CAPACITY FOR CHANGE

Common Framework on Capacity Development for Agricultural Innovation Systems

CONCEPTUAL BACKGROUND

Tropical Agriculture Platform
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Foreword

The Tropical Agriculture Platform (TAP) is a G20 initiative with strategic goal of contributing to the development of national capacities for agricultural innovation in the tropics and the objective of enhancing "Capacity Development" (CD) in "Agricultural Innovation Systems" (AIS). As stated in the TAP "Theory of Change", the "TAP capitalizes on and adds value to on-going initiatives by fostering greater coherence of capacity development interventions in tropical agriculture, strengthening interaction for more harmonized action and greater mutual accountability, and avoiding duplication".

One of the first tasks of TAP is therefore to facilitate the emergence of a common language and a shared understanding of the scope of the challenge. Most countries and Development Partners (DP) use their own terminology and a lot of time is lost in trying to understand the exact meaning of the words used. A few examples: Are "capacity development", "capacity strengthening" and "capacity building" synonymous? What is meant by "Agricultural Innovation Systems" (AIS)? Is there a general agreement on the three "levels" usually identified in the field of capacity development" (CD), i.e. individual, organisational and institutional/system? How are defined the CD recipients/targets for each of these levels? etc.

To reach their objectives, CD programmes must meet the needs of the target groups. Therefore, each DP and/or government/institution who wants to initiate such programmes must begin by "assessing the capacities in order to identify the CD needs" for the different target groups. Consequently, they both spend time and money to "assess the capacities and CD needs" by developing methodologies and tools which may logically differ for the different "levels" and for the many types of recipient/target groups within them. The problem is that the methodologies and tools used often differ between DP, governments and institutions and CD interventions designed and implemented by DPs without prior needs assessments! Without a common understanding on how the "capacities and CD needs" are assessed, it is impossible to benchmark between and within countries, to increase coherence, and avoid duplication between CD activities supported by different DP, governments and institutions. In this context, a priority for TAP is to identify key metrics by which capacity can be measured – both quantity and quality – so as to conduct baseline assessments and then to measure long term CD improvements.

More and more the civil society makes governments or DP accountable for the investments made. The culture of "impact assessment" is now widespread and each institution launching or supporting CD activities has to demonstrate the impact of its programmes/projects. They therefore are all struggling to develop methodologies and tools to assess the impact of "their" activities. As long as each institution attempts to assess the impact of "its" activities and does not work collectively to develop common methodologies and tools for a set of CD activities, whatever the institution carrying them out, the results will remain questionable and not comparable.

The draft Common Framework for Capacity Development of Agricultural Innovation Systems that is here presented is a first attempt to respond to these problems. The draft is the result of the work of a group of consultants, and the TAP Secretariat with contributions from the TAP CD Expert Group under the guidance of the TAP Global Task Force, who also endorsed the draft document. The EU-funded CDAIS project is now validating the draft at field level in eight pilot countries (Angola, Bangladesh, Burkina Faso, Ethiopia, Guatemala, Honduras, Laos, and Rwanda). The discussion will be soon widened to a larger community of scientists, practitioners, development agencies, social society representatives, and policy makers through electronic conferences and policy dialogues. We are confident that the wide involvement of Capacity Development and of Agriculture Innovation Systems' actors will lead to a large consensus, prerequisite for the broad adoption of the Common Framework.

Any comment, suggestion, criticism is warmly welcomed. Contributions can be sent to: tropagplatform@fao.org.

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Abbreviations used in the text

AIS	Agricultural Innovation System(s)
AKIS	Agricultural Knowledge and Innovation Services
CD	Capacity Development
CF	Common Framework
CIAT	International Center for Tropical Agriculture
ECDPM	European Centre for Development Policy Management
FAO	Food and Agriculture Organization of the United Nations
GPC	Global Plant Clinic
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
KM	Knowledge Management
LDC	Least Developed Country
M&E	Monitoring and Evaluation
OECD	Organisation for Economic Co-operation and Development
PAR	Participatory Action Research
TAP	Tropical Agriculture Platform
UFE	Utilization-focused Evaluation

Glossary of Terms

Agricultural innovation	The process whereby individuals or organizations bring existing or new products, processes and forms of organization into social and economic use to increase effectiveness, competitiveness, resilience to shocks or environmental sustainability, thereby contributing to food and nutritional security, economic development and sustainable natural resource management.
Agricultural Innovation Systems (AIS)	A network of actors or organizations, and individuals, together with supporting institutions and policies in the agricultural and related sectors, that brings existing or new products, processes, and forms of organization into social and economic use. Policies and institutions (formal and informal) shape the way that these actors interact, generate, share and use knowledge, as well as jointly learn.
Boundary (of the system)	The line, concept or elements that separate the inside from the environment.
Capacity	The ability of people, organizations and society as a whole to manage their affairs successfully.
Capacity Development (CD)	The process whereby people, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time.
CD for AIS	The process directed to develop the skills or competencies of both scientific and non-scientific kinds required for the agricultural innovation system to perform effectively. Among other aspects, it works to develop and improve: linkages between producers and users of knowledge; the types of relationships and institutional setting conducive to knowledge sharing and interactive learning; a policy environment that is sensitive to the need to create the conditions needed to make productive use of knowledge rather than focusing solely on the creation of that knowledge; and the science and technology and innovation policy foresight needed to prepare for the future.

