MEF4CAP objective

Wide **range of needs** and **increasing amount of data** in agri-food sector

MEF4CAP will deliver a roadmap for future monitoring and evaluation

- where the needs of different stakeholders are identified
- and the potential of different technologies is (fully) exploited
- while minimizing the associated cost and administrative burden

Project logic

WP 2
ICT developments / sources

2 Identify technological developments

Farm administration Chain initiatives Satellites Sensors

1 Identify future needs

WP 1
Wish list of indicators

Categorised in:

Policy evaluation, monitoring and control, farmer needs

And/Or

Planet People Profit

WP 3
Evaluating potential of ict development to meet needs

ICT developments

Needs

X	V		V?
	V?	V?	
V?		X	

Potential pathways

WP 4
Demonstration cases

4 Demonstration cases

3 Assess potential of technological developments to meet future needs

needed to exploit potential

Demonstration cases

Background

Agricultural statistics

Advisory services

ICT

Earth observation

Farm economics

Monitoring

Policy evaluation

Farm cooperatives

Citizen organisations

Agenda

- Welcome & overview of MEF4CAP project
- Keynote: Setting the scene of where we are at and where we're heading for policy M&E in agriculture
- Introduction to the MEF4CAP project
  - Policy Needs / ICT developments / Current systems and future pathways
- Key MEF4CAP demonstration cases
  - Ireland, Spain, Greece
- Break
- A roadmap for M&E of agriculture policies and how to translate it into an innovation agenda
  - Reactions & discussion by a panel of experts
- Policy discussion: how can better M&E capacity unlock the move to a more performance-based CAP?
  - Introductory remarks
  - Reactions & discussion by a panel of experts
- Wrap-up and closing remarks

Scene-setting keynote: The sate of play and future outlook for policy M&E in agriculture

Tassos Haniotis

MEF4CAP

Introduction to the project

Policy needs

Emma Dillon and Trevor Donnellan, Teagasc, Ireland

- Increasing policy focus around **sustainability**
  - Wide ranging policies and legislative targets (EU and MS level)
  - Broadening CAP objectives
- Consequences for **monitoring and evaluation**
  - New delivery model - compliance -> performance
  - Further sustainability metrics required
- Implications for **data** collection, management and analysis
  - Increased capacity to produce relevant indicators
  - Role of evolving technologies to support data collection

Data utilisation

- Increased potential for **data integration**
  - Better utilisation of existing datasets and data sources
  - Reduce collection cost and burden (aim to deliver more for less)

- But **obstacles** to data integration
  - Issues around trust, sensitivity and potential legal impediments
  - Challenges around data interoperability

- **Costs and benefits** for data users and providers
  - Increased administrative burden on data providers
  - Clear demonstration of benefits required to support buy-in
  - Sustainability performance at the farm level

Indicator development

- Reflective of **priority data needs**
  - Identification of current data gaps and solutions
- Thematic areas and **indicator definition**
  - An iterative process - further refinement necessary
- Broad categories – economic, environmental and social
  - Some indicators may be cross-cutting

    i.e. capable of serving more than one CAP objective
- A long list of indicators (88) shortened (to 41)
- Perfection is the enemy of the good
  - Need to avoid being overly ambitious in the number of indicators selected
  - Devote resources to delivery of priority indicators (Farm to Fork objectives in particular)

Indicator Wishlist

ICT developments
WP2 - Objectives and work plan

Objective: To identify and assess digital agricultural technologies useful for CAP monitoring and evaluation

Workflow:

1. Extended review on legacy, current and future technologies supporting data flows in the agricultural sector

2. Analysis of initiatives for EU-wide harmonisation of data sharing and business-related processes

3. Evaluation of selected technologies potential useful both for agricultural production and CAP monitoring.

ICT developments
Promising technologies as new data sources for policy M&E

Digital Agricultural Technologies as Farm level data sources:
Field Sensors, Machinery/Tractors, Decision support systems, Precision Livestock Management, Pasture Management, Financial management, Earth Observation,
What is the penetration of these technologies?
What data logs are generating? How easy/usefull is to collect and process these data logs?

Analysis of real-world cases/examples:

- Farm level data monitoring through agricultural decision support systems
- Variable Rate Application technologies and monitoring of applied phytochemicals

Landscape-Environmental monitoring – Agro-environmental observatories and Public data repositories:
Soil quality, Water quality, Biodiversity index, Natura2000 data, Wildlife sanctuaries data, Land use change, Water bodies

ICT developments
Interoperability

The problem: *Digital Agricultural Technologies generate data with different formats and were not developed considering policy monitoring needs*

The solution: Need for data interoperability mechanisms on semantic and syntactic level.

Agricultural data standardisation activities

- Agricultural digital integration platforms (H2020-DEMETER AIM, ATLAS, IoF2020-FIWARE)
- ETSI-SAREF-Agri
- UN/CEFACT eCrop
- AgGateway's ADAPT Framework
- Agricultural data taxonomies (EPPO, AGROVOC)

Agricultural data sharing frameworks/regulations

- European Strategy for Data – Data ACT
- GAIA X – Agri Gaia
- FAO-UN on farm data management and sharing

ICT developments
Results

All results are documented in the following deliverables:

D2.1 - Landscape of agri-food ICT technologies within EU

D2.2 - Best practices on the adoption of ICT agricultural technological solutions

D2.3 - Identified new technological opportunities from collaboration with EU projects and initiatives

D2.4 - Emerging ICT technologies for the agricultural domain

Available here: https://mef4cap.eu/resources

ICT developments
Key outcomes

A) **Convergence of smart agriculture practices with policy monitoring and evaluation.** It is feasible digital agricultural technologies to concurrently serve two objectives:

- Implementation of optimised and sustainable agricultural practices >> clear benefits for farmers, climate, ecosystems
- Provision of farm level ground truth evidences of applied agricultural practices >> support for CAP M&E

B) There is no one fits all digital agricultural technology for farm level data collection. M&E data collection mechanisms should consider the **complementary** use of technologies and data logs. **Farm Management Information Systems** can act as a farm-level data gateway.

C) There is still a lack of EU wide data formats even for relatively simple to be modeled entities: parcel geometry, crop/cultivation types, agrochemicals, farming activities, farm level performance indicators

Current systems and future pathways

Objectives

- **Review** the Common Monitoring and Evaluation Framework to identify the difficulties encountered during its implementation, and describe the set of indicators, metrics and data sources it utilized.
- Identify **potential ICT solutions** to meet the detected data requirements for post-2020 CAP Performance Monitoring and Evaluation.
- **Define** and **identify** the most promising **pathways** to meet the data needs detected through the set of the indicators identified previously.

Current systems and future pathways

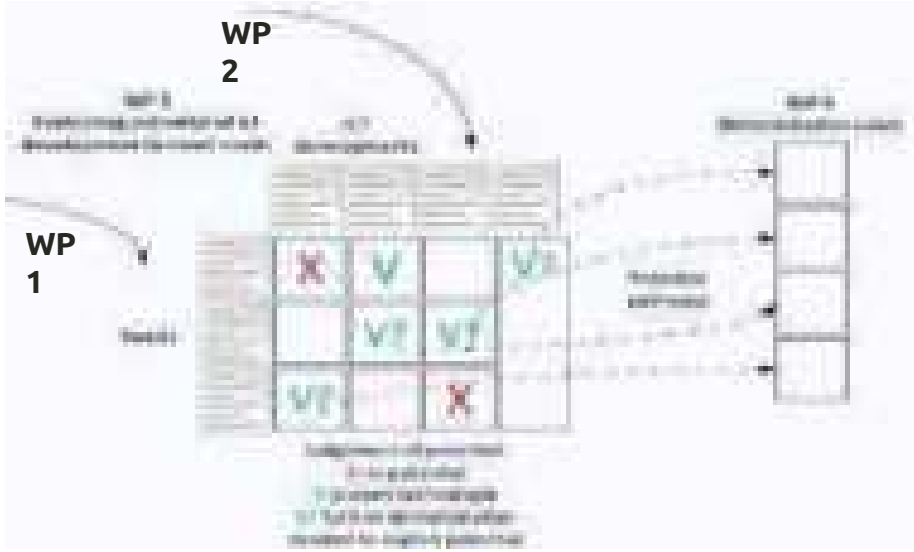
Structure

Task 3.1: **Review of current monitoring systems**

- Background on CAP 2014-2020 and CMEF structure.
- Review CMEF's indicators and its data sources.
- Describe relevant initiatives for CAP Post-2020.

Task 3.2: **Potential of current systems and ICT developments for future data needs**

- Data needs (WP1) Vs. ICT solution (WP2)
- **Judgement** on potential use of ICT solution



Task 3.3: **Identification of potential pathways for the monitoring and evaluation framework for future policies**

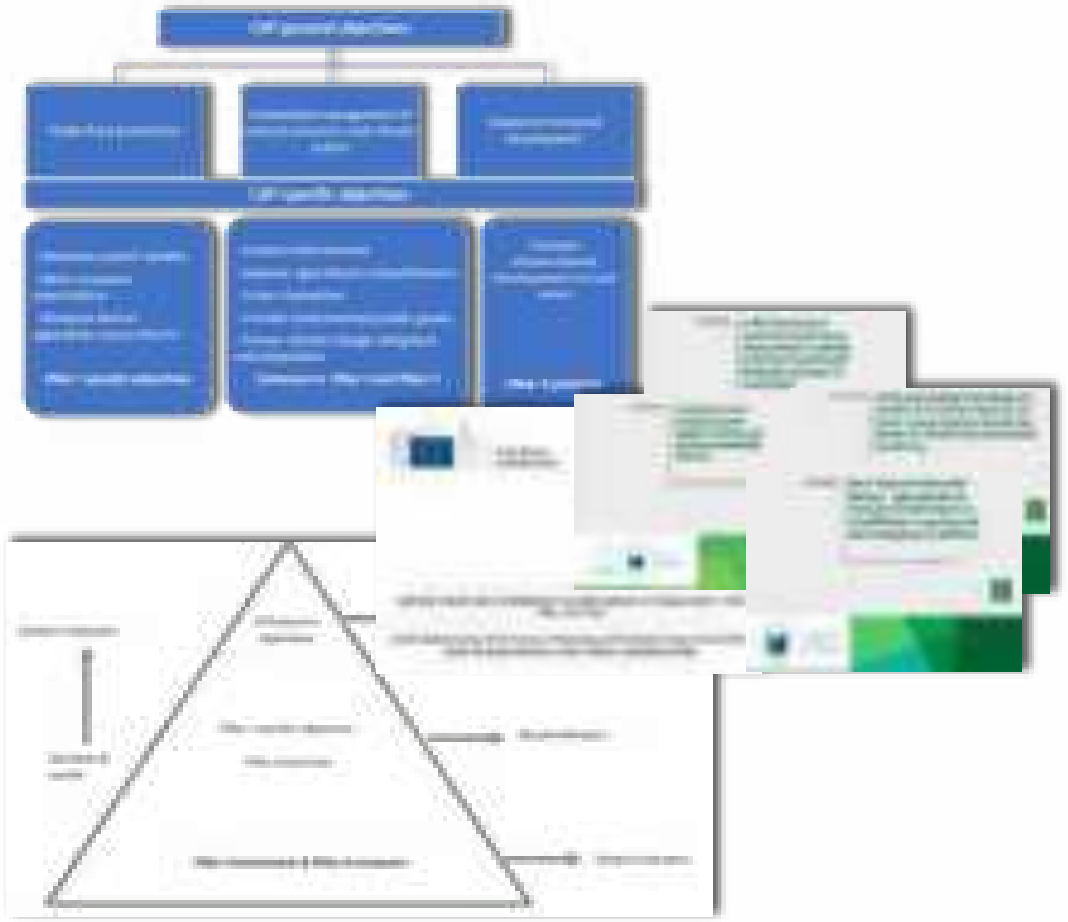
- **Pathway**: a series of actions based on a combination of several data sources and technologies to compute indicators that covers the monitoring and evaluation needs.

