Assessing agricultural innovation systems to improve innovation support actions

Outlines for an operational guide

Notification:
This document is a first basis on which to develop comprehensive guidelines.
It is based on the outline of the AIS diagnostic methodology developed after the experts' workshop in June with inputs from experts and FAO

Introduction

This document presents outlines for an operational guide for assessing agricultural innovation system (AIS).

The purpose of such an assessment is to support and inform decision-makers on investments and strategizing on AIS to develop innovation capacities and trigger innovation processes. Through participatory and inclusive methods, the assessment aims to give decision-makers an understanding of the strengths and weaknesses of AIS, and also key entry points to improve the AIS, to design innovation capacity development strategies and to plan investments.

The operational guide is aimed at experts in agriculture, innovation and AIS who will be in charge of conducting and adapting the assessment process so as to achieve these objectives in a given country.

These outlines were developed based upon a comprehensive review of the literature on the methods, approaches and tools currently used worldwide to assess agricultural innovation, the outputs of an online survey on AIS assessment criteria and expectations of AIS stakeholders, systems and the recommendations made during an experts' consultation organized by CIRAD and FAO in Paris from 13-15 June, 2018.

The document has three parts (1) rationale, concepts and definitions, analytical frameworks; (2) general steps of the assessment process and recommendations for adapting it to the diverse situations in different countries; (3) activities, methods and toolboxes to be developed.

Part 1. Rationale, concepts and analytical frameworks

1. Rationale

In many countries, policy- and decision-makers lack relevant information on agricultural innovation systems (AIS) to guide the formulation of innovation strategies and policies. The purpose of AIS assessment is to provide national policy- and decision-makers with timely and usable knowledge and information to take informed decisions to unlock the potential of agricultural innovation for sustainable food and agriculture in their country. In particular, they need support in improving existing mechanisms, measures, programs and/or policy instruments or in the design of new ones that best match the particular conditions of their country.

Due to the nature of innovation processes, which are usually complex, non-linear, uncertain and context-specific, there is no simple blueprint to support their emergence and upscaling. Hence the AIS assessment is seen as a way to increase decision-makers' knowledge on the mechanisms of innovation, the actors involved and leverage actions to support the emergence in a given country situation. Strengthening the capacities of key actors/stakeholders of AIS to identify the triggers, drivers of and barriers to innovation and to identify and design support actions are both considered as keys to addressing innovation challenges. Support actions may be policy instruments or measures, sectorial or inter-sectorial programs, development projects or targeted interventions.

In this perspective, the AIS assessment is grounded in action-oriented diagnosis methodologies using a range of inclusive and participatory methods in which learning plays a central role. An action-oriented assessment is embedded in the perspective of AIS actors in order to help them to advance or change their practices, strategies and knowledge. All of this in a social transformation perspective that implies the participation of the stakeholders in the assessment, at different stages and in different forms. For instance, collaboration rather than consultation is important in ensuring ownership and outcomes. Tailoring assessment tools to different groups of AIS actors, goals and available resources is also important to ensure the effectiveness of the assessment process.

The assessment approach proposed in these outlines was designed to be flexible enough to address core questions raised by AIS stakeholders and to their needs. The assessment process and its ownership by decision-makers and AIS leaders are as important as the actual process of data collection and analysis. The results may indeed not be used by decision-makers if there is no clear endorsement of the goals pursued and the approach by a core group of national AIS stakeholders with policy influence and decision-making power. Consequently, attention must be paid to ensuring that the conditions for a conducive successful, useful and usable assessment are in place.

The results and effects of the assessment may vary depending on a country's present situation and the decision-makers' and AIS actors' expectations. Within the imposed time limits, the AIS assessment may lead to a collective action and transformational changes, or may not. Consequently, the AIS assessment should be considered as a first step in taking up the challenges involved in supporting agricultural innovation and finding solutions in a variety of countries.

2. Objectives, expected outputs and outcomes

The main objective of the assessment is to characterize the innovation system, i.e. identifying enabling and hindering factors that affect the innovation processes in a given context, with the aim of helping both decision-makers, in particular policy-makers, and AIS stakeholders to set goals and choose strategies collectively, based on mutual expectations and some level of agreement on how to move forward.

The two specific objectives of the AIS assessment are the following:

1) To provide policy-makers with a better understanding of the main triggers, drivers of and barriers to agricultural innovation mechanisms;
2) To support decision-makers and AIS actors in identifying entry points for strategic interventions and investments to improve the performance of AIS and to unlock the potential of innovation;

To achieve these objectives, the methodology of the AIS assessment has been designed to produce both outputs (short-term tangible products such as data bases, scoping studies, analytical reports and an action plan) and outcomes (medium-term effects related to the capacity development of the AIS actors and decision-makers involved in the assessment).

The expected outputs are:

- A **portfolio of reports and bibliographic resources** describing key features of the structure and the functional s of the AIS, the capacity development issues and entry points to strengthen the capacities to innovate;
- A **dashboard of key features/indicators for** measuring AIS performance and supporting the monitoring and evaluation of innovation support actions;
- An **action plan** including recommendations for the improvement of existing innovation support mechanisms and/or the design of new ones and a set of specific potential interventions to support their implementation.

The expected outcomes are:

- An understanding of the key concepts related to innovation and agricultural innovation systems considered as useful for the design of an action plan by decision-makers and key AIS actors;

- A shared understanding among decision-makers about the main triggers, drivers of and barriers to agricultural innovation at the country level;
- A shared vision among decision-makers and AIS actors of specific levers, and entry points to address main barriers and to strengthen AIS and to develop the innovation capacities of AIS actors;

These outcomes may be accomplished to varying degrees depending on the country's present situation and the expectations of policymakers and AIS actors.

3. Key concepts and definitions

Agricultural sectors and sub-sectors: Agriculture sectors and sub-sectors comprise establishments primarily engaged in growing crops, raising livestock, and harvesting fish and other animals on a farm, ranch, or in their natural habitats.

Innovation: Innovation is both a process and a result. It can relate to a product, an organization, a service or even society. Innovation is distinguished from invention by the fact that the novelty has been integrated into a social or economic process that successfully responds to a problem recognized by all.