Champions	Self-motivated and naturally emerging people who can influence the overall direction, specifically on issues that may arise in the life of the innovation process.
Co-creation of Knowledge	The process of developing knowledge in collaboration with societal stakeholders and practitioners.
Collaborative Learning	The situation in which two or more people learn or attempt to learn something together. People engaged in collaborative learning capitalize on one another's resources and skills (asking one another for information, evaluating each other's ideas, monitoring one another's work, etc.).
Double-Loop Learning	Implies questioning underlying assumptions and current ways of working, and looking for new strategies. It answers the question "are we doing the right things?"
Emergence	The process whereby larger entities, patterns, and regularities arise through interactions among smaller or simpler entities that themselves do not exhibit such properties. It is a central concept of complexity theory. Change happens in an iterative way.
Enabling Environment	The context in which individuals and organizations put their competencies and capabilities into actions.
Experiential learning	The notion that people learn from experience and build new knowledge on existing practice.
Facilitator or Broker	Individuals working towards developing the trust and consensus between actors that enables the learning process and to support actors in tracking and reflecting on the process of transformation. Neutrality, assurance of clarity of roles and networking abilities are key attributes of facilitators.
Functional Capacities	Those needed for an individual or organization to work effectively.
Inclusive development	Ensuring that all marginalized and excluded groups are stakeholders in development processes.
Innovation	The process of putting knowledge into use, be it in the form of technology, practice or a particular way of working.

Innovation Capacities	The ability of people and organizations to create, organize and use knowledge for innovation.
Innovation Niche	A clearly identified and bounded institutional or geographical space where specific technologies or practices are put into work to improve existing conditions.
Innovation Platform	A group of individuals (who often represent organizations) with varying backgrounds and interests – farmers, agricultural input suppliers, traders, food processors, researchers, government officials, etc. – that come together to develop a common vision, to identify solutions to common problems or to achieve common goals.
Institutional	The set of social norms and rules defining the environment within which interaction, learning and innovation takes place.
Invention	A novel idea that has been given form, e.g. as a diagram, model or technology, and has potential for application.
Knowledge Development	The process through which familiarity, awareness or understanding of someone or something, such as facts, information, descriptions or skills, is acquired through experience or education, by perceiving, discovering or learning.
Knowledge Management (KM)	The process of capturing, developing, sharing and effectively using organizational knowledge.
Multi-stakeholder Platform	An organizational and operational mechanism bringing together all social actors having direct or indirect interests in a particular issue or problem.
Participatory Action Research (PAR)	An approach to research in communities that emphasizes participation and action. It seeks to understand the world by trying to change it, collaboratively and following reflection. PAR emphasizes collective inquiry and experimentation grounded in experience and social history.
Social Learning	Process in which individuals observe the behaviour of others and its consequences, and modify their own behaviour accordingly.
System	An entity made up of interconnected elements within a boundary that separates the inside from the environment.

Systemic Action Research	Methodology combining systems thinking with action research to support bottom-up efforts to change systems. It focuses on systemic inter-relationships to uncover their complex dynamics, often revealing unexpected opportunities. It emphasizes facilitated processes and system-wide learning.
Systems approach	Using the concept of system to conceptualize, analyse and/or intervene in a given issue or problem.
Tacit Knowledge	Unwritten, unspoken and hidden knowledge based on emotions, experiences, insights, intuition, observations and internalized information. It is difficult to articulate and communicate directly.
Technical Capacities	Knowledge and skills that are task- or mandate-specific, linked to organizational objectives and goals.
Triple-loop Learning	Focuses on challenging and changing the underlying values and assumptions and on solving problems that are complex. It answers the question "How do we decide what is right? (What is our theory of change?)".
Value Chain	The set of interaction between actors, leading to the emergence of new insights, practices, processes or ways of interacting, and resulting in the creation of value at each stage, in relation to a given production system.

Executive summary

Agricultural development processes increasingly involve complex undertakings that are influenced by the dynamic interaction of environmental and socio-economic factors, such as trade liberalization and demands of global markets, urbanization, climate change, agricultural intensification, concentration and vertical integration of food production and consumption, as well as food safety standards and the need to ensure equitable benefits to actors along value-chains (World Bank, 2007; IAASTD, 2009; FAO, 2014). There is general agreement that, to meet these challenges, agricultural innovation is key. To this end, it is essential to bring together multiple actors within and beyond the agricultural sector to benefit from their various perspectives and experience. Many countries, however, are not fully exploiting their potential for innovation to promote agricultural productivity, market competiveness and sustainability. Strengthening the capacity of individuals and organizations, as well as that of the enabling environment in which they are embedded, is required to actively promote agricultural innovation.