⇩

- Potential
- No potential
- Some potential

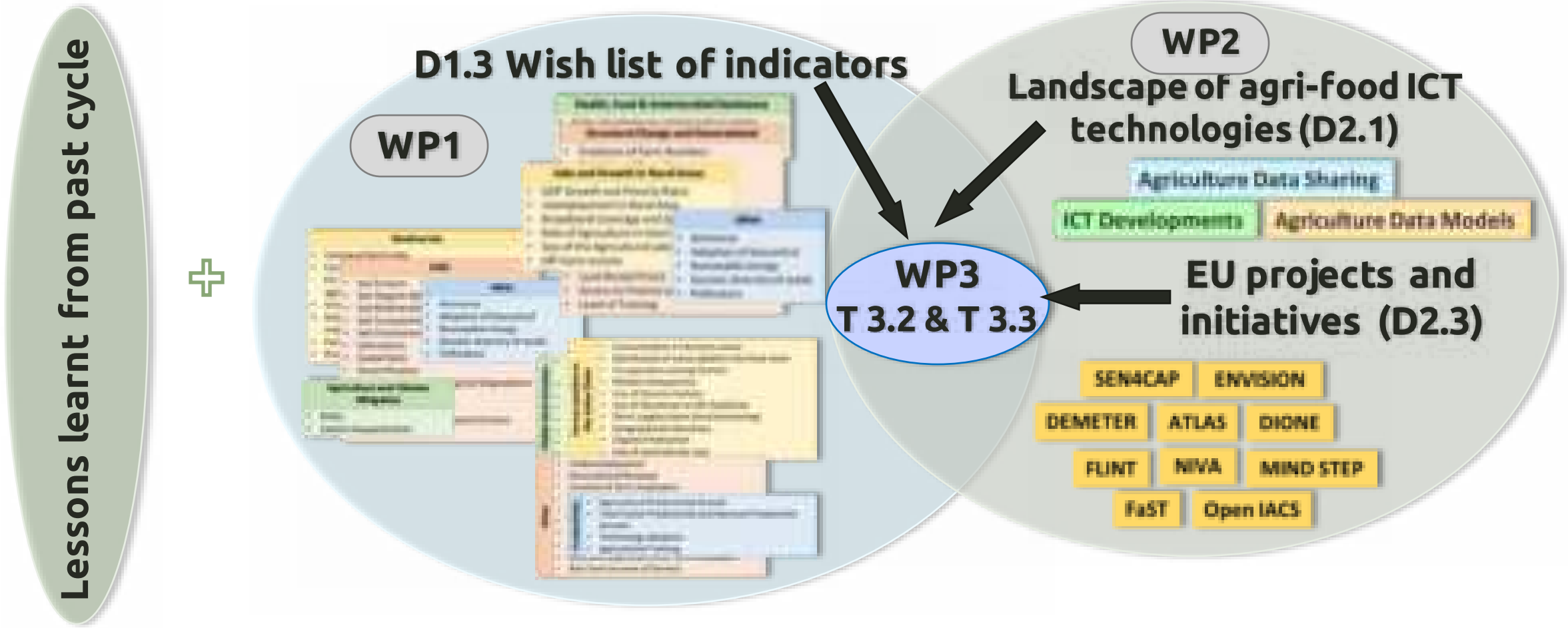
Current systems and future pathways

Task 3.1: **Review of current monitoring systems**



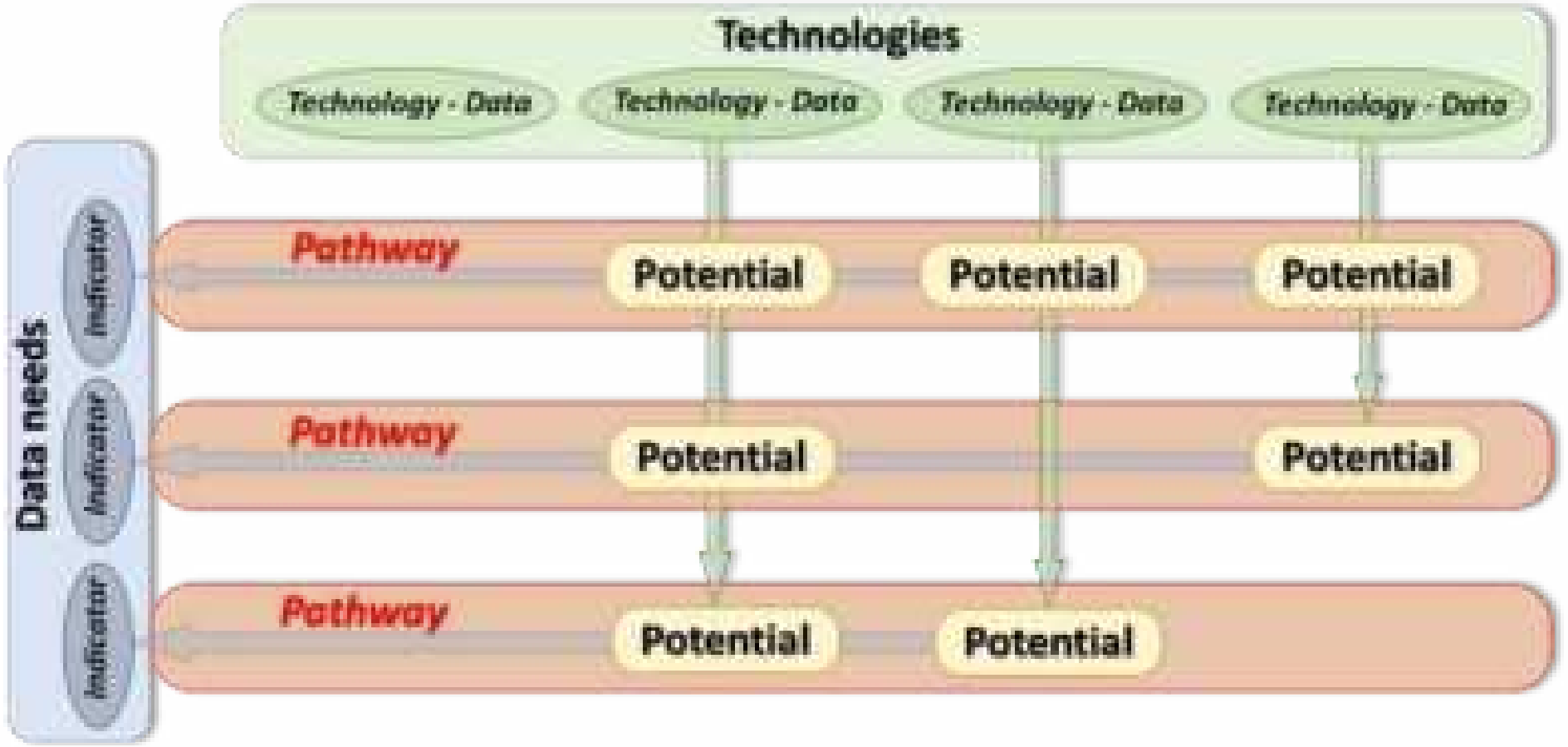
Current systems and future pathways

Task 3.2 + Task 3.3



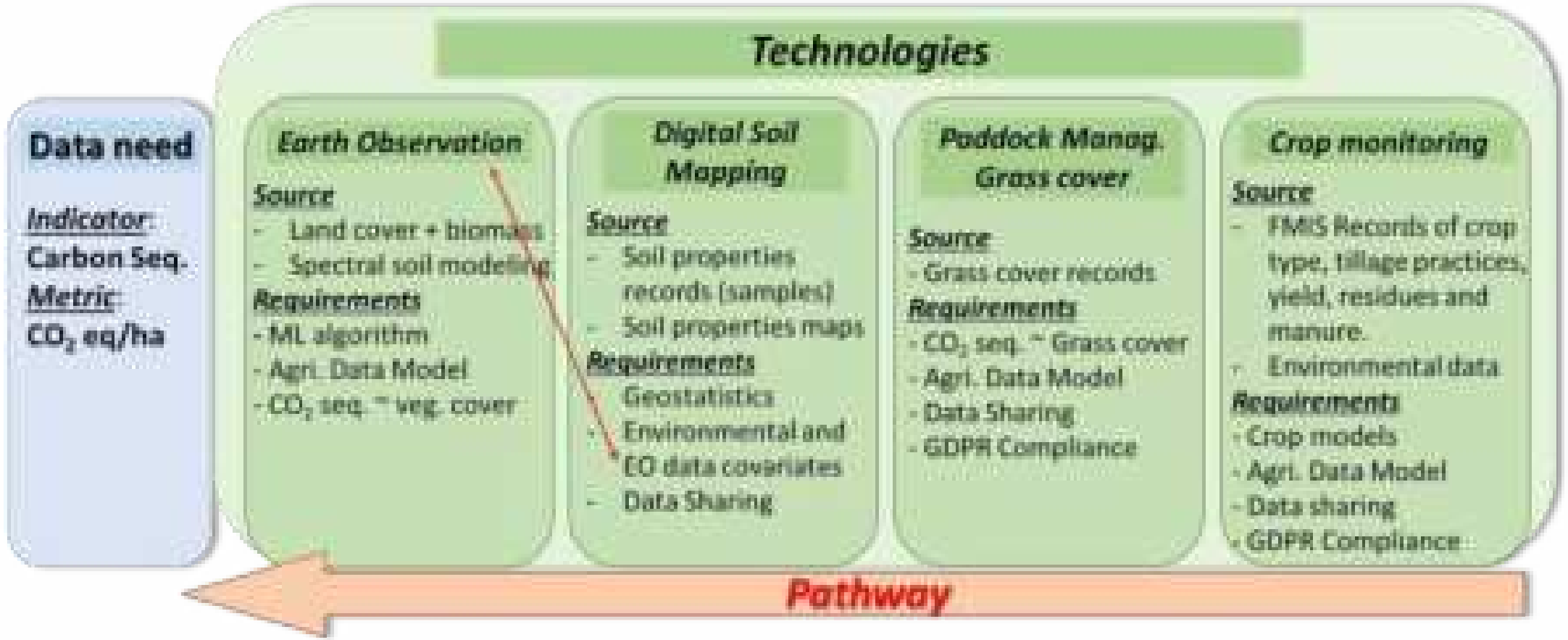
Current systems and future pathways

Task 3.2 + Task 3.3



Current systems and future pathways

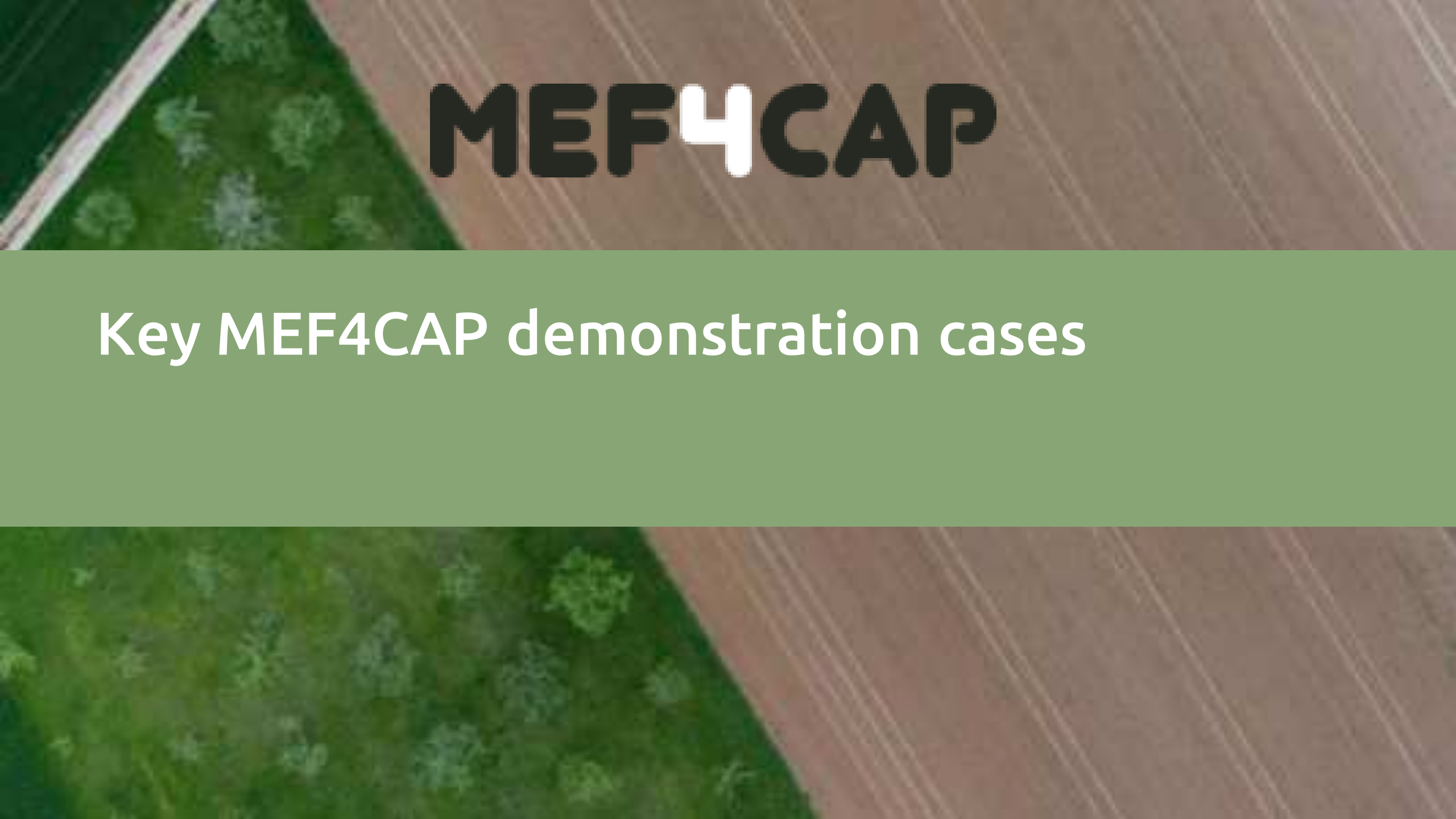
Examples



Current systems and future pathways

Conclusions

- Technologies addressing **economic indicators** are better **developed and established**.
- Few technologies to quantify some **social indicators**.
- **Environmental indicators**:
  - Requiere **combining** more **technologies** to compute their metrics.
  - **Scientific models** are needed to estimate either the metric or a proxy.
- **Interoperability and harmonitation between systems**:
  - Administrative databases ←→ statistical databases (evaluators access)
  - Machinery logs ←→ FMISs => data models and semantics (among others).
- **Technology adoption and willingness and of data providers**:
  - Perception: evidence for penalties.
  - Accomplishment of GPDR regulation.
  - Technologies need to show advantages to data providers.
  - Farm level: invesment in new technologies.
  - National/regional level: feasibility of using some technologies
- Need for data **cross-validation** to avoid fraud: “error” detection.



Key MEF4CAP demonstration cases

Challenges and opportunities associated with data integration from various sources?

Challenges

- Requires stakeholder buy-in
- Needs farmer agreement
- Ensure GDPR Compliance
- Requires ICT/human resources

Opportunities

- Reduce farmer burden in data collection
- Improved data collection efficiency & accuracy
- Speedier reporting of data
- Scope to collect more sustainability data

Irish Demo Case

Addressed two problems with two solutions

1. **Improve data sharing** and integration
   - **source farm data directly from processors**
   - **speed up data collection** process, & publication of **Irish FADN Farm reports**
2. Develop structures to **improve farm data visualisation**
   - **to benefit farmers** and **other stakeholders**
   - **utilise dashboards** and **farm reports to improve sustainability**

Challenges and opportunities in developing a farm sustainability dashboard?

Challenges

- Farmer skillset/digital divide (training need)
- Farmer concerns around how data will be used
- Farmer concerns around data privacy
- Resource costs for Teagasc

Opportunities

- A more digitally confident farmer
- Use of data to facilitate farm level decision making
- Help farmers to focus on the most useful KPIs
- Facilitate tailored farm advice
- More comprehensive farm sustainability reports
- Proof of sustainability performance over time

Online - Interactive Dashboard

- Farmers becoming more accustomed to **electronic data access**
- **Younger farmers** expect to be able to access their data online
- Online Interactive Presentation
- Built using Microsoft Power Bi
- Allows **user select results** that are of **more of interest to them**

Is the approach scalable? What are the policy benefits?

- **Scalability**
- The approach could be **scaled** to cover a **larger number of farms**
- Whether the approach would work in **other MS** would need **further investigation**

- **Policy Benefits**
- Policy makers would benefit though
  - a **deeper understanding** of the sustainability of farms
  - especially **different farm types** and **farms of different sizes**
- Understanding which parts of agriculture are **environmental hot spots**
