modern AKIS

Together for Systems' Innovation

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modernAKIS Together for Systems' Innovation

Modernisation of Agriculture through more efficient and effective Agricultural Knowledge and Innovation

Systems

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Conceptual and Methodological Framework for transformative/evolutionary AKIS journeys

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DEC	Websites, patent fillings, videos, etc.	☐			
OTHER		☐	**CI**	Classified, as referred to Commission Decision 2001/844/EC	☐

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Acronyms

AKIS – Agricultural Knowledge and Innovation System
CAP – Common Agricultural Policy
CCO - Cross-Cutting Objective
CD- Capacity Development
CDAIS - Capacity Development for Agricultural Innovation Systems
CNA - Capacity Needs' Assessment
CoP – Community of Practice
DEF4AKIS -Developmental oriented framework for the evaluation for the AKIS
EC - European Commission
EIP – European Innovation Partnership
ELA - Experiential Learning Assessment
EU - European Union

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FAO - Food and Agriculture Organization
GFRAS - The Global Forum for Rural Advisory Services GFRAS
ISS – Innovation Support Services
KOM – Kick Off Meeting
KT&I- Knowledge Transfer & Innovation
M&E - Monitoring & Evaluation
MA – Managing Authorities
MAA – Multi-Actor Approach
MS – Member State
OECD – The Organisation for Economic Cooperation and Development
OG - Operational Group
SCAR-AKIS - Standard Committee on Agricultural Research, Agricultural Knowledge and Innovation Systems
SP – Strategic Plan
SWOT – Strengths Weaknesses Opportunities Threatens
TAJ -Transformative AKIS Journey
TAP - Tropical Agricultural Platform
UNDP - United Nations Development Programme
WP – Work Package

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1. Executive Summary

modernAKIS has been designed to support the capacity development of the governing bodies of the AKIS (Agricultural Knowledge and Innovation Systems) strategies that are funded by the CAP Strategic Plans 2023-2027 and of the key actors of change of agricultural systems. The aim is to strengthen the AKIS functioning on the ground across EU and make them better functioning to contribute to achieve a more modernized, resilient, sustainable and competitive agriculture in Europe.

The conceptualization of Agricultural Knowledge and Innovation Systems (AKIS) has been developed over decades following the different paradigms that occurred over time with regard to agricultural development (e.g., productivist, constructivist, systemic, circular, sustainable development and others) and under the EU Regulation relating to the CAP 2023-2027, AKIS is defined as "the combined organisation and knowledge flows between persons, organisations and institutions who use and produce knowledge for agriculture and interrelated fields (§3.1; § **Fehler! Verweisquelle konnte nicht gefunden werden.**).

As a matter of fact, the emergence of modernAKIS is due to the recent acquisition of policy dignity of the AKIS within the Common Agricultural Policy 2023-2027 that implied the establishment of an AKIS strategy within the CAP Strategic plan of each Member State with the aim to reinforce to reinforce the AKIS functioning and their contribution to the cross-cutting and specific policy objectives (§3.4).

However, according to recent studies across EU, still, the concept and the functioning of the AKIS are rather than well-acknowledged by the policy makers and governing bodies of the CAP SPs and by the other typologies of the AKIS actors (farmers, advisors, research bodies and so on) and as well capacities relating to creating an enabling environment for the agricultural development and innovation as well as effectively play key roles and functions within the respective AKISs (§3.3).

Based on the evidence emerged during previous studies (Aparicio Montero et., al. 2019; Knierim et al., 2020) and specific discussion and needs assessment that were conducted for the purpose of modernAKIS project design and early development, within the partnership it is embraced the idea that the reinforcement of the AKISs and their better functioning across EU imply a transformative change based on a shift in mind-sets towards a system thinking and collective action. This would be likely to allow shifting existing AKISs (and their component structures, institutions and actor positions) onto alternative development pathways (Pelling et al., 2015) (§4).

Accordingly, as it is presented in this deliverable, the process of strengthening the AKIS will function as a discovery journey, namely a Transformative AKIS Journey (TAJ), which will move AKIS actors away from the boundaries of what is already known to explore new horizons, challenge themselves, and experience new things that will make the journey an evolutionary learning experience (§4).

The smooth implementation of the TAJs will benefit from the wide engagement of key actors of change of AKISs at EU and MSs level within the modernAKIS network (WP2). They are seen as the actual/potential protagonists in their AKIS who actively participate in AKIS dynamics through their support in knowledge flows and the creation of innovations (§4.1).

So, the key actors of change are fundamental for the right implementation of the TAJs and will be embarked on the TAJs to learn along the way and being carried away by creativity, motivated by the ambition to increase the capacity to be part of a system and to understand its dynamics.

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On this regard, during the Kick Off Meeting (KOM) held in Rome in November 2022, the modernAKIS partners reflected on the characteristics that key actors of change should have to be engaged within the project and accordingly they will be iteratively engaged during the project implementation.

Transformative AKIS journeys will draw on the sound combination of three participatory systemic approaches to behavioral change that will inspire an overall pathway of collective learning and system thinking development across EU: (1) transformative change; (2) multi-actor approach; (3) reflexive monitoring and evaluation in action.

The TAJs will intervene on all the three levels of AKIS by supporting key actors of change in developing four, plus one - overarching, capacities already identified and described by (Yang et al., 2021) that are fundamental for developing the overarching capacity to adapt and respond in order to realize the potential of innovation within an AKIS: (i) capacity to navigate complexity; (ii) capacity to collaborate; (iii) capacity to reflect and learn; (iv) capacity to engage in strategic and political processes, including the AKIS strategies within the CAP SPs (§4.2).

As it is designed, modernAKIS relies on an inherent multi-actor approach that will be ensured by three interconnected functions: (1) the organization of structures (actors and their organization) and their functioning through appropriate methodologies; (2) the co-development of systemic capacities and knowledge that will accordingly serve the capacity development of the key actors of change and the AKIS in MSs; (3) the enabling mechanisms that will ensure responsiveness, significance and effectiveness of MA implementation along the TAJs along with impact across AKISs in MSs (§4.3).

A third important component of the TAJs will be a systematic reflexive assessment process that will reinforce the development paths of the TAJs by supporting the key AKIS actors during an on-going analysis on how they are contributing to reinforcing the AKISs and this will feed evolutionary loops of learning and adjustment of action in their respective systems (4.4). in fact, reflexive practices have the potential to encourage the participants involved into the evaluative process "to look at their networking activities from a broader perspective on barriers within society, so that those activities can then be recalibrated" (Beers & van Mierlo, 2017; Van Mierlo & Beers, 2010).

Finally, this deliverable provides the first attempt for an overall and significant framework for the evaluation of the AKIS in EU MSs which also includes a systematization of already in place relevant tools and indicators.

This will be further co-developed within the network of the key actors of change and with the aim of supporting the adoption of measures for evaluating or assessing the national/regional AKISs as well as to their reinforcement strategies that will allow capturing specific though significant aspects to mark evidence of state of art and assess the functioning and performance of the AKIS in MSs for systematic diagnosis and decision making.

The proposed overall evaluative framework is called Developmental Oriented Assessment Framework for AKIS (DoAF4AKIS) as it adopts an overarching developmental, evolutionary and reflexive evaluative approach for the integrated implementation of the typical structural (Bergek et al., 2008), functionalist (Hekkert et al., 2009), transformative (Lamprinopoulou et al., 2014) and capacity development () oriented analytical frameworks that have been already put in use for the assessment of the AKIS. Indeed, while the latter offer the contents and meanings around which to conduct the assessment of the AKIS, the developmental, evolutionary and reflexive evaluative frameworks represent valuable systemic approaches to contribute solving systemic problems and crating enabling environments for innovation system's functioning, by stimulating and organizing

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actors' participation, creating space for capability development and promoting interactions among heterogeneous actors (Wieczorek and Hekkert 2012; Cristiano and Proietti, 2018).

In practical terms, the DoAF4AKIS (including topics, methods & tools, timing, evaluative questions, indicators, …) will be finalized during the modernAKIS implementation (M38) together with the key actors of change that will be engaged within the network (T2.2.) and with other relevant stakeholders (e.g. evaluators of the CAP SPs/AKIS strategies and the European Evaluation Helpdesk for the CAP).

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2. Introduction

This is an overarching deliverable for all the activities that will be conducted during the modernAKIS project, and its purpose is to provide the frame for worthwhile transformative AKIS journeys (TAJs) that will accompany the key AKIS actors of change in MSs during the development of systemic capacities.

Given the dynamism and complexity of AKISs, the length of implementation of modernAKIS, and the unpredictability of the needs and behavioural and mind-set changes of the actors who will be involved, TAJs will be dynamic and systematically redefined on capacity needs assessment paths instrumental to the definition of the dynamic learning agenda.

In fact, it should be noted that TAJs will be repeatedly redefined in contents, methods and activities and based on the experiential learnings that during the modernAKIS implementation will be gained by the key actors of change by practicing the capacity development activities.

So that, this deliverable will be updated in M16 to take advantage from the first results of the TAJs, their adjustments and developments to fit the needs, the reflexive exercises and the feedbacks of the key AKIS actors.

This deliverable includes: (a) the scope, purpose and the theoretical and conceptual background of the TAJs; (b) a description of the overall methodological framework for TAJs and actors, including approaches and methods for WP2, WP3 and WP4, and for capturing specific needs and feed further project's developments. As well, principles are established for a meaningful implementation of the multi-actor approach all along the project activities in view of grounding effectively further development s of the project on real needs and opportunities of the key actors of change; (d) M&E framework, methods and practical tools (e.g. indicators) for monitoring the functioning and co-assessing Member States' AKISs.

2.1. Methodology to prepare this deliverable

This deliverable systematizes the assumptions, expectations, discussion and the ideas held among the project partners since the preparation of the proposal and along the first six months of its implementation.

Particularly, it benefitted from the discussions and the decisions made by the partners during several on-line and in-real meetings grew out during the proposal preparation of the discussion around the ISS concept started during the modernAKIS two Kick-off meetings, held in in Rome from 7th to 9th November 2022.

Particularly, during the latter KOM different aspects of the TAJs were discussed and co-designed by the partners and a common vision on key needs to follow-up, principles, approaches and activities were agreed.

The initial structure of the deliverable was presented and discussed at the WPs/Tasks leaders some meetings held during December and January. During these meetings the partners achieved a consensus about the needs for general approach, principles and methodologies to describe by this deliverable in view to feed the further project activities.

A consolidated draft of the deliverable was uploaded to the shared platform for 4 weeks to allow all partners reviewing and providing further insights.

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The last version of the deliverable was finally discussed with WP/Tasks' leaders before the submission.

2.2. Relation to the activities of the Project

This deliverable provides the theoretical baselines, the methodological approach and key overarching principles, upon which to develop all the following project activities.

Over the chapters, specific reference is also made on interactions with other WPs/Tasks.

In general, it sets the frame for the Transformative AKIS Journeys (TAJs) to realize through all the project activities, by including the networking and knowledge exchange (WP2), the capacity building activities (WP3 and WP4) and the dissemination and exploitation activities of the project (WP5) by engaging the AKIS coordination bodies and the other key actors of change of the AKISs in Member States.

Besides, clear approach and methodologies to conduct the capacity needs assessment are defined to feed:

- T1.2: Identification of insightful and ready-for-practice solutions
- T1.4: Collection of various ways and good examples for the intensive integration of advisors in AKISs, including for innovation support,
- T1.5. Approaches and practical incentives to encourage researchers' engagement in interactive research processes,
- T2.2. Setting up the modernAKIS network,
- T2.3. National/Regional AKIS Communities of Practice.

As well, criteria for the identification of the key actors of change provide guide for T2.2. Setting up the modernAKIS network and T2.3. National/Regional AKIS Communities of Practice.

Finally, the DoAF4AKIS and the review of relevant indicators and tools, set the frame specifically for the activities to conduct under:

- T1.3: Comparative analysis of the various types of AKIS within the EU at national, regional and local levels and identification of benchmarks,
- T3.3 (Monitoring, assessing and benchmarking AKISs and their functioning at national, regional and local level),
- T4.3 (Help the AKIS CB to monitor the CAP implementation).

3. AKIS: from conceptualization to the CAP strategic plans 2023-2027

3.1. What is the AKIS?

The conceptualization of Agricultural Knowledge and Innovation Systems (AKIS) has been developed over decades following the different paradigms that occurred over time with regard to agricultural development (e.g., productivist, constructivist, systemic, circular, sustainable development and others) (Dockès et al., 2011) (see Annex 1).

Under the EU Regulation relating to the CAP 2023-2027, AKIS is defined as "the combined organisation and knowledge flows between persons, organisations and institutions who use and produce knowledge for agriculture and interrelated fields (Agricultural Knowledge and Innovation System)" (Regulation (EU) 2021/2115, article 3 (9)).

This is a simplified definition of a more complex concept encompassing the way people and organisations interact to exchange knowledge and generate innovations, "together with the institutions and policies that affect the way agents interact, share, access exchange and use knowledge" (Hall, 2007; Knickel et al., 2009).

Drawing from this definition, AKIS functioning relies on four fundamental components (see Annex 2: The multiple perspectives of AKISs):

AKIS encompass all agricultural and other actors from interrelated fields and organisations (farmers, foresters, farmers' and foresters' organisations and cooperatives, advisors, researchers, trainers, rural entrepreneurs, non-governmental organisations (NGO), public authorities, etc.) that generate, share, and use knowledge and innovation for agriculture and interrelated fields: rural areas, value chains, landscape, environment, climate, biodiversity, consumers and citizens, food and non-food systems including transformation and distribution chains, etc.

European Commission (2021): Tool 8.1. Tool for the CAP CCO: modernisation, AKIS, digital strategy

- **Structures:** within an AKIS a multiplicity of structures are relevant to initiate and make it function (Hall et al., 2007; Wieczorek & Hekkert, 2012). These include actors, institutions (i.e., the structures of rules and norms that shape and constrain behaviour), interactions and infrastructures.
- **Processes:** the dynamism of an AKIS depends on the extent to which some key processes are adequately run by the different actors. They include change and innovation development, knowledge development, knowledge diffusion through networks, guidance of the search, market formation, resource mobilization, creation of legitimacy/counteracting resistance to change.
- **Enablers and disablers of AKIS functioning and performance**: processes that pertain to the interactions of the different structures are often hindered by inter-functional dynamics (virtuous and vicious cycles) and possible failures/blocking/ enabling mechanisms that need to be identified and detected to allow the AKIS well-function (Bergek et al., 2008; Bergek et al., 2015). On this regard, we distinguish between a micro level of structures (interactions, institutions, infrastructures, capability and market orientation) and a macro/systemic level (Directionality, Demand articulation, Policy articulation, Reflexivity) enablers or disablers of AKISs functioning (Annex 2 - The AKIS Functioning: the process perspective).
- **Capacities for change:** in addition to technical capacities, the presence of adaptive, collaborative and innovative (functional) capacities which led to long-term transformative change at individual,

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organizational, inter-organizational and system levels is a requirement for the AKISs to change over time (Weber & Rohracher, 2012; van Mierlo et al., 2010; Klerkx et al., 2010a; Yang et al., 2021). Particularly, a well-developed AKIS relies on four key capacities that are interconnected and enable the overarching capacity to adapt and respond to problems and opportunities through co-creating innovation and transformative change: Capacity to navigate complexity; Capacity to collaborate; Capacity to reflect and learn; Capacity to engage in strategic and political processes (Yang et al., 2021).

3.2. Paradigms, principles and concepts related to AKIS.

The AKIS conceptualization that is adopted by the European Commission (EC) relies on some key concepts on which modernAKIS will work on along the project in view of reinforcing AKISs in MSs.

- **Multi-actor and network driven innovations.** Within the AKIS, like in each systemic approach, innovation is considered the result of a process of networking and interactive learning among a heterogeneous set of actors (farmers, input industries, processors, traders, researchers, extensionists, government official, and civil society organizations) (Leeuwis, 2004; Hall et al., 2006; Röling, 2009). In fact, innovation is driven by a variety of dynamics (networking, joint (or social) learning, negotiation, mobilisation of resources, etc.) in which knowledge can flow from different sources and may emerge outside the formal learning world (Hermans et al., 2012; Assefa et al., 2009) in a bottom-up process (Aarts et al., 2007; Knickel et al., 2009).
- **Interactive processes.** The AKIS is 'alive' to the extent to which actors are able to combine their respective knowledge (codified and tacit) to develop new knowledge and innovations on an ongoing basis, promoting feedback links between them and generating mutual learning, sharing and utilisation of new technologies, knowledge and innovations. Therefore, rather than focus on the number of actors, infrastructures, and institutions, it is fundamental to reconstruct the agency-structure of an AKIS through identifying and configurating the actors according to the different means of interactions, interdependencies, knowledge flows, innovations and effects that they generate in a certain space/environment and moment (Knierim et al., 2015; Klerkx et al., 2010b).

- **Complex adaptive systems**. AKISs are increasingly understood to be self-organizing systems, since they include a wide array of heterogeneous actors adapting their strategies and actions based on the actions of others and on changing system conditions (including institutions), while contributing to these changing conditions through their evolving responses to them (Spielman et al., 2009; Klerkx et al., 2010).
- **Non-linear models**. As a result of the dynamic nature of these inter-connected changes, AKISs produce unpredictable developmental patterns (Axelrod and Cohen, 2000). While AKISs do not lend themselves easily to control or management, due to their unpredictable nature (Spielman et al., 2009; Arkesteijn, 2015; Birner et al., 2009), it is significant that policy makers have an understanding of their dynamics.

- **Innovation as a change.** Systemic approaches to innovation point out that innovation is a change in a given socio-technical system[1] in response to a problem or to an opportunity emerging from the context (Knickel et al., 2009). This process may happen as a more or less spontaneous adaptation to changing conditions of the context (for example, climate change, market demand, technological breakthrough) or as an effect of strategic action of some relevant actors. When the change is radical or entails long-term, multi-dimensional and fundamental processes of change it is referred to as a "transition".
- **System thinking.** The system must be understood in terms of wholes and interdependence relationships between all the elements rather than by splitting it down into its parts. This leads to focusing on the coordination among the AKIS' different components where actors think of themselves as being part of a system and bring different perspectives, experiences and knowledge by acting as part of a 'human activity system' (Röling 1992; Engel 1995; Klerkx et al., 2012), that is an assembly of people and other resources organized into a whole in order to accomplish a purpose. The people in the system are affected by being in the system, and by their participation in the system they affect the system. People in the system select and carry out activities -- individually and collectively -- that will enable them to attain a collectively identified purpose.

AKIS – Agricultural Knowledge and Innovation System

The AKIS can be compared to the human body. Similar to this, it is "made of many different interacting parts, each of which can affect the human body behaviours or properties. Each part has inter-dependencies on other parts of the system, and as such the system cannot be divided into its sub-parts without losing its properties". As well, "a car (as a whole) can move, however that property is lost if you break the car into parts (e.g: engine alone cannot move)".