Agricultural Innovation System (AIS): AIS is a network of actors (individuals, organizations and enterprises), together with supporting institutions and policies in the agricultural and related sectors that bring existing or new products, processes, and forms of organization into social and economic use **at the national level**. Policies and institutions (formal and informal) shape the way that these actors interact, generate, share and use knowledge as well as jointly learn. (Tropical Agricultural Platform, http://www.fao.org/in-action/tropical-agriculture-platform/commonframework/en/)

Innovation sub-systems: innovation sub-systems are sub-national innovation systems such as regional, territorial or sectoral innovation systems.

Regional, territorial or local innovation sub-systems encourage the rapid diffusion of knowledge, skills and best practice within a geographic area larger than a city, but smaller than a nation. The edge of those sub-systems may be drawn conceptually and organizationally around the economic, social, political and institutional relationships that generate a collective learning process within a related group of technological or functional areas.

A sectoral or even sub-sectoral innovation system is a set of new and established products for specific uses and the set of agents involved in market and non-market interactions for the creation, production and sale of these products. he agents have a knowledge base, technologies, inputs and an existing, emergent and potential demand.

AIS domains: In the analysis of the structure of AIS, four domains are usually distinguished: agricultural extension and advisory services, business and enterprises, research and education, an enabling environment.

Agricultural Extension and advisory services: these services are critical for facilitating access to technology and knowledge by smallholders and enterprises. Advisory services increasingly play a brokering role to support inclusive multi-stakeholder innovation processes - linking key actors, e.g. producer organizations, research services, higher education and agribusinesses, with producers. In many cases, advisory services are the only AIS institutions that actively facilitate knowledge and technology adoption by smallholders.

Capacities to innovate: the Tropical Agricultural Platform identified four key capacities required for AIS to perform effectively: the capacity to navigate complexity, to collaborate, to reflect and learn, to engage in strategic and political processes (www.fao.org/in-action/tropical-agriculture-platform/). These capacities are systemic and concern individuals, groups or organizations equally.

Innovation system structure: this structure encompasses the components of the AIS (organizations and institutions), their roles (innovation support activities) and the nature of their relationships (types, frequency and quality of their exchanges).

Innovation system functions: this encompasses the functions that are fulfilled by the AIS and that make innovation occur (knowledge production; scaling-out; scaling-up; etc.)

Enabling environment: an "enabling environment" for agricultural innovation includes factors that influence innovation positively but are controlled by policy domains other than agricultural innovation policy. Given the resource limitations and numerous choices, investments in an enabling environment must be prioritized and sequenced with great care. An agricultural innovation policy seeks coordination with these other domains to ensure that together they enable innovation. Cross-cutting policy issues affecting agricultural innovation include policies to reduce poverty and sustain the environment, to foster collaboration between public and private sectors, and more generally, to build social capital.

Innovation Support Services (ISS): by its nature, an ISS is immaterial and intangible and involves one or several providers and one or several beneficiaries in activities in which they interact to address a more or less explicit demand emerging from a problematic situation and formulated by the beneficiaries to co-produce the services able to solve the problem. The aim of the interactions is to achieve one or several beneficiaries' objectives based on willingness to enhance an innovation process, i.e. by fostering technical and social design, enabling the appropriation and use of innovations, facilitating access to resources, helping transform the environment and strengthening the capacities to innovate. We distinguish four types of service providers: public sector, private sector (companies), third sector (NGOs) and farmer-based organizations. They all are formal organizations.

Innovation support actions: any type of intentional and designed interventions that formally aim at supporting innovation processes, i.e. triggering, facilitating, or leading innovation processes. These can be new policy instruments or measures, sectoral or inter-sectoral programs, development projects or targeted interventions. The actions can be undertaken by public or private actors, civil society or international agencies.

Baseline country situation: this is the context of change in which the assessment is implemented, i.e. the present understanding of the AIS challenges by the AIS decision-makers and their expectations toward the AIS assessment.

Innovation partnerships: a group of actors who are engaged together in the achievement of an innovation project.

4. A combination of existing analytical frameworks

In this part, we present three possible entry points for assessing AIS and designing innovation support actions. Several analytical frameworks have been developed and could be combined, depending on the core questions raised by policy makers.

4.1. Entry points for AIS assessment

Three entry points can be considered in the design of innovation support actions that will help to trigger or accompany innovation, each corresponds to one level of action:

a) The **"micro" level**, i.e. the level at which innovation is created and deployed, on a limited scale, involving a **small number of actors engaged in collaborative activities and who share objectives for bringing an innovation project to a successful conclusion**. These innovation partnerships can be anchored at territorial, regional, sectoral or inter-sectoral scales, depending on the nature of both the innovation and the actors involved in its deployment.

b) **The "meso" level,** i.e. the level at which **innovation support services (ISS) are designed and deployed** to answer the needs of innovators and to accompany them in their project. These services may be provided by public, private or civil society organizations. The objective is to develop the capacities of ISS providers to support innovation projects. At this level, support actions should also aim to make these support services more visible and accessible, to identify their shortcomings or weaknesses, and in particular to identify the segments of support for innovation that are missing at the national level.

c) **The "macro" level** is the level of **policy and regulatory framework development**, which therefore concerns longer-term mechanisms that can encourage or facilitate innovation at all levels. At this level, support actions aim to help political actors and their partners to better understand innovation support mechanisms at the national level and to identify impactful public actions, new instruments or measures to improve the enabling environment.

At each level, a different group of actors is needed for the assessment of innovation capacities and support. Their need for capacity development and learning issues might also be different. The AIS assessment process will help to identify priority levels of actions and workable solutions according to the expectations and involvement of key AIS actors.

4.2. Key analytical frameworks

4.2.1. Assessing the structures and functions of an Innovation System (macro level)

Structural analysis

The structural analysis of AIS consists of identifying the structural components of the AIS (see fig.1), so that the system can be bounded, and stakeholders and their networks can be identified. This analysis aims to link structures and understand how the system enables or constrains innovation. Structural analysis makes is possible to understand what encourages initiatives and what effect interaction patterns have on the system (Knierim et al. 2015).