In 2012, the Agriculture Ministers of the G20 called for the creation of a Tropical Agriculture Platform (TAP) with the strategic goal of contributing to the development of national capacities for agricultural innovation in the tropics. Whilst the aim of TAP is to improve the overall performance of Agricultural Innovation Systems (AIS), the focus is particularly on creating benefits for small- and medium-scale producers, as well as small and medium enterprises in the agribusiness sector, and ultimately to improve livelihoods.[1]

A premise of TAP is that interventions – including those of capacity development (CD) – are seldom designed and implemented in an integrated manner and consequently fail to capture the full complexity of innovation processes. Frequently, interventions, particularly those promoted by external actors, are designed and implemented independently; are often too small in scale; or end up taking contradictory positions with regards to the local innovation system. Capacity development interventions in particular tend to be narrow in scope, neglecting institutional capacity dimensions, and not ensuring learning across the system. They lack high-level political and operational mechanisms to assure comprehensive and sustained efforts, essential for successful capacity development in tropical AIS.

In view of these observations, TAP partners approved an Action Plan for the Platform in 2013, which called for specific activities to be developed, including the development of a Common Framework on Capacity Development for Agricultural Innovation Systems (CD for AIS).[2] The objective of the TAP Common Framework is to harmonize the diverse approaches to CD of various development actors for AIS. Such harmonization and coordination of approaches would promote optimal use of the resources of different donors

[1] For a full description of the tropical agricultural platform membership, objectives, overall approach and plan of work see http://www.fao.org/in-action/tropical-agriculture-platform/en/

[2] For a full presentation of the approved Action Plan see http://www.fao.org/3/a-bc455e.pdf

and technical cooperation agencies. The Common Framework is addressed to various audiences. The primary audience of the Common Framework is the TAP partners themselves, committed to its development. The Common Framework offers them a common perspective for fruitful interactions with national policy-makers and stakeholders and to ensure that their actions in support of CD for AIS create synergy and are consistent with each other. A second key audience is that of national policy-makers and AIS stakeholders. For this audience, the Common Framework serves both to raise awareness and as an operational guide for their own efforts to improve the performance of the different system components. A third audience is that of development agencies and CD organizations. The Common Framework provides them with opportunities for more effective interventions to support AIS in tropical agricultural countries, and also points towards areas where further work is required in terms of both practical tools and conceptual development.

Given the diversity of the audiences, the Common Framework is divided into two volumes. One, the present volume, illustrates the conceptual underpinnings that informed the approach and operationalization of CD for AIS. A second volume provides a guide for practitioners and policy-makers on steps and useful tools in implementing the Common Framework. Both publications are integral components of the Common Framework.

The Agricultural Innovation Systems (AIS) perspective as the conceptual basis for Capacity Development (CD)

The TAP Common Framework builds conceptually on the AIS perspective, emphasizing that agricultural innovation, in contrast to linear approaches of technology transfer, results from a complex, multi-stakeholder process of interaction. The AIS perspective brings into play the diverse actors, social mechanisms and policies essential for innovation to take off.

The Common Framework recognizes that AIS in any given situation (local, regional or national) already exists – the diverse actors in the systems, rules and processes driving the innovation are in place. Frequently, initiatives and interventions have been designed and implemented to strengthen components of the AIS. The system may be working effectively, promoting agricultural innovation and utilizing available resources efficiently, or the system may be disjointed and behaviours, mind-sets, policies and processes disrupted, stifling innovation and missing opportunities. The complex web of inter-related actors, is nonetheless always present. What is in existence, however, is frequently not reaching its full potential. The nature of diversity and complexity needs to be fully captured and its effectiveness assessed. For interventions strengthening AIS – CD or otherwise – to be effectively designed and implemented, it is imperative that all involved at the different levels of the system recognize the nature of interdependencies and the roles they can play in the innovation process. AIS thinking, however, has to date not been fully reflected conceptually and analytically in national policies and capacity development efforts.

In this context, the Common Framework builds on AIS thinking, related methodologies and tools, as analytical devices to better understand the architecture of the exist-

ing AIS and to inform the conceptual approach for capacity needs assessments and the associated development. Through the emphasis on interaction among multiple actors, AIS thinking recognizes the contribution (knowledge and skills) of different actors, particularly with respect to the roles of the conventional actors (research and extension) in agricultural development, who are no longer seen as the sole drivers or initiators of the process of agricultural innovation. This view underscores that the roles of different actors are negotiated and evolve over time, based on comparative advantages – qualifications, skills and competencies – that they have in a given system. This diversity and complexity is the basis for the conceptual approach adopted by the Common Framework in identifying emerging capacity development needs and the strategies proposed to respond to them.