Russel Ackoff, On Systems Thinking - Video Presentation, 1994

- **Innovation ecosystem approach**. Like and innovation ecosystem, the AKIS includes an evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors. (Granstrand & Holgersson, 2020). The ecosystem perspective goes beyond the agricultural innovation systems view by emphasizing the co-evolution of technology, practices and institutions (Pigford et al., 2018) and the co-creation of value (Thomas & Autio, 2020). Therefore, innovation ecosystems are dynamic systems including actors, artifacts (including products and services, tangible and intangible resources, technological and non-technological resources, and other types of system inputs and outputs, including innovations), institutions, activities and relations, that can be of collaborative/complementary and competitive/substitute nature. As in the case of biological ecosystems, actors participating in innovation ecosystems collaborate or help, but also can attack or consume each other (Shaw & Allen, 2018).
- **Multiperspectives** AKIS are composed by different sub-systems depending on the perspectives of the observer, and thus by respective components (structures, processes, virtuous cycles or failures and capacities). For example, an AKIS at national or at sectoral level might be characterized and may functions differently from one at local and value chain/farming system level.

[1] Socio-technical system is defined as 'Relatively stable configuration of institutions, techniques and artefacts, as well as rules, practices and networks that determine the 'normal' development and use of technologies' (Rip and Kemp, 1998).

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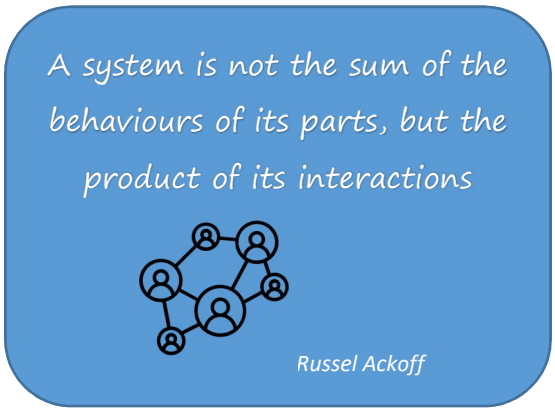

- **Context- sensitive:** AKIS builds upon the network of structures, their interactions and processes that are available at a certain context and time.
- **Transformative governance**: systemic transitions require an open governance approach that acknowledges differences, creates space for alternative understandings and actors learning from each other (Feindt & Weiland, 2018).

In fact, in system innovations, public governance must create an enabling environment within the AKIS, through harnessing interconnectivity and interactivity among actors; promoting system thinking and sense of belonging to the system as part of it and being interconnected with the others; enabling collective action to adaptation and challenges and co-creation of innovations; creating space for knowledge exchange iterative and adaptive learning (EU SCAR, 2019). Besides, some scholars argue the need for reflexive governance involving a change of assumptions, practices, institutional arrangements (Hendriks & Grin, 2007) and reflexive monitoring (van Mierlo et al. 2010).

3.3. State of the art of the AKISs in MSs

New combinations of knowledge and actors drive innovation. Therefore, the EU has an interest in ensuring the well-functioning of AKISs throughout its territory, so as to avoid duplication of efforts, save costs, increase the impact of EU and national/regional funding and speed up innovation. This is why, the various regions and Member States are required to build better Agricultural Knowledge and Innovation Systems, including all people and organisations (actors) that generate, share, and use knowledge and innovation for agriculture and interrelated fields (value chains, environment, society, consumers, etc.) (EU SCAR AKIS, 2019). This, in turn, means that they need to undertake efforts to interconnect actors with different expertise, knowledge and competences who together are able to solve the challenges we face (EC, 2021 – *Tool 8.1 Tool for the CAP Cross-Cutting Objective*).

However, the AKIS concept itself and its working principles are not yet widely known and embraced, and the capacity of policy, sectoral and societal decision makers to use and to contribute to the AKIS governance is still underdeveloped (Knierim et al. 2015). Agricultural decision makers, at all levels, are often not aware that, beyond their tasks within their organization, they have a role and impact within the AKIS. In addition, they have limited resources to explore new systemic perspectives. Therefore, activities related to the strengthening of AKIS must be of practical value and enable them to identify with "their" AKIS and link it to changes in resource deployment towards systemic improvement.

In addition, AKIS systems in the EU MS are marked by their diversity at national, regional and even local level, which affect effective flows of knowledge and the creation of synergies. Trends such as decentralization and privatization of, e.g., advisory services, education and training activities have contributed to an increasing pluralism of AKIS actors, which leaves some potential clients either insufficiently/partially served or totally unserved (Knierim et al., 2017).

In 2022, 28 AKIS country reports produced by the i2connect project were cross analysed (Birke et al., 2022) with the purpose of (i) presenting the diversity of the AKISs in the EU and further selected European countries; (ii) highlighting and comparatively assessing a number of key AKIS features that substantially contribute to the systems' functioning and performance; and (iii) providing information

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on advisory services' situation as one key subsystem of the AKIS. The analysis relied on different parameters, including organization and governance of AKIS, type and diversity of AKIS actors, AKIS supporting policy and dedicated resources, AKIS coordination mechanisms, linkages among AKIS actors, and dominant type of advisory organizations reaching farmers.

The cross analysis revealed variations in AKIS among the investigated countries. Overall, a certain diversity of AKIS actors is recognizable in all countries at the national level. However, clear evidence of AKIS characterised by a pluralism of actors was demonstrated in more countries in Western Europe than in Eastern and Central Europe. Regarding the dominant actor categories in AKIS: public administration, public research and education bodies, and farmer-based organization constitute the dominant constellation of each AKIS, with only a few countries deviating from this. Additionally, private economic actors appear to be more present in the AKIS nowadays, having active roles and functions as compared to the last decade. The NGO's presence in the AKIS, however, appears to be an exception in many national AKIS.

Most European countries have infrastructures to coordinate and manage their AKIS at a national level-centralized governance system. In fewer countries, regional governments are responsible, particularly for the education, research and advisory services systems and therefore, can be considered as decentralized AKIS governance. Moreover, some countries such as Austria and Switzerland, although in theory have centralized AKIS, in practice, the regional governments are responsible for governing their AKIS, and therefore they are decentralized system.

AKIS Coordination mechanisms are crucial for good AKIS governance. Coordination mechanisms identified in the AKIS country reports can be broadly categorized into two: (i) coordination mechanisms established in relation to the EU level policy, e.g., national networks for rural development that aim to facilitate cooperation and knowledge dissemination mainly among EIP-OG participants, and (ii) coordination mechanisms established in response to the national policy programs, which include councils, platforms, alliances, and working groups.

Regarding advisory service providers, despite the pluralism of service providers in many countries, results showed the continued dominance of public advisory organizations, closely followed by farmer-based organizations, as the main actors reaching farmers. The underlying reason for this situation could be the fact that the public funds allocated to advisory services are mainly managed by public organizations.

3.4. AKIS as a strategic approach to the CAP strategic plans 2023-2023

The strengthening of AKIS in each Member State is a mandatory requirement in the CAP 2023-2027.

According to the EC Regulation, in their CAP Strategic Plans 2023-2027, Member States must set up their **AKIS strategic approach**[2] which will contribute to the achievement of the Cross-Cutting Objective (CCO) of modernisation, knowledge sharing, innovation, and digitalisation[3]. The main objective is that all 9 CAP specific objectives are served by the CCO. To this aim, MSs must provide a

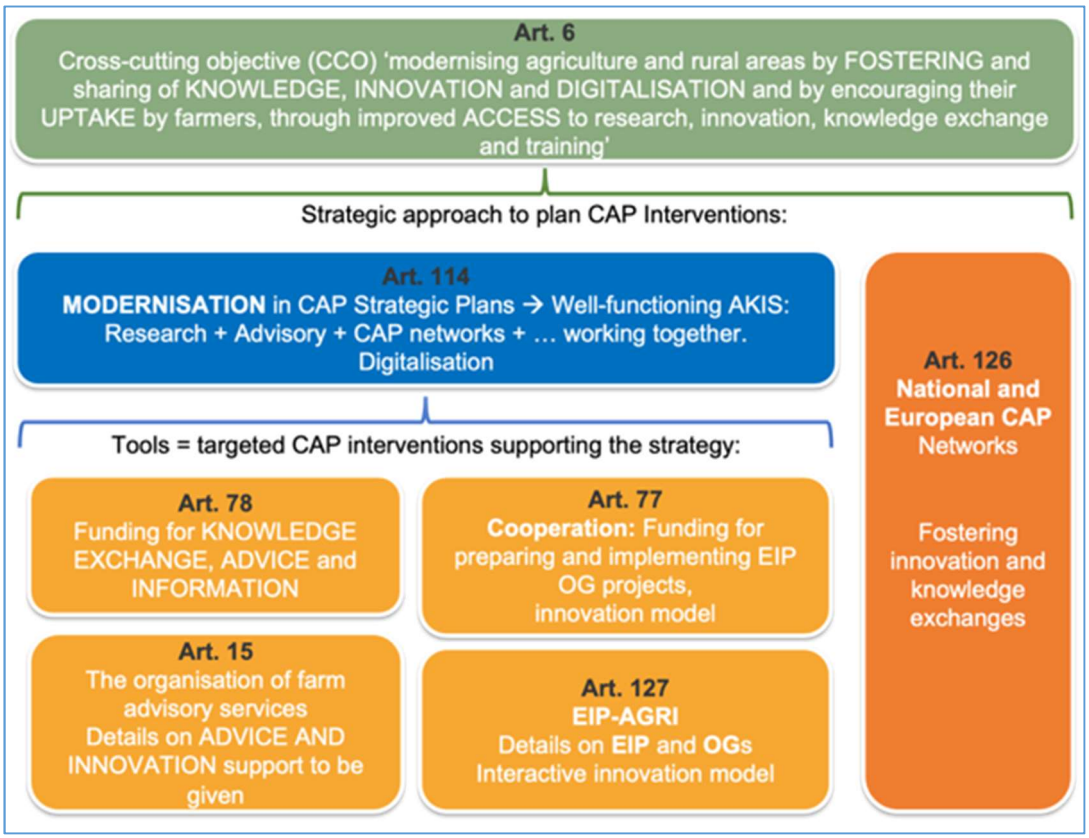
[2] Recital 85 of the Regulation (EU) No 2021/2115 and Sections 8.1 and 8.2 of the CAP SP according to Article 114 of the Regulation (EU) No 2021/2115.

[3] Article 6(2) of the Regulation (EU) No 2021/2115.

description of the organisational set-up of AKIS and a description of how advisory services, research, and the national CAP Networks will cooperate to provide advice, knowledge flows, and innovation services[4].

The AKIS strategy within the CAP SPs should be defined according to the specific contextual situation and policy objectives of the MSs and based on a systems approach, to design the different types of interventions typically aimed at strengthening human and social capital in agriculture: Knowledge exchange and dissemination of information[5]; Farm advisory services[6]; Operational Groups' (OG) innovation projects under the EIP[7] (Figure 1).

Figure 1: Overview of most relevant CCO provisions for knowledge and innovation (AKIS)



Source: EC, 2023 (in publication)

As a matter of fact, the AKIS strategy has to effectively combine the diverse types of interventions that have the potential to create an enabling environment for well-functioning innovation systems in MSs.

In practice, after the elaboration of a strategic AKIS approach based on the CCO SWOT, the prioritization of needs, and the putting together a sound intervention logic, the resulting AKIS interventions will mainly fall under Articles 78 (funding advice, knowledge exchange, training and information), and Article 77 (funding EIP Operational Group innovation projects). The framework and

[4] Article 114 of the Regulation (EU) No 2021/2115.
[5] Article 78 of the Regulation (EU) No 2021/2115.
[6] Article 15 of the Regulation (EU) No 2021/2115.
[7] Article 77(1)(a) of the Regulation (EU) No 2021/2115.

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details on farm advisory services are provided for in Article 15, and for EIP and Operational Groups in Article 127.

All these knowledge and innovation interventions are complemented by the specific innovation activities of the national CAP network dedicated to speed up broad knowledge exchange and innovation (Art. 126).

In this context, the CAP networks, at national and EU levels, have been reinforced as bridging institutions that within and among AKISs have the duty to foster innovation and knowledge exchange[8]. The tasks of the national and European CAP networks for the achievement of the objectives set out in paragraph 3 shall be the following: (a) collection, analysis and dissemination of information on actions and good practices implemented or supported under CAP Strategic Plans as well as analysis on developments in agriculture and rural areas relevant to the specific objectives set out in Article 6(1) and (2); (b) contribution to capacity building for Member States administrations and of other actors involved in the implementation of CAP Strategic Plans, including as regards monitoring and evaluation processes; (c) creation of platforms, fora and events to facilitate exchanges of experience between stakeholders and peer-to-peer learning, including where relevant exchanges with networks in third countries; (d) collection of information and facilitation of its dissemination as well as networking of funded structures and projects, such as local action groups referred to in Article 33 of Regulation (EU) 2021/1060, EIP operational groups referred to in Article 127(3) of this Regulation and equivalent structures and projects; (e) support for cooperation projects between EIP operational groups referred to in Article 127(3) of this Regulation, local action groups referred to in Article 33 of Regulation (EU) 2021/1060 or similar local development structures, including transnational cooperation; (f) creation of links to other Union-funded strategies or networks; (g) contribution to the further development of the CAP and preparation of any subsequent CAP Strategic Plan period; (h) in the case of national CAP networks, participating in, and contributing to, the activities of the European CAP network; (i) in the case of the European CAP network, cooperating with, and contributing to, the activities of the national CAP networks. (Reg. 2021/2015)

3.5. The AKIS coordination bodies

The increasing importance of the AKIS approach for agricultural policies and the sector's sustainability performance, as expressed in MS preparatory activities for the CAP Strategic Plan 2023-2027 has put the new actor 'AKIS coordinating bodies (AKIS CB)' on the forefront. In principle, these new actors should enable the environment for a well-functioning AKIS, through fostering cooperation, effectively combining the interventions of the CAP Strategic Plans and satisfying the need for a quicker, more qualitative and more inclusive AKIS. Building up capacities and engaging actors and coordination bodies is key to successful system change. Expectations on the AKIS approach to support the knowledge-based transformation of EU's agricultural production and sustainable management of natural resources in the context of climate change are high (European Commission, 2018) and its successful implementation will rely on well-informed, motivated and comprehensively trained actors.

As a matter of fact, the AKIS CBs represent the first attempt, within the European policies, to identify an institutional structure in charge of creating an enabling environment for innovation; however, they are neither configured nor specifically vested with specific responsibilities by any of the EC

[8] Article 126(3)(e) of the Regulation (EU) No 2021/2115.

Regulations for the CAP 2023, such it is, for example, for the managing authority of the CAP Strategic plan.

The only reference to AKIS CBs is provided by a tool of the *Tool 8.1 Tool for the CAP Cross-Cutting Objective* (EC, 2021) that proposes the following duties:

- acting as the contact point for the Commission as regards the governance and coordination of the AKIS strategic approach.
- organising the advice and advisors and all other related AKIS interventions.
- Keeping close and regular contact with the main AKIS (regional) coordinators and actors in the country by giving suggestions for encouragement of more effective knowledge exchange activities (advice, training, …), including also the generation and co-creation of innovation (EIP OGs) and the broad sharing of it.

ModernAKIS partnership is composed by representatives of the Ministries of Agriculture that have the responsibility to officially nominate the AKIS CBs.

On this regard, most of the activities of modernAKIS are addressed to understand how to better configure the AKIS CBs and to enhance their capacities to organize and enabling the AKIS well-functioning.

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4. The Transformative AKIS Journeys

The endorsement of the AKIS by the CAP and the definition of relating strategies within the CAP Strategic Plans is certainly a challenge for actors and mainly for the public governance authorities that, indeed, have to lead a transformative change in agricultural and rural systems innovation.

In fact, MSs are called to strongly pursue the AKISs reinforcement towards the overarching goal of modernizing the agricultural sector across EU and achieving the CAP 9 specific objectives.

The reinforcement of the AKISs and their better functioning across EU imply a rethinking of activities, relationships and tools that make them better functioning and performant, entailing a transformative change able to "shift existing systems (and their component structures, institutions and actor positions) onto alternative development pathways" that must be based on a shift in mind-sets towards a meaningful system thinking and collective action (Pelling et al., 2015).

The need for this shift is grounded on some fundamental assumptions:

(i) an appropriation of the concept of AKIS by policymakers and actors across EU is necessary since, concept, principles, actors-types roles and functions of AKIS are not widely known;
(ii) coordination and exchange between actors are limited and often this is a reason why policies seem to be ineffective,
(iii) Member States' authorities and AKIS actors need insights and tools to advance knowledge exchange and build capacities;
(iv) setting up of structural networking within national/regional/local AKISs is needed to empower and innovate AKIS's governance;
(v) AKISs are evolving ecosystems, reflecting the specific situational contexts, so that knowledge and solutions for AKIS governance and functioning are country-led but take advantage from the diversity in Countries for adaptation;
(vi) still in Member States there's need for structuring knowledge exchange and fostering innovation processes;
(vii) the potential of AKISs to contribute achieving the CAP objectives is less acknowledged across EU (Aparicio Montero et al., 2019; (Beck et al., 2020); SCAR AKIS, 2019; Knierim et al., 2015).

According to the social sciences, change is a systemic process , not just individual developments, and thus involves multiple actors at multiple levels in a collaborative endeavour (Kemp et al., 2007); Geels, 2002; Mersmann et al., 2014; (Federal Ministry for the Environment et al., 2014); (Westphal & Thwaites, 2016) embracing various aspects of the respective system, including changing actors' objectives, knowledge, professional norms, values and motivations, and integrating resources into agricultural systems.