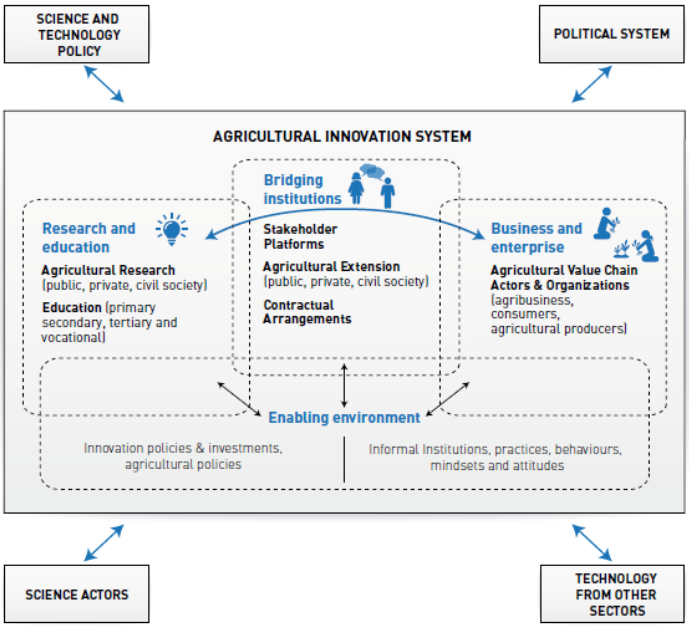

Figure 1: ***Structure of an innovation system (source: TAP 2016)***

Functional analysis

The overall function of an AIS is to develop, diffuse and use a new technology (Bergek et al. 2008; Carlsson et al. 2002; Jacobsson and Jacobsson 2014). This approach means that different innovation systems can be compared despite the heterogeneity of their structures. It focuses on "*what is actually achieved in the system"* (Bergek et al. 2008), regardless of the structure. Functions are analyzed as processes, as "something that is going on" (Bergek, 2012), regardless of the direction or causalities related to the Innovation System. Functional analysis enables the assessment of system failures and the evaluation of the performance of the system.

Six types of functions can be identified:

- demand articulation (vision building, diagnosis, foresight),
- institutional support (institutional change and boundary spanning),
- knowledge brokering (connecting to knowledge and technology)
- network brokering (match-making of partners),
- capacity building (training, coaching, organizational development) and
- innovation process management (aligning agendas and learning).

4.2.2. Assessing the performance of innovation support services (meso level)

At each stage of an innovation process (from ideation to embedding), the support needs are not the same (see fig 3). In general, without adequate and coordinated support services, innovators fail in achieving their innovation projects. Assessing the performance of innovation support services provides insight into possible interventions for the strengthening of service providers.

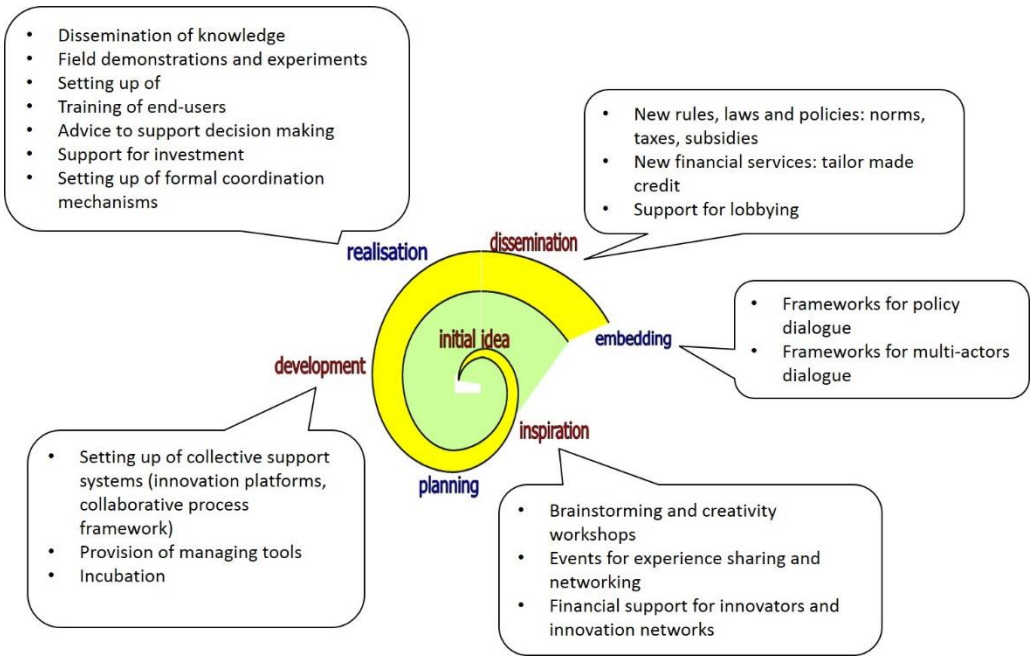

Figure 2 : Phases of an innovation process and types of innovation support services (source: adapted from Faure et al., 2018)

4.2.3. Assessing the capacities of individuals (micro-level)

In the agricultural sector, innovation projects are conducted by innovation partnerships. These are groups of individuals engaged together in the design and the deployment of an innovation. For their innovation project to succeed, they need several capacities:

- To envision, create and be open to new ways of doing things - to individually and/or jointly envision something new and improved; to accept or be open to new ways of doing things
- To connect with others to access and understand new information and resources – to form new connections and to use both new and existing relationships with diverse actors (individuals and entities) to obtain, share and understand information and resources;
- To iteratively experiment, test, assess, and adapt – to conduct experiments involving iterative learning and improved processes and results over time;
- To work with others to achieve action and change - to work together formally and informally in order to take effective collaborative action and achieve shared objectives.

Those capacities can be assessed in order to identify targeted capacity development interventions.

Part 2. Conducting and adapting the assessment process

This part presents the actors that should be involved in the assessment, the steps and activities to carry out and the guiding principles for a useful and action-oriented assessment in a diversity of contexts.