  - allows the **targeting of policy** to deliver positive and **more immediate outcomes**
- Areas of agriculture which make **progress (regress)** environmentally could be **rewarded (penalised)**

Integrating open-source satellite data with farmer level data in Spain

Pablo Fernández Álvarez de Buergo, Cooperativas Agro-alimentarias de España, Spain

Case-country context:

EU Farm to Fork strategy will ensure that farmers keep more detailed tracking of all the tasks they carry out in their holdings. **Special concerns are on the use of fertilisers, pesticides and water**.

SIEX and related regulations enforce them to provide this information (mainly fertilisers and pesticides treatments) **on a monthly basis** (after each treatment/application) **through digital means** from September 2024 onwards (one of the main novelties for the new CAP period in Spain).

Expected outcomes:

- An easy-to-use digital farm logbook which integrates into a GIS both in-farm and out-farm data for a better decision making.
- Farm book API development to communicate the required information to the administration and download the farms holdings available information. The adequate aggregation of farmers' data will result in indicators for CAP monitoring and evaluation purposes.
- A friendly system for tracking data at farm level in cooperative frameworks and available to be replicated beyond grapevines sector.

The stakeholder(s) considered:

- Farmers and advisory services in cooperatives

Integrating open-source satellite data with farmer level data in Spain

Pablo Fernández Álvarez de Buergo, Cooperativas Agro-alimentarias de España, Spain

Integrating open-source satellite data with farmer level data in Spain

Pablo Fernández Álvarez de Buergo, Cooperativas Agro-alimentarias de España, Spain

Digital farm book & GIS integration:

KPI
KPI_1 N Balance per Hectare
KPI_2 P Balance per Hectare
KPI_3 K Balance per Hectare
KPI_4 Crop Rotation
KPI_5 NH_3 Emissions per Farm
KPI_6 NH_3 Emissions per Hectare
KPI_7 Adoption of (Natural) Biocontrols on Farm
KPI_8 Pesticide Use on Farms
KPI_9 Carbon Sequestration per Hectare
KPI_10 Water consumption
KPI_11 Pesticide risk on Farms

- In-farm data: crop and variety, plot area (LPIS), yield, inputs consumption (water, fertiliser, pesticides), application dates.
- Out-farm data: earth observation (Sentinel 2, NDVIs), meteorological (AEMET & SiAR), soil information, etc.

Integrating open-source satellite data with farmer level data in Spain

Pablo Fernández Álvarez de Buergo, Cooperativas Agro-alimentarias de España, Spain

Opportunity

C3

CCAA

CCAA

SIEX

Nacional

SIGC3X

esri

Mandatory request

Integrating open-source satellite data with farmer level data in Spain

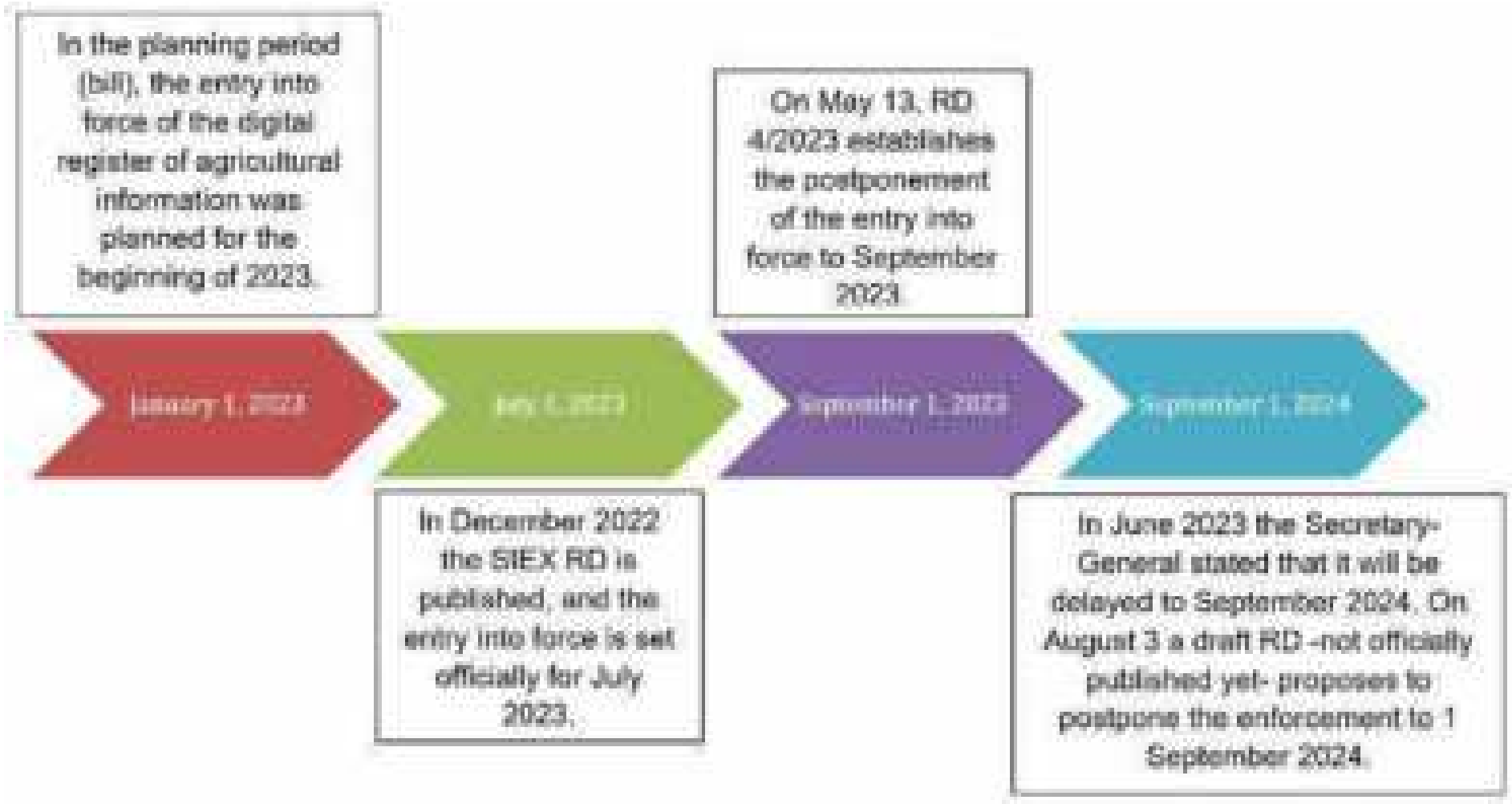
Pablo Fernández Álvarez de Buergo, Cooperativas Agro-alimentarias de España, Spain

DRIVERS
Regulation framework enforcement
Young farmers interest in the adoption of new technologies
Mid/long term economic savings
Performance improvement
Decrease of work load (long term)

BARRIER
Farmers' age
Lack of experience in digital techs
Administrative burden
Low connection in rural areas
Farmer's data used for control

Integrating open-source satellite data with farmer level data in Spain

Pablo Fernández Álvarez de Buergo, Cooperativas Agro-alimentarias de España, Spain



Integrating open-source satellite data with farmer level data in Spain

Pablo Fernández Álvarez de Buergo, Cooperativas Agro-alimentarias de España, Spain

General Data Protection Regulation (GDPR)

Development of non-personal data exchange contracts based on the *Regulation (EU) 2018/1807* and on the COPA-COGECA code of conduct on agricultural data sharing.

