEDs & Projections

## THE 30 TECHNOLOGIES OF THE NEXT DECADE

Created by: Sean Moffitt @seanmoffitt , Managing Director, @Wikibrands












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Agricultural applications!!!

# The Space Sector and ... Mr. Moore

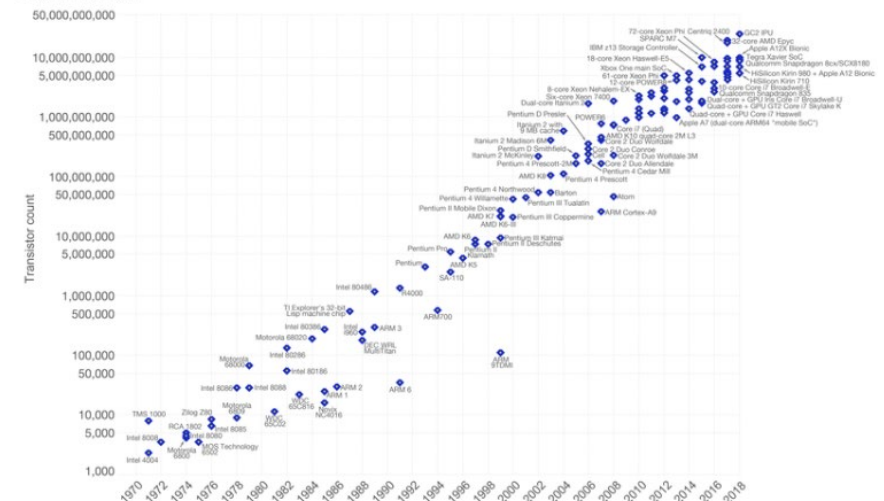
Exhibit 3: The space sector already plays a role in many non-space industries.

 <p><b>Energy and mining</b></p> <p>Monitoring methane emissions, informing development of sustainable energy services, providing imagery of mining sites</p>	 <p><b>Agriculture</b></p> <p>Monitoring soil, rainfall, and snow cover to inform irrigation plans, predictions of agricultural output, etc.</p>	 <p><b>Pharmaceuticals</b></p> <p>Conducting experiments leveraging microgravity (e.g., protein crystallization) to improve pharmaceuticals</p>	 <p><b>Telecom</b></p> <p>Providing broadband internet to planes and remote areas, including emergency backup coverage</p>
 <p><b>Automotive</b></p> <p>Collaborating on lunar rovers, enabling autonomous driving and in-car entertainment</p>	 <p><b>Transportation</b></p> <p>Tracking moving shipping containers, providing positioning and navigation information, monitoring temperature of sensitive containers and road congestion</p>	 <p><b>Consumer</b></p> <p>Experimenting in space under specific aerodynamic conditions to inform design and manufacturing of sneakers, soccer balls, etc.</p>	 <p><b>Finance</b></p> <p>Leveraging commodities geolocation tracking (e.g., vessels) to inform trades</p>
 <p><b>Insurance</b></p> <p>Using radar satellite-based flood monitoring capability to inform risk management and tailor solutions</p>	 <p><b>Tech</b></p> <p>Developing in-space computing offerings</p>	 <p><b>Media</b></p> <p>Filming movies on International Space Station</p>	



Moore's Law – The number of transistors on integrated circuit chips (1971-2018)

Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important as other aspects of technological progress – such as processing speed or the price of electronic products – are linked to Moore's law.