1. Overview of the actors involved in the assessment

During the assessment process, many types of actors have to be engaged, consulted, interviewed or associated. The table below give an overview of the categories of these actors.

Categories	Definition
AIS decision-makers	Individuals who have the power to make decisions regarding the structure and the functioning of the national AIS and/or the innovation sub-systems.
AIS actors	Individuals or organizations who are part of the AIS
AIS stakeholders	Individuals or organizations among the network of AIS actors in a given country (leaders, donors, policy makers, knowledge producers, support providers, etc.) who have a major influence
Meta support team	Team of experts for international backstopping
Assessment supporting team	Team of experts in charge of providing technical assistance for the implementation of the AIS assessment process in a given country
National task force	Team of national AIS experts and stakeholders in charge of conducting, adapting and organizing the assessment process in the country concerned, with the help of the assessment supporting team at the country level
Core national task force	Core members who initiated the request for an AIS assessment at the country level
Steering committee	Core national task force and the assessment supporting team at the country level
Advisory group	Group of diverse AIS actors considered as resource persons for some steps of the assessment process at the country level
Data end-users	Individuals who will use the results of the AIS assessment
Sponsoring agencies	Agencies in charge of financing technical assistance and AIS implementation in the country
Final beneficiaries	The aim of assessment is to contribute to the improvement of the AIS in the countries in order to ultimately improve the situation of family farmers and the performances of the agricultural sector (growth, sustainability, equity, etc.). This means that possible final beneficiaries of the solutions identified by decision-makers could be different types of actors in the agricultural sector (farmers' organizations, private sector, bridging institutions, research and education) with a specific but not exclusive focus on family agriculture.

2. Suggested steps and activities

The assessment process goes through three steps:

- The setting up of conducive conditions for a useful assessment;
- Data Collection and analyze;
- The design of innovation support actions.

Each step has specific objectives and a set of activities to achieve these objectives. Some activities might be optional or irrelevant in given context.

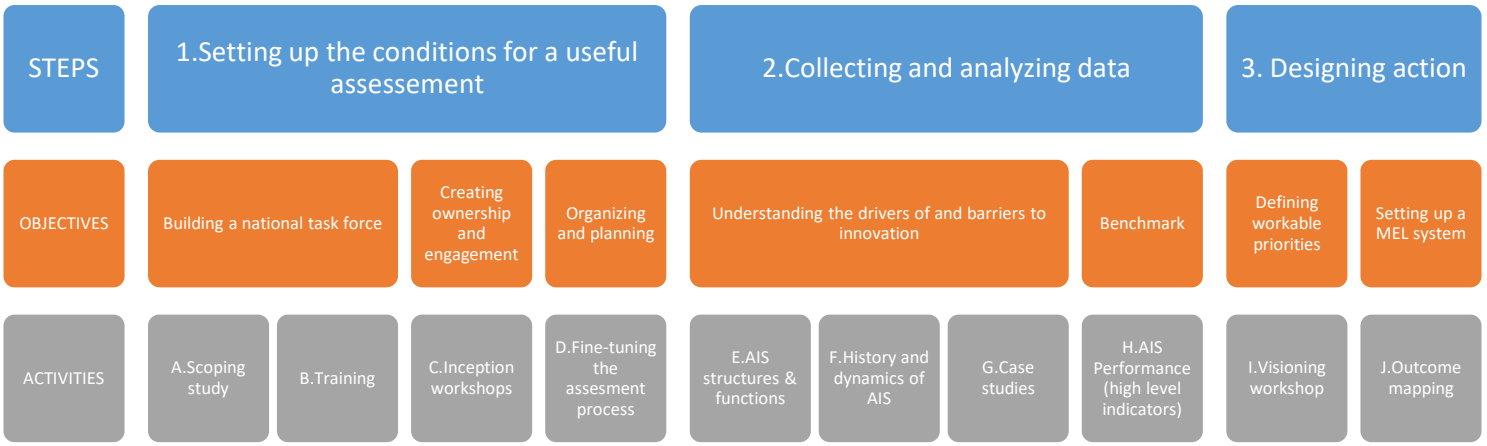

Figure 3: Steps and activities of the assessment process

2.1. Step 1. Setting up the conditions for AIS assessment

Overall objective: to create enabling conditions so that the results of the diagnosis will be owned and used by decision-makers and key AIS actors in the country. This is a pre-requisite step to ensure that the assessment will support and be embedded into on-going political mechanisms and social changes related to the development of an effective AIS.

Specific objectives:

- Build an *ad-hoc* national task force;
- Create ownership and engagement;
- Organize and plan the assessment.

Activities:

	Objectives	**Main methods**
Activity A. Scoping study	The supporting team in collaboration with the core national task force should: - Gain insights into the challenges faced by relevant innovation actors, including decision-makers. - Review policy instruments and assess their efficiency; - Identify key actors to be included in the national task force	-On-line individual semi-structured interviews (Delphi) by email or text message. -Literature review
Activity B. Trainings	The assessment supporting team should: - Train the national task force in the AIS assessment approach and in the key concepts related to AIS	- Classroom training with active participation and sharing of experience.

Activity C. Inception workshop	The national task force, the supporting team and selected AIS stakeholders together should: - Share, prioritize and refine the objectives of the AIS assessment. - In particular: (i) select agricultural sectors, regions and/or territories where innovation should be strengthened as a priority; (ii) discuss the underlying agricultural development models; (iii) bring out differing visions among AIS actors and look for converging expectations.	- Participatory workshop
Activity D. Fine-tune the assessment process	The national task force and the supporting team should: - Define the baseline situation of the assessment, i.e. the core questions to be addressed during the assessment according to the results of the inception workshop and considering the available resources (time, resources); - Identify requirements and available data sources - Accordingly, review steps, activities and tools to be used, in particular, customize the toolbox - Decide on the need to compensate for missing expertise and adapt the composition of the national task force if needed. - Identify team members, consultants or institutions for data collection and analysis; - Schedule the assessment process with responsibilities for execution and coordination shared between the members of the national task force.	Reflection and Refinement workshops

2.2. Step 2. Collect and analyze data

Overall objective: collect and analyze first and second order data, information and knowledge from a variety of sources, for the description of the AIS.