COMMISSION IMPLEMENTING REGULATION (EU) 2023/564

of 10 March 2023

as regards the content and format of the records of plant protection products kept by professional users pursuant to Regulation (EC) No 1107/2009 of the European Parliament and of the Council

- **Obligation to record the information** set out in Annex I is established:
  - ✓ type of use (surface treatment, indoors or treatment of seeds or plant propagating material)
  - ✓ plant protection product (PPP) use (name and registration number)
  - ✓ date of use
  - ✓ application rate
  - ✓ location or area/unit treated
  - ✓ size or quantity of area or unit treated
  - ✓ and crop or use
- **Obligation for the professional user to transfer this information into electronic format at the latest 30 days after the date of use of the PPP.**
- **It shall apply from 1 January 2026**.

Integrating open-source satellite data with farm level data in Greece

- Digital farm calendars and decision support systems are already available as commercial services operated by ICT companies/SMEs.
- Maintain precious data but are not designed for policy monitoring

Problem:
Is it feasible to use **farming advisory services** also for policy M&E? How?
Can **Farmers** and **Advisors** and **SMEs** be an integral part of the policy monitoring process?
What are the **incentives and benefits** for sharing their datasets?

Demonstrated solution:

- Design, implementation and testing of a data platform for **"agri-data aggregation and sharing"**
- Mechanisms for close-to-real-time calculation of performance indicators at parcel and/or group of parcels level (e.g., farmers association)
- Controlled sharing of calculated outcomes to Advisors, Farmers, Policy makers

Integrating open-source satellite data with farm level data in Greece

Build on top of the **Gaiasense** smart farming solution:

- ~400 Weather stations, ~70.000 ha, ~26 different crops
- A tool for **advisors** and **farmers**
- Advice on irrigation, fertilization, crop protection
- Supports certification audits (e.g., GlobalGAP, organic, subsidies)

Demo case data flow:

A) The **farmer** consents farm calendar data to be processed for calculating regional-level aggregates

B) Regional/community aggregates are shared with the **advisor/farmer** --> Advanced decission support

C) Calculated indicators available for sharing with **policy monitoring authority**

Technology	Properties
Digital Farmers Calendar	User provided data on applied farming practices
Agro-environmental sensors	Supportive evidence of practices
Satellite based EO	Calculated Indices relevant with agricultural activity
Information systems	Calculation of aggregates/ indicators, Controlled sharing of data (API), Export to file (pdf, xls, csv)

Demo Case data flow

Certification (GlobalGAP, organic)

Agri-Insurance

CAP M&E authority

Records of applied practices & Farm assets

Crop damage assessment

Calculated Performance Indicators

Farm Management Information System(s)

Farm Advisor

Farm Advisor MEF4CAP

Farm level data

Farming Advice

Farming Advice

Farm level data

Farm level data & consent for aggregation

Farming Advice

Regional Aggregates

Regional data

Farm level data-sources

Farm A

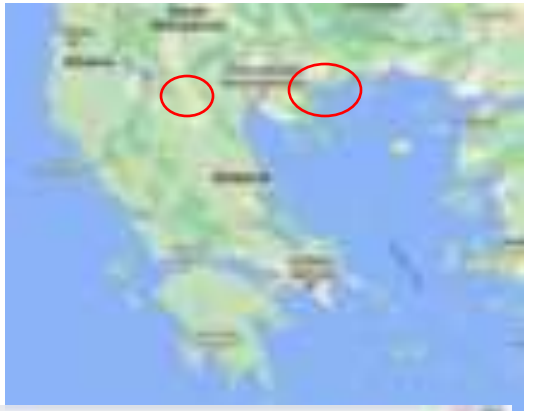
Farm B

Farm C

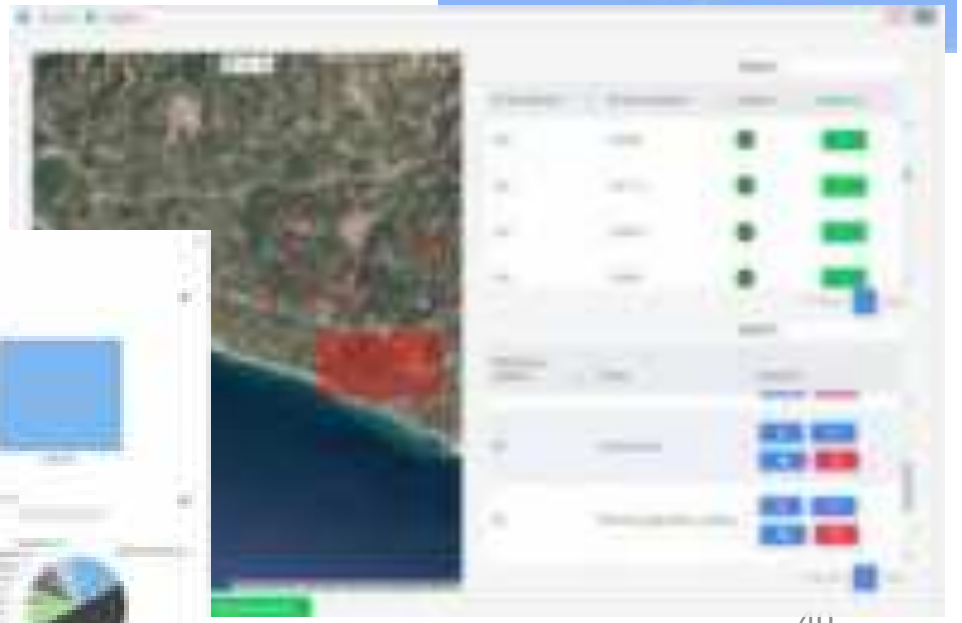
Farm D

Integrating open-source satellite data with farm level data in Greece

MEF4CAP demo case Greece:
~20 producers, ~70 parcels, 2 regions, 2 cultivation types: peaches & olives



- A data platform capable to connect with digital farm calendars
- Role based access control - Different level of data access according to role: Farmer, Advisor, Policy Monitor
- User defined group(s) of parcels
- Group level calculation of indicators for user defined time-periods
- Metrics for Fertilisers, Pesticides, Irrigation and Harvests



- Advisors: Min, max, average, outliers
- Policy: Achievement of targets and KPIs

Integrating open-source satellite data with farm level data in Greece

On-line workshops, interviews, testing of the platform with Farmers/Advisors

Key outcomes:

- Farmers are willing to share part of their farm-calendar and aggregated data with other farmers in the area (e.g. members of the same cooperative).
- Incentives/rewards for data sharing: a) get similar data from other farmers, b) financial benefits
- Advisors may have a more significant role in data sharing and regional M&E.
- Issue with farm-calendar data quality. Manually entered – (un)intentional errors. Not sure if they reflect actual farming practices.

Break

A roadmap for M&E of agriculture policies and how to translate it into an innovation agenda

Tomaso Ceccarelli and Rob Lokers, Wageningen Research, The Netherlands

Roadmap:

a representation (narrative, visual) that ties together a strategy ("why"), the actions needed to achieve the intended goals ("what"), the modalities (“how “) and a timeline for completion and monitoring ("when").

While the answers to the **“why”** (the very M&E of EU agricultural policies) and the **"when"** (the post-2027 CAP) are known, the ways and the specific actions to get there (the **“what”** and **“how**”) are only partially known and are one of the questions MEF4CAP is expected to contribute to

Trajectories within the roadmap

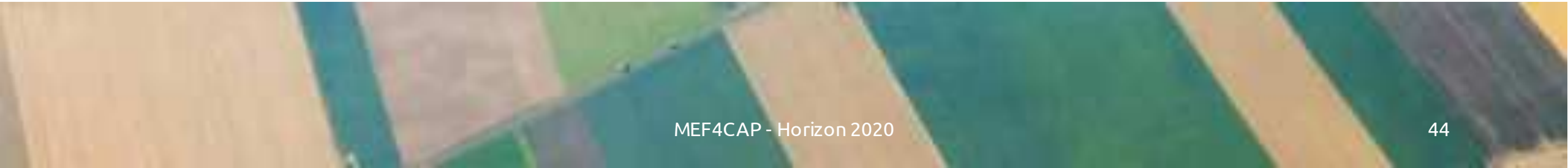
Based on the MEF4CAP findings we identified **2 groups of indicators** and **underlying data delivering technologies and data streams (defined as pathways, in MEF4CAP)** which corresponds to different spatial levels of reporting and ultimately respond to different M&E needs