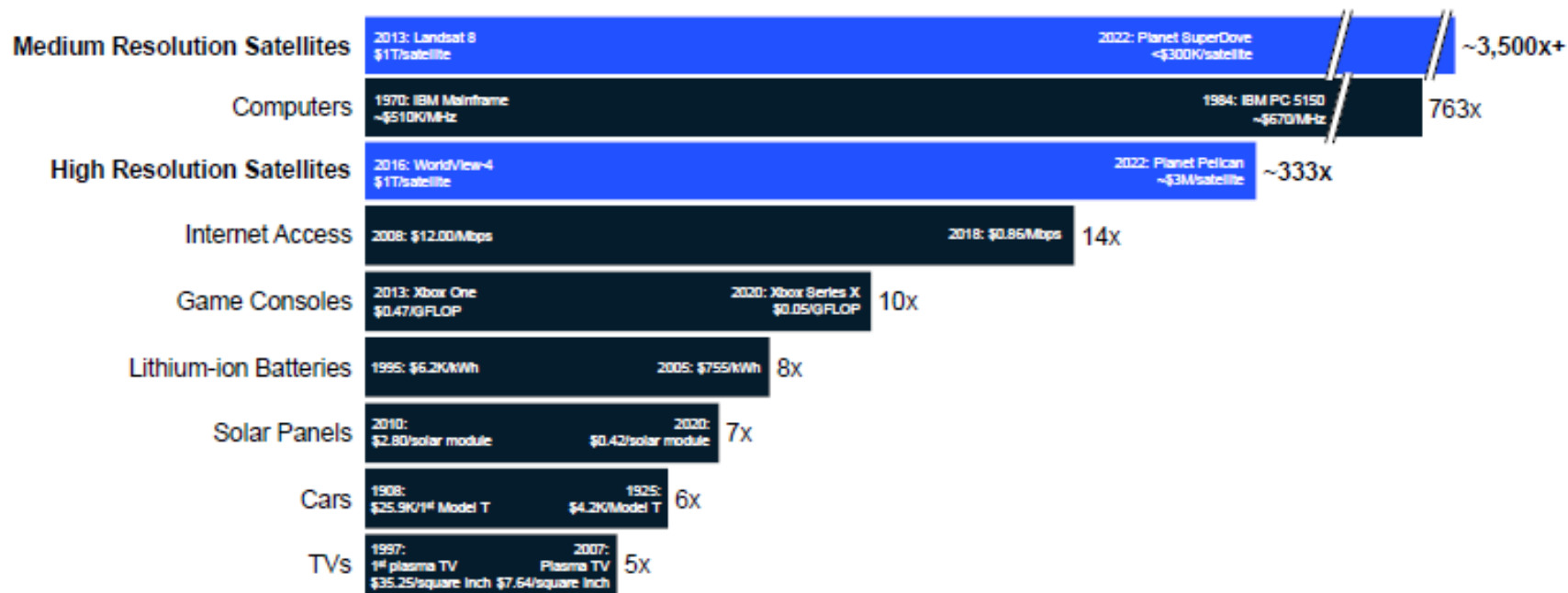
Data source: Wikipedia ([https://en.wikipedia.org/wiki/Transistor\\_count](https://en.wikipedia.org/wiki/Transistor_count))  
The data visualization is available at OurWorldinData.org. There you find more visualizations and research on this topic.  
Licensed under CC-BY-SA by the author Max Roser.

Source: Public press

# The Space Sector and ... Mr. Moore

Exhibit 2: Satellite cost performance improvements within a 15-year time horizon far surpass those seen in most other technologies.

Increases in cost performance over time<sup>1,2</sup>



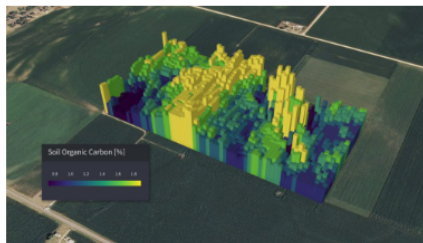
1. Prices are converted to 2022 dollars

2. Comparisons reflect products with similar end-markets; however, they are not meant to construe perfect substitutes. Products may not be comparable on other factors (eg, satellites may not be comparable on data rates, signal to noise ratio, lifetime – however, increase is notable even on other measures such as dollar per bit)