Specific objectives:

- Provide insights into the drivers of, triggers and barriers to agricultural innovations at national, regional, local, sectoral scales
- Review and assess existing innovation policies, regulations and instruments.
- Design a dashboard with some key features for measuring the performance of the AIS.

Activities:

	Objectives	**Main methods**
Activity E. AIS structures and functions	- Describe the present structure of the national AIS and some priority innovation sub-systems selected during the previous step. - Score their functions - Identify key organizations that have the potential to improve their functions	- Apply specific frameworks according to the selected sub-systems

Activity F. Historic and dynamics of AIS	- Describe past milestones and the dynamics of national AIS, with particular attention paid to (i) cultural factors that influence innovation processes; (ii) innovation capacity development issues in relation with the development of AIS public institutions (extension and agricultural services; research and education) and the development of innovation support services; - Identify major milestones or policy/institutional changes related to innovation indicators.	- Literature review - Semi-directed interviews with resource persons
Activity G. Case studies	- Conduct detailed analyses of successful and unsuccessful innovations in the selected priority sub-systems in order to illustrate hindering and enabling factors (innovation capacities of individuals and organizations, mechanisms, innovation support services, enabling environments, etc.).	- Case study combining internal and external assessment
Activity H. AIS performance	- Design a dashboard with some key criteria to measure the overall performance of the AIS through high-level indicators combined with easy-to-measure sub-indicators.	- Participatory evaluation

2.3. Step 3. Support the design of Innovation Support Actions

Overall objective: To support decision-makers and AIS actors in the design of an action plan to unlock the potential of innovation. Action refers to any type of support interventions at the micro, meso and/or macro level, aimed at overcoming barriers to innovation, triggering innovation projects or accompanying innovators in their project.

Specific objectives:

- Define workable and desirable priorities on possible leverage actions to strengthen AIS;
- Set up a Monitoring-Evaluation and Learning (MEL) system for the future actions and interventions that will be scheduled.

Activities:

	Objectives	**Main methods**
Activity I. Visioning	- From the results of the step 2, build a vision of priority changes and improvements to be made to unlock the potential of innovation; - Design strategies to achieve those changes	- Visioning workshop
Activity J. Outcome mapping	- Identify progress markers and innovation indicators to monitor and evaluate future interventions and actions	- Participatory workshop, back-office work and validation workshop

3. General recommendations for conducting the assessment

This part includes recommendations for each step of the AIS assessment to help the assessment team implement the whole process in a given context.

3.1. The involvement of AIS actors

The key issues are the following:

- The identification of key actors to get involved in the assessment process
- The creation of ownership
- The creation of commitment in implementing the assessment process and using the results
- Ensuring participation in assessment activities

To achieve those objectives, the recommendations are to:

- Organize regular workshops led by the national task force to support learning and decision-making at the different stages of the diagnosis;
- Identify existing committees, platforms, high-level groups at the country level where ideas and the results of the diagnosis can be shared; and also where to communicate on the diagnosis process.
- Ensure that policy makers are able to properly articulate the future expectations of the country's agriculture sector in the medium to long-term. For this purpose, policymakers have to identify national needs at the different expected stages of development;
- Ensure the AIS assessment is designed by the appropriate national actors to address the main policy priorities in the context of the current state of national agricultural sector;
- To give equal importance to the collection, analysis, and interpretation of the data;
- To promote inclusive participation of all relevant stakeholders (e.g. policy makers and decision makers from different sectors: farmers, enterprise, advisory service providers, research, educational institutions, civil society, producer organizations, etc.).
- Ensure that motivated and engaged stakeholders in the AIS are effectively enabled to participate in the identification of problems/solutions;
- Pay particular attention to collaborative and inclusive approaches rather than only consultative approaches. Such an ownership building approach will foster conducive interactions between all relevant AIS actors and policy-makers.
- Include capacity development activities to enable stakeholders to participate meaningfully in diagnosis activities, in the design of innovation policies, and in the implementation of strategic actions;

3.2. The setting-up of technical teams

In order to create the national task force, recommendations are to:

- Identify resource persons, able and entitled to represent key AIS actors (civil society, farmers and their representatives, private agro-business actors, public sector), in charge of supporting/advising the diagnostic team and also able to collaborate in the diagnosis itself.
- Agree on tasks: Ensure that information will be produced in a timely and usable manner for decision-makers; strategic planning and monitoring of the AIS assessment; Take stock of other similar ongoing initiatives dealing with AIS strengthening: coordinate activities and if possible,

mutualize resources; Raise awareness among a wide audience about innovation issues and communicate the objectives of the diagnosis to prepare the participants/members to interact in interpreting the results, and in defining? steps forward;

- Host the task force at inter-ministerial level (for instance between the Ministry of Agriculture and the Ministry of Education, Research and Innovation or the Ministry of Economy) ;
- Interact with the international meta-support team, who ensures backstopping on concepts, tools and methods, assessment process as deemed necessary (could be both national and international experts, researchers).

The national task force will be supported by a core support team at the international level (a meta-support team). This team will play a number of roles, including: (1) serving as a clearing house for AIS and assessment related issues, (2) providing methodological training, advice and coaching to AIS assessment teams before and while they are implementing AIS assessments in their respective countries, (3) monitor and learn from what is happening at the country level, (4) develop generic lessons and recommendations across-countries, and (5) kick-start a longer term commitment to implementing an AIS approach.

3.3. Selecting adequate methods and tools

The operational guide should propose a living toolbox approach, meaning that the national task force will be responsible for selecting relevant tools that are best fitting and responding to the specific context and research questions/objectives. They will be responsible for:

- Customizing suggested generic toolboxes to the situation of each country, according to priority objectives, the skills of the assessment team, available data and resources (time, funding);
- Using a mix of quantitative and qualitative tools and applying triangulation approaches to validate the information collected.
- Considering iterative data collection and analysis to obtain an in-depth understanding of some key drivers of innovation and insights into possible support mechanisms

4. General recommendations for fitting the assessment to the situation in a given country

Each country has its own specific trajectory with respect to AIS: some may have fairly extensive experience with the concept and its operationalization at national or sub-national level; other countries may just be getting started with pilot projects. It is thus essential that the generic principles presented in the operational guide can be carefully adapted to reflect the context and trajectory of the country concerned.