Finally, the conceptual background of the Common Framework considers the crucial role of facilitation, reflection, learning, documentation and knowledge management issues for enabling agricultural innovation in developing country contexts.[3] The concept of facilitation goes beyond conventional facilitation tasks – such as communication and information sharing, listening, convening actors and managing logistics – to include the fostering of synergy by managing systemic interactions that link people and resources and enhancing their ability to make collective decision and implementation. The emphasis on documentation, knowledge management, reflection and learning reflects that in the real-life multidimensional innovation system perspective, relevant knowledge is much more complex, both in its origins and content, with all actors becoming potential sources of knowledge and change; consequently, there is the need to explicitly consider this reality as part of any CD for AIS.

CD for AIS

CD for AIS of the AIS concept calls for shifts, not only in how we understand the innovation process – the different roles actors play in agricultural development, the different ways of knowledge creation, sharing and learning, and concomitant changes in the institutional and policy setting – but it also calls for innovative and systemic approaches to capacity development itself. Capacity development needs to be recognized as a multi-dimensional and multi-actor process that extends beyond the skills, technical expertise and experience needed to perform specific functions. Agricultural innovation – and indeed innovation in any field – *'... requires skills or competencies of both a scientific and non-scientific kind; it requires linkages between producers and users of knowledge; it requires the types of relationships and institutional setting conducive to knowledge sharing and interactive learning; it requires a policy environment that is sensitive to the need to create the conditions needed to make productive use of knowledge rather than focusing solely on the creation of that knowledge; and it needs the science and technology and innovation policy foresight to prepare for the future' (Hall, 2005).*

[3] Facilitation is a purposeful intervention that enhances interaction and relationships of individuals, organizations, objects, and their social, cultural and political structures through a process of network building, social learning and negotiation (Leeuwis and Aarts, 2011).

Thus beyond the skills, technical expertise and experiences relevant to perform a given function, for AIS to perform effectively, five key capacities are required:

- Capacity to Navigate Complexity,
- Capacity to Collaborate,
- Capacity to Reflect and Learn,
- Capacity to Engage in Strategic and Political Processes, resulting in the
- Capacity to Adapt and Respond in order to Realize the Potential of Innovation.

These five capacities are interdependent and are relevant to the individual, organizational and enabling environment dimensions of CD. The TAP Common Framework pays special attention to the often neglected dimension of capacity development for an enabling environment.

Dual pathways to CD for AIS

In many countries in the tropics, CD for AIS-related interventions and activities (e.g. new curricula in university courses on agriculture and extension; departments of innovation within Ministries of Agriculture; value chain-related innovation platforms) are supported by diverse development partners and NGOs. These initiatives are, however, frequently isolated and disjointed, and do not contribute to the overall learning of system actors, nor are they coordinated in any meaningful way. In line with the AIS thinking and underlying concepts and assumptions, a multilevel approach is proposed, taking into consideration that there are synergies and inter-relationships among three dimensions of the system (individual, organizational and enabling environment). More often than not, there is simply an implicit assumption that strengthening the competencies of individuals will enhance the capabilities and capacity of organizations, which in turn will contribute to the emergence of capacity of the system. CD of each dimension has to be dealt with in its own right, through multiple but complementary pathways for change. This conceptual approach includes two aggregated processes: (i) at system level, focusing on the functionalities and performance of the system as a whole; and (ii) in an innovation niche, where capacity development takes place around a specific innovation agenda, such as food safety, a value chain, nutritional security, curriculum for life-long learning in agriculture and food, farmers' market groups, or food processing. CD at system level recognizes social, cultural and political structures in which power relations, social and institutional dimensions determine opportunities for different groups of actors in initiating an innovation niche and acting upon the interventions to attain sustainability.

The Operational Approach for CD for AIS

In this context, a cycle of five main stages is proposed for the operationalization of CD interventions at the level of an innovation niche, within organizations (involving individuals within these) and addressing the enabling environment. The stages are "Galvanizing Commitment", "Visioning", "Capacity Needs Assessment", "CD Strategy Development and Action Plan" and "Implementation". The CD for AIS Cycle should not be viewed as a one-off, closed process with a clear start and finish, as within a typical project mode. It

represents just one cycle in a continuum or spiral of action, reflection, learning adaptation and implementation of the CD process. It requires embedding an iterative process of reflection and documentation of learning throughout the cycle, leading to further cycles of adaptation and implementation.

Nor should the proposed cycle be viewed as a strait jacket to be followed rigorously to achieve effective CD for AIS. It is offered as a guide for action. Country approaches may differ significantly in content and process, reflecting local context, opportunities, ongoing initiatives, commitment of individuals, organizations and institutions, as well resources that can be mobilized to support the process. The practicalities of the proposed approach need to be tested and its further refinement informed by experience and learning on the ground. The key element common to all countries is the systemic approach, which ensures all actors within the system have the opportunity to participate, with the creation of joint learning and formulation of joint solutions.