Source: Public press; CPI Inflation Calculator; Center for Strategic and International Studies; National Renewable Energy Laboratory; NCTA; American Enterprise Institute; expert interviews; McKinsey analysis

Within this framework Earth Observation based services appears as:

# A promising investment to replace soil sampling and support soil management in the New CAP



Cloud Ag visualization showing variable soil carbon levels across a single field. Image credit: Cloud Ag

## Startup Spotlight: Cloud Ag seeks to replace soil sampling by measuring carbon from the air

December 1, 2020 Jack Ellis

The agriculture industry is slowly but steadily switching on to carbon sequestration, its potential environmental impact, and the opportunity for it to provide additional income streams for farmers.



## Scientists say this new satellite is a game changer for tracking how our environment is changing

By Danya Gainor

Updated 17:31 GMT (01:31 HKT) April 15, 2022

## Success Stories

### Copernicus Sentinel-2 data to estimate soil organic carbon in croplands

03 May 2019

One of the main threats for soil degradation is the decline of soil organic carbon—the Copernicus Sentinel-2 satellites are currently being exploited to monitor soil conditions in croplands, in turn supporting the Common Agricultural Policy of the European Union.

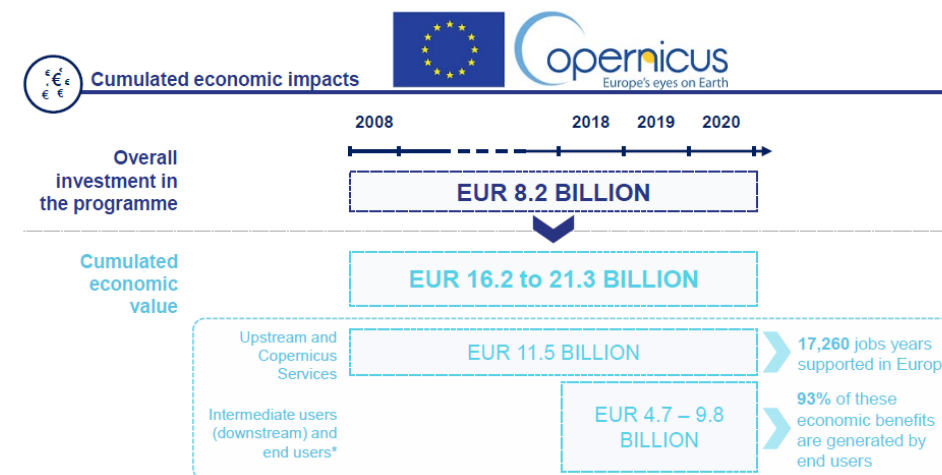


## Soils in the new CAP

- Soil management is recognised in the new CAP as an important element to improve farm sustainability in economic and environmental terms:
  - Specific objective 5: **“Foster sustainable development and efficient management of natural resources such as water, soil and air”.**
- Higher environmental ambition of the new CAP is channelled e.g. via
  - stronger requirements for conditionality
  - new GAEC 2: preservation of carbon rich soils such as peatlands and wetlands
  - eco-schemes
  - agri-environment-climate measures
  - farm investments
  - Farm Sustainability Tool for Nutrient Management (FaST)



Research and innovation recognised as an enabler for achieving CAP objectives





# However, adoption of innovative technology lacks behind & The end-user(s) has questions ...



*How can we integrate this service? Another APP?  
Accuracy issues? Technological problems?  
Are there independent reviews? Will it work in practice?  
How to get started? Solution for my specific problem?  
Is it applicable for me?*