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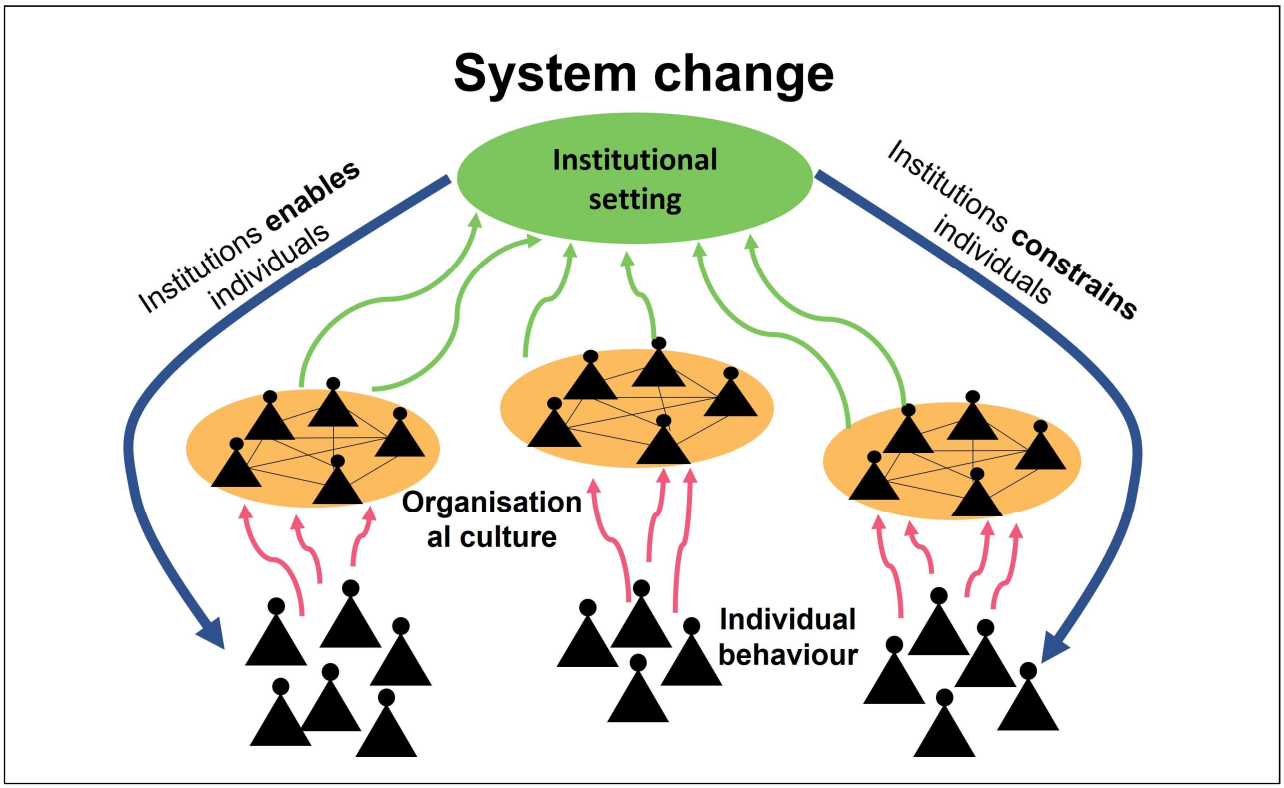
Figure 2: Dynamics of system change



The AKIS is a set of actors who are embedded in a network: this is why change in the system cannot be disconnected from change in the individuals' behaviour, and vice versa, change in individuals is influenced by the system. Therefore, to achieve transformational change in the AKISs it is necessary to change individual behaviour by developing new capacities, which should empower individuals on three knowledge areas: (a) system thinking and AKIS organizing and enabling to well-functioning, (b) experiential knowledge and practices for a better integration, intensive knowledge flows and innovations within the AKIS, (c) AKIS as the engine for the modernization of the CAP.

Moreover, transformative change is described as the outcome of interactions between actors at different levels (Kemp et al., 1998); (Geels & Schot, 2007), taking place in complex and dynamic systems that continuously evolve over time (Vallacher, Read, & Nowak, 2002)

Therefore, although AKIS coordination bodies and MAs play a key role in strengthening AKISs, transformational change must be pursued collectively, by the involvement of other individuals or groups of individuals (hereinafter actors) who are also part of the change and that can act as booster of change. Within the AKIS, different groups of individuals may be involved by the strengthening of the system, in different ways. To address this issue, modernAKIS will engage, in each EU MS, a variety of key AKIS actors (cfr. 4.1), to be part of the transformative process and facilitate other actors, within the respective AKIS, in understanding the need and actively being engaged for change.

Due to the complex structure of the interactions between actors, transformative change is not a linear process, but a pathway that is formulated upon exploration of possible pathways and co-evolves in response to a changing environment and continuous evaluation (Haasnoot et al., 2013; Van Bruggen et al., 2019).

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Following these characteristics, transformation can be defined as a journey, whose direction is traced through dialogues, exploration of options and choices that are often innovative and breakthrough (Manzoni et al., 2017; Lee et al., 2020).

"The real voyage of discovery consists not in seeking new landscapes but in having new eyes."

Marcel Proust

In modernAKIS, the process of strengthening AKIS takes the characteristics of a discovery journey, namely a Transformative AKIS Journey (TAJ), which will move AKIS actors away from the boundaries of what is already known to explore new horizons, challenge themselves, and experience new things that will make the journey an evolutionary learning experience. It concerns a transformation that will occur through the discovery of different/new realities and the exchange with different people and environments. The ending point of this journey cannot be established in advance: if it were, nothing new would be discovered. Embarking on this discover journey, in fact, means learning along the way and being carried away by creativity, motivated by the ambition to increase the capacity to be part of a system and to understand its dynamics.

Because AKISs differ from each other, and their circumstances, capabilities, and goals differ as well, no transformation journey can be defined and managed the same way. Indeed, the pathway is shaped by the different combination of key enablers, execution capabilities, and cultural traits (Guley, 2019). Therefore, the TAJs will be multiple and differentiated, through co-designed and implemented with modularity by the same key AKIS actors, according to the context in different MSs and the specific needs for strengthening the interconnections, the capacities and skills of implementing actors.

The TAJ brings forward, through a process of learning which transforms the meaning-making schemes of individuals and organizations[9] new thoughts, feelings, and behaviours (Mezirow, 1997; 1985). Therefore, to acquire change effectively individuals must clear away the "old" ways of thinking and behave in order to create a new definition of self and a deeper sense of reality.

This occurs through cycles of systematic learning that develop in a spiraling, ever-deepening journey. Such a journey always starts with critical reflection, which is aimed at allowing actors to become aware of problems while reconsidering and challenging their current core beliefs, values, attitudes, and behaviours, thus creating the conditions for change.

[9] Meaning being defined as "the structure of cultural and psychological assumptions within which our past experience assimilates and transforms new experience".

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To this end, the development paths of the TAJs will be based on a reflexive assessment process aiming at supporting key AKIS actors in the on-going analysis of how they are contributing to shape a new AKIS, thus feeding evolutionary loops of learning and adjustment of action in their respective systems (§4.4).

In practical terms, the TAJs aim to:

- change actors' perspective on their own role as a part of a system: change the way of perceiving, thinking, reflecting, and making meaning about themselves and the system.
- allow a clearer view on each own place within the system: shifting relationships and connectedness to and within the system and how actors show up.
- allow more consistent and congruent actions with actors' role and place in the system
- increase AKIS actors' capacity for responsiveness and ability to access resources within themselves as well as within system.

More in general, the TAJs are intended to affect the way AKIS actors perceive their roles, responsibilities, and relationships based on an overall transformative learning process that, inspired by Mezirow (1990; 1991), will iteratively accompany AKIS actors across 6 stages of transformative learning (Table 1):

Table 1: Stages of transformative learnings along the TAJs

Stages of transformative learning		Transformative learning along the TAJs
1. Disorienting dilemma	This is the first part of transformational change, that prepare actors for moving away from the current and comfortable situation. It aims at de-structuring current mindsets. For instance, the AKIS coordination body, may feel that s/he is an outside actor of the AKIS and not an integral part of it. Through the exchange of information, s/he starts questioning her/his thinking. This can be uncomfortable or challenging, but it is the key spark in starting transformational learning.	**WP1** – WP1 will iteratively co-design, with the AKIS CBs and other actors of change (WP2), along modernAKIS implementation, and basing on systematic needs' assessments, the overall conceptual and methodological framework for TAJs, enabling and empowering AKISs' actors to start transformative system change. WP1 will also facilitate a wider use of the new know-how and already existing knowledge/practices across the EU to fuel the advancement in knowledge exchange within the AKISs, thus enabling AKISs actors to benefit from the diversity of AKIS models and strategies, from across the EU **WP2** – WP2 will support capacity development activities through systematic engagement of the key actors of change. This will allow to draw on experiential evidence of the AKISs' actors, collective learning and co-decision in reviewing the transformative pathways of change in view of a major
2. Critical reflection	This is the key to Transformative Learning. Actors are able to think about their experiences and how they connect to this disorienting dilemma. Critical reflection helps reconsidering and challenging their own current core beliefs, values, attitudes, and behaviours, and looking them with more unbiased eyes, thus creating the conditions for change. For instance, the AKIS CB	

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	starts thinking differently about its position within the respective AKIS. S/he gains awareness of being part of the system and having specific functions.	effectiveness in supporting AKIS actors to face challenges and issues that will arise during the implementation of the CAP. **WP3** – WP3 will target individual and collective learning for value-setting and behavioural change in AKISs' governance, through focusing on system thinking, common understanding, social construction of the AKIS in relation to the contexts and collective visioning, identifying actors, roles and functions, bridging gaps and disconnections, boosting interaction and dialogue. WP3 activities will be addressed to enable participants to critically reflect on the current patterns of AKISs and the structural and functional aspects that need to be changed in order to move them toward alternative development directions. **WP4** – WP4 will specifically target enhancing competencies and knowledge about how to best support the CAP implementation through innovative AKIS governance. Particularly through peer-to-peer learning and experience exchange, AKIS actors will be able to gather insights, good practices and models for designing and deploying impactful AKIS Strategic Plans. Key actors will be empowered in identifying and applying innovative governance solutions and will increase their capacities on specific topic-oriented issues relating to the AKIS Strategic Plans regarding planning, implementation, functioning, monitoring and evaluation as well as the role of the AKIS in achieving greater impacts on the 9 CAP specific objectives. **WP5** – The wider engagement and dissemination will actively involve the key actors of change in view to support
3. Capacity Needs' assessments and agenda setting for the capacity development	Actors are able to consider what kinds of learning they need to develop their capacities and set the agenda for their capacity development. For instance, AKIS CBs realize that they need to gain new capacities related to the functions they have to perform	
4. Development of capacities	This is the starting of collaborative learning towards the development of new meaning perspectives and their integration into new models of action. Key actors of change gain the capacities aimed at changing their own behaviours; for instance, within T3.1 they acquire competencies in systemic thinking	
5. Exploring new roles, building relationships and self-efficacy in new roles	Actors experience the new capacities doing their work within their respective AKIS, thus gaining confidence in their beliefs and understanding, thus continuing to practice the transformative cycle as they move forward.	
6. Systematization of learnings	Key actors of change will continually experiment the new acquired capacities valorising them through empirical day-to-day experiences within the respective AKISs. This will offer new insights to critically reflect leading to new advancement in the effects of the capacity development being applied during the TAJs and to new capacity development needs.	

	the exploitation of the results of the project and to initiate at local level a proper chain of transformative changes in respective AKISs by relying on their own networks and capacities.

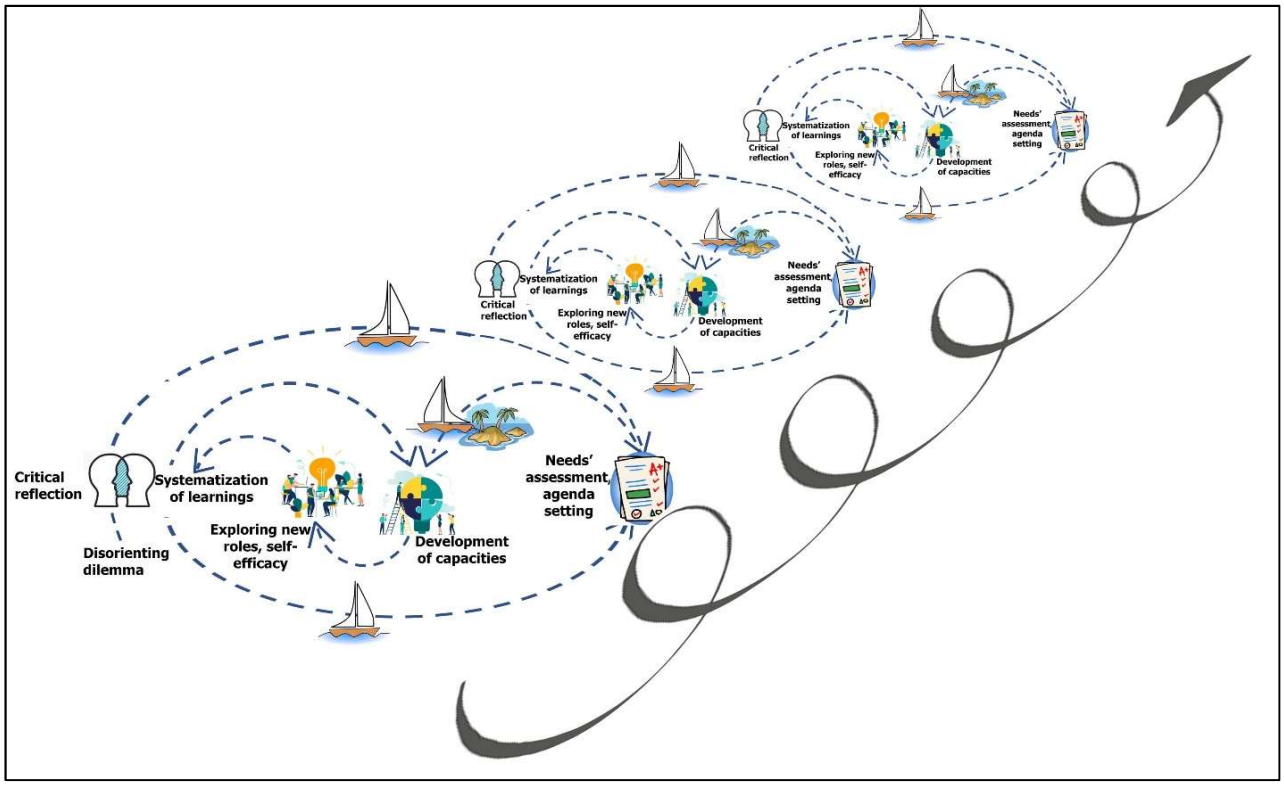
The variety of the AKISs across EU will be taken into great consideration since, also due to their nature, TAJs will be possibly differentiated according to the contextual situations in different MSs and the specific needs for strengthening the interconnections, the capacities and skills of actors that will implement them.

In this respect, AKIS journeys will be defined between the project partners and key AKIS actors engaged within the network (WP2) through an iterative process of co-definition, co-development, co-review and co-decision for further developments, tailoring and melioration.

The process will start since a very early (WP1, M3) co-assessment of needs and opportunities for strengthening actors in the AKIS of each MS that will feed the co-design of the TAJs. During the implementation of the TAJs participatory methodologies for systematic engagement (WP2, WP3, WP4) will be applied to draw on experiential evidence of the AKISs' actors; this will allow collective learning and co-decision in putting together tailor-made transformative pathways of change that are deemed necessary for the effective support of AKIS actors to face challenges and issues/emergencies that will arise during the implementation of the CAP.

Transformative AKIS journeys will draw on the sounding combination of three participatory system approaches to behavioral change that will inspire an overall pathway of collective learning and system thinking development across EU: (1) transformative change; (2) multi-actor approach; (3) reflexive monitoring and evaluation in action.

Figure 3: The TAJs as journeys to systems change



4.1. Key actors of change and their engagement during the TAJs

Actors of change are key people that, due to their roles and functions within the AKISs are acting as influencers with regard to AKIS' setting and AKISs' functioning. Actors' of change are crucial knowledge providers about the state of their AKISs across EU and they can ensure the best exploitation/implementation of ModernAKIS by acting as key boosters and catalysers of transformative change within the respective MSs and at EU level. So, without them TAJs cannot be effectively enacted.

In ModernAKIS, actors of change have a twofold key function: (1) immediate end-users and responsible for co-designing, co-experiencing and co-revising TAJs. The Journeys will empower actors of change through their sensitisation and the acquirement of knowledge about the AKIS concept, design and implementation and systems thinking; (2) multipliers of further transformative change within the respective AKISs, where TAJs can be replicated to help intrinsic change and resilience towards modernized/upgraded AKIS ecosystems.

Through the TAJs, AKISs' actors of change will be actively engaged in designing (WP1) and critically applying (WP2, WP3, WP4, WP5) pathways of individual and collective learning that will empower them on three crucial areas of capacities and knowledge areas: (a) system thinking and AKIS; (b) knowledge exchange and networking; (c) AKIS as a key for the modernization of the CAP.

The engagement of key AKIS actors of change implies defining criteria for their identification and methods for their effective engagement in the vary of activities of modernAKIS.

Based on the theoretical background and the work carried out during the Kick Off Meeting (KOM), a set of multiple criteria was set up to help the identification of key AKIS actors in MSs (Table 2).

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Table 2: Guiding principles and criteria for the identification of key actors of change

Guiding principles	
Inclusive approach: key actors are expected to help the smooth identification of all (the types of) the actual/future key AKIS actors of change across EU MSs. Criteria are not meant to be selective/discriminatory with regard to the type of actor. On the contrary, inclusive criteria are aimed at identifying actors based on what they actually do within a certain AKIS in a MS. Besides, some relevant typologies of hard-to-reach actors need to be captured by modernAKIS in view to help them become actors of change (e.g. consumers, students).	***Continuity in actors' identification***: AKISs reflect the dynamics of relations among actors and these may change over time as AKIS may do as well (also due to the AKIS strategies that will support their strengthening). Additionally, the positions of the different actors within an AKIS may change over time . It is then crucial to monitor the engagement of key actors of change on a continuous basis, in order to ensure the on-going recruitment and engagement of relevant actors and inclusiveness.
Win-win approach: while contacting the key actors of change, some important messages about mutual benefits of their active participation (multi-actor approach) in our project must be clarified (see results of the KOM on the topic "Motivation of the actors of change"	***Plurality of levels***: actors of change at different levels of the respective AKIS must be engaged and, particularly, grassroots actors . It is fundamental not to engage only "institutional" bodies and representatives of the different typologies of actors activated within the AKIS.
Individuals: key actors of change of this project are individuals that reflect some of the personal criteria listed below. Networking and capacity building activities need to be conducted with individuals. However, it must be acknowledged that associative bodies/organizations (es. University, farmers unions) are not neglected under this project as they can act as multiplier of the project's activities and results through helping to enlarge the scope of modernAKIS beyond its direct participants. This means that representatives of these associative bodies must fulfil the selected personal criteria.	***Flexibility***: the list of identified criteria is to be considered as flexible to allow plasticity in identifying actual actors of change during the project implementation and across changes in AKISs dynamics.
Motivation-related abilities of key AKIS actors of change	
Self-motivation to act as agent of change, through actively participating within the	**Energizing**, the ability to show vitality, force and determination that will help the network collaborating

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project and contributing to enhance the respective AKIS	
Enthusiasm, being interested and willing to participate to the project activities	**Motivating** as able to stimulate the other actors by influencing their thoughts and behaviors
Personal abilities of key AKIS actors of change	
Brave and or "Crazy farmer"/front farmer, having the courage to face the risks and challenges related to becoming/being an actor of change within the AKIS.	**Open minded**: able to be receptive to new ideas and knowledge by being creative and opening own mind in scope, ways of collaboration (co-working) and ways of communication.
Well-interconnected between AKIS, meaning that the key actor has a good degree of interconnections within the AKIS, so that it can bring impact through echoing the activities and results of modernAKIS.	**Collaborative** as able to co-work with other actor in a peer-to-peer way
Cross-generational and Intergenerational relationships: ability to get engaged in peer-to-peer relationships with individuals that belong to different generations for mutual learning and growth.	**Critical thinker** as able to be active listener, skeptical and curious, to value fair-mindedness, to respect evidence and reasoning, to be humble when looking at different points of view and be open/flexible but root about own positions.
Leadership: this ability includes some of the other ones, but it specifically concerns determination, charisma and team building skills.	**Transdisciplinary** approach to work within a multi-actor contest; being able to cross border own discipline as able with actors that have different backgrounds/expertise/languages
Trustiness: ability to be loyal and reliable.	**Professional**/Good level of knowledge on methods and tools for multi-actor facilitation
Impartiality: being able to maintain integrity in decision-making and in supporting the others' decisions, based on objective criteria and avoiding bias or preferences that, particularly, relate to own positions within the AKIS.	Well-structured organizations/bodies to bring to impact. Associative organizations or bodies that can act as multiplier of modernAKIS activities and results within the respective AKIS

The set of identified criteria should be used to guide the partners in a snowball-type identification process of the key actors of change in the respective AKISs. They are not meant to rate the capacities/attitudes of key AKIS actors but to be used by partners as driving elements for the identification of those AKIS actors that fit the purpose of modernAKIS.