Whilst the CD for AIS Cycle is described as a logical sequence of consecutive steps, operationalization of the framework may not be a linear process. Depending on the context of the country in which it is being implemented, stages may be merged or addressed simultaneously. For instance, in a given context, actors may consider capacity needs assessment as a composite part of the CD strategy and action plan rather than an input into the strategic planning process; in other cases it may be decided to conduct a CD needs assessment before embarking on a visioning exercise. The stages should not be seen as separate, bounded actions. Decisions on the practicability of certain stages must be made by country teams based on available resources (people, time and finances) and available documented information, as well as existing programmes and past experience. The country context will also dictate whether the CD for AIS Cycle is initiated only at national level, or if regional- and district-level processes need to be initiated concurrently or as initial pilots.

Monitoring and Evaluation Architecture of CD for AIS

A Monitoring and Evaluation (M&E) architecture composed of two elements interconnected through learning loops is proposed. The first element refers to M&E of progress and results at each of the Cd for AIS stages laid out *within* the TAP Common Framework, whereby the second element evaluates the success of the Common Framework approach in its entirety (i.e. the overall performance of the Common Framework as a new approach to CD for AIS). These two elements are being integrated by design, whereby empirical evidence, findings and learning from one element feeds into the other and vice versa, triggering a continuous adaptation of the CD effort. This "adaptive" character builds on the use of formative, developmental and utilization-focused evaluation methods, a process of structurally embedding M&E functions of CD into the five-step process of the Common Framework itself, particularly as part of the "Capacity for Reflection and Learning", and by institutionalizing recurring learning loops between the two elements.

CHAPTER 1

Introduction

An active and effective process of agricultural innovation is a precondition to meeting the challenge of feeding the growing world population and reducing poverty, in a context of an eroding natural resource basis and increasing climate change constraints. It is fundamental to achieving the Sustainable Development Goals of ending poverty and hunger, achieving food security, improving nutrition and promoting sustainable agriculture. It also has a role to play in achieving gender equality, ensuring healthy lives for all and contributing to economic growth.

A brief revision of experience since the Second World War clearly shows that time and again, the world has only been able to escape from tight conditions when change processes were successful in increasing productivity and better, more efficient use, of human and natural resources available throughout agricultural value chains. In spite of this evidence, there are still strong concerns that many countries are not fully exploiting the potentials of innovation to promote agricultural productivity growth and transition towards sustainable agriculture.

To respond to this concern, Agriculture Ministers of the G20 requested FAO to facilitate the establishment of the Tropical Agriculture Platform (TAP) with the aim of improving the effectiveness and efficiency of capacity development of agricultural innovation systems in target countries of the tropics. The platform was officially launched in September 2012 in Mexico, with the strategic goal of contributing to the development of national capacities in agricultural innovation in the tropics, with a focus on small- and medium-scale producers, as well as small and medium enterprises in the agribusiness sector.[4] In line with this, TAP partners approved an Action Plan for the Platform in 2013, which called for specific activities to be developed, including, in particular, the development of a Common Framework on Capacity Development for Agricultural Innovation systems (CD for AIS).[5] The objective of the TAP Common Framework is to harmonize, from an AIS perspective, the diversity of approaches to capacity development existing among various development support actors, to synergize the resources coming from different donors and technical cooperation agencies, and to facilitate coordination among them during implementation.

The development of this Common Framework has evolved from a broad review of existing experience at national and international levels, in two interrelated and sequential steps. The first step focused on the identification of gaps in current capacities and on the development needs as perceived by stakeholders involved in the national and regional Agricultural Innovation Systems (AIS). The second step covers the actual design of the Common Framework itself.[6] The regional needs assessments in sub-Saharan Africa, Asia and Latin America revealed that many of the institutions involved in agricultural research and extension are highly dependent on development assistance, and that interventions for CD in agricultural innovation are mostly focused on individual and some organizational issues, while little or no attention is paid to aspects of the enabling environment.[7] In all three regions, respondents to

[4] For a full description of the Tropical Agricultural Platform membership, objectives, overall approach and plan of work see http://www.fao.org/in-action/tropical-agriculture-platform/en/

[5] For a full presentation of the approved Action Plan see http://www.fao.org/3/a-bc455e.pdf

[6] The regional need assessments were carried out with the cooperation of the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), based in the Philippines; the International Center for Tropical Agriculture (CIAT), based in Colombia; and the Forum for Agricultural Research in Africa (FARA), based in Ghana.