In order to support this adaptation process, we propose to distinguish three different baseline situations in which the AIS assessment might take place (table 1). They are related to the context of implementation, i.e. the level of knowledge and understanding of AIS challenges, the expectations of the AIS assessment and the core questions raised by decision-makers.

Each of the three situations leads to some adaptations in the operationalization of steps 2 and 3 and their activities. Adaptations concern both the role of the assessment supporting team (involved in the technical assistance and the piloting of the assessment process to a greater or lesser extent), the types of AIS actors to involve, and the assessment models to consider for data collection and analysis.

Table 1: Baseline situations related to the context of implementation of the AIS assessment

Baseline situations (context of implementation)	**Situation 1**	**Situation 2**	**Situation 3**
Core questions asked by policy-makers	**How can we do more of the same?**	**What rules, incentives should we create ?**	**Which system should we develop?**
AIS "transformation" challenges	Improving the performance of AIS, as it actually works **("Simple")**	Changing the way parts of AIS interact. **("Complicated")**	Create new possibilities / new AIS **("Complex")**
When those challenges apply	In routine usage, when AIS works and the entry points are known	When parts of the system are not connected / aligned	When the system is not established
Type of change expected	Incremental	Reform	Transformation
Expected outcomes of the diagnosis	Changing ways of acting and behaving	Changing ways of thinking	Changing ways of perceiving
Key participants in the assessment	Current AIS actors addressing specific problems	Stakeholders of the AIS	Any actor with the capacity to design the system and to lead the transformation
Main assessment models	**Multiple assessment models** Several possible frames, depending on the innovation sub-system and AIS functions to be improved.	**Nested assessment models** Macro-level, multi-sectorial frames and micro-level frames focused on linkages and coordination issues	**Learning-based assessment models** Prospective scenarios based on other situations

Part 3. Activities, suggested methods and toolboxes

This part gives an overview of the ways to run each activity, available toolboxes and key methodological references (published guidelines and examples of results).

Step 1. Creating the conditions for a useful and assessment

Activity A. Scoping study

Overall Objective: To define the specific objectives of the AIS assessment in a given context.	
Specific objectives	**Methods and tools**
Review existing policy instruments that support innovation in the country Assess their relative effectiveness in comparison with other countries	- Review policy instruments (financial support for R&D and innovation, support for capabilities and skills to generate and disseminate innovation, support for interactions and learning, strengthening demand for innovation, regulation and standardization) and policy processes (review of the literature, interviews, case studies of policy processes including policy design, implementation, monitoring, and enforcement). - Compare with other countries
Gain insights into the challenges faced by relevant innovation actors, including decision-makers.	On-line interviews: - Rapid overview of the main ongoing agricultural development paths in the country concerned (organic agriculture? Industrial scale agriculture? Small scale and self-subsistence farmers? Agro-ecology? Farming systems based on export crops? Farming systems based on food crops? etc.) - For each challenge, identify existing innovation processes, obstacles, expectations; draw up the main technological innovation timelines; Short-list innovation cases considered as crucial for achieving the vision of the government
Identify key actors to be included in the national task force	- Networking - Tender process
Possible Products: ☐ a short report on agricultural development priorities for the government and existing innovation policies and instruments ☐ A short report on the agricultural development paths and key innovation from the AIS stakeholders' point of view (sub-systems) ☐ some innovation trajectories (timelines) ☐ A short list of innovation cases to possibly investigate to answer specific questions raised by policy makers and by the national task force	
Available references and/or toolboxes for further development: - see CDAIS project: www.cdais.net	

Activity B. Training

Overall Objective: To develop the capacities of actors involved in the assessment	
Specific Objectives	**Suggested methods and/or tools**
Identify the training needs of the members of the national task force to enable their active and meaningful engagement in the assessment process	- Short questionnaire on their knowledge and experience related to AIS and innovation support (boxes to tick)
Organize training sessions	Several options: - Organize classroom training in the country or at international organizations specialized in adult education in agricultural development and innovation; - Organize (regional) learning workshops across neighbouring countries interested in AIS / AIS assessment in which participants can exchange their experience of AIS: initially, this could spur buy-in, later it could help support the assessment process. This could be done by taking advantage of the exchange mechanisms in place at a number of existing forums (e.g. Innovagro, Foragro, FARA and their respective regional sub-forums, etc.).

Activity C. Inception workshop with AIS actors

Overall Objective: organize a participatory workshop with decision-makers, AIS actors and/or AIS stakeholders to awaken interest and commitment to the assessment process.	
Specific Objectives	**Suggested methods and/or tools**
Ensure that different stakeholder groups in the country are interested in an AIS assessment and are willing to take ownership of the AIS assessment process, not only the government;	- Select representative of the different stakeholder groups
Raise awareness about innovation issues and related interventions to advance innovation and increase the impact on the agricultural development	- Write a story including convincing arguments to stimulate engagement in the diagnosis such as better support for national policies, improving impact at scale with innovation policies, building national capacities on AIS, etc. - Share practical and scientific knowledge related to AIS strengthening among AIS actors;
Agree on the objectives of the AIS assessment to achieve the expected outputs	- Share the results of the scoping study - Showcase ongoing innovations, leading actors and sectors; - Identify the agricultural development models - Bring out differing visions among AIS actors and look for converging expectations.

Pre-select agricultural sectors, regions and/or territories where innovation should be strengthened as a priority	

Possible products:

☐ A narrative of the diversity of interests and engagement ; the objectives of the assessment and the priorities of interest, etc.