A list of actual typologies of key actors of change was prepared within the project partnership during the KOM and this will be basis for the setting of modernAKIS network (T2.2.).
The list is in Annex 3.

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4.2. Capacity development

Transformative pathways of change fostered by the TAJs are supported by a capacity development approach.

"Capacity" has been defined as the ability of individuals, institutions and companies to implement functions, solve problems and set and achieve goals in a sustainable manner (UNDP, 2006). Capacity development (CD) is, therefore, 'the process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time' (UNDP, 2008).

> *Capacity Development can be seen as the "continual pursuit of resourcefulness, enabling actors in the system to respond with flexibility and adaptability to changing circumstances and to act decisively and with effect"*
>
> *Kaplan, 1999*

CD is increasingly recognised as a multi-dimensional, multi-actor process (Ubels et al., 2011; Pearson 2011) that goes beyond the transfer of knowledge and skills at the individual level to include organisations, sectors, systems, and the enabling environment in which they all exist (Lucas, 2013).

Therefore, CD approach well fit the purpose of TAJs of triggering a broad process of change in the ways of thinking and behaviors of AKISs' actors enabling them to catalyse iterative shifts in individual and system level culture through the impact on mental constructs that prevent AKIS from functioning as effective ecosystems. In fact, it allows to link individuals and the enabling environment to address, in addition to individual capacities, broad questions of institutional change, empowerment and participation.

Accordingly, the TAJs will intervene on individual, organizational and system dimensions of AKIS by supporting key actors of change in developing four, plus one overarching, capacities already identified and described by the (Yang et al., 2021) (Table 3).

- Capacity to Navigate Complexity
- Capacity to Collaborate
- Capacity to Reflect and Learn
- Capacity to Engage in Strategic and Political Processes, including the AKIS strategies within the CAP SPs.

These are the basis for an overarching fifth capacity, namely, to Adapt and Respond in order to Realize the Potential of Innovation, shifting focus from reactive problem solving to co-creating the future.
Indeed, in line with the AKIS approach, the paths of capacity development foreseen by the TAP (2017) will be reconsidered to focus also on knowledge exchange, which is less focused by this approach that has been built around the AIS concept (see Annex 1).
These five capacities are interdependent and are relevant at each of the three dimensions of CD.
According to the systemic approach of CD, the capacity to adapt and respond or "capacity to innovate" can be strengthened through three major focus areas: (i) upgrading skills, expertise, competencies and confidence of individual actors; (ii) improving the organization, processes and incentives within organizations, businesses and actor groups to be involved; creating an environment in which actors actively interact, exchange new ideas and expertise, and collaborate (Gildemacher and Wongtschowski, 2015) (Figure 4).

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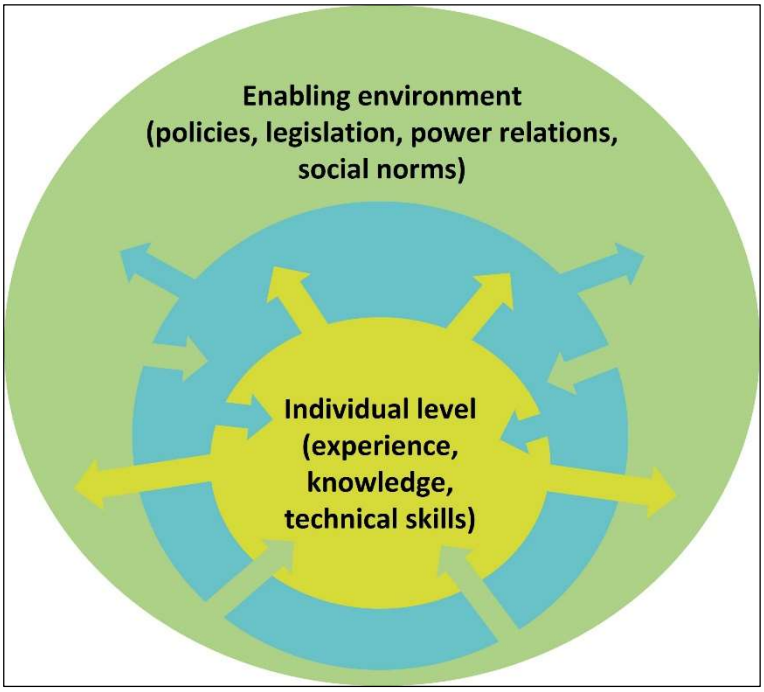
Particularly:

The individual dimension requires the acquisition of knowledge and skills to develop the capacity to adapt and respond.

An organization's capacity to adapt and respond in order to realize the potential of innovation requires that an organization effectively manages the core competencies of individuals and relates to external actors.

Strengthening the capacity of institutions within the enabling environment involves factors that influence the management of organizations, and in particular the interaction between these organizations and other actors. These factors create the "enabling environment" for organizations and individuals to improve their own capacity and to contribute to a new way of collaborating, learning and innovating.

Figure 4 Capacity development: a systemic approach



According to this, modernAKIS CD pathway starts from the engagement and aggregation of key AKIS actors throughout EU MS and supports them, on the one hand, to dialogue with each other to improve and co-produce new knowlege concerning AKIS, and on the other hand, opening new ways of dialogue and involvement of national/local AKIS actors to enable the development of more inclusive knowledge and innovation environments.

Table 3: Types of system capacities included within the TAJs

Type of capacity to develop	
Capacity to Navigate Complexity	It requires a shift in mind-sets, attitudes and behaviours to comprehend the larger system and to create an understanding of it and the relationships between the parts, viewing change as an emerging property that cannot be predicted or planned for in a linear fashion.
Capacity to Collaborate	Enabling actors to understand each other's perspectives, resolving conflicts and diversity in order to combine individual skills and knowledge, and create an awareness of their complementarity; building synergetic partnerships and networks to enhance collaboration. It also involves communication skills and strategies, both internally and externally.

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Capacity to Reflect and Learn	Bringing stakeholders together, designing and leading processes of critical reflection and following double-loop and triple-loop learning processes, leading to action and change; this requires respect for different opinions and an atmosphere of trust for those opinions to be voiced. It also requires a systematic tracking of processes and progress to enable reflection to take place. Interventions need to be sufficiently flexible and adaptable to changing conditions, with analysis undertaken in an iterative fashion as well as promoting experimentation and risk taking
Capacity to Engage in Strategic and Political Processes	CD for transformational change is inherently political, and involves questioning the status quo. Power relations need to be understood for a number of dimensions, including economic interests, the balance of power among elites, and civil society-state relations. This understanding and influencing the politics and power relations between individuals, including the conscious empowerment of vulnerable and often marginalized groups, is crucial for bringing about new forms of interaction among stakeholders. It also includes the Capacity to manage the Strategy to strengthen the AKIS, meaning the capacity of using a systems approach in programming the different types of interventions typically aimed at strengthening human and social capital in agriculture, as well as to evaluate the effective implementation and interplays among all types of AKIS related interventions and to effectively use the results of the (ongoing) evaluation to redesign interventions.

Source: Adapted from TAP, 2017

In modernAKIS, the actors' network is instrumental to the realization of the organised pathway of strengthening their capacities of the actors of change: the TAJs.

In this regard, the network will act as a learning community and the space for the exchange of knowledge, practices and experiences between the participants (Wielinga, 2008; Wielinga & Zaalmink, 2015[10]).

The common goal of the network is to exchange knowledge and, possibly, develop new insights through the different combination of expertise by the different 'change' actors being part of it.

This makes the modernAKIS network different from an innovation network or an operational group where, typically, participants share a common ambition of innovation.

As well, unlike CAP networks, participation in the modernAKIS network, which, however, is not

> *Networks are about people.*
> *Creating a warm network for change does not occur at negotiation tables but at kitchen tables.*
> *Without people connecting and maintaining relationships, structure building and progress monitoring become increasingly difficult*
> *Wielinga and Robijn*

[10] Wielinga, H. E., & Zaalmink, W. (2015). Networks with free actors Encouraging sustainable innovations in (Free Actors in Networks). August.

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binding nor does it require any commitment 'to do' from participants, guarantees a continuity in the relational space and in the sharing of the capacity-development pathway. This will foster the growth the trust that is necessary to give fluidity to the relational dynamics and knowledge exchanges along with the possible co-creation of knowledge between the actors of change on issues related to the organisation, governance and functioning of AKIS.

CD pathways will be co-developed, as an integrated part of TAJs, through an iterative design-application/learning-reflection/ learning-adjustment process applying multi-actor approach.

Indeed, to be consistent with TAJs, CD must ensure, as much a s possible, the following aspects:

- multi-actor engagement
- collaborative dialogue (mutual active listening; expression of different points of view)
- critical reflection
- collaborative (social) learning.

Multi-actor approach (MAA) (ref. 4.3) is an important part of any capacity development intervention, since it allows building the combined as well as the individual, organizational and institutional capacities and may enhance the quality of interventions that influence their interrelationships through effective mobilization of actors at different levels (Rocchigiani and Herbel, 2013).

Practical experience has shown that effective capacities can exist only in the relationships between actors and grow through interaction rather than from training or organisational development. This is why working with multiple actors is considered an effective form of CD in its own right. By knowing each other and better understanding the bigger picture, actors start to jointly influence whole systems in positive ways and work together to negotiate improved conditions (Acquaye-Baddoo et al., 2010).

The implementation of CD activities will be complemented by reflexive practices (§ 4.4), to encourage participants to reflect on their learning experiences (what worked well, what did not work and what they would like to see improved), the gathering of feedback, from participants, stakeholders and other interested parties, aimed at gaining a comprehensive understanding of the impact of the capacity development process, and the evaluation of the results of the capacity development process in relation to the initial objectives and the impact upon participants and systems. Based on the reflexive and evaluation practices, changes will be introduced to improve the effectiveness of the capacity development process.

Capacity development activities will rely on the use of different methods and tools that guarantee wide access, suitable time-scheduling, flexibility and their tailoring around specific needs, expectations and topics. A variety of virtual and face-to-face activities will be employed to facilitate reaching the largest audience, as well as agile approaches, employing a mix of desk-based, on-site and hybrid support, for training, coaching and mentoring aimed at allowing adaptation to the realities of the end-users. A not exhaustive overview of possible methods is provided in Table 4.

Table 4 Overview of capacity development activities in modernAKIS

Main objective	Type of CD activity	Possible topics (tentative list)	WP
Better integration within the AKIS	Country-based Community of practice	Practices on how to better incentivise the integration of advisory services and education bodies within the AKIS**	WP2

		Practices on how to better incentivise the researchers applying for more impactful and responsible research innovation approaches**	
Cross-fertilization of experiences Co-creation of innovative solutions	Networking activities Cross-country Community of practice	Setting up cross-border EIP groups; cross-border project management and financing*** Topical issues relating to the contribution of the AKIS to the CAP objectives	WP1 WP2 WP4 WP5
Tailored and enlarged capacity development at Country level focusing on specific themes	In-Country CD workshop	Eliciting (Young) Farmer expectations towards AKIS, farm viability (e.g. accessing capital, business planning, food, development and design of farm viability support instruments) How to ensure impartial advisory services* How to (series): Building a common vision of the local/regional AKIS	WP1 WP4
Knowledge exchange on specific practices	Good Practice workshop	How to (series): Methods/tools for network development and coordination; Policy and administrative practices supporting the implementation of the AKIS plan; Instruments to improve research-practice communication	WP1 WP2; WP4
Tailored and enlarged CD at Country level	In-Country coaching AKIS days	Organizing AKIS functioning based on a wider system thinking***	WP3
Discussion	Knowledge Exchange workshop	How to (series): Knowledge driven structures in agri-food systems (demonstration farms, living labs, DIHs, knowledge communities etc.) *** Fostering generational renewal in agriculture; Webinar series for e.g.: (a) Pesticide reduction, (b) Digital competences, (c) Bioeconomy etc. ***	WP2; WP4
Exploring new/in place knowledge and solutions for a specific topic	Thematic Focus Groups	Land ownership, off-farm income and opportunities; enablers and barrier for transition to biological agriculture**	WP3
Systemic thinking: collective reflexive exercises to change mind-set and achieve common understanding	AKIS intensive training with serious games	Fostering generational renewal in agriculture** How to (series): Tools and methods for (a) AKIS governance design, (b) AKIS network implementation, (c) AKIS evaluation and monitoring* Digital advisory tools and services*	WP3 WP4

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Provision of knowledge to help strategic planning for change	Real time strategic workshops	How to (series): AKIS intervention design: simplified costs; inter-institutional agreements for AKIS coordination*	WP3
Peer-to-peer knowledge exchange and learning	Cross-visits and Peer-to-peer (AKIS peering days) Cross-country Community of practice Networking workshops	How to (series): setting up cross-border EIP groups; cross-border project management and financing** Practices on how to better incentivise the integration of advisory services within the AKIS** Practices on how to better incentivise the researchers applying for more impactful and responsible research innovation approaches** Roles played by the AKIS CB* Setting up and functioning of back-office services*	WP2 WP3 WP4

** Topic defined during the KOM; ** Topic identified by the Call; *** Topic identified during the proposal preparation.*

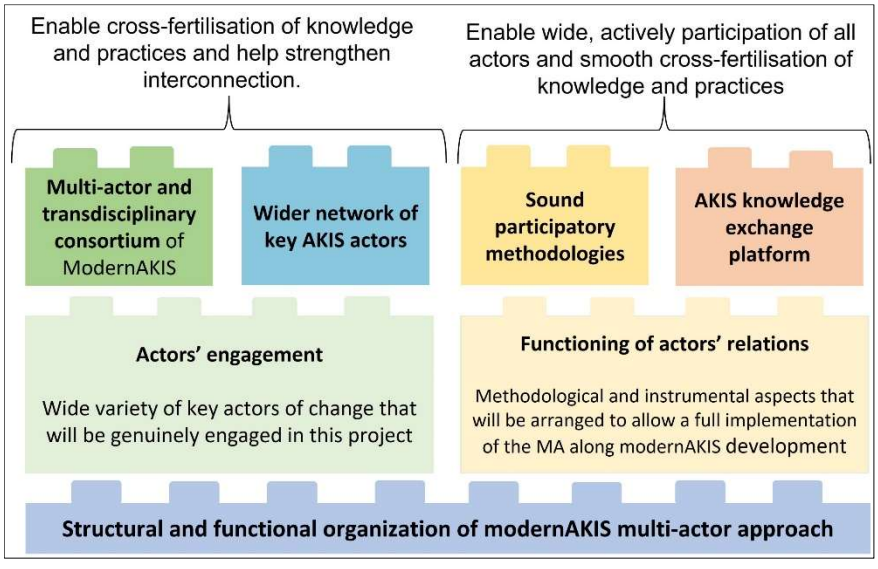
4.3. The embeddedness of a multi-actor approach in TAJs as a device of capacity development

The full implementation of modernAKIS multi-actor approach will be ensured by three interconnected functions:

1. the organization of structures, serving infrastructures (actors and their organization) and their functioning through appropriate methodologies;
2. the co-development of system capacities and knowledge that will serve the duly capacity development of the key actors of change and the AKIS in MSs;
3. the enabling mechanisms that will ensure responsiveness, significancy and effectiveness of MAA implementation along the TAJs along with impact across AKISs in MSs (§ 4.1.5).

The structural and functional organization of modernAKIS multi-actor approach relies on four building blocks concerning the actors engaged in the project and their organization (1st and 2nd blocks) and the functioning of their relations during the project implementation (3rd and 4th blocks), namely the methodological and instrumental aspects that will be arranged to allow a full implementation of the MAA along modernAKIS development.

Figure 5: Structural and functional organization of modernAKIS multi-actor approach



The first building block regards the **multi-actor and transdisciplinary consortium** of ModernAKIS that is composed by current actors of change: public authorities responsible for the AKIS plans (26,47%), practitioners (29,41%), research and academic bodies (14,70%), and secondary and higher education (11,76%). This makes sure the design and the implementation of modernAKIS project are drawn on knowledge, practices, expectations and needs of the key actors of change of the AKIS from across the EU.

The second building block entails the engagement of a **wider network of key AKIS actors** of change that have an actual or potential influential role to boost system change within respective AKISs in MSs. modernAKIS network has been set up at the very beginning of the project (M6) and the engagement of actors will continue in every time all along the project implementation. The network will be composed by the key actors of change that already play roles within the AKIS in MSs from across EU (around 1000 network members), as well as networks from other EU relevant initiatives (e.g., network of the advisors of i2connect and AttractISS; SCAR AKIS working group; EUFRAS network and others).

Plurality, cross-sectorial, transdisciplinary and multi-level perspective of the key actors of change engaged within the ModernAKIS network will allow continuous, both multilateral and bilateral, cross-fertilization of knowledge and practices to help strengthening interconnections at the different levels of AKISs in EU, taking advantage from the variety of countries' settings.

The third building block of the MAA entails the implementation of sound **participatory methodologies** will be applied for effective iterative engagement of actors of change in project activities (TAJs), enabling valuable creation of co-ownership, which could speed up the innovation in governance and functioning of the AKIS through a wider exploitation of the project learnings. Participatory methodologies (e.g., CoPs, European awareness scenario, gamification, and innovation boot camps) will enable common understanding and visioning, teambuilding, collaboration, building bridges and breaking silos between actors and sectors.

To ensure a fully implementation of MA the capacity development will be implemented through participatory methodologies and tools that meet four criteria (Table 5).