[7] For a full summary of the regional reports, see Aerni *et al.*, 2015.

the assessment further observed that actors in the AIS often lack incentives to respond to the expressed needs of local producers, producer cooperatives and agribusiness. In this sense, the needs assessments highlight that there are as yet unexploited opportunities for these countries to share their knowledge and experience within their own countries, in their region and beyond. The need for an appropriate balance among the individual, organizational and enabling environment dimensions in CD efforts, which emerged as a common issue across regions, is a key finding from the regional reviews and needs to be reflected accordingly in the conceptual approach to the framework.

Development of the Common Framework was organized in two phases, with a first "review" phase devoted to the review of literature relevant to the different dimensions of CD for AIS, and a "formulation" phase focusing on the design of the Common Framework including principles, concepts, approaches, methodologies and tools for CD for AIS.[8] The present conceptual document is the results of the above process and is addressed to a variety of audiences. The first audience of the Common Framework is that of TAP partners, committed to its development. For them, the proposed Common Framework attempts to offer a common perspective for fruitful interactions with national policy-makers and stakeholders and to assure that their actions in support of capacity development for AIS are synergistic and consistent with each other. A second key audience is that of national policy-makers and AIS stakeholders. For this audience, the Common Framework serves both as an awareness-raising instrument and also as operational guidance for their own efforts to improve the performance of the different system's components. A third audience is that of development partners and capacity development organizations. The Common Framework expects to offer them opportunities for more effective interventions in support of AIS in tropical agricultural countries, and also points towards areas where further work in terms of tools and conceptual development is needed.

Within this context, the present volume, which forms the conceptual background of the Common Framework, is structured in five chapters in addition to this introduction. The second chapter emphasizes the AIS perspective and its contribution to the better understanding of the logic of agricultural innovation processes, as an essential first step for successful capacity development. The third chapter presents a general discussion of the dimensions of capacity development, emphasizing not only the need to look at the individual and organizational dimension, but to also explicitly consider the role of the enabling environment. Special attention is also given to expanding the traditional view of functional and technical capacities, to include a number of capacities considered essential for successful innovation. Following this, chapter four introduces the need to work on dual pathways, bringing together system wide approaches, and the analysis of "innovation niches" to address the capacity development needs of different innovation actors. In turn, chapter five proposes an approach for the operationalization of the Common Framework, based on the

[8] This proposal was put forward for discussion and validation at a workshop held in Montpellier, France, from 19 to 20 March 2015, which gathered experts selected by TAP Partners and members of the TAP Global Task Force on Capacity Development. The workshop served to discuss the results of the review on CD for AIS resources; identify gaps in the literature; and develop common conceptual and operational understanding, whilst providing recommendations for the formulation of the Framework. Further details of the recommendations emerging from the workshop can be found in the draft report of the meeting.

sequential approach identified and discussed during the "review" phase. Chapter six is on the M&E architecture and activities related to the implementation of the Common Framework. The operationalization of the CD for AIS Cycle and the M and E framework at country level are expanded upon in a separate guidance note that complements this conceptual document.

CHAPTER 2

Agricultural Innovation Systems

Concepts and Elements

Agricultural innovation is critically required for increasing agricultural productivity and output, farmers' income, ultimately reducing poverty and improving food security and nutrition (i.e. improving livelihoods) along with sustainability of agricultural systems. Innovation is an endogenous process that cannot rely only on spin offs of foreign research, but needs local capacities to generate, systematize, adapt knowledge (both indigenous and imported) and develop, experiment, fine tune, adopt and upscale new technologies, innovative managerial schemes and social change. As agriculture in the tropics is increasingly transformed by the dynamic interaction of environmental and socio-economic factors, such as trade liberalization and demands of global markets, urbanization, climate change, agricultural intensification, concentration and vertical integration of food production and consumption, food safety standards and the need to ensure equitable benefits to actors along value-chains (World Bank, 2007; IAASTD, 2009; FAO, 2014), it is becoming increasingly complex. Addressing this complexity requires that innovation in agriculture and rural development be based on multi-stakeholder interaction to include non-conventional stakeholders (e.g. private sector, farmer. organizations, non-profit organizations and civil society organizations). The complex and dynamic nature of food and agricultural development also calls for consolidation of local, indigenous and formal scientific knowledge, viewing agriculture from multiple perspectives and disciplines, i.e. the gamut from biological science to social, natural and policy research. It also requires establishing effective partnerships based on trust among a broad set of actors, beyond those of formal science and development. This necessitates coordination and collaboration, with the aim of harnessing new ideas and mobilizing resources from both public and private realms (Leeuwis and Van den Ban, 2004; World Bank, 2006; Pant and Hambly Odame, 2010).