*What about my data? Are others happy with the change?*

*Payback time? How will this improve my life?*

*Added value? High investment costs!*

*Reduce of cost and when?*

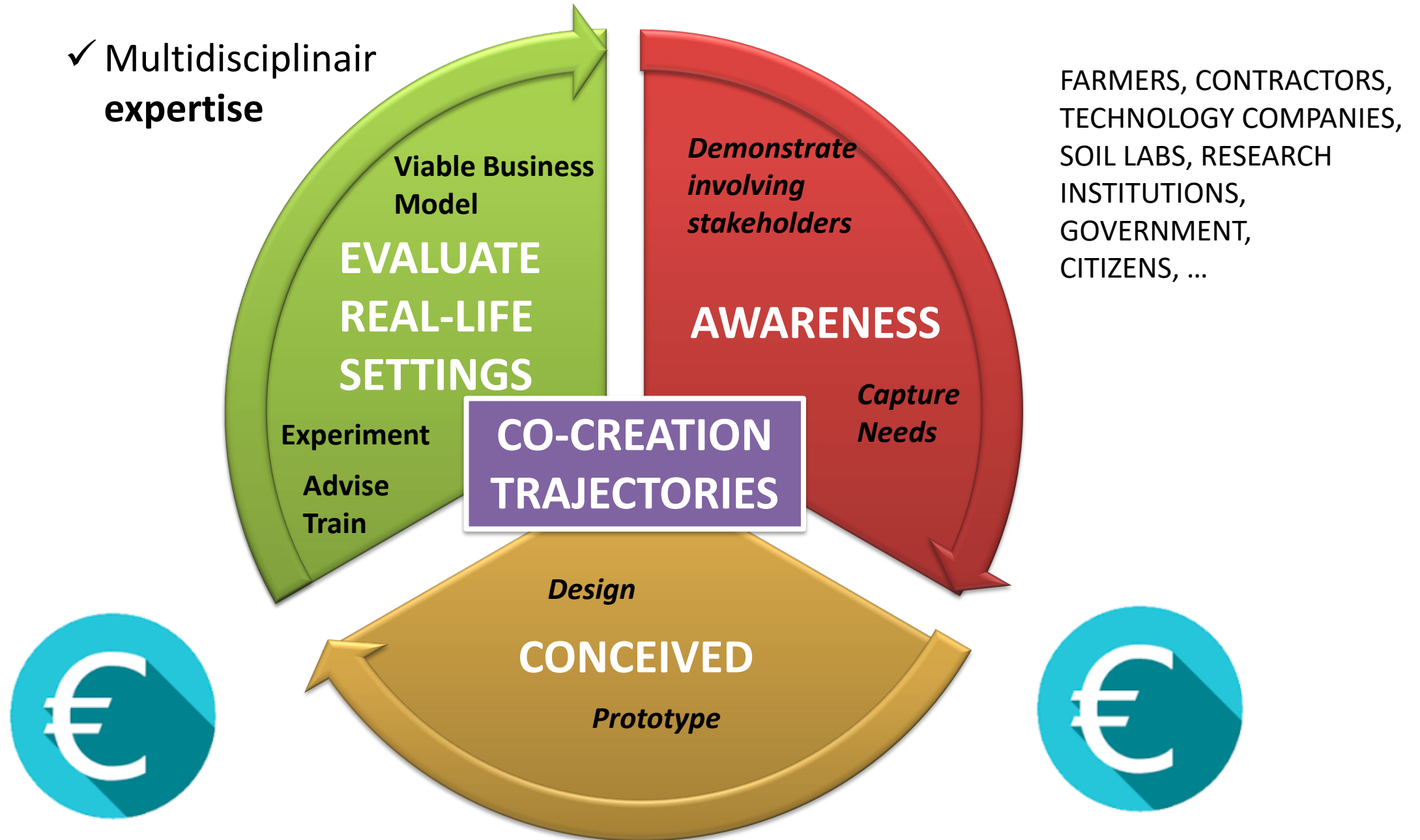


4/06 2007-346 © INKINCT Cartoons www.inkinct.com.au

**Clear need for  
End-user Involvement!**

# HOW? Living Lab x DIH?

✓ Multidisciplinair  