Table 5: General criteria of multiactor capacity development methodologies in ModernAKIS

Empowerment empowering the plurality of key actors of change to provide feedbacks on the on-going project activities and results and to co-create further developments	**Peer-to-Peer** ensuring processes of peer-to-peer discussion about the on-going projects' activities and results and enable systematic exchange of experiences and collective learning
Common visioning ensuring processes of sharing of views, debate, common visioning and prioritization about the further developments of the project	**Practice-oriented** project activities and results must be user-friendly to bring to immediate take-up and benefits for the actors of change that will be actively engaged along the TAJs

Additional methods and tools might be possibly identified during the project implementation to better fit the emerging needs for intervention and will duly comply with these criteria.

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The fourth building block of modernAKIS MA is the **AKIS knowledge exchange platform** that will play a key role in smoothing the network functioning and serve the wider streamlining of the multi-actor approach adoption. It will support direct and mediated knowledge exchange among AKISs actors from across EU countries and regions and, at the same time, be instrumental to ongoing monitoring of knowledge flows and needs for support from the project. Tools and functionalities of the platform will include spaces for open dialogue (e.g. Microsoft Teams, Zoom, Mural, ...), constant access to the capacity building tool box, direct contact with the project facilitators, and others.

Based on the above described building blocks the key actors of change will implement the modernAKIS MAA along two main trajectories that will shape the TAJs: the co-development of individual and collective capacities that will enable them boosting change and well-functioning within the AKISs in MSs and the co-creation of new worthwhile practice oriented knowledge, based on their own empirical ongoing experiences, that will serve fueling further developments and decision-making at local level, with and among other actors of AKISs that are not directly engaged in this project, through dissemination and exploitation that will amplify the project results (Table 5).

Table 6: The two trajectories of MA along the TAJs

Co-development of individual and system capacities	Co-creation of evidence-based and practical oriented knowledge
• Networking, knowledge sharing and exchange • Peer-to-peer review learning • Capacity building system thinking, system innovation • Capacity building on AKIS conceptualization and enabling • Reflexive learning, critical thinking, experiential learning assessment • AKIS and its contribution to CAP policy and strategies	• Topical insights relating to the CAP policy and strategies • Practices relating to the implementation of the AKIS strategies within the CAP Strategic Plans (advisory services, ISS, back-office services, young farmers, …) • Practice abstracts • Evaluation strategies for the AKISs in MSs • Significant Indicators

4.4. Reflexive assessment process as a booster for capacity development

The use of a reflexive assessment process in ModernAKIS meets a twofold goal.

The first, already mentioned *(§4.3*), concerns the introduction of an enabling instrument that will serve the implementation of a real MAA, through accompanying AKIS actors along a learning and critical mirroring path that will enhance the capacity development and transformative change.

The second purpose of the reflexive assessment process is to complement the development paths of the TAJs to allow embedding critical reflection and evaluative analysis into the logic of actions for change that the key actors of the AKIS will undertake within respective systems. Indeed, a reflexive process will support these actors in the on-going collection of empirical evidence that will feed evolutionary loops of reflexive exercises, learning and adjustment of action in their respective systems, during the ModernAKIS project implementation (T4.3).

To meet the above-mentioned purposes, a reflexive assessment process will be applied along the TAJs and this will take the form of systematic assessment exercises with the key actors of change. This process will contribute to solve systemic problems and to create enabling environments for

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innovation system's functions, by stimulating and organizing actors' participation, creating space for capabilities development and promoting interactions among heterogeneous actors (Patton, 2008; Wieczorek and Hekkert 2012).

Through reflexive assessment process the key actors of change will be accompanied to iteratively questioning themselves, sharing views and experiences, reflecting, co-reviewing assumptions and planned activities, towards learning for action about: ongoing state of play of the AKIS (structural and functionalist analysis) and actual system micro and macro failures (institutional, infrastructural, capacity-related, marketing, …) of the AKIS strategies in respective countries with respect of the positioning of the different actors, institutions, interactions and interactions and respective actions for change over time.

Reflexive Monitoring in Action

It is an integrated methodology to encourage learning within multi-actor groups or networks as well as institutional change in order to deal with complex problems. Appointed reflexive monitors stimulate collective learning and the design and adaptation of actions targeting a future system change. Key is to trigger recurrent collective reflection on the results of actions undertaken in the light of systemic barriers as well as opportunities. While facing the everyday struggles of an ongoing transformative change process, these system innovation initiatives will thus be able to change their practices, relations and rules and contribute to the long-term ambition of sustainability.

Source: https://www.wur.nl/en/show/reflexive-monitoring-in-action-2.htm
Access on 13th march 2023

In line with the grounding theoretical framework and the MAA of modernAKIS, a crucial strength of the reflexive assessment process is the early and continuous involvement of the plurality/heterogeneity of key AKIS actors that will express the different viewpoints and concerns during the participatory meetings, and these will be (deliberatively) integrated in the TAJs' developments, by leading legitimacy to actions put in place at country level by AKIS CBs (Beers and van Mierlo, 2017).

The reflexive assessment process will be implemented by, principally, through tasks T2.2 (COPs), T3.3 (Monitoring, assessing and benchmarking AKISs and their functioning at national, regional and local level) and T4.3 (Help the AKIS CB to monitor the CAP implementation).

Crucial starting points of the reflexive assessment process will be the needs assessment for capacity development and the collective reconstruction of the theory of change pursued by the TAJs in order to include their expected outcomes and impacts. This will help increasing ownership and easy take up by the key actors of change.

This constant reflection by the innovating actors on their position vis-à-vis their environment needs to be supported by dedicated facilitators and monitoring and evaluation methods aimed at system learning (Klerks 2010). The modernAKIS facilitators will moderate the participatory workshops, during which the participants will be encouraged to engaged in iteratively questioning themselves, sharing views and experiences, reflecting, co-reviewing assumptions and planned activities, towards learning for action on topical matters relating to system and strategic capacities, like the ongoing state of art of the AKIS (structural and functionalist analysis) and actual system micro and macro failures (institutional, infrastructural, capacity-related, marketing, …), thus travelling through the reflexive cycles towards adaptation and action upon the different ambits of assessment (Figure 10). Internal guidelines for the facilitation and agenda of the workshops will be prepared under Task 1.1.

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4.5. Capacity Needs' assessments and agenda setting for the capacity development

The capacity development foreseen throughout the TAJs will be adequately grounded on yearly capacity needs' assessments that will follow a structured approach to identify and prioritize current and emerging necessities of the key actors of change in relation to the system and strategic capacities that are crucial to play roles and activities within the respective AKISs.

Annual capacity needs' assessments (CNAs) will be at the core of the multi-actor development of the TAJs since it will allow specifically capturing early and on time specific needs for support and empower the key actors of change to set the agenda for further capacity development activities for WP1 to WP5. This will ensure tailoring the TAJs upon the necessities and challenge that the key actors of change will occur during modernAKIS implementation (Table 7).

Table 7: General framework of the capacity needs assessment process in a nutshell

PURPOSES	METHODS	OUTPUTS
• Identify/Prioritize capacity needs and setting the agenda for CD activities • Design on-demand capacity development activities • Empower the key actors of change to decide pathways of CD • Review the capacity development activities	• Capacity gap assessment matrix • Systemic analysis • Institutional analysis • Problem tree • Actor-Network analysis • S.W.O.T. • Others • **Dynamic learning agenda**	• Topical matters for D1.2 • Topical matters D1.4 • Topical matters for the definition of project developments of WP2, WP3, WP4, WP5 • Approaches and practices of change action • Cases for the practice abstracts (WP5)
↓		
• Menu of approaches and activities to deliver CD on topical matters: • WP1: Compendia of ready-to-put in practice innovative solutions • WP2: Knowledge exchange and co-creation of innovative solutions within the network • WP3: Capacity building on system thinking, design M&E • WP4: Capacity building on topical matters relating to the CAP SPs • WP5: Learnings and tools to help exploitation by the key actors of change within the AKISs		

To fit well these purposes the CNAs will be based on the following principles.

- **Process-wise.** The CNAs are conceptualized as a continuous process cycle of assessment that will occur over 5 main stages to lead to yearly co-designing and reviewing of the TAJs activities; so that CNAs will not be just a one-spot exercises. They will follow a reflexive path of learning -action – reflection- replanning that will allow recurrent learning cycles from the project activities and reflexive exercise upon real experiences of key actors of change.
- **Collective learning and capacity development are conceived as interdependent**. The ed value of modernAKIS, against other programs/projects at MSs level, is the socialization and collective reflection upon pathways of learning and of empirical experiences among a plurality of actors that belong to different AKIS and political backgrounds. This will contribute to a 'learning system' in which actors learn from and with one another and, as a result, become more capable of withstanding setbacks, of dealing with insecurity, complexity and risks" (Beers et al., 2010). This is likely to bring new co-learnings. In practical terms, within the TAJS, the CNAs will represent a stage of needs assessment and as well of capacity development based on the collective learning that will be based on reflexive exercises about the experiences of the key actors of change.

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- **Reflexive approach**. The reflexive exercises to run along the CNAs are integral part of the entire reflexive process that will shape the TAJs. Within the CNAs the reflexive exercises are aimed at taking advantage from day-to-day off-project activities of the key actors of change to feed learning loops that will help, on one hand, reviewing contents and methods of capacity development and, on the other hand, reconsidering and adjust action for change within the AKIS.
- **Systematization of experiential learnings from off-project day-to-day life in AKISs**. The iterative process of CNAs will build on the experience of actors. These latter will continually experiment the new acquired capacities and will offer new insights, by valorizing the empirical day-to-day experiences of the key actors of change within the respective AKISs through benefitting the collectiveness and advancing the effects of the capacity development being applied during the TAJs.

The overall capacity needs assessment (CNA) process will be articulated over five stages (Figure 6):

1. **Structuring the yearly CNA exercise and engaging key actors of change**. This includes mapping the key actors of change through typologies (e.g. AKIS CBs, researchers, advisors, …) that are actually engaged within the modernAKIS network, and defining methods and tools for the carrying out of the CNA. The engagement of key actors of change will be achieved under WP2 and specifically within the network (T2.2) and will follow the established timeline of the CNAs activities.
2. **Conducting the CNA**. The capacity needs assessment will benefit from the dynamic learning agenda method that truly helps grounding the capacity development topics and activities on the actual priority needs of participants. In this respect, some recurrent learning questions will be defined with the view to allow capturing the specific needs for capacity development that relate to the different systemic capacities being addressed by modernAKIS. Particularly, learning questions will be defined together with the key actors of change and they will be based on an institutional and a system analysis and the participants' perceived challenges/barriers with respect to their ambitions for changes in AKISs. The learning agenda is dynamic in the sense that, along modernAKIS implementation, some questions might disappear as soon as the associated challenges/ambitions are no longer perceived as relevant, by ensuring continuous adaptation and review (Beers & van Mierlo, 2017). Additionally, the participatory meetings will include socializing perceived barriers/opportunities/challenges and needs of the key actors of change, and this will help individual processes of increasing own awareness and identification of unperceived, misperceived and emergent issues that will, in turn, lead to better articulation of demand for capacity development. The implementation of the CNA at this stage implies the application of appropriate tools for identifying and prioritizing a list of topical matters that need to become subjects of capacity development activities (e.g. functions of the AKSI CBs; innovative solutions for a major integration for advisors within the AKIS or for a major involvement of young farmers within operational groups, or for setting up back-office services).
3. **Data interpretation** and reporting will be carried out by the facilitators and will bring forward specifically defining/defined areas of system capacities, topics and tasks through which to intervene to address the needs of actors of change.
4. **The co-validation phase** regards the collective discussion and reflection about the findings of the CNA. The draft report prepared by the facilitators will be discussed and revied to setting the definitive agenda for the capacity development to carry out over the next year. Based on this the list of priority topical matters (output of the 1st stage), participants will co-define the

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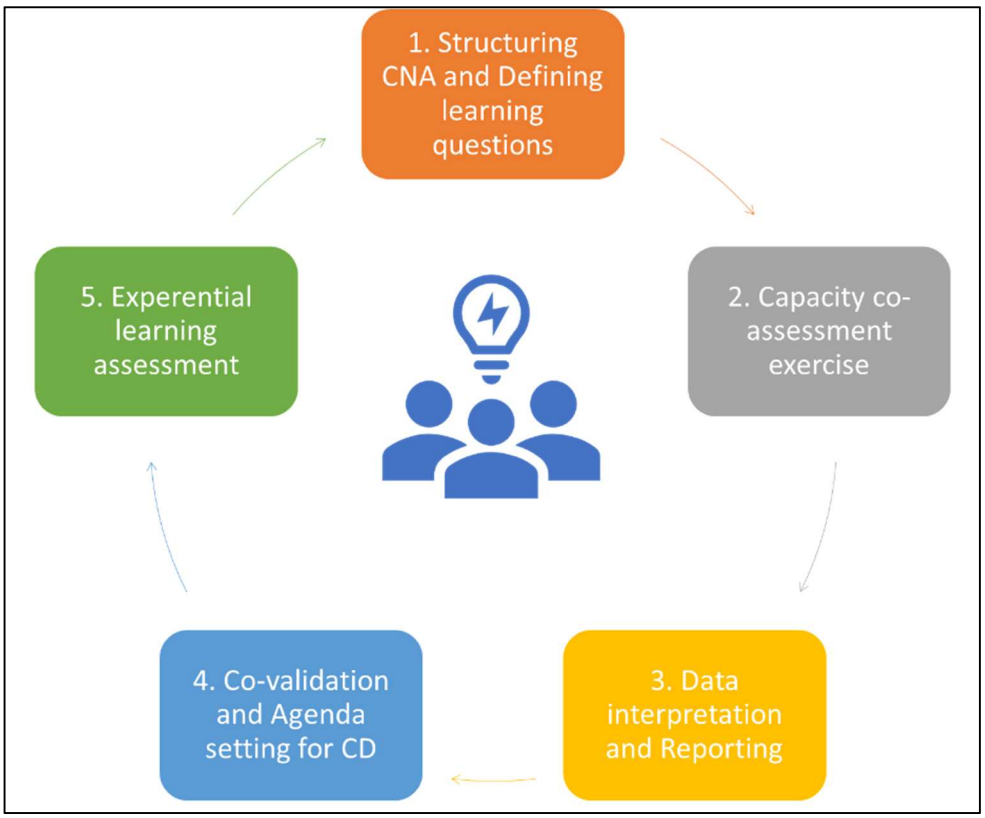
learning agenda for further capacity development activities (WP1 to WP5). This will include the association of the different topical matters with the different types of capacity development activities to conduct under the relevant WPs (e.g. sharing practices and comparing approaches; co-develop innovative practices within a working group; capacity building activities). The co-definition of the agenda will include both the key actors of change and the WP/task leaders that, for respective topics, will be responsible for the capacity development activities: networking, capacity building on systems innovation, capacity building on topical issues relating to the CAP and communication and exploitation about the AKIS.

Figure 6: Capacity assessment process



5. **The experiential learning assessment (ELA)** regards the reflexive exercise of the key actors of change about what they have experienced in their respective AKISs and in relation to the roles played within them, by triggering the emergence of perceived challenges/barriers and success stories. This will help assessing further needs for capacity development. The ELAs will be moderated by the modernAKIS facilitators and will be reported with a view to be used at the basis of structuring the next CAN exercise (1st stage). As a matter of fact, since the second year, stage 1 and stage 5 will be concurrent in order to help the key actors of change to better direct the structure the CAN based on their experiential learning and needs for capacity development.

Along the different stages of CNAs a mix of participatory methods and tools will be applied that adequately fit the purposes showed in Table 7 and based on the criteria the MAA defined by Table 5. Moreover, during the structuring stage, the identification of the most appropriate methods will be done with the view to ensure the wide involvement of a plurality of key actors of change and by taking into consideration that over modernAKIS implementation the key actors of change may vary in both their effective engagement and in presence, owing to possible changes in country level responsibilities and turn-offs in public bodies (e.g. new entitlements in relation to CAP post 2027) and/or other incidents. The mix of methods will combine remote and in-person participation of the actors concerned.

As a matter of fact, some topical matters have been arisen from a general CNA that has been conducted for the purpose of designing modernAKIS project activities and during the kick-off

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meetings held between October and November 2022(M3). All of this brought to defining a fist tentative list of topical matters that will be tackled by modernAKIS during the first year (Table 8).

This will be further developed after M6 the CNAs by following the framework defined by D1.1.

*Table 8: Agenda setting for 1st year (tentative, not exhaustive)**

Topical matters	WP	Task/Deliverable (Month)
Mechanisms to integrate ISS within the AKIS	WP1	T1.2: Identification of insightful and ready-for-practice solutions D1.2.(M12) T1.4: Collection of various ways and good examples for the intensive integration of advisors in AKISs D1.6.(M6)
	WP2	T2.5. Widening the network and cross fertilization.
	WP4	T4.3. Better integration of actors in the AKIS
	WP5	T5.4. Provision of practice abstracts. D5.4(M84)
Mechanisms to engage actively potential actors within the AKIS	WP1	T1.2: Identification of insightful and ready-for-practice solutions D1.2.(M12)
	WP2	T2.2. Setting up the modernAKIS network T2.3. National/Regional AKIS Communities of Practice
Roles and functions of the AKIS coordination bodies in MSs	WP1	T1.2: Identification of insightful and ready-for-practice solutions D1.2(M12) T1.3: Comparative analysis of the various types of AKIS within the EU at national, regional and local levels. D1.3(M12)
	WP2	T2.3. National/Regional AKIS Communities of Practice (CoP's) (M09-M72)
	WP3	T3.2. Governance in the AKIS: Capacity building of actors to organize, coordinate and govern AKIS actors and to align and connect infrastructures (M01-M72)
	WP4	T4.2. Modernizing AKIS governance to foster transition processes across EU (M09-M78) T4.4. Help the AKIS CB to monitor the CAP implementation (M09-M84)
Mechanisms for integration of (impartial) advisors within the AKIS	WP1	T1.2: Identification of insightful and ready-for-practice solutions D1.2.(M12)
		T1.4: Collection of various ways and good examples for the intensive integration of advisors in AKISs D1.6.(M6)
	WP4	T4.3. Better integration of actors in the AKIS
	WP5	T5.4. Provision of practice abstracts. D5.4(M84)

**The agenda will be finalized based on the participatory work to carry out during the first semester of the project*

To follow up with these topical matters, first learning questions have been already defined and will shape the CNA (Figure 7).