Available references and/or toolboxes for further development:

- see CDAIS project: www.cdais.net

Activity D. Fine tuning the assessment process

Overall Objective: To adapt steps and tools to the context of the AIS assessment.	
Specific Objectives	**Suggested methods and/or tools**
Define the baseline situation of the assessment, i.e. the core questions to be addressed during the assessment based on the results of the inception workshop and considering the resources available (time, resources, funding);	- R&R workshop (national task force, key resource persons)
Identification of requirements and available data sources.	- Scoping with the help of national resource persons (researchers and experts)
Review the steps, activities and tools to be used; in particular, customize the toolbox	- Workshops
Decide on the need to compensate for missing expertise and adapt the composition of the national task force if needed	
Identify team members, consultants or institutions for data collection and analysis;	
Schedule the assessment process and divide responsibility for execution and coordination among the members of the national task force	

Possible Products:

☐ A report with the objectives and schedule of the assessment process

Available references and/or toolboxes for further development:

- Femke Gordijn with Natalia Eernstman, Jan Helder and Herman Brouwer (2018). Reflection Methods. Tools to make learning more meaningful. Practical Guide for Trainers and Facilitators. http://www.mspguide.org/tool/reflection
- L'art de l'échange de connaissances. Guide de planification axée sur les résultats à l'intention des praticiens du développement édité par la Banque Mondiale, 2013. https://openknowledge.worldbank.org/bitstream/handle/10986/17540/art_of_knowledge_exchange_french.pdf?sequence=6&isAllowed=y (French) ; https://openknowledge.worldbank.org/handle/10986/17540 (English)

Step 2. Collecting and Analyzing data

Activity E. Analyze the structures and functions of AIS

Overall Objective: To provide a global picture of the main strengths and weaknesses of the AIS at the macro level.	
Specific Objectives	**Suggested methods and/or tools**
- Description of the innovation system or sub-systems related to the main agricultural development paradigms/priorities; - Provision of in-depth understanding of their functioning (key organizations, missions, activities, innovation support services, targets, impacts);	- Select sub-systems to work on (value chains, territories, partnerships) - For each sub-system, conduct a network analysis ie. draw a typology and netmap of interacting organizations: collect data through a review of the national literature, interviews with key resource persons using semi-structured questionnaires - Draw a diagram of influence at the level of each sub-system. This task could be done through workshops with key organizations and/or rapid surveys. - Conduct a SWOT analysis of several leading organizations per category of actors (case studies)
Identification of the key functions to be improved and possible structures to rely on.	- Conduct **a scoring** of the key functions filled by the network - In collaboration with policymakers and stakeholders, **envisage** the improvements to be made in the sub-system and **map the system of actions** (how key actors could work effectively and in alignment (relationships) to achieve and sustain the vison using inputs from steps 1-2-3
Possible products: ☐ A Netmap of key organizations and a diagram of the degree of integration and alignment between organizations. ☐ A diagram of the influence of key organizations ☐ A scoring of innovation networks' functions ☐ A narrative of leverages for action	
Available references and/or toolboxes for further development: - See PROAKIS Project (tools for assessing AKIS at the national level) - See : https://umr-innovation.cirad.fr/	

Activity F. History and dynamics of AIS

Overall Objective: To understand possible and priority changes in the AIS.	
Specific Objectives	**Suggested methods and/or tools**
Identify the rationale of the main changes in the leading organizations	- Literature review of the development of innovation policies and their rationale;

of the national AIS (research, extension and education organizations; farmers' organizations; agro-food firms; banks; NGOs)	- Literature review of the development of the main institutions leading the AIS (mainly the research and extension institutions); - Build a timeline with the most significant changes that affected the main institutions of the AIS.
Identify the specific cultural features that shape in-country capacities to innovate (mindsets, attitudes, values).	- Interview some leading organizations, leaders and influential organizations in innovation projects; - Semi-directed interviews social scientists
Possible products: ☐ A narrative of the key events and most significant changes that affected the main institutions of the AIS.	
Available references and/or toolboxes for further development: - See PROAKIS Project (tools for assessing AKIS at the national level) - See : https://umr-innovation.cirad.fr/	

Activity G. Case studies

Overall Objective: To conduct in-depth analyses of innovation processes at micro-level	
Specific Objectives	**Suggested methods and/or tools**

Get the "beneficiaries" or "innovation actors" points of view on innovation support: what kind of support services do they need to achieve their innovation project? Which support services are effective and efficient from their point of view?
 	
Identify the specific cultural features that shape in-country capacities to innovate.
 	
Support services are (for instance): Funding mechanisms; demand articulation, coordination mechanism, networking and facilitation; knowledge creation and sharing (from research, farmers' organizations, the private sector, etc.); Capacity building; Up-scaling support
	- Select case studies i.e. innovation partnerships or communities; innovation networks, in different innovation sub-systems of the agricultural sector according to development priorities agreed with the national task force.
	- Collect data through participatory workshops with a panel of stakeholders from those partnerships/networks:
	  - Draw a map of **innovation networks in practice** and score the functions performed by the network.
	  - Identify with stakeholder's critical points and options to accelerate and/or achieve their innovation project;
	  - Evaluate existing innovation support services (demand driven? effective? accessible?)
	- Identify key actions for strengthening innovation with specific focus on key functions to promote innovation (knowledge production, demand articulation, networking, resources mobilization, etc.), innovation support services to support innovation at scale, the capacities needed to innovate (to navigate complexity,

	to collaborate, to reflect and learn, to engage in strategic and political processes)

Possible products:

- ☐ Maps of **professional** innovation **networks (individual oriented)**
- ☐ **Spider diagrams** of their scores per function.
- ☐ **Testimonials** from innovation communities;
- ☐ A short **analytical report** per case study;

Available references and/or toolboxes for further development:

- See CDAIS project for mapping and scoring methods

Activity H. Measuring AIS performance

Overall Objective: To measure AIS performance

Specific Objectives	Suggested methods and/or tools
- To help the country to better understand its position and status vis-à-vis AIS compared to others in terms of the structure and sub-structure of AIS, policy instruments, domains of AIS, innovation policy spinoff; - To make the AIS less complex for decision makers and the other actors involved - To support discussions between local and national actors - To monitor AIS, for instance to set up a health alert monitoring system	- Review existing high level indicators for the country - Rank in a participatory manner and select the most relevant indicators - Establish cross-country comparison of the indicators - Identify in a participatory manner the need for additional relevant high level indicators - Design a dashboard to be included in the Mel system and identify a team able to continuously collect the necessary data to monitor progress - Use indicators to create awareness and stimulate discussion between local and national decision makers

Possible products:

- ☐ Identification of the type of AIS in comparison to other countries
- ☐ Dashboard of indicators to monitor progress and launch “alerts” on AIS “health status”, to be included in the MEL system

Available references and/or toolboxes for further development:

- ASTI/IFPRI- Ragasa et al, 2011
- CTA/KIT-Francis J., 2005. Analyzing the Agricultural Science Technology and Innovation (ASTI) Systems in ACP Countries
- Global Innovation Index (2017)

- "OCDE" methodology: Gray E. 2017. Agricultural enabling environment and innovation systems in Asean OCDE.