There is growing agreement among scholars, practitioners and policy-makers that agricultural innovation is the outcome of the effective functioning of an Agricultural Innovation System (AIS). Many countries in the tropics, however, need to enhance resource allocation and capacities to develop an effective AIS. In the changing contexts of agricultural and rural development, capacity development interventions can be designed and implemented effectively if these are informed by AIS thinking, with relevant methodologies and tools (World Bank, 2012). Capacity development initiatives for effective AIS must be coordinated and aligned with country and regional policy and planning frameworks as well as institutional needs in order to ensure their ownership. AIS thinking is presently not reflected conceptually and analytically in many national policies and capacity development efforts (Sulaiman and Hall, 2005; Sanginga *et al.*, 2009; Chowdhury, Hambly Odame

Box 2.1 | **Elements of a crop production system**

In realizing a production system for a new crop variety, we need to consider the functional relationships of different components of the system. From a farming system perspective, linkages and inter¬con¬nect¬ed¬ness of various components, such as plants, soils, insects, fungi, animals and water, as well as other aspects of the environment and economy, have to be considered. The production of a new crop variety is likely to be effective if it is realized in terms of changes in tangible components, such as agronomic practices (e.g. new plough, seedling, line spacing, irrigation practices), as well as other intangible or abstract aspects, such as new forms of social organizations within the family (e.g. tasks and division of labour between men and women), the community (e.g. customs and norms of sharing labour and implements and land-tenure practices), and/or the wider institutional environment (e.g. rules and regulation governing land ownership, new arrangements for provision of inputs, credits, market facilities etc.).

and Leeuwis, 2014). This chapter aims to present key theories, concepts and elements of AIS thinking that inform a conceptual approach for CD for AIS.

2.1 System thinking: AIS and agricultural innovation

Agricultural and rural development problems, such as new crop pests and diseases, soil degradation, water scarcities, achieving fair and sustainable access to markets or proper management of natural resources are typically 'system' problems (IAASTD, 2009; Fresco, 2009; Thompson and Scoones, 2009). National and global demands (e.g. productivity, competitive markets and supply chains) often influence production and policy decisions, with little concern for the effects on resource-poor communities in low-income regions. Many rural producers are unable to benefit from opportunities provided by global and national agricultural markets due to a lack of natural resources and other resources provided traditionally through the public sphere. Market forces and government policy tend often to neglect the specific needs and risks of small-scale producer communities. How can diverse actors adopt shared purpose, rules and forms of management that would satisfy their different needs and interests, and also create conducive economic, social and environmental states and processes?

System thinking may provide useful insights into addressing this question. A system can be seen as *'an entity made up of interconnected elements within a boundary, which separates the inside from the environment'* (Chema, Gilbert and Roseboom, 2003; Hall and Clark, 2010). Interplay among system elements and between the inside and its environment determines performance of the system as a whole. A system is an *'image of metaphor of the adaptive whole'*, which means that a system is more than a sum of its subsystems or elements. According to Engel (1997) the term *'system'* is a way of thinking of the whole – including abstract and tangible components (see Box 2.1).

There are two major traditions in system thinking – a dichotomy of *'close'* versus *'hard'* and *'open'* vs *'soft'* system thinking (Engel, 1997; Hall and Clark, 2010). They differ in consideration of the degree of interaction among components and the system's environment that analysts may consider. The former takes the systemic images to represent and study

Table 2.1 | **Comparison between hard and soft system thinking**

Aspects	Hard system	Soft system
System objectives	Predefined, develops one's knowledge about the world by improving one's model	Variable, improves human performance (depends on purpose of the system) through debate and reflection
System elements	Fixed, according to one's model	Variable, according to the purpose of the system
System environment	Not relevant	Relevant, owing to focus, arbitrary
System boundaries	Fixed	Variable, negotiated and re-negotiated depending on the purpose of the system
System relations	Fixed linkage mechanisms	Chaotic variable interaction
System performance	Fixed through input-output relations	Determined by structure and objectives, unpredictable

Source: Cited from Chowdhury, 2011.

the real world through models (see Table 2.1). The proponents of this *'hard'* thinking believe that the world out there can be described as transforming inputs into outputs through models. They are interested to see whether the outcomes predicted by the models coincide with the observed events. Farming systems, and industrial processing models are examples of the hard system thinking (Engel, 1997). In contrast, the *'soft'* system thinkers (e.g. Checkland and Scholes, 1990) do not assume systems to exist. Rather, they understand the system as emergent properties of interactions among social actors through situation analysis, dialogue and collaboration, with an aim to solve problems, to develop certain joint capacities, or to ensure outcomes, such as poverty reduction and sustainable development.

Innovation for agricultural development has in the past been dominated by a perspective of change, which considers knowledge in the form of new physical technologies, social processes or cultural practices, etc., as being essentially generated by research (research organizations), and passed on to the extension system for adoption by farmers through a linear technology transfer process (see Figure 2.1). This linear process has frequently failed in tackling contemporary agricultural development problems and complexity.

As agricultural research has increasingly been called upon to contribute to solving complex problems of rural poverty, food security and natural resource management, there has been a shift away from simply improving technology transfer, towards strengthening national agricultural research systems, and towards embracing an innovation systems perspective involving various actors and sources of knowledge.

In agriculture and rural development, systems thinking has a history of more than three decades, which resulted in a wide range of approaches. We can distinguish four main theoretical traditions related to system thinking in agriculture and rural development (Klerkx *et al.,* 2012a). As we move from left to right hand columns in Table 2.2 we notice an increasing adherence to soft-system thinking. The approaches are not necessarily mutually exclusive – some approaches fed into each other, some emerged in parallel (e.g. AKIS and AIS) while others co-exist in the present day (e.g. AIS, Transfer of Technology, and Farming System thinking).

The later approaches (AKIS and AIS) focus not only on the supply of knowledge, but also take into consideration the demand side of the equation, recognizing the multiple dimensions and complex nature of the innovation process. Through networking and commu-

Table 2.2 | **Theoretical perspectives on agricultural innovation**

	Transfer of Technology (ToT)	Farming System Research	Agricultural Knowledge & Information Systems (AKIS)	Agricultural Innovation Systems (AIS)
Periods/Era	Central since 1960s	Starting in 1970s and 1960s	From 1990s	Since 2000s
Purpose	Supply technologies through linear processes	Learn farmers' constraints through surveys	Collaborate in research (participatory research) & extension	Co-develop innovation involving multi-actor processes and partnerships
Scope	Productivity increase	Efficiency gains (input-output relationships)	Farm-based livelihoods	Value chains, institutional change
Innovators	Scientists	Scientists and extensionists	Farmers, scientists and extensionists together	Multiple actors
Role of Farmers	Adopters and laggards	Source of information	Experimenters	Partners, entrepreneurs, innovators, exerting demands
Role of Scientists	Innovators	Experts	Collaborators	Partners, one of the actors responding to demands
Key changes sought	Farmers' behaviour change	Removing farmers' constraints	Empowering farmers	Institutional change, innovation capacity
Market integration	Nil	Nil	Low	High
Capacity development	Technology adoption and uptake through development of technical skills & infrastructure	Technology adoption and uptake through development of technical skills & infrastructure & integration of ecological and farm-economic conditions	Enhancing communication between actors, co-evolved technologies better fit livelihood systems	Capacity to interact, innovate & learn, creating enabling conditions

nication mechanisms, relevant knowledge is created collectively, in groups. AKIS and AIS differ with regards to the types of actors involved and direction of change (World Bank, 2006; Assefa *et al.*, 2009).

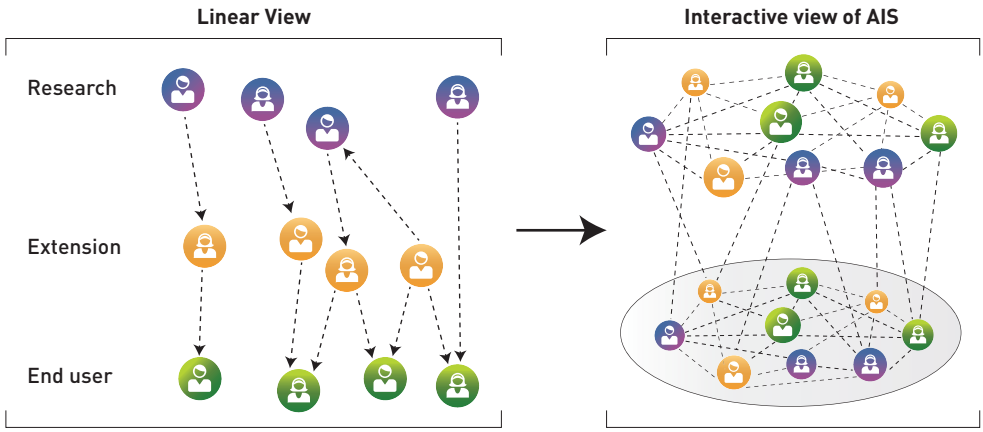
An **Agricultural Innovation System** is a network of actors or organizations, and individuals together with supporting institutions and policies in the agricultural and related sectors that bring existing or new products, processes, and forms of organization into social and economic use. Policies and institutions (formal and informal) shape the way that these actors interact, generate, share and use knowledge as well as jointly learn.

AKIS is restricted to rural innovation (agricultural research, extension and education) and pays limited attention to markets. An AIS encompasses all of the various actors (farmers, farmers' organizations, businesses, processors, marketers, transporters, input suppliers, policy-makers, regulatory agencies, researchers, service providers, extension services, civil society organizations, and others) involved directly or indirectly in agricultural production, processing, marketing, distribution and trade (see Figure 2.2).

Agricultural innovation is the process whereby individuals or organizations bring existing or new products, processes and forms of organization into social and economic use to increase effectiveness, competitiveness, resilience to shocks or environmental sustainability, thereby contributing to food and nutritional security, economic development and sustainable natural resource management.

With its emphasis on the interaction among multiple actors, AIS thinking aims to under-

Figure 2.1 | **Linear and interactives on agricultural innovation**