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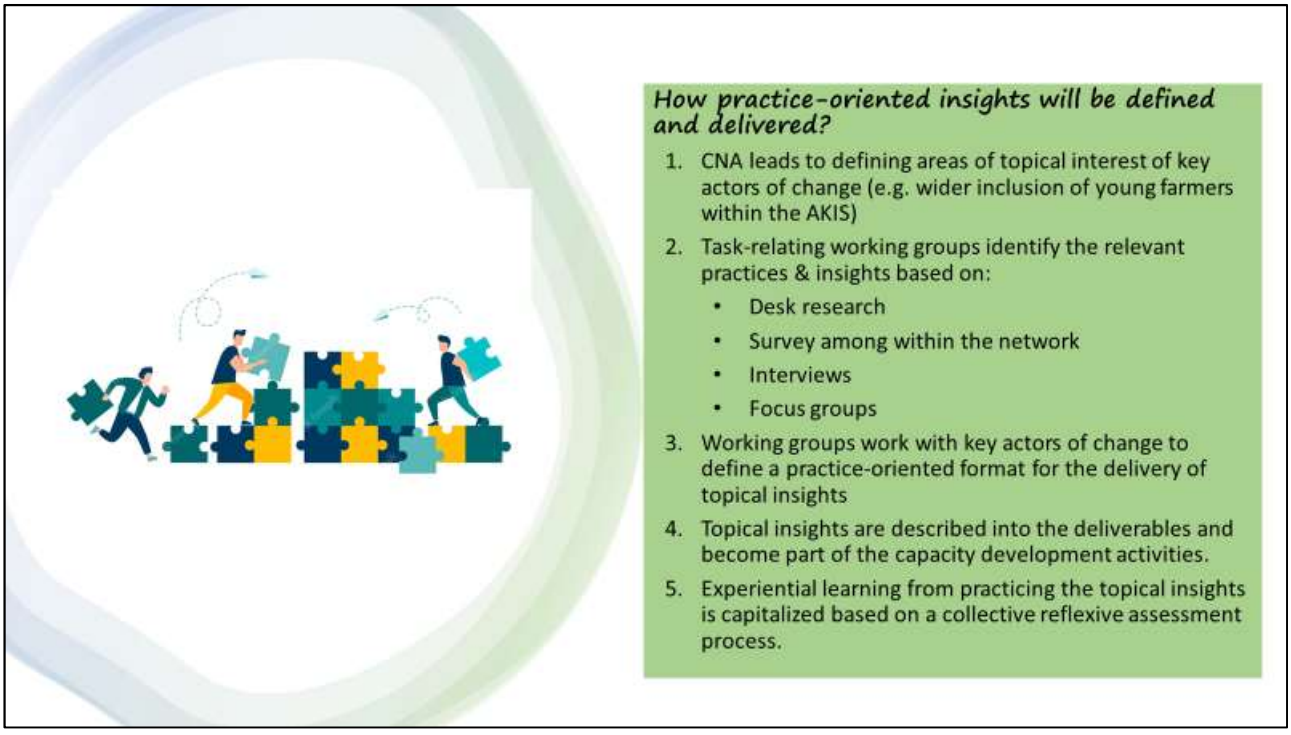
Figure 7: First learning questions for the CNA

In practical terms, in the cases, for example, of the identification of topical insights relating to the identification of insightful and ready-for-practice solutions (T1.2), the Collection of various ways and good examples for the intensive integration of advisors in AKISs (T1.4) and the Provision of practice abstracts (T5.4), the CNA will foster the MA pathway showed in figure (Figure 8).

Figure 8: Process of development of the deliverables relating to topical practice-oriented insights



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Internal guidelines for the conduction and reporting of the CNA will be prepared under Task 1.1.

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5. A developmental oriented framework for the evaluation of the AKISs and their strategies within the CAP Strategic Plans

The introduction of the AKIS within the CAP's Strategic Plans will certainly contribute to the adoption of systematic measures for evaluating or assessing the national/regional AKISs as well as to their reinforcement strategies (cfr. 3.4). In this respect, the EU regulation provides for the evaluation of AKIS strategies included in the national Strategic Plans, but not explicitly either for the evaluation of the AKIS as system innovations or of their functioning, that will be possibly influenced by the implementation of CAP strategies.

In fact, at the European level, guidelines for evaluating the strategy of AKIS have been defined with the objective of evaluating the AKIS strategic approach as reflected in the choice of AKIS related interventions and their combination included within the CAP Strategic Plan, namely: Its contribution to achieve, on the one hand, the CCO relating to the modernisation of agriculture and rural areas, and, on the other hand, other relevant SOs addressed by the CAP Strategic Plan (CE, 2023).

However, the systematic evaluations of AKIS implementation is a priority, especially for the coming years, in order to support policy-making and strategic planning, considering that:

Developmental Evaluation

DE is an utilization and innovation-focused type of evaluation.

It provides evaluative information and feedback to social innovators to inform adaptive development in complex dynamic environments because that's the arena in which social innovators are working. These are people who want to change the way things are in major ways.

It happens like this: In inquiring into the meaning of innovation within a context and particular change-focused initiative and providing feedback about what is learned as well as further questions generated, DE affects and alters the innovation process and outcomes.

Being utilization-focused DE (#1) requires staying attuned to the priority purpose of the evaluation, namely developmental (#8) support of innovation and adaptation (#2). DE occurs in a complex dynamic system (#3) that requires understanding and applying complexity concepts and systems thinking (#4) with timely feedback (#6). Utilization-focused engagement is collaborative (#5) and evaluative (#7), making the DE part of the intervention.

Source: (Patton, 2016)

- due to the novelty of the topic for managing authorities and evaluators, there is a need to start collecting evidence, i.e. robust and meaningful information on a continuous basis (time series), for grounding targeted interventions to support AKIS functioning;
- by 2027 a new CAP programming period will start and this requires up-to-date data to feed decision making;
- a (regular) AKIS diagnosis, has the potential to increase interaction between actors and therefore enhance participation in and capacities for implementing a programme/projects/process, especially if done in a participatory way (Knierim et al., 2015);
- there is a need to develop common metrics on AKIS to allow comparative, cross-national analyses and benchmarks across EU.

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Therefore, there is a need to adopt a twofold approach that includes two evaluation objectives: on the one hand, the assessment of the AKISs and their functioning (in realty) in each MSs and, on the other hand, the evaluation AKISs' strategies that are defined within the CAP strategic plans.

The difference between the two objectives is deemed necessary due to: 1. The evaluation of the AKIS's strategies is, according to the EU Regulation, compulsory, primarily aiming at judging the extent to which the respective goals and their contribution to the CAP SPs are effectively accomplished (key elements of success); 2. It is important that AKISs as innovation systems are gauged with respect to the performances that effectively reflect the values and perceptions of the AKISs actors (Cristiano and Proietti, 2018), rather than through typical (external) evaluations, even if they are carried out through participatory methods. In this respect, the assessment processes become part of the intrinsic dynamism of the AKIS and they help building trust and creating ownership and engagement among the different AKIS actors, based on their own findings and insights in the course of on-going decision making and change.

Assessment

It is a process of appraising something or someone, i.e. the act of gauging the quality, value or importance. Assessment is made to identify the level of performance of an individual, whereas evaluation is performed to determine the degree to which goals are attained.
It considers value, merit, worth, significance or quality (Scriven, 1991). It identify what works, for whom, in what respects, to what extent, in what contexts, and how (Pawson and Tilley, 2004). It examines expected and achieved accomplishments, the results chain, processes, contextual factors and causality in order to understand achievements or the lack thereof (UNEG, 2005). The process involves, setting up goals, collecting information (qualitative and quantitative) and using the information for increasing quality.

5.1. The Developmental oriented framework for the evaluation of the AKISs

ModernAKIS project will help the key actors of change, and primarily the AKIS coordination bodies and public authorities, to develop, and possibly to implement, a meaningful and comprehensive evaluative framework, and to strengthen the capacities for supporting the development of relating M&E activities.

In this perspective, during modernAKIS project an overall developmental-oriented evaluation framework (DoAF4AKIS) will be co-developed with the key actors of change (**Fehler! Verweisquelle konnte nicht gefunden werden.**).

This will be established starting from the combination of four already-in-use analytical frameworks, that have been developed for the purpose of analyzing innovation system:

- structural,
- functionalist,
- transformative oriented and
- capacity development.

Considering all together, these frameworks define a comprehensive set of key elements likely to configure worthful ambits of assessment of AKIS and of the inherent interconnections

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(Lamprinopoulou et al., 2014; Bergek et al., 2008; Wieczorek & Hekkert, 2012; TAP, 2016a; TAP, 2016b): what it is needed to investigate on when assessing the AKIS (Figure 9).

The structural-oriented analytical framework concerns the multiplicity of actors, infrastructures) and interactions among them, including the institutions that govern and influence behaviors and relationships of innovation systems (Hall et al., 2006; Wieczorek and Hekkert, 2012), through formal and informal rules.

The functionalist analytical framework focuses on the key processes (e.g. knowledge development and dissemination; networking; change in behaviors and practices or farming systems, ect) of structures that directly influence the development and the performance of the entire innovation systems (Bergek et al., 2008). It aims at assessing the extent to which (presence, goodness) key system functions are fulfilled, capturing their dynamics (virtuous and vicious cycles) and blocking mechanisms that influence the performance of the innovation systems (Bergek et al., 2008; Hekkert et al., 2009).

Utilization focused Evaluation (UFE)

is an approach based on the principle that an evaluation should be judged on its usefulness to its intended users. Therefore, evaluations should be planned and conducted in ways that enhance the likely utilization of both the findings and of the process itself to inform decisions and improve performance. UFE has two essential elements. Firstly, the primary intended users of the evaluation must be clearly identified and personally engaged at the beginning of the evaluation process to ensure that their primary intended uses can be identified. Secondly, evaluators must ensure that these intended uses of the evaluation by the primary intended users guide all other decisions that are made about the evaluation process. Rather than a focus on general and abstract users and uses, UFE is focused on real and specific users and uses. The evaluator's job is not to make decisions independently of the intended users, but rather to facilitate decision making amongst the people who will use the findings of the evaluation.

Source: Betterevaluation.org
Access on 10/03/2023

The transformative oriented analytical framework addresses the issue of examining strategic challenges (directionality, policy coordination, demand articulation, and reflexivity) which influence the functioning of the innovation systems (e.g. AKIS). Particularly, systemic failures (and merits) analyses concern, at the micro-level, the functioning of the actors into the innovation processes (interaction, infrastructural, institutional, market, capabilities) and, at the macro-level, the capacity of the system to respond to long-term transformative change (Lamprinopoulou et al., 2014; Flanagan et. Al., 2010; Weber and Rohracher, 2012; Klerkx et al. 2010).

In line with the developmental approach of modernAKIS, the DoAF4AKIS will appropriately include the aspects relating to the availability of the diverse capacities (capacity to navigate, to manage the complexity, …) that enable the AKIS well-functioning. For this purpose, the DoAF4AKIS will adopt the Common framework on Capacity development (CD for AIS) that was developed by FAO and CDAIS (2016) for the purpose of harmonizing the diversity of approaches to CD for agricultural innovation of various development agencies and that focuses on the identification of meaningful capacities for AIS functioning, their assessment and development, through a capacity scoring tool including a comprehensive list of indicators (cfr. 5.2).

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With specific regard to the evaluation of the AKIS strategies within the CAP SPs (EC, 2023) the DoAF4AKIS will adopt the European framework that sets some elements that are likely to be common (elements of evaluation, indicators, judgement criteria, evaluation questions) to the evaluative practices of the MSs.

All these analytical frameworks will be combined within an overarching developmental, evolutionary and reflexive evaluative approach that is appropriate for the case of complex-aware system innovations, as they are valuable systemic instruments able to contribute to solve systemic problems and to create enabling environments for innovation system's functioning, by stimulating and organizing actors' participation, creating space for capability development and promoting interactions among heterogeneous actors (Wieczorek and Hekkert 2012; Cristiano and Proietti, 2018).

Besides, reflexive practices have the potential to encourage the participants involved into the evaluative process "to look at their networking activities from a broader perspective on barriers within society, so that those activities can then be recalibrated" (Beers & van Mierlo, 2017; Van Mierlo & Beers, 2010).

In fact, these approaches consider those factors inherent in the larger systems within which an intervention is embedded, like: multi-level perspective, multi-actoriality, complexity and context-related issues; interconnections between individual, organizational and systemic capacity development; strategic approach and policy-mix; mutual embeddedness in the environment and uncertainties (Van Mierlo et al., 2010; Patton, 2008).

Specifically, since these evaluative approaches are user-centered and utilization-focused, they will set the frame for the direct engagement of primary intended users (e.g. AKIS coordination bodies), in an exploratory process of "action-reflection-evolution-action" that is as instrumental "to extract useful learning from the evaluation process itself" (Preskill & Torres, 2000; Patton, 2008) and supporting a collective learning about the processes, reflexive loops and on-going adaption, through changes of actors' behaviors and capabilities and, ultimately, transformational system changes (Patton, 2008; Gamble, 2008).

In practical terms, the DoAF4AKIS (including topics, methods & tools, timing, evaluative questions, indicators, …) will be finalized during modernAKIS implementation (M38) together with the key actors of change that will be engaged within the network (T2.2.) and with other relevant stakeholders (e.g. evaluators of the CAP SPs/AKIS strategies and the European Evaluation Helpdesk for the CAP).

All in all, the DoAF4AKIS will be developed through a stepwise path along which the assessments of AKIS and the evaluation of their strengthening strategies under the CAP SPs will be combined to bring the comprehensive and utilization focused knowledge for policy makers and other stakeholders. Particularly, the components of the AKIS will be investigated starting form some key general questions that are showed in Figure 9. Other relevant evaluative questions might help structuring the evaluation strategies for the AKIS (Table 9).

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Figure 9: General framework of the DoAFS4AKIS

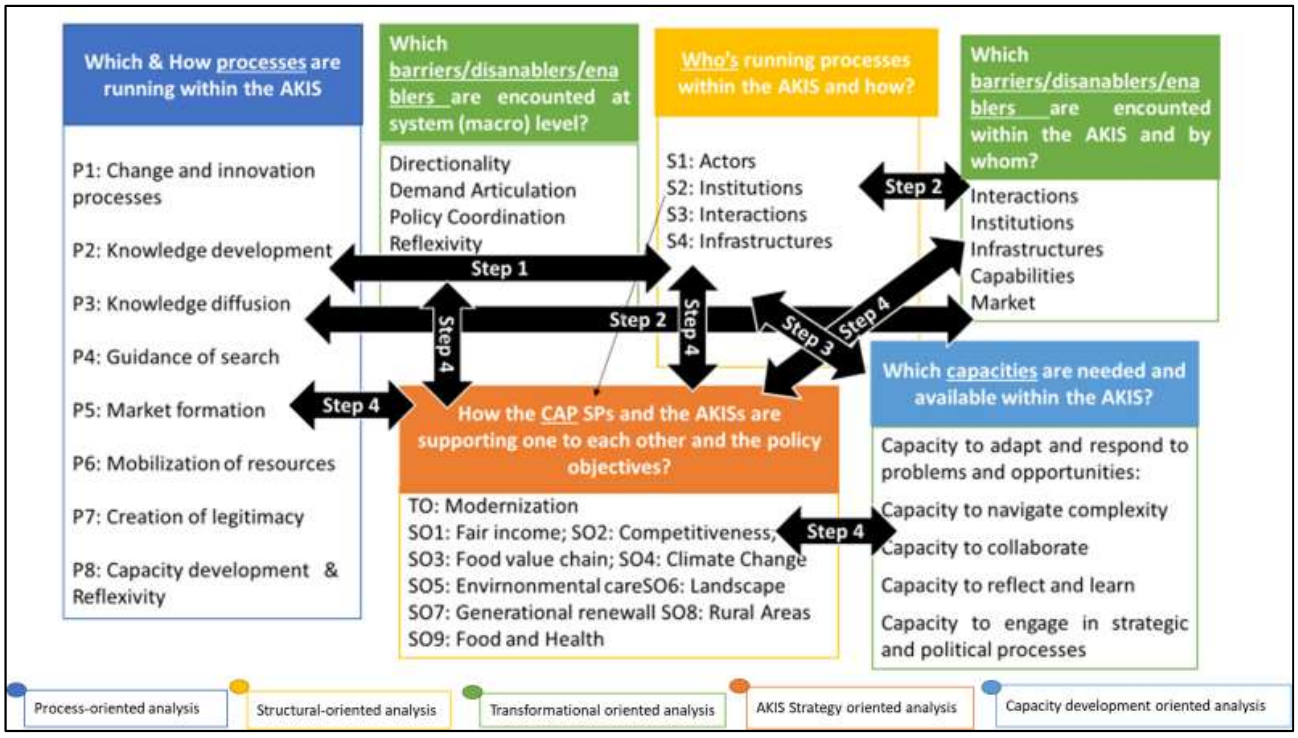

Table 9 – Exemplary list of assessment questions for the DoAF4AKIS

Structural	Functionalist
Who are the key actors of the AKIS?	What are main functions performed within the AKIS?
Which typologies of actors play which roles, interactions and processes within the AKIS? How do they contribute to the AKIS functioning?	Which typology of actor does perform the different functions?
How is the AKIS coordination body profiled and by which functions? Is the AKIS coordination body well-profiled and functioning to fit the purpose?	Which is the overall level of interactivity within the AKIS?
How are the relations organized within the AKIS? How do the actors' networks and collaborate in innovation processes, and what are power relations?	Which actors (typologies) are well-integrated within the AKIS?
What are the major challenges to agricultural innovations?	Which type of collaboration is mainly applied for each specific function?
What are the key systemic drivers and barriers of innovations?	What are constraints/barriers to for each function identified?
What are the factors enabling or constraining innovation processes?	What are the observable weaknesses in innovation system functions (missing/weak)
What are existing innovations that have a high potential for scaling?	What are the systemic failures which are causing the identified system function as missing or weak?
	What are the structural weakness of the system?

How to ensure knowledge flows between innovative actors across rural areas/regions/countries? What are the drivers and barriers of knowledge flows, learning, innovation collaborations and exclusion? And how can it be further strengthened? What mechanisms have been developed to encourage collaboration between actors in view of enabling interactive and user-cantered innovations? Which enablers/disablers/barriers are encountered within the AKIS at micro/macro level?	What are the functions performed within the AKIS, by which actors, and how do they spur innovation processes? How do actors of AKIS and their interactions/networks affect functions within the system? How is knowledge generated, shared, accessed, learned, diffused and used within the system? And what are the mechanisms used, challenges and constraints related to knowledge flows between actors? How are they coordinated to ensure effectiveness and efficiency in supporting innovation activities?

Capacity development

What are the capacities available?

Are all the systemic capacities available within the AKIS? And by which degree? by whom?

What are the gaps and needs for to consider for capacity development?

What are their capacities to perform a specific or group of AKIS processes?

What are their capacities to perform a specific or group of functions, and what are the main challenges, constraints and opportunities related to fulfilling the functions?

Which capacities are needed in relation to the design and implementation of the AKIS strategies within the CAP SPs?

AKIS Strategy within the CAP SP

What are policies, strategies related to agricultural innovation, how do they foster, promote, and facilitate systemic innovations?

Which enablers/disablers/barriers are encountered within the AKIS at micro/macro level?

To what extend the AKIS strategy and other institutions support scaling innovations?