**expertise**

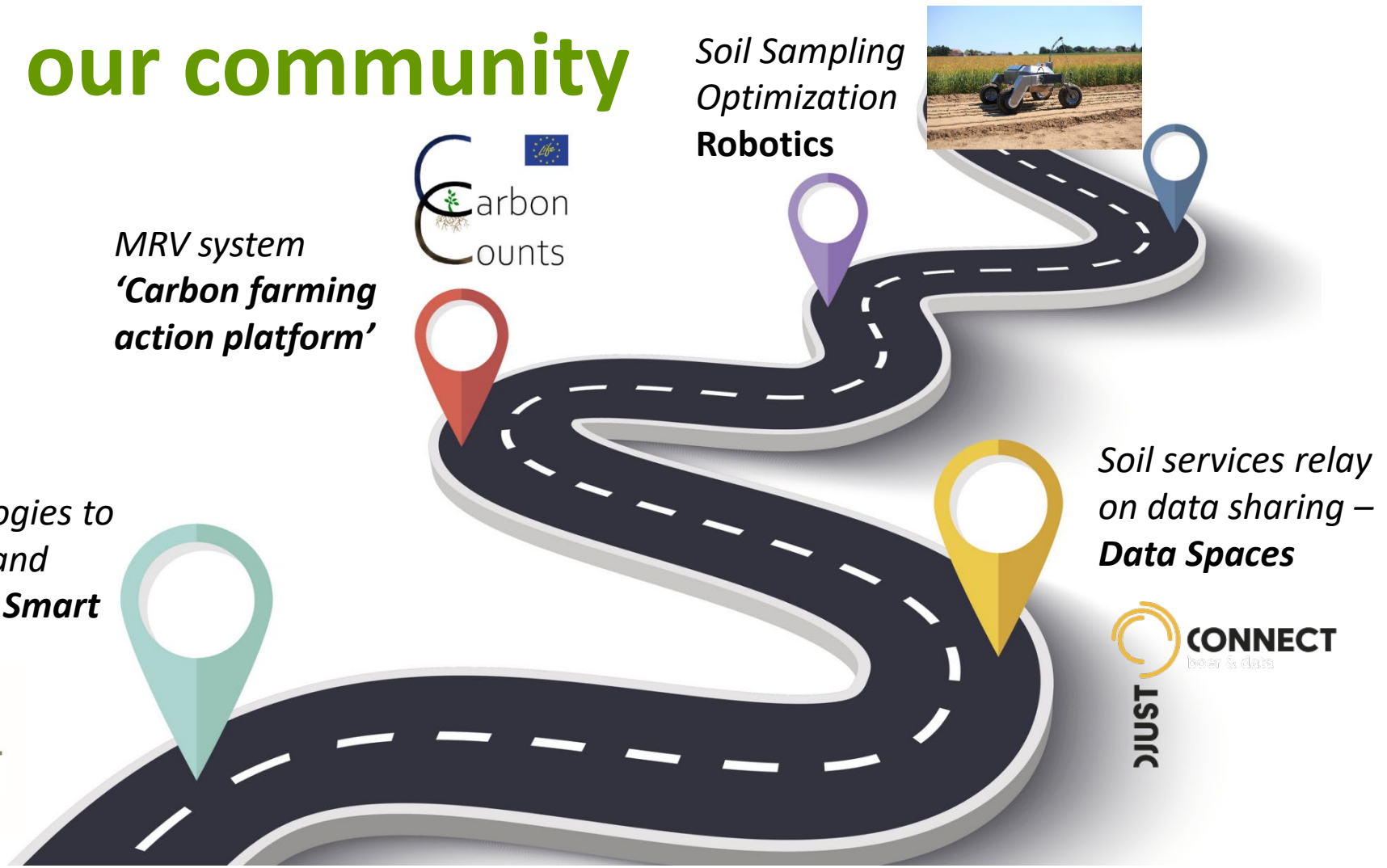


# HOW?

- LL is ILVO culture
  - Integrated (one stop)
  - Be there if they need you
  - Understand (All)
  - Build bridges – **Innovation Road Map** - Bring Solutions
  - Open doors – leading by example (e.g. zerow pesticides)
  - Farmers staff - own farm – at farms
  - Funding Channels => Projects
  - => Trust!!!