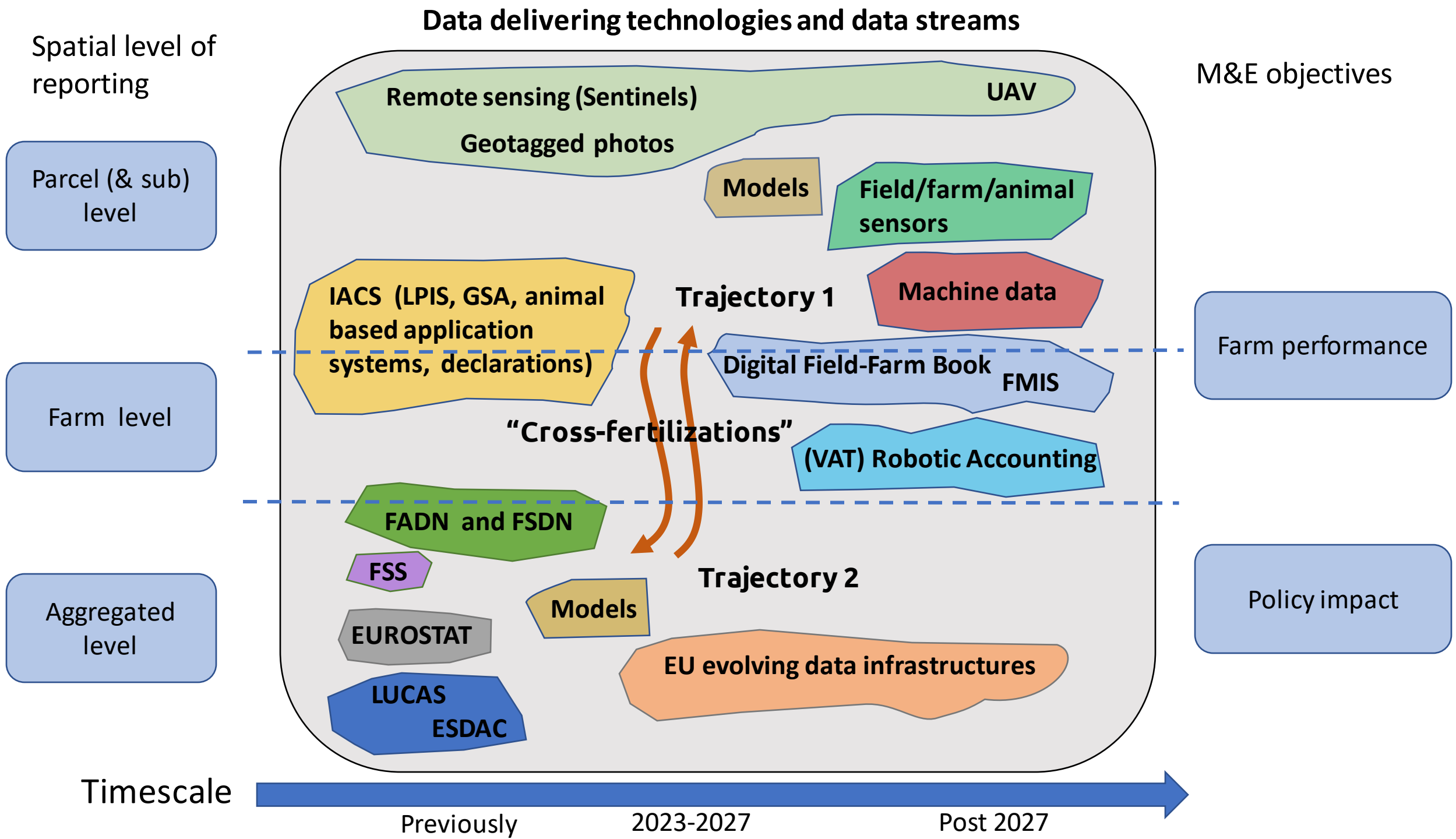
In the first case existing data streams can generate indicators **at a high (farm, parcel** and even sub parcel**) spatial resolution scale.** This responds to the current needs of **operational CAP monitoring**, but it can be usefully applied for evaluation purposes of **farm level performance.**

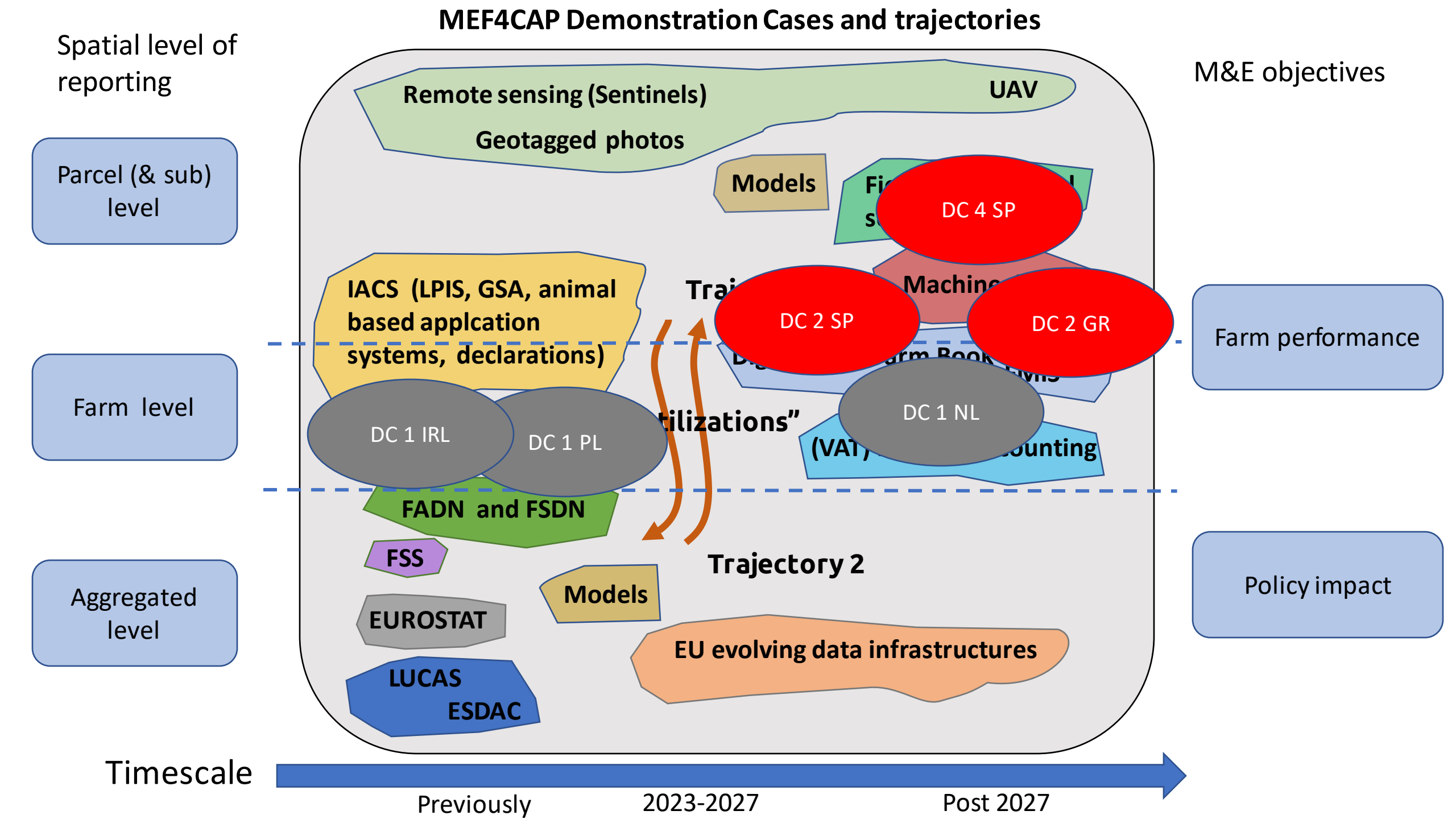
In the other case data streams feed indicators measuring the **impact of policies** at **aggregated levels.**

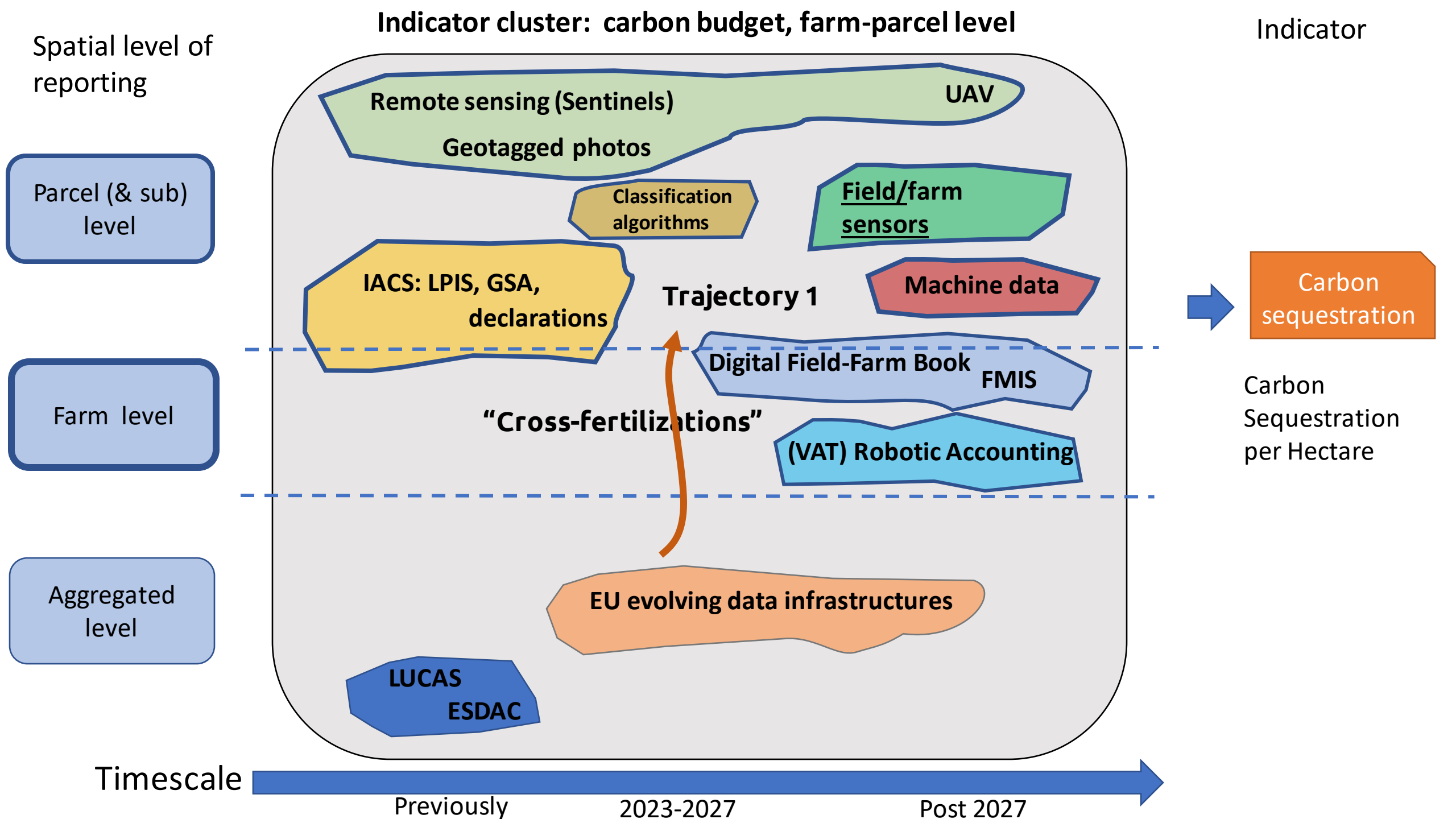
However, neither data stream fully addresses the goals of future M&E, whether it be the need for greater spatial resolution or new thematic content. **Thus, a combination of data delivery technologies should be considered.**

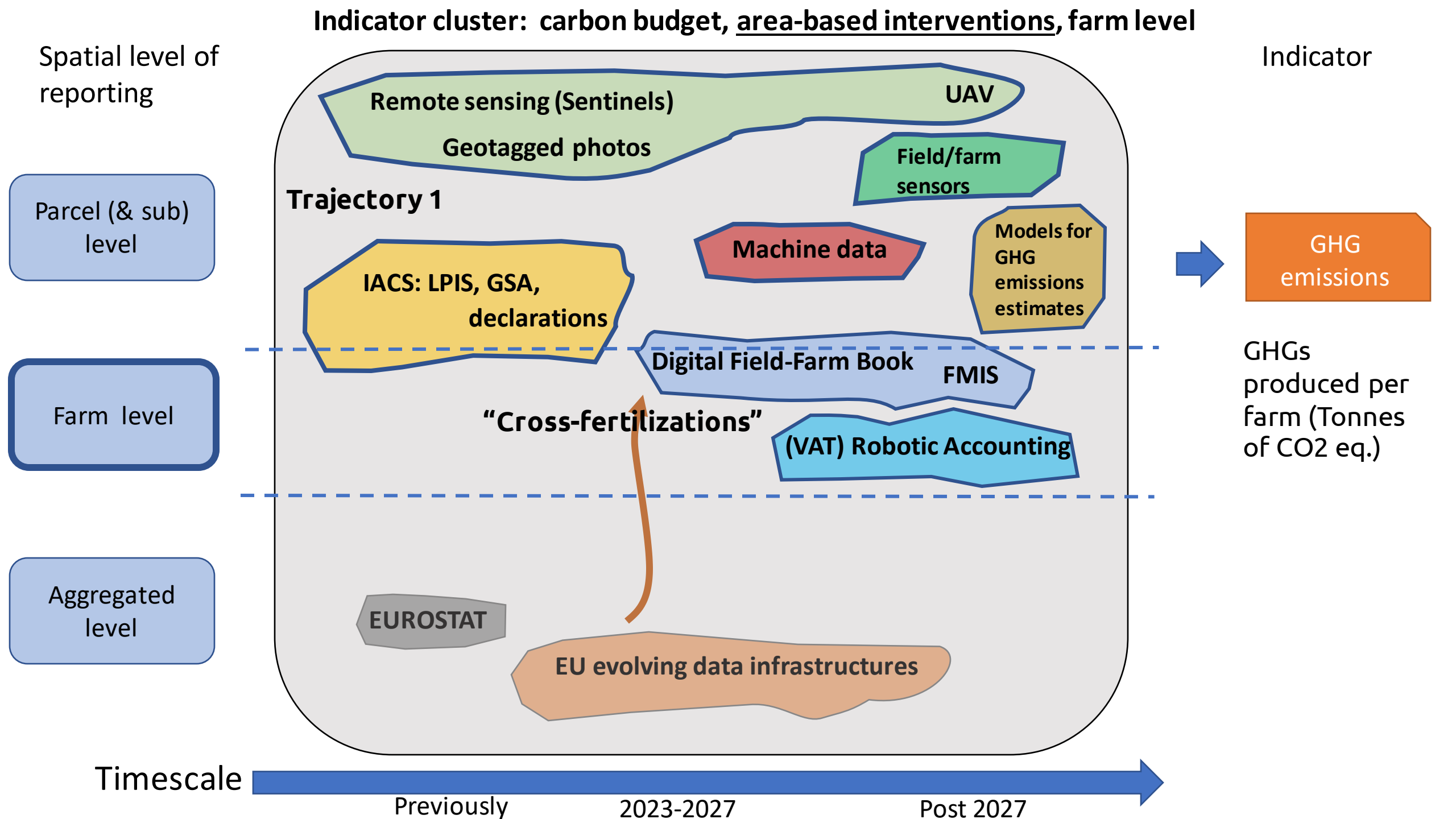
To put the development of technologies and data streams into perspective, we make use of the concept of **trajectories.** We define an innovation trajectory as a **"plausible course of action" in the future EU CAP monitoring roadmap**

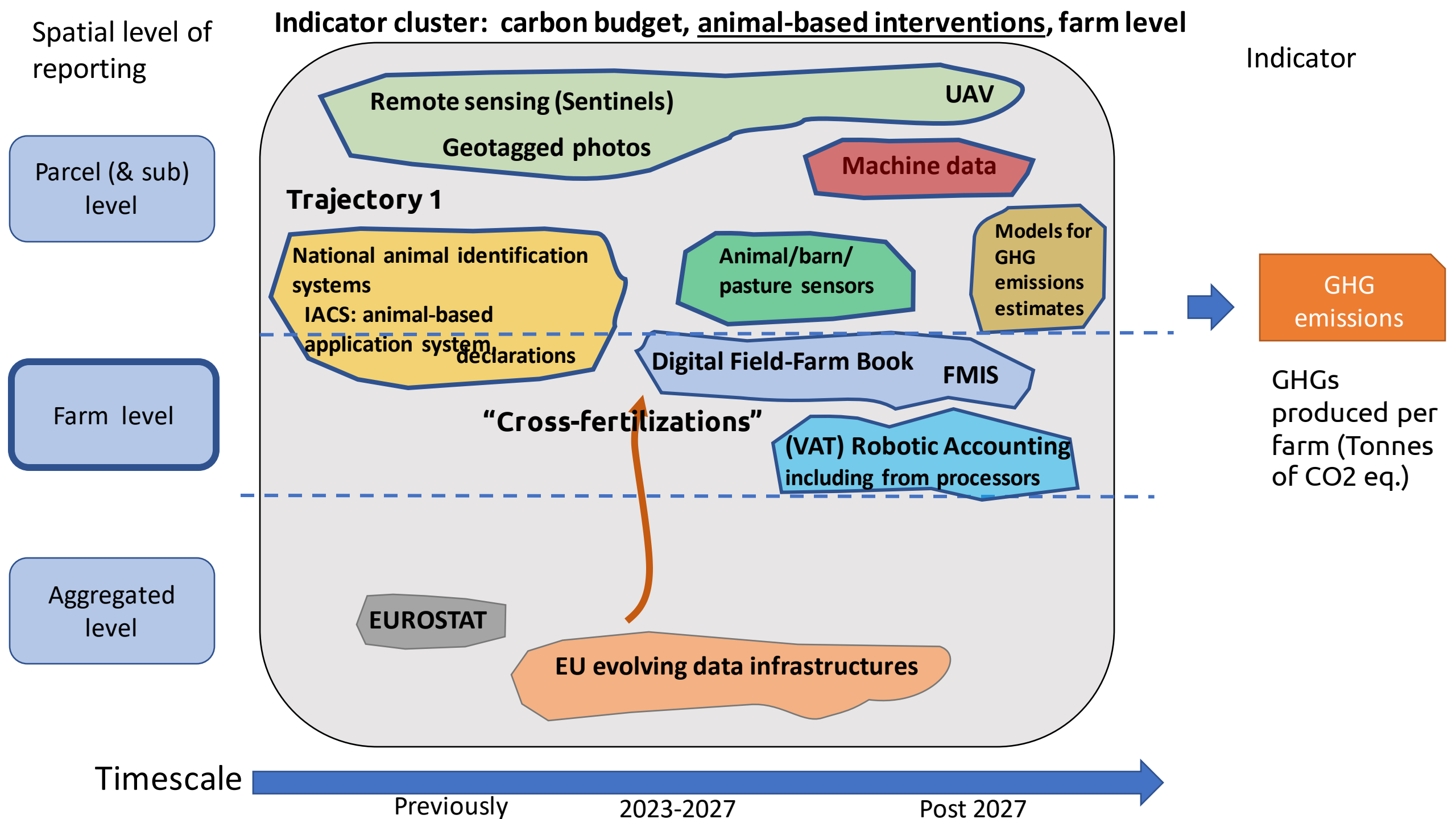


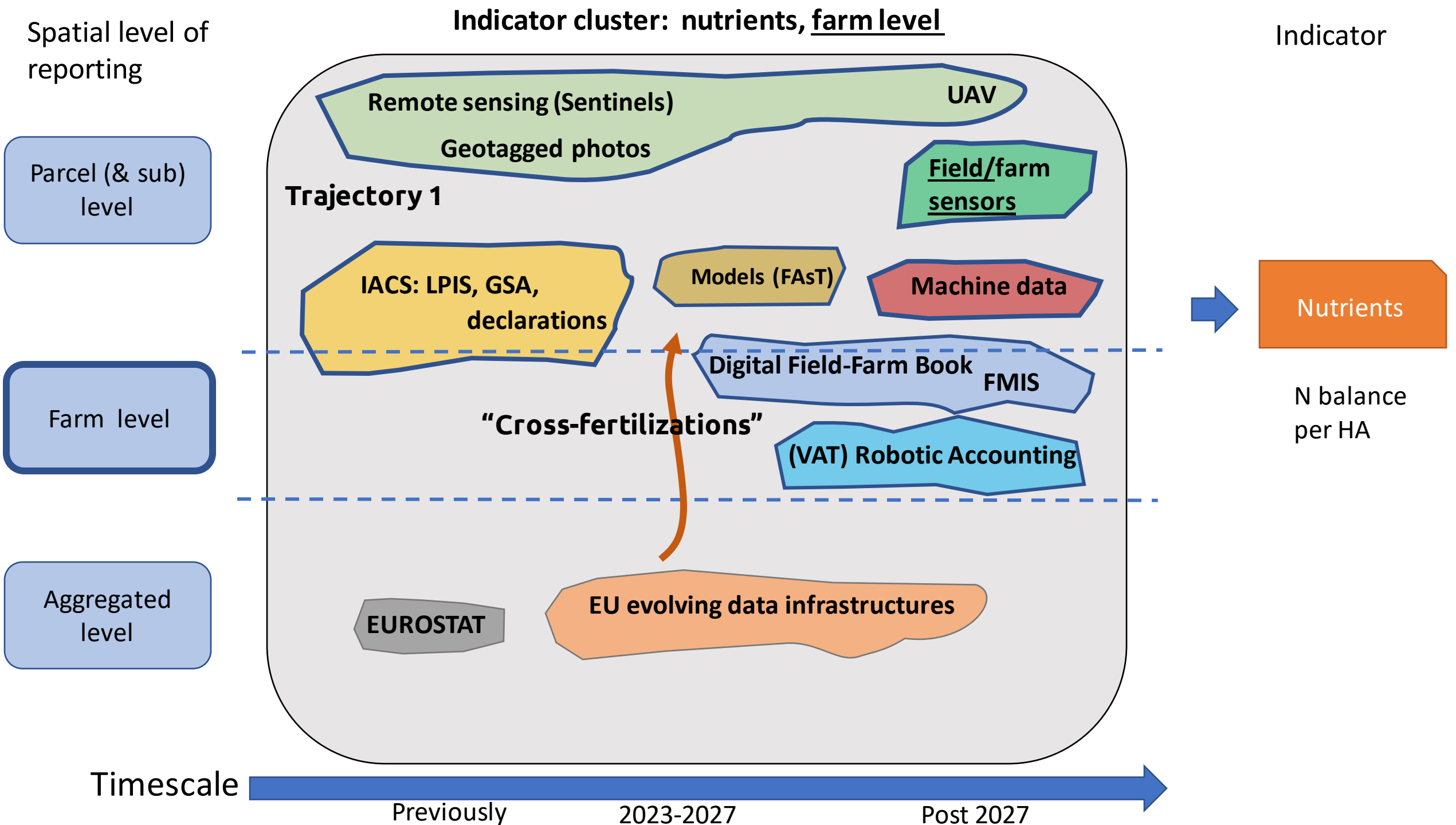

Data delivering technologies and data streams
Spatial level of reporting
M&E objectives
Parcel (& sub) level
Farm level
Aggregated level
Remote sensing (Sentinels)
UAV
Geotagged photos
Models
Field/farm/animal sensors
IACS (LPIS, GSA, animal based application systems, declarations)
Trajectory 1
Machine data
Digital Field-Farm Book
FMIS
"Cross-fertilizations"
(VAT) Robotic Accounting
FADN and FSDN
FSS
Trajectory 2
Models
EUROSTAT
EU evolving data infrastructures
LUCAS
ESDAC
Farm performance
Policy impact
Timescale
Previously
2023-2027
Post 2027

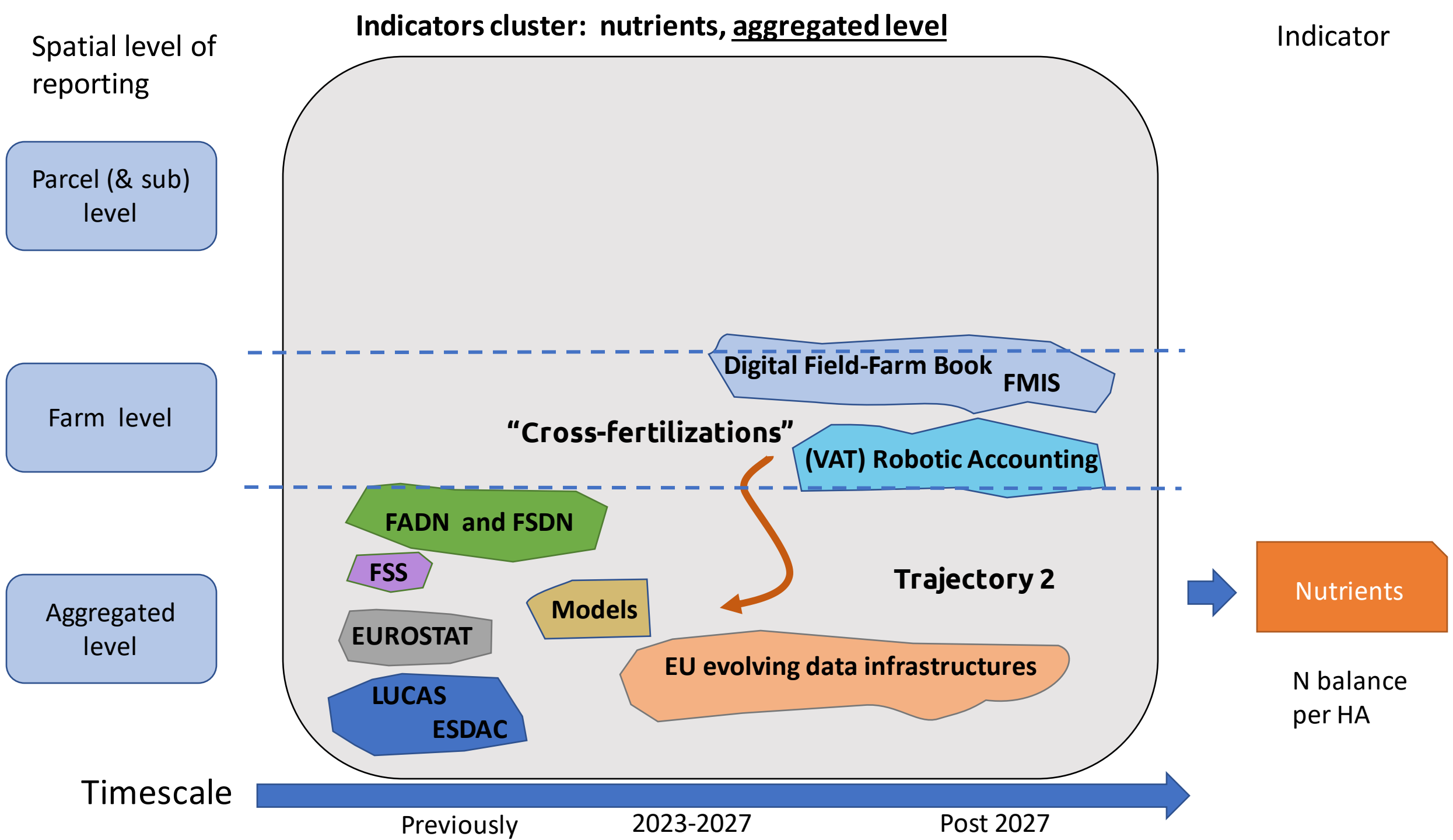

MEF4CAP Demonstration Cases and trajectories
Spatial level of reporting
M&E objectives
Parcel (& sub) level
Farm level
Aggregated level
Farm performance
Policy impact
Remote sensing (Sentinels)
UAV
Geotagged photos
Models
DC 4 SP
IACS (LPIS, GSA, animal based applcation systems, declarations)
DC 2 SP
DC 2 GR
DC 1 NL
DC 1 IRL
DC 1 PL
FADN and FSDN
FSS
Trajectory 2
Models
EUROSTAT
EU evolving data infrastructures
LUCAS
ESDAC
Timescale
Previously
2023-2027
Post 2027


Indicator cluster: carbon budget, farm-parcel level
Spatial level of reporting
Indicator
Parcel (& sub) level
Farm level
Aggregated level
Remote sensing (Sentinels)
UAV
Geotagged photos
Classification algorithms
Field/farm sensors
IACS: LPIS, GSA, declarations
Trajectory 1
Machine data
Digital Field-Farm Book
FMIS
"Cross-fertilizations"
(VAT) Robotic Accounting
EU evolving data infrastructures
LUCAS
ESDAC
Carbon sequestration
Carbon Sequestration per Hectare
Timescale
Previously
2023-2027
Post 2027


Indicator cluster: carbon budget, area-based interventions, farm level
Spatial level of reporting
Indicator
Parcel (& sub) level
Farm level
Aggregated level
Remote sensing (Sentinels)
UAV
Geotagged photos
Field/farm sensors
Trajectory 1
Machine data
Models for GHG emissions estimates
IACS: LPIS, GSA, declarations
GHG emissions
Digital Field-Farm Book
FMIS
"Cross-fertilizations"
(VAT) Robotic Accounting
GHGs produced per farm (Tonnes of CO2 eq.)
EUROSTAT
EU evolving data infrastructures
Timescale
Previously
2023-2027
Post 2027


Indicator cluster: carbon budget, animal-based interventions, farm level
Spatial level of reporting
Indicator
Parcel (& sub) level
Farm level
Aggregated level
Remote sensing (Sentinels)
UAV
Geotagged photos
Machine data
Trajectory 1
National animal identification systems
IACS: animal-based application system declarations
Animal/barn/ pasture sensors
Models for GHG emissions estimates
Digital Field-Farm Book
FMIS
"Cross-fertilizations"
(VAT) Robotic Accounting including from processors
EUROSTAT
EU evolving data infrastructures
GHG emissions
GHGs produced per farm (Tonnes of CO2 eq.)
Timescale
Previously
2023-2027
Post 2027


Spatial level of reporting
Indicator cluster: nutrients, farm level
Indicator
Parcel (& sub) level
Farm level
Aggregated level
Remote sensing (Sentinels)
UAV
Geotagged photos
Trajectory 1
Field/farm sensors
IACS: LPIS, GSA, declarations
Models (FAsT)
Machine data
Digital Field-Farm Book
FMIS
"Cross-fertilizations"
(VAT) Robotic Accounting
EUROSTAT
EU evolving data infrastructures
Nutrients
N balance per HA
Timescale
Previously
2023-2027
Post 2027


Indicators cluster: nutrients, aggregated level
Spatial level of reporting
Indicator
Parcel (& sub) level
Farm level
Aggregated level
Digital Field-Farm Book
FMIS
"Cross-fertilizations"
(VAT) Robotic Accounting
FADN and FSDN
FSS
Models
EUROSTAT
LUCAS
ESDAC
EU evolving data infrastructures
Trajectory 2
Nutrients
N balance per HA
Timescale
Previously
2023-2027
Post 2027

Indicator/cluster: N Balance, farm level

Assessment of readiness, Scalability (across MS, farm types...next)

↓

Innovation Agenda "Challenges"

Data delivering technology	Technological maturity	Societal readiness	Organizational readiness	Legal readiness
IACS				
Remote sensing				
Geotagged photos				
UAV				
Digital farm/field bo				
FMIS				
Field/farm sensors				
Machine data				
VAT (robotic accounting)				
Models (FAST)				
EU data infrastructures				

maturity of the technologies in the experimental environment of the project demonstration cases

related to the organizational impact of a certain technology on a specific data subject (PAs, farmers, advisors, etc.)

potential of adoption of a specific technology and innovation process by the relevant data subject (drivers and barriers)

legal and regulatory implications in the application of the proposed technologies and the data streams

Indicator (or indicator cluster) specific: N balance, farm level

Assessment of readiness

Innovation Agenda "Challenges"

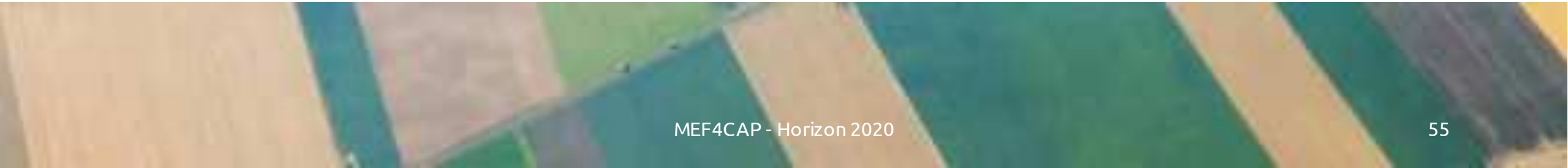
Data delivering technology	Technological maturity	Societal readiness	Organizational readiness	Legal readiness
IACS	high	high	high	medium-high
Remote sensing	low	medium	medium	low
Geotagged photos	Limited application			
UAV	low	medium	medium	low
Digital farm/field book	Medium (but see Spain !)	medium	medium	low
FMIS	low	low	low	low
Field/farm sensors	low	medium	medium	medium
Machine data	medium	high	medium	low
VAT (robotic accounting)	medium	medium	medium	medium
Models (FAST)	medium	medium	medium	low
EU data infrastructures	medium	high	high	high

An Innovation Agenda for future M&E

MEF4CAP Final Meeting, 13th December 2023

Towards an Innovation Agenda

- Preparing for post 2027 M&E of agricultural policies
- Connected with MEF4CAP Roadmap
- Taking account of drivers, existing barriers and main challenges
- Tapping from MEF4CAP “pathways” and demonstration cases
- Linked to current M&E landscape and currently evolving innovations, for continuity
- Broadly scoped, including wider data governance, technological & infrastructural challenges
- Where possible, with specific directions to cope with generic challenges for scaling, infrastructure, interoperability, data sharing etc



Barriers & drivers

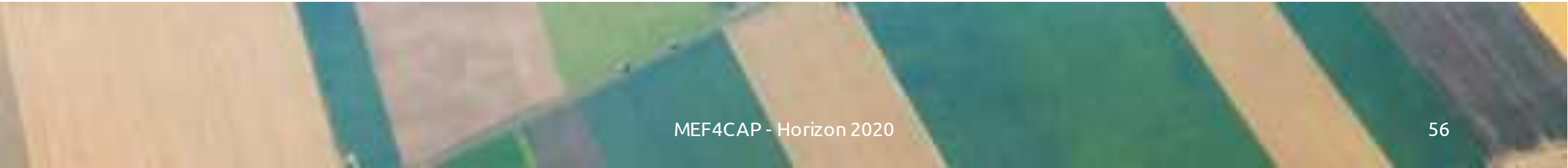
Drivers

- Support for improved decision making and better economic results, including farm advice, benchmarking etc.
- Decrease of administrative burden
- Support to deliver proof of performance and compliance for certification, subsidy application etc.