To what extent are AKIS interventions coherent and complementary with other strategies, plans or initiatives at Member State level that target AKIS?

What is the share of the CAP SP budget devoted to knowledge sharing and innovation?

To what extent is AKIS strategic approach relevant for contributing to the achievement of the CCO? (What are the pre-conditions, the interim results and the expected impacts of the AKIS interventions?)

To what extent does the choice of AKIS interventions reflect the SWOT and identified needs related to the CCO?

To what extent does the AKIS coordination body support the implementation of the AKIS strategic approach?

To what extent do implementation arrangements enable relevant actors to participate effectively in AKIS related interventions?

To what extent were simplification measures implemented in the respective interventions to lower administration costs for beneficiaries and public administration?

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To what extent have AKIS interventions contributed to: a) increased knowledge flows and b) strengthened links between research/experts and practice?

To what extent do farmers change farming practices after participating in training programmes and/or making use of farm advice?

To what extent does the EIP support to AKIS through OGs contributes to speed up innovation (1) creation and (2) implementation (e.g. different types, models and stages of innovations), also by connecting policies and instruments?

To what extent do AKIS related interventions contribute to innovation uptake by farmers?

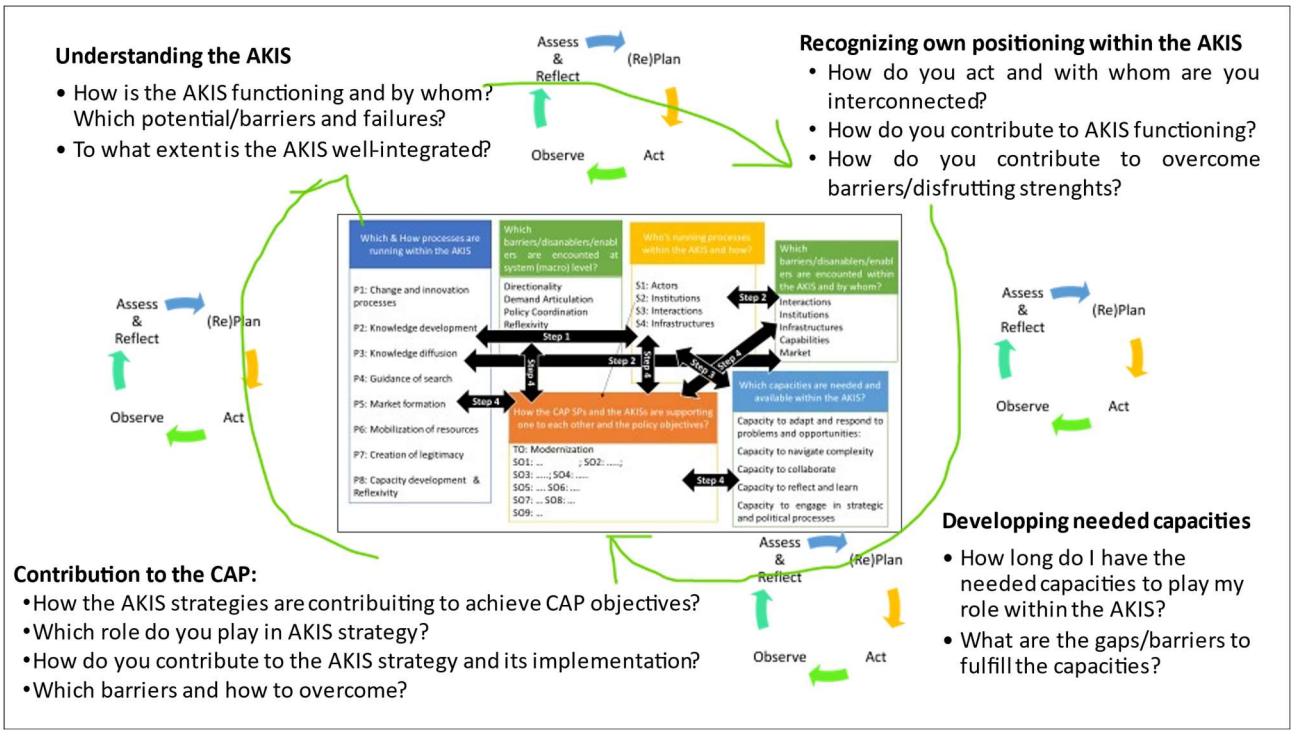
To what extent have AKIS interventions contributed to strengthening farm advice and fostering all advisors' interconnection within the AKIS?

To what extent R&I policies at MSs level are well-coordinated and synergically contribute to enable the environment within the AKISs (national, regional)?

Source: Adapted from FAO (2022), Lamprinopolu (2014) and EC (2023)

In fact, the during the reflexive assessment processes, the participants will be facilitated to mirror themselves in relation to the evidence that will emerge from the on-going evaluations of the AKISs and on the AKIS strategies that will be conducted during the CAP SPs implementation (cfr. § 4.4). Particularly, key actors of change will be engaged in iteratively questioning themselves, sharing views and experiences and reflecting on their positioning within the AKIS and the CAP SPs, re-considering the respective actions for change and needs for capacity development (Figure 10).

Figure 10: Questions for the reflexive assessment process on findings of evaluations



Ultimately, modernAKIS will work with the key actors of change to verify opportunities for adaptation of that framework to the case of the assessment of the AKIS in EU countries.

This will be mostly done under the following tasks:

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- T1.3 (M01-M24) - Comparative analysis of the various types of AKIS within the EU at national, regional and local levels and identification of benchmarks
- T3.1. Being part of the AKIS: Capacity building of actors to conceptualise valuable, relevant and credible AKIS models (M06-M84)
- T3.2. Governance in the AKIS: Capacity building of actors to organize, coordinate and govern AKIS actors and to align and connect infrastructures (M01-M72)
- T3.3 Monitoring, assessing and benchmarking AKISs and their functioning at national, regional and local level (M36-M84).
- T4.4. Help the AKIS CB to monitor the CAP implementation (M09-M84).

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5.2. Tools for the AKIS assessment and evaluation

In line with the definition of the overall framework for the assessment and the evaluation it is fundamental to define relevant tools, including indicators, that will serve the Monitoring & Evaluation (M&E) activities, along with capturing specific though significant aspects to mark evidence of state of art, functioning and performance of the AKIS in MSs.

Particularly, the definition of a set of relevant indicators is crucial to support monitoring and evaluating the reinforcement of the AKISs that will occur over the years and this might be complementary to the ones that are already foreseen by the regulation to follow the path of the impacts of the AKIS strategies that are supported by the CAP SPs.

However, the already in place sets of relevant indicators at European and international level are limitedly significant to fit the purpose of AKIS M&E, since they tend to narrow the systemic approach only to certain elements or segments of the processes that specifically relate to the Knowledge Transfer & Innovation (KT&I). Moreover, they only reflect the linear model to innovation: the creation/import of new knowledge; the adoption of new knowledge; the diffusion of knowledge/combination of existing knowledge; the enabling market and policy environment; the induction of innovation (Vincent-Lancrin, 2013).

This is a number of internationally recognized input/output/result/impact indicators, which have a good coverage of the statistics provided by the international agencies such as OECD, EUROSTAT, World Bank and, also by the EC-DG AGRI for the purpose of M&E the CAP programmes (Table 13 in Annex 4).

In the EU context, some system-oriented indicators were defined during the 4th mandate of the SCAR-AKIS but these certainly need further elaboration and grounding on available/feasible methods for collection of needed information (Table 15 in Annex 6).

More recently, under i2connect H2020 project, based on the relational matrix developed by Aparicio et al. (2019), the AKISinteract! tool was developed to help capturing the degree of interactions actually in place among the different typologies of AKIS actors playing roles within a certain system innovation and according to their specific perceptions (deliverable 3.4 of i2connect H2020 project).

As well, still under i2connect H2020 project and based on the framework developed by PROAKIS F7P (2012), a net-diagram tool for the AKIS was developed to help identifying, and reflect on, the key actors actually playing roles within the AKIS in MSs and the degree of their interconnections (Figure 13).

Indeed, both the tools can support managing authorities and evaluators during the designing, monitoring and evaluating of the AKIS and their strategies and arrangements (e.g. governance). In fact, they've been already put in use several times, for the purpose of the AKIS reports delivered under WP1, task 1.2 of i2onnect project, to ground the contextual analyses of the AKIS strategies of the respective CAP strategic plans, and for the purpose of the study "Member States (MS) AKIS implementing tools to bridge the gap between research and practice" (CASA H2020 project EU).

Indeed, for the purpose of M&E of the AKIS a more meaningful set of "system-oriented indicators" is needed to capture the combination of aspects characterizing innovation systems and their functioning through processes and drivers as well as aggregation, interactivity and scaling-up (e.g. demand-orientation, learning processes, interactions and relationships). Also, the definition of

composite indicators would be consistent with the purpose of capturing the multidimensionality of the system innovation activities (Rivera et al., 2005; Bank et al., 2008; Tunny, 2007; Katz, 2005).

Besides, as it already emerged in literature, developing new and/or strengthening analytical tools for quantitative methods, benchmarking and rankings could serve the conduction of systematic cross-country and comparative analyses (Knierim, 2015; Balzat and Hanusch, 2004).

In this regard, over the recent years, some relevant tools for system-oriented indicators have been developed and certainly they merit to be further analysed and possibly adapted to be put practically in use for the purpose of the assessment/evaluation of the AKISs in MS in EU.

For example, under the EU-funded CDAIS project, jointly implemented by national partners, FAO and AGRINATURA, a scoring tool has been developed to assess the functional capacities (Capacity to navigate complexities, Capacity to collaborate, Capacity to engage in strategic and political processes, Technical skills, Enabling environment) that are needed to promote, lead or successfully participate in innovation processes. Through this AIS assessment tools a number of relevant impact and outcome indicators can be drawn and they can adapted to the AKIS approach in EU (in Annex 5).

The overview provided in this paragraph will serve as a reference to work within ModernAKIS, together with the key actors of change, to define useful and significant system-oriented indicators, composite indicators/indices and benchmarks that will be useful for the good M&E of the AKIS in MSs.

This will be specifically done under the following tasks:

- Task 1.3 (M01-M24) - Comparative analysis of the various types of AKIS within the EU at national, regional and local levels and identification of benchmarks
- Task T3.3 Monitoring, assessing and benchmarking AKISs and their functioning at national, regional and local level (M36-M84).
- T4.4. Help the AKIS CB to monitor the CAP implementation (M09-M84).

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7. Annexes

Annex 1: AKIS conceptualization across the years

The conceptualization around AKIS is developed over decades following the different paradigms in agricultural development (e.g., productivist, constructivist, systemic, circular, sustainable development and others) (Dockès et al., 2011) that occurred over time.

Initially, the linear technology transfer model was mainly exemplified in the National Agricultural Research Systems (NARS), that are defined as "the entities responsible within a given country for organizing, coordinating, or executing research" towards the agricultural development and modernization of a certain country (World Bank 2012).

The concept of the Agricultural Knowledge System (AKS) was originated in the 1960s by an interventionist policy in agriculture based on the idea that, in order to accelerate agricultural modernization, innovation transfer should be strongly coordinated (Leeuwis and Van den Ban, 2004). This concept was implemented in many countries through a strong integration, generally at national level, of public research, education and extension bodies, in many cases under the control of the ministry of agriculture (Brunori, Rand and Proost, 2008), that were organised according to a linear model of knowledge transfer from research to farmers through technical assistance, without any degree of integration with the market (Hall et al., 2006).

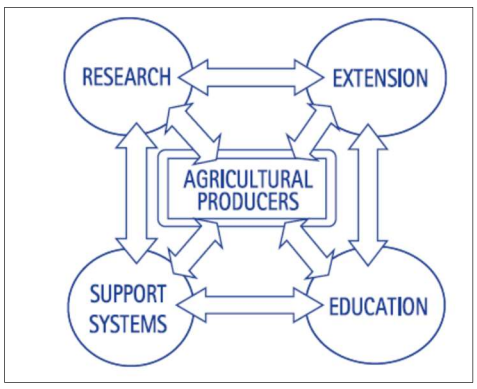
In 1986, Röling coined the term Agricultural Knowledge and Information System (AKIS) to describe the "set of agricultural organizations and/or persons, and the links and interactions between them, engaged in the generation, transformation, transmission, storage, retrieval, integration, diffusion and utilization of knowledge and information, with the purpose of working synergistically to support decision making, problem solving and innovation in in a given country's agriculture or domain thereof'" (Röling, 1990; Röling and Engel, 1991; Klerkx and Leeuwis, 2009; EU SCAR, 2012).

Since then, the AKIS acronym has been through several evolutions. In 2000, FAO and the World Bank referred to AKIS as a system that "links people and institutions to promote mutual learning and generate, share and utilize agriculture-related technology, knowledge and information. The system integrates farmers, agricultural educators, researchers and extensionists to harness knowledge and information from various sources for better farming and improved livelihoods". Farmer communities are at the centre of the knowledge triangle created.

In a version of early 2000s, the AKIS concept is broadened to include rural development and named AKIS/RD (Rivera et al., 2002). This model takes into consideration four main actors whose mission is related to agricultural/RD innovation: research, extension services, education and training, support systems (that is, all organisations related to credit, inputs, producers' associations). All of these domains, according to this model, act upon farmers' and rural actors' knowledge and, by this way, generate innovation (Figure 11).

This model does not necessarily imply a top-down approach. Indeed, since its initial version, the AKIS concept recognizes that research is not the only means

Figure 11. An Agricultural Knowledge and Information System model



Source: Rivera et al., 2005

of generating or gaining access to knowledge. Although the AKIS still focuses on research supply, it gives much consideration to the links among the knowledge actors and the recognition of farmers' demand. This is a sharp departure from the conventional view of innovation as a linear process.

The intense debate on AKIS has led, progressively and rather silently, to change the meaning of "I" from "information" to "Innovation". This shift has been driven by the need to encompass "*the complexity of knowledge and innovation processes in the rural sphere"* (EU SCAR 2012).

This reflects the evolutionary dynamics of knowledge systems, which over the past 20 years have gone through a trend of liberalization that resulted in a movement from government-led AKS toward multi-actor systems, in which private actors (such as input industries and private advisory firms) have assumed an increasingly important role. At the same time, the challenges of the new millennium (first of all, climate change, food security and natural resources preservation) have fostered the involvement of new actors in innovation processes, as well as the broadening of the scopes related to innovation to also include strategies, ideas and organizational patterns that address emerging social needs.

Several European studies (see IN-SIGHT, SOLINSA, PRO-AKIS projects) have demonstrated that the AKIS systems, as initially conceptualised, have been slow to take up new opportunities and adopt new ways of thinking coming from new societal concerns and demands and the entrance of new actors into the agricultural domain. Moreover, disconnections between the various AKIS subsystems impede learning and hamper effective research and innovation.

Indeed, the plurality of actors within the AKIS reflects different perspectives and (competitive) expectations and must be stimulated by incentives to connect with each other. This have led to the conceptualization of the AKIS as a network with non-hierarchical nodes which should be nurtured by context-aware policies, well circumscribed in space and time, able to make choices to support innovation cycles, in terms of institutional infrastructure, funding mechanisms, network characteristics, and market structure (Dockès et al, 2011; SCAR AKIS, 2012).

The evolution of the AKIS concept occurred in parallel (and was certainly affected by it) with the rise of Agricultural Innovation Systems (AIS) thinking (Assefa et al. 2009; Pant and Hambly-Odame 2009).

AIS is defined as "a network of organisations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organisation into economic use, together with the institutions and policies that affect the way different agents interact, share, access, exchange and use knowledge" (Hall et al. 2006).

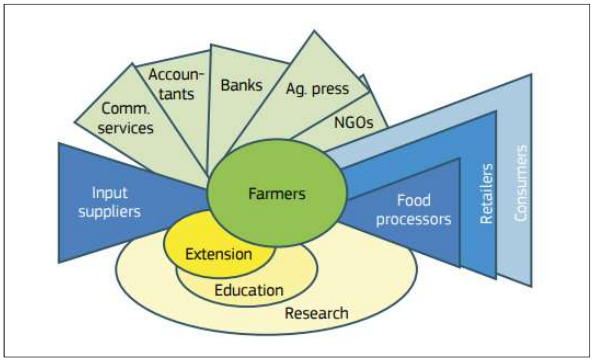
The AIS approach focuses on the complex interactions between a multitude of players and sub-systems that characterize innovation. Indeed, the main difference between AIS and the "Agricultural Knowledge and Information System" conceptualisations lies in the greater focus of AIS on the influence of institutions (seen as organisations like companies, public research institutes and governmental entities) and infrastructures on learning and innovation, and its explicit focus to include all relevant organizations beyond agricultural research and extension systems (Hall et al., 2006).

Although the AIS concept is too much focused on enhancing innovation (Klerkxs et al., 2012), its 'systemic thinking' perspective is certainly better suited to the new millennium societal challenges like the lack of food security, the increasing impoverishment of small farmers, the effects of global warming, animal diseases, depletion and pollution of natural resources, etc. (Elzen et al. 2012).

For these reasons, recent definitions of the Agricultural Knowledge and Innovation System provided within the European policy framework are largely inspired by it.

The latest AKIS concepts, therefore, focus on the plurality of sources of knowledge and on the interaction between different actors in the innovation process to take advantage of the respective knowledge (both codified and tacit) to develop new knowledge and innovation on continuous basis, through emphasizing the need to foster feed-back linkages among the wider range of actors and to generate mutual learning, sharing, and use of new technologies, knowledge, and innovation (fig. A2). Concepts and paradigms at the basis of AKIS are system thinking, life-long learning, non-linear and interactive models, multi-actor and network driven innovations.

Figure 12. Actors in the AKIS directly relevant for agricultural innovation in the food chain



Source: EU SCAR 2012

Annex 2: The multiple perspectives of AKISs

In a system perspective, knowledge flows and interactions occur among diverse typologies of actors, infrastructures and institutions having stake and taking action in single or multiple processes of change and innovations.

This implies multiple and complementary perspectives of analysis to apply when evaluating the AKIS (Toillier et al., 2018). Otherwise, there's a risk of narrowing one or more components of its functioning.

- **The AKIS structures: the structural perspective**

Structural components of an AKIS are actors, infrastructures and institution, as well as the interactions among them.

Due to the dynamic and unpredictable feature of multi-actor environments, **actors** can play different type of activities depending on different innovation processes and AKIS subsystems in which are embedded, no matter which domain it belongs to. An exemplary, not necessarily exhaustive, list of actors taking place within an AKIS is provided by Knierim et al. and this is based on the broadly distinction of five types actors (Knierim et al., 2015; 2020; Birner et al., 2009): (i) public sector organizations (ministries and subordinated public administration), (ii) research and education (universities, research institutes, schools), (iii) private sector (industries, independent consultants and advice-providing companies), (iv) farmer-based organizations (chambers of agriculture, cooperatives) and (v) non-governmental organizations (for example, charity organizations, environmental groups). This distinction was used for the configuration of

The cross-national analysis of the AKIS reveals that the diversity and numerosity of actors across MSs is vary. The diversity of the AKIS organisation across the European countries in terms of diversity and numerosity of actors and their type is quite broad. While in almost all countries, public authorities and public research and education actors as well as farmer-based organisations are present and well recognisable, private companies and non-governmental organisations are very less recognised as being AKIS actors (Birke et al., 2022).