# What? An Innovation Road Map for our community



Soil Sampling Optimization Robotics



Carbon Counts

MRV system 'Carbon farming action platform'

envision

Emerging technologies to indirect measure and model SOC – CAP, Smart Climate Farmina

EJP SOIL STEROPES

Soil services relay on data sharing – Data Spaces

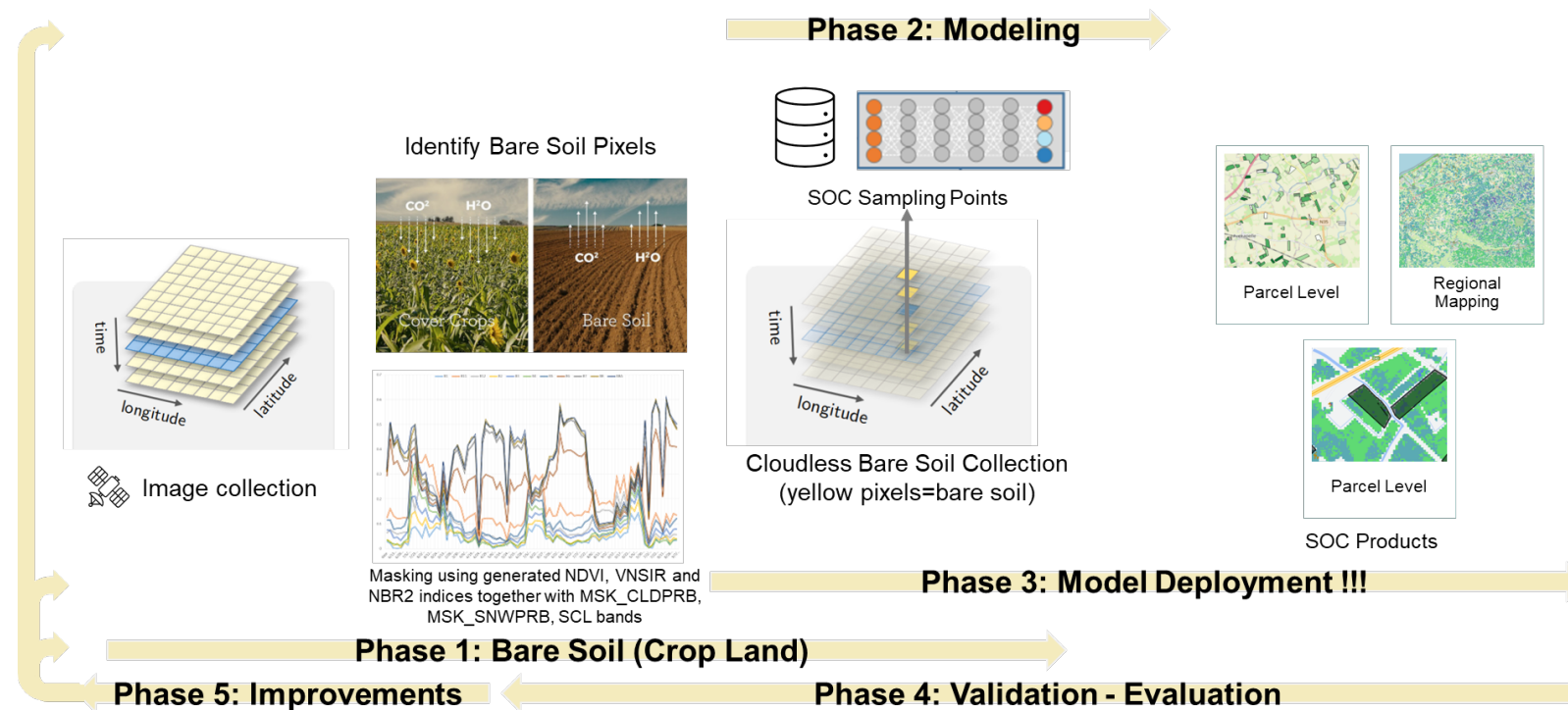
CONNECT  
data & data  
JUST

=> Targeted Projects

# Our goal (in short) within ENVISION?

A service that delivers top-soil qualitative Soil Organic Carbon estimations at a parcel level, governing the CAP needs for soil organic carbon monitoring in cropland. The Service will adjust to provide estimations for the whole Flemish region (large scale). Working together with the **Flemish Paying Agency (LV)**.

## AN INNOVATION ACTION & CO-DEVELOPMENT



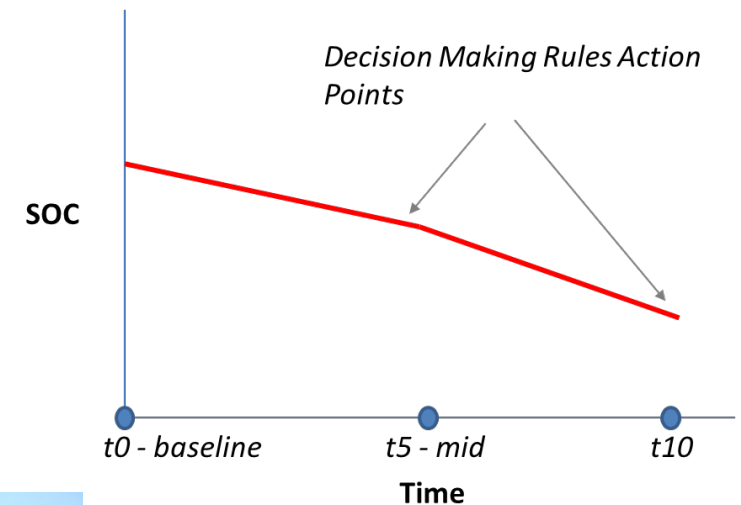
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869366.

**Legal notice:** The ENVISION project and its content reflect only the author's view, therefore the EASME is not responsible for any use that may be made of the information it contains!

# Main Co-Development Challenge in Phase 3: Model deployment

## Co-Define a Meaningful Service business logic and a Sustainable Service Business Model

- Different options to deal with **accuracy** and error transferring => Which one to select?
- A decision make challenge => How can we support better the **decision-making process**? What is needed?
  - ✓ Different options to present SOC change over time.
  - ✓ Different options to present the modeling results (PAs – Farmers – Service Providers).
- The goal is to support CAP Strategic plans=> Any **Reusable components**?
- Alignment of CAP SOC monitoring with Monitoring Report Verification systems? Do we need to **bring together different communities**?
- Ground truth data are needed in Model building and Data sharing can support it. Which are the options for **viable Business Models**? What can be the benefit for the actors? **Trusted partner?** **Governance?**
- When do we have to stop? What is the **common accepted optimum cost-accuracy level**? What controls it? Can technology further support this by automating soil sampling activity?
- Part of the equation is the **Environmental, Societal and Economic Impact**. How to assess? Improve?



# Thank you



Institute for Agricultural and Fisheries Research  
**Technology and Food Science Unit**

[Living Lab](#)

[AgriFood Technology](#)

[www.ilvo.vlaanderen.be](http://www.ilvo.vlaanderen.be)

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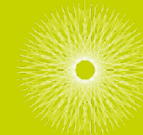


# **EIP-AGRI brokerage event** **'Get involved in the EU Mission:** **A Soil Deal Europe** **8-9 June 2022, Brussels, Belgium**

All information on the brokerage event is available on  
[www.eip-agri.eu](http://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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