Suggested indicators to use

Level of M&E	Possible indicators to be selected and refined by the national task force	Sources of data
Macro /Structural	**Research and education:** *Quantitative & aggregate data* : - Public investments in agricultural research -Funding for agricultural research as a percentage of agricultural gross value added - support for private investment in innovation (OCDE) *Qualitative data* : -Quality of university education in agriculture -Quality of vocational training in agriculture - Demand-orientation of agricultural research - Research-extension collaboration (Grovermann et al. 2017)	National data, ASTI
	Bridging institutions *Quantitative data :* - Enrolment in agricultural programmes - Capacity of public agricultural extension systems (human resources) - Level of collaboration between research centers and government agencies, estimate by the number of co-authorships of scientific publication - Density of networks for co-operation between higher education institutes (OCDE) *Qualitative data* : - 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 allocations - Frequency of priority setting, strategic planning, and reform exercises in extension services (Spielman and Birner 2008)	National data, ASTI Government, survey, experts, or other sources
	Business & enterprises *Quantitative data* -Inputs to agricultural production (fertilizer, land, rain, labour per ha, animal stocks, etc.) -Road network, foreign direct investments (Mekonnen et al 2012) -*Qualitative data* - Proportion of farmers who say they have access to/are satisfied with agricultural inputs, financial, transport, and marketing services; - Quality of interactions among actors in a specific value chain in terms of product and process innovation (Spielman & Birner 2008)	Government, survey, experts, or other sources

	Enabling environment *Quantitative data* -Level of corruption -Extent of land under irrigation as a proportion of total arable land -Rural population density (Mekonnen et al 2012) *Qualitative data* -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 (Spielman & Birner 2008)	Government, survey, experts, or other sources
Macro / Functional	Coupled functional-structural analysis to detect 'system failures' : - Capability failures - Policy coordination failures - Market structure failures *(monopoly or the lack of transparency in the ever enlarging food chains, but also imperfections in the 'knowledge market')* - Infrastructure failures - Directionality failure *(lack of shared vision among actors to orient the system)* - Demand articulation failure - Reflexivity failure *(insufficient ability of the system to engage actors in a self-governance process)* Lamprinopoulo et al. 2014 , Turner et al. 2016, Kebebe et al. 2015 Lack of institutions enabling/facilitating collaboration and partnerships (Darbas, et al, 2015)	Qualitative data, collected through interviews and workshops.
Meso / Process	No specific indicators can be found in the literature. Each study defines, should defIne? its own indicators for analysis, for example : • Institutional and political constraints • Embedding of constraints in different systems • Structural conditions that can create obstacles to innovation • Value chain segments • Integration levels (international; national; regional; district; ward; village; household) Dimensions of complex biophysical, technological, socio-cultural, economic, institutional, political, agricultural problems, (RAAIS toolkit 2016)	
Micro /Capacity	**Improved (systems) capacity to navigate complexity**: - Level of cost reduction and revenue gain of AIS organizational actors. - Increase in the number of co-innovations (between individuals and among organizational actors). **Improved (systems) capacity to collaborate**: - Inclusive decision-making processes about xxx in place. - AIS actors views themselves as part of an aligned interlinked system. - Perceived level of trust and commitment by AIS actors. **Improved (systems) capacity to engage in strategic and political processes**. - Resources (time, budget) dedicated to engaging in joint activities with other AIS (organizational) actors with the aim of advancing the functioning of AIS (e.g. joint publication). - Progress made in advocating for reforms.	

	Improved (systems) capacity to reflect and learn - 'Developmental evaluation tools' are being effectively implemented (on a scale from 1-5). (CDAIS, TAP Framework)	

Step 3. Design Action

Activity I. Visioning

Overall Objective: Prepare open argumentation of actions that allow the change in direction desired by the actors.	
Specific objectives	**Suggested methods and/or tools**
Prioritize changes and define strategies to reach expected changes	Participatory workshop: 1) share analysis: create a common understanding of the mechanisms (causal relationships) that trigger or hinder innovation processes : formulate the possible effects of the dynamics at work and the risks involved in economic, social or environmental terms; 2) design a strategy (working groups)
Draw up an action plan	Back-office work with the national task force
Possible products: ☐ An action plan	
Available references and/or toolboxes for further development: - Resources on how to elaborate an action plan : see CDAIS project: www.cdais.net	

Activity J. Outcome mapping

Overall Objective: Outcome mapping is supposed to help policy makers better understand what types of change they expect and better explain how they plan to achieve them. It should help them to better account for the drivers of changes in the design of future strategies to support innovation in the specific context of their country.	
Specific objectives	**Suggested methods and/or tools**
- To define expected outcomes and possible progress markers - To initiate? choose? design? a handy	- Provide training in outcome mapping and MEL - identify progress markers and indicators related to expected changes

management tool for technical staff of the Ministry of Agriculture (or other), who will be in charge of leading the process of AIS strengthening	- Create a dashboard with responsibilities for monitoring and evaluation shared among the members of the national task force

Possible products:

- ☐ An outcome map;
- ☐ A handy management tool, including a dashboard, for technical staff of the Ministry of Agriculture (or other), leading the process of AIS strengthening.;

  Key people trained in MEL approaches

Available references and/or toolboxes for further development:

- See cdais project on outcome mapping methodologies

Part 4. Resources

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