Barriers

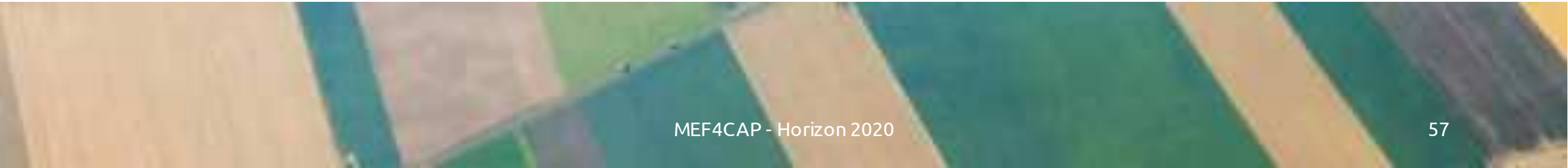
- Increase of administrative burden
- Fear of lack of control on data access and usage
- Lack of awareness and/or skills on data sharing and digitalisation in general
- Fear of non-compliance, and being penalized
- The need for large time and/or technological investments

- Lack of interoperability
- Limited opportunities for data sharing
- Low internet connectivity in rural areas
- Complexity of digitalisation of the whole interconnected value chain



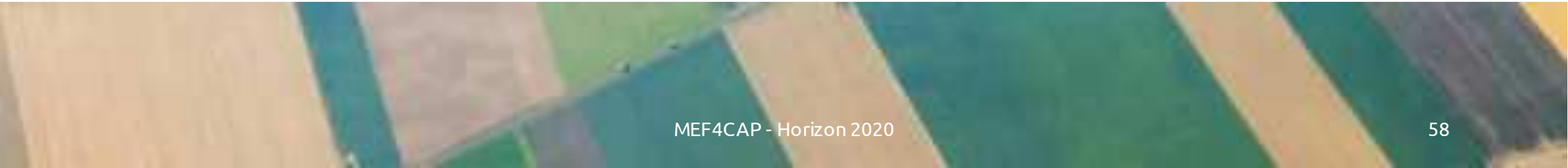
Main Challenges for M&E Innovation

- Readiness and maturity of novel data streams and technologies
- Data Sharing Infrastructure
- Data Interoperability
- Digital Infrastructure & Skills
- Digital divide among MS and among farmers



Innovation propositions from demonstration cases, e.g.

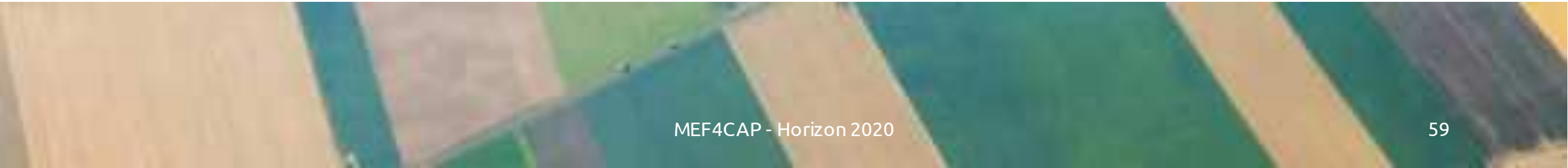
- Implementation of robotic accounting to allow automated collection of data on farm inputs and outputs based on digital invoicing.
- Integration of farm registries in the M&E system, allowing the use of farm management data
- Establishing sensor networks, and the integration of IoT data (from sensors, machines)
- Deployment of federated computing approaches to allow downstream (e.g. farm, Member State) processing of data for upstream purposes

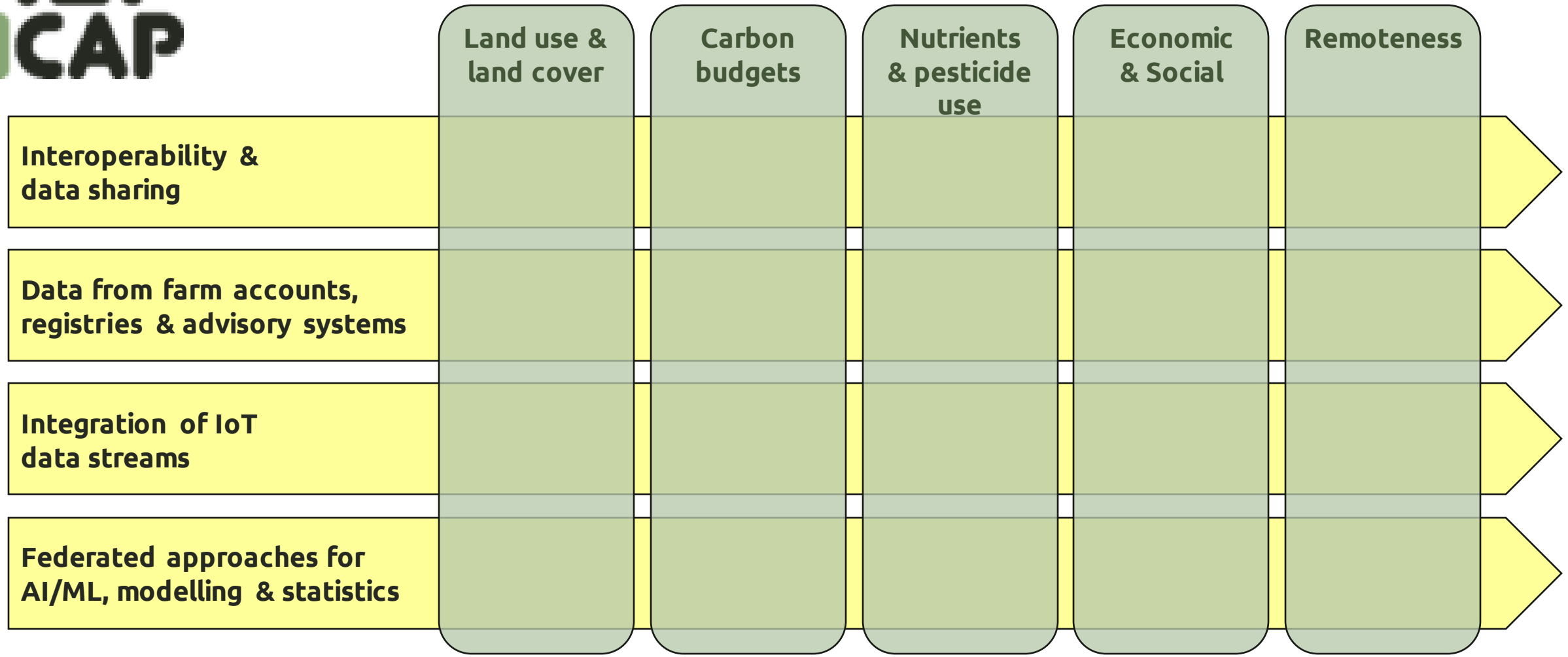


Related innovation programmes

Supporting, complementing, overlapping with desired M&E innovations

- Horizon Europe – Cluster 6, Food, Bioeconomy, Natural Resources, Agriculture and Environment
- European Partnership “Agriculture of Data”
- EU Common Data Spaces
- EU Space Programme
- EU Mission: A Soil Deal for Europe




Land use & land cover
Carbon budgets
Nutrients & pesticide use
Economic & Social
Remoteness
Interoperability & data sharing
Data from farm accounts, registries & advisory systems
Integration of IoT data streams
Federated approaches for AI/ML, modelling & statistics

Example topic - Nutrients & pesticide use

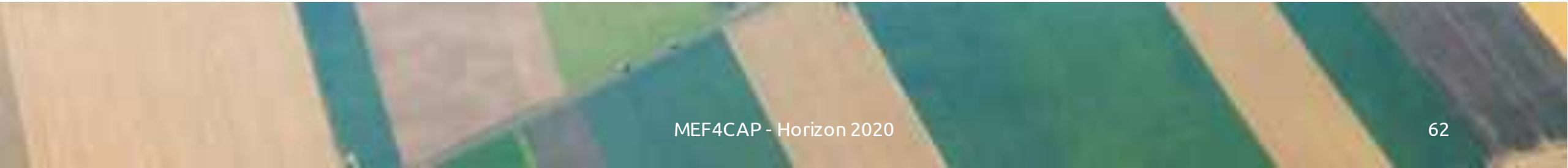
Proposed innovations

- Collection and integration of FMIS, Fieldbook, herd management systems and laboratory data, to get access to registered on-farm management practices, and possibly also available data on soil organic content and related soil parameters (e.g. through soil sample analyses)
- Integration of data from systems implemented to comply with national and EU level regulations: national monitoring systems, records of MS-level nutrient advisory tools (FaST), records of MS-level crop protection monitor tools.
- Collection and integration of data from sensor networks and machinery data, to complement and refine data from farm registry systems.
- Data sharing and merging, with a specific role for the Common European Dataspaces and associated developments on cloud-to-edge federation and associated integration issues

Example topic - Nutrients & pesticide use

Ongoing and upcoming innovation work

- HORIZON-CL6-2021-ZEROPOLLUTION-01-02: Optimisation of nutrient budget in Agriculture.
- HORIZON-MISS-2022-SOIL-01-01: Building the mission's knowledge repository and advancing the European Soil Observatory
- HORIZON-MISS-2021-SOIL-02-02: Validating and further developing indicators for soil health and functions



Example topic - Nutrients & pesticide use

Innovation strategy & timeline

Subject	Rationale	How	Timeframe
Setting up the processes and infrastructure to automatically collect accounting data and derive farm level data for M&E of nutrients and pesticides	Accounting data contains valuable information on the farm level inputs and outputs of nutrients and pesticides. Robotic accounting would allow making estimates of farm level nutrient balances and pesticide use, as part of the new FSDN or for broader/full sector surveying, while reducing administrative burden for farmers and administrations.	To be decided	2024-2027
Setting up the processes and infrastructure to automatically collect farm and parcel level data for M&E of nutrients and pesticides	A wealth of valuable location specific data is available on-farm, partly registered in automated systems. At the same time digitisation in general and regulatory obligations to deliver data are gradually leading to a more connected (although still fragmented) data ecosystem. Reuse of such data could improve M&E, while reducing administrative burden for farmers and administrations	MS innovation projects, e.g. coordinated through Agriculture of Data	2024-2033
Exploitation of Sentinel CHIME mission data streams	The CHIME mission promises to provide novel data streams providing high resolution data on among others crop yields, post-harvest residues, nitrogen and phosphorus content. This can improve M&E capacities, particularly for arable farming.	Horizon Europe and ESA research actions	2027-2033

A roadmap for M&E of agriculture policies and how to translate it into an innovation agenda

Panel discussion en Q&A

- Olivier Chartier (Ecorys)
- Maira Dzelzskaleja (COPA COGECA)
- Sophie Helaine (DG AGRI)

A roadmap for M&E of agriculture policies and how to translate it into an innovation agenda

Panel discussion and Q&A
Keynote, Demonstration cases, Roadmap and Innovation agenda

Policy discussion: how can better M&E capacity unlock the move to a more performance-based CAP?

Introductory remarks by Alan Matthews

A roadmap for M&E of agriculture policies and how to translate it into an innovation agenda

Panel discussion en Q&A

- Kaley Hart (IEEP & CAP Network)
- Emmanuel Rauch (ECA)
- Hans Vrolijk (WUR)
- Marion Picot (CEJA)

Wrap up

MEF4CAP

Presentations by:

MEF4CAP partners

www.mef4cap.eu

@MEF4CAP

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101000662. The content of this publication exclusively reflects the author's view and the Research Executive Agency and the Commission are not responsible for any use that may be made of the information it contains.

A roadmap for M&E of agriculture policies and how to translate it into an innovation agenda

Panel discussion en Q&A

- Data needs for CAP evaluation: What type of data is needed - qualitative vs quantitative? How important is the auditability of the data? What's the potential of big data for CAP M&E?

- What would a full shift to performance mean for the CAP itself? What would need to change in how the policy is designed and implemented?