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the AKISs across EU carried out for the purpose of the PROAKIS FP7 (2012) and i2connect H2020 (2020) European research projects.

Knowledge and innovation infrastructures can be broadly referred as the conglomerate of people, institutions, tools, facilities, which are engaged in the generation, capturing, preservation (organisation, storage, retrieval) and diffusion of different resources with the purpose of empowering and extending innovation in EU agriculture (Cristiano et al, 2019).

Table 10: Typologies of knowledge and innovation infrastructures

FACILITIES IT/IM infrastructure, data base, data warehouse, information system, knowledge repository, traditional and digital libraries, facilities that enable experiments (e.g. laboratories)	**RESOURCES** Data and information (facts and observations: files, documents, records, datasets, databases, statistics, photos, maps, presentations, regulations, policies, procedures etc.), collections and archives (objects and artifacts: books, documents, plant materials, etc.), e-infrastructures, such as data and computing systems and communication networks; tacit knowledge (skills, and experience; cognitive part: know-how, mental models, viewpoints, beliefs and perspectives of individuals in organisations	**PEOPLE** Networks, communities, learning, experience, know-how, …
KNOWLEDGE INSTITUTIONS Universities, libraries, scientific societies, government agencies, private entities (e.g. Facebook, Google, and Twitter)		**TOOLS** Systems to capture, store, share and process resources (e.g. social media, "big data," open source software, wikipedia, Practice Abstracts on the EIP-AGRI website, etc.)

Institutions are all form of organization, agreements, contracts, explicit/implicit rules, but also language and culture that regulate the interactions among actors (Knierim et al. 2015).

The interactions mean the relationships that occur between actors at the level of networks and of individual contacts (Wieczorek & Hekkert, 2012).

An example of a structural representation of an AKIS is provided by figure 13.

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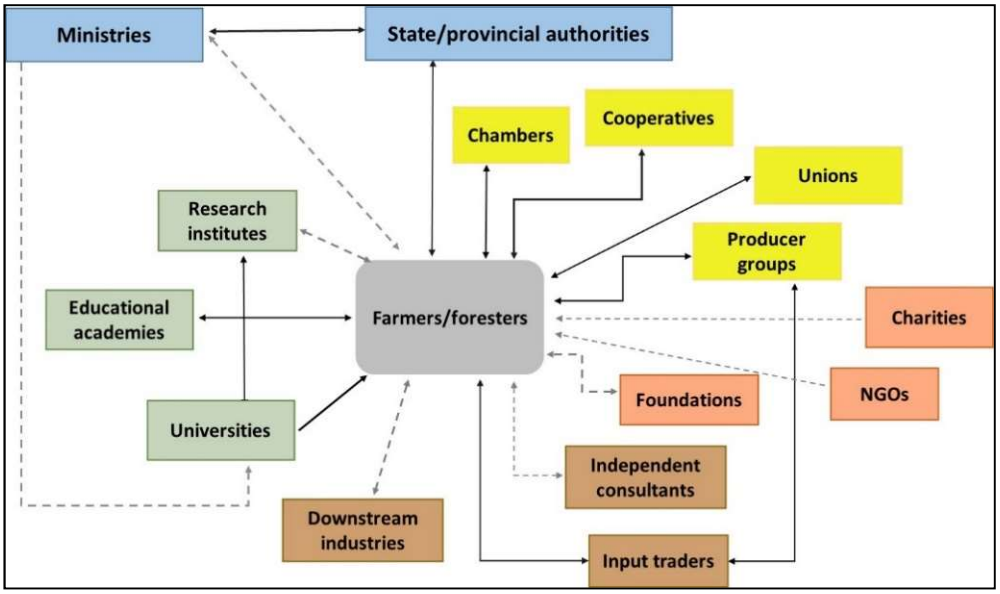
Figure 13: Exemplary AKIS diagram



Source: Knierim et al., 2015

- **The AKIS Functioning: the process perspective**

The functioning of an AKIS concerns the means and characteristics of interactions and processes. Therefore, the functionalist analysis focuses on "what is actually achieved in the system" (Bergek et al., 2008), regardless of the structure.

Therefore, it is important to identify and configure, at least, the key processes that allow capturing and understanding the most important system dynamics and performances ((Hekkert et al., 2007; Wieczorek and Hekkert, 2012; Musiolik et al., 2012). This exercise also includes drivers, failures and constraints that hinder system well-functioning (Klerkx and al., 2012).

Key processes that are needed in an AKIS to run certain innovations or pathways of change have been analysed by different studies (Hekkert et al., 2007; Mathè et al., 2016; Kilelu et al., 2013).

Drawing on these studies, ModernAKIS suggests seven key processes that allow creating knowledge flows and innovation. These processes have the general meaning of "something that is going on", irrespective of the direction or causalities related to a specific innovation system (Bergek, 2012).

The order of their sequence is not predefined as it depends on the structural setting (actors, infrastructures and institutions), the power balance put in place for the specific process. Multiple and different functionality circuits can emerge within and AKIS to relation to different pathways of change.

Table 11: Processes of AKIS

Process	Description
Attitude to change and innovation	The entrepreneurs/farmers are central in AKIS perspective. The role of the entrepreneur is to turn the potential of new knowledge, networks, and markets into concrete actions to generate and take advantage of new business and innovation opportunities. Therefore, the more the entrepreneur is well-interconnected within the AKIS and has the capacities to access and take advantage of the different sources of

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	knowledge to develop innovation the more the AKIS has the innovative potential.
Knowledge development	This function encompasses learning by searching (e.g. research bodies and universities) and collective learning leading to new knowledge and innovation (e.g. learning by doing, social learning, transdisciplinary learning, transformative learning). Therefore, knowledge is not only the product of formal research, but is developed through a social learning process among all AKIS actors and from the re-combination of different forms of knowledge (e.g., practical, tacit, scientific).
Knowledge diffusion through networks	The AKIS perspective emphasizes the knowledge diffusion based on exchange within heterogeneous and multi-actor contexts and/or networks. This can lead to increasing access to knowledge, learning by interacting as learning by using. Thus, the more the actors within the AKIS are well-interconnected and interact, the more effectively the knowledge is disseminated.
Guidance of the search	This process regards focusing investments of the specific fields of interest, and it encompasses mechanisms that influence supply-side actors in applying their resources, driving them work within strategic choices in that field. Guidance of the search represents the process of selection one or more knowledge pathways towards innovation on the best fitting certain needs or policy objectives among different knowledge processes.
Market formation	The opening up of a space/arena in which goods and services can be exchanged in (semi-)structured ways between suppliers and buyers. Within such an environment actors can learn about an innovation (e.g. new technology) and expectation can be developed.
Resource mobilization	Resources, both financial and human capital, are necessary as a basic input to all activities within the innovation system. CAP support to AKIS-related interventions represents this function. As well, national strategies supporting research and innovation and digitalization or forms of incentives for both researchers, advisors and other actors to engage in innovation processes relate to this function
Creation of legitimacy/counteract resistance to change	The process of gaining regulative, normative and cognitive legitimacy for innovations and regime change, which is crucial for the embeddedness and the creation of a favourable environment to innovation. Innovations and regime change can encounter oppositions and reluctance by established actors, particularly in certain sectors/fields of knowledge/farming systems (e.g., organic vs. conventional). Advocacy coalitions or group of interest can act as catalyst in influencing the transition

Source: Adapted from Bergek, 2012

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Table 12. Failures and constraints that hinder AKIS well-functioning

Level of failure	Tipology of failure	Description
Micro	Interactions	Interaction failures at either a network level or bilateral contacts between individuals is the so-called 'strong network failure', which refers to actors locked into their relationship, which causes myopia, blocks new ideas from outside and prohibits other potentially fruitful collaborations. This is an interaction intensity type of problem, whilst the so-called 'weak network failure' constitutes an interaction presence type of problem (Wieczorek and Hekkert, 2012). The latter refers to a situation where actors are not well connected, and fruitful cycles of learning and innovation may be prevented because there is no creative recombination of knowledge and resources.
	Institutions	Institutional failure refers to either laws, regulations and strategies any other formalised rules (the so-called 'hard institutions'), or a set of unwritten rules, common habits, routines and shared norms/values used by humans in repetitive situations i.e. 'the way business is done' (the co-called 'soft institutions'), that are missing or 'malfunction', hampering innovation.
	Infrastructures	Infrastructural failures concern (absence of) the physical infrastructure, such as railroads telecom, machines, buildings, harbours etc. are constraints requiring major investments that cannot be made independently by the actors of the system. They also concern investments in knowledge infrastructure (e.g. R&D facilities, libraries, training systems, knowledge, expertise, know-how and strategic information), and financial infrastructure (e.g. subsidies, grants, incentives from banks etc.).
	Capabilities	Capabilities failure points to actors' ''capacity to learn, innovate or utilise available resources; to identify and articulate their needs; and to develop visions and strategies''.
	Market	Market structure failures refer to the positions of and relations between market parties. Such as a monopoly or the lack of transparency in the ever enlarging food chains, but also imperfections in the 'knowledge market' (Klerkx and Leeuwis, 2008).
Macro	Directionality	implies that socio-technical transformational change is closely linked to direction and the setting of collective priorities for the system, referring to the lack of shared vision, and inability of collective coordination of fragmented change agents due to the effect of power on defining any vision (Weber and Rohracher, 2012).
	Demand articulation	Demand articulation failure ''reflects a deficit in anticipating and learning about user needs (and is addressed through) joint learning processes involving producers (and) innovation-oriented procurement mechanisms to directly stimulate the advancement of novel solutions from the demand side and users'' (Weber and Rohracher, 2012).

	Policy articulation	Policy coordination failure refers to coordination and coherence problems at policy levels e.g. regional-national-European or technological versus sectoral innovation policies
	Reflexivity	Reflexivity failure concerns the insufficient ability of the system to engage actors in a self-governance process, to constantly monitor progress against the transformational goals, and finally to anticipate and develop an adaptation strategy (e.g. stop policy initiatives if proved less promising than initially expected, Weber and Rohracher, 2012)

Annex 3: Typologies of potential key actors of change to engage within the modernAKIS network (WP2)

AKIS coordination bodies, at different levels of AKIS strategies that are designed and implemented in MSs. For example, in regionalized MSs the regional level must be included as well as the national level. The plurality of individuals within the AKIS coordination bodies should be also taken into account. For example, other individuals composing the AKIS coordination body (unit) should be engaged in this project.

Farmers/Foresters and their representatives. There are farmers that are actual protagonists of their AKIS and should be involved in this project. As well their representatives (farmer-based organizations) should be engaged because they will act as multiplier of this project, through involving associated farmers that it is difficult to intercept.

SMEs and rural entrepreneurs

New entrants in agricultural activities

Young farmers and Women

Advisors, innovation support services and other providers of specialized services. Networks and professional bodies of advisors should be also engaged in order to act as multiplier and facilitate this project enlarging the scope. For example, in Italy the representatives of the professional orders of agronomists, vets, foresters and agro-technicians should be include

Researchers and academics.

Business organizations and suppliers.

Financial bodies. They are normally neglected (instead they were mentioned in literature) but they are crucial in enabling innovations across the AKIS and, particularly, in supporting investments under the AKIS strategies of the CAP SPs.

Non governative organizations (NGOs)

Consumers: it is important to intercept consumers that still are not well represented nor engaged in AKIS strategies

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CAP Networks an other networks. They play a role of facilitating interconnections and disseminating innovations.

Students and schools: we are co-constructing the AKISs were they will be actors (as farmers, advisors, ….).

Annex 4: Overview of indicators in use for knowledge transfer and innovation in agriculture

Table 13 – Indicators of knowledge transfer and innovation in agriculture (not exhaustive list)

Types of Indicators	Indicators *([1]. RDPs 2014-2020; [2]. The indicator was provide by OECD Network for Farm Level Analysis; [3] CAP SP 2023-2027)*
Inputs	Total public and private expenditure on agricultural R&D Number of staff in public and private agricultural R&D Number of staff in agricultural extension services Number of patents registered in the area of agricultural biotechnology
Outputs	Number of supported training, advice and awareness actions or units[3] RDP expenditure in R&D as a % of the GDP Number of persons benefitting from advice, training, knowledge exchange or participating in European Innovation Partnership (EIP) OGs supported by the CAP in order to enhance sustainable economic, social, environmental, climate and resource efficiency performance[3]. % of expenditure for the 3 RDP measures: 'Knowledge transfer & information action' + 'advisory services' + 'cooperation' in relation to the total expenditure for the RDP[1] EIP operational groups[1] Public expenditure on agricultural extension and schools Public and private cost of extension services
Outcome/Targets	Total number of cooperation operations realized under the cooperation measure (groups, networks/clusters, pilot project, …) % of innovative projects out of all RDP supported projects Number and types of partners involved in cooperation projects Number of persons benefitting from advice, training, knowledge exchange, related to environmental or climate-related performance[3]. Number of supported innovative actions implemented and disseminated by EIP operational groups % of cooperation operations continuing after the RDP support including for the purpose of improved environmental management and performance Number and types of partners involved in cooperation projects Number of innovations created/adopted or introduced in firms
Impacts	I1. Share of CAP budget for knowledge sharing and innovation[3] TFP growth or number of changes introduced in firms Contribution of technological change to TFP[2] Contribution of technical efficiency change to TFP[2]

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	Distribution of farm productivity performance in the sector[2] Diversification in non-agricultural on-farm activities[2] Horizontal and vertical integration in the agri-food chain Linkage between farm support and productivity performance[2] Entry and exit in the agricultural sector[2] Change in the rate of substitution of inputs[2] Reflection of R&D demand in public R&D agenda

Source: Authors' elaboration

Annex 5: Indicators in use by FAO/CDAIS for capacity diagnosis

Table 14 - Overview of indicators used in the capacity scoring questionnaire.

Topic 1: capacity to navigate complexity	
Indicator 1.1	Availability of skills to understand and solve problems (seeing the bigger picture; understanding interdependencies/interactions, etc.)
Indicator 1.2 –	Availability of management skills
Indicator 1.3 –	Access to and mobilization of resources by group/partnership
Indicator 1.4	Access to and sharing of information by stakeholders within the group/partnership
Indicator 1.5	Access to and sharing of information by group/partnership with outside actors (officials, businesses, etc.)
Indicator 1.6	Extent to which value of local knowledge is recognized in decision-making
Indicator 1.7	Extent of informed decision-making in the group/partnership
Indicator 1.8	Development and identification of a vision where the group/partnership wants to be in the future (dream of what it should be like)
Indicator 1.9	Development and identification of strategy (plan of action designed to achieve the vision for the future)
Topic 2: capacity to collaborate	
Indicator 2.1	Existence of cooperation among actors in the group/partnership
Indicator 2.2	Extent of representation of stakeholders in coordination
Indicator 2.3	Existence of incentives for networking, partnering, multi stakeholder interaction
Topic 3: capacity to reflect and learn	
Indicator 3.1	Existence of environment that encourages joint learning and experimentation
Indicator 3.2	Participation in training programmes that cover multi-stakeholder innovation processes (facilitation, networking, etc.)
Indicator 3.3	Understanding of knowledge flows (understanding origin and transfer)
Indicator 3.4	Documentation and monitoring processes
Topic 4: capacity to engage in strategic and political processes	

Indicator 4.1	Role and responsibilities of leadership
Indicator 4.2	Degree of awareness of agricultural development issues among stakeholders
Indicator 4.3	Degree of awareness of opportunities for policy change
Indicator 4.4	Extent to which decision-making processes are influenced by stakeholders
Indicator 4.5	Effectiveness of communication channels
Topic 5: technical skills	
Indicator 5.1	Availability of required technical skills
Topic 6: enabling environment	
Indicator 6.1	Favourable socio-economic circumstances for linking producers to markets
Indicator 6.2	Efficiency of registration/certification processes in agriculture

Source: FAO, 2017

Annex 6: System-oriented indicators for the AKIS

Table 15: System-oriented indicators for the AKIS and their strategies in MS

M&E Topics	**System-oriented indicators**
Enhancing knowledge flows within the AKIS and strengthen links between research and practice	Share and quality of research that are based on collaborations among innovation system actors
	Share of research and education expenditures that involve multiple stakeholders in (a) priority setting and strategic planning or (b) decision making and resource allocation
	Frequency of priority setting, strategic planning, and reform exercises in research and education institutions
	Extent of individual or organizational membership in regional and international research and education networks
	Quality of information and communications technology available to the research and education system
Strengthening farm advisory services within MS' AKISs	Share and quality of extension services that are based on collaborations among innovation system actors
	Share of extension expenditures that involve multiple stakeholders in (a) priority setting and strategic planning or (b) decision making and resource allocation
	Frequency of priority setting, strategic planning, and reform exercises in extension services
	Number of different consultation methods used by extension services
	Frequency of training and skills upgrading for extension agents

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	Quality of extension services with respect to enhancing agricultural production, managing natural resources, and facilitating market linkages for farmers
Enabling Environment for Agricultural Innovation	Quality of policies on agricultural research, education, and extension/advisory services
	Quality of legislation and enforcement of intellectual property rights
	Quality of legislation and enforcement of biosafety and food safety regulations
	Quality of government effectiveness and quality of agricultural regulation
	Quality of investment climate or competitiveness of agricultural sector
	Level of entrepreneurial activity or behaviour in the rural economy
	Level of openness to indigenous or foreign knowledge sources
	Quality of rural innovation system and local innovation networks and partnerships
Enhancing knowledge flows within the AKIS and strengthen links between research and practice	Participation in activities/networks facilitating knowledge exchange and interactive innovation
	Number of supporting networks producing output for agricultural practice
	Number of selected interactive innovation projects produced by thematic multi-actor networks
	Number of outputs/publications in agricultural dissemination channels for end-users
Strengthening farm advisory services within MS' AKISs	Number of trained advisors
	Share of farmers using support for advice, training and knowledge exchange
	Number of advisors involved in EIP OGs
	Number of shared digital tools supporting advisory work
Incentivize interactive innovation projects	Participants in collaborative innovation projects (EIP OGs + innovative cooperation projects)
	Number of innovation support services
	Number of interactive innovation projects developing generational renewal
	Number of innovation cooperation agreements
	Number of young people participating in OGs
	Number of education actors (students, teachers, trainers) participating in OGs
	Number of farmers and advisors trained in the innovative results of OGs
	Number of cross-border OGs and OGs incorporating cross-border expertise

Source: Adapted from SCAR AKIS, 2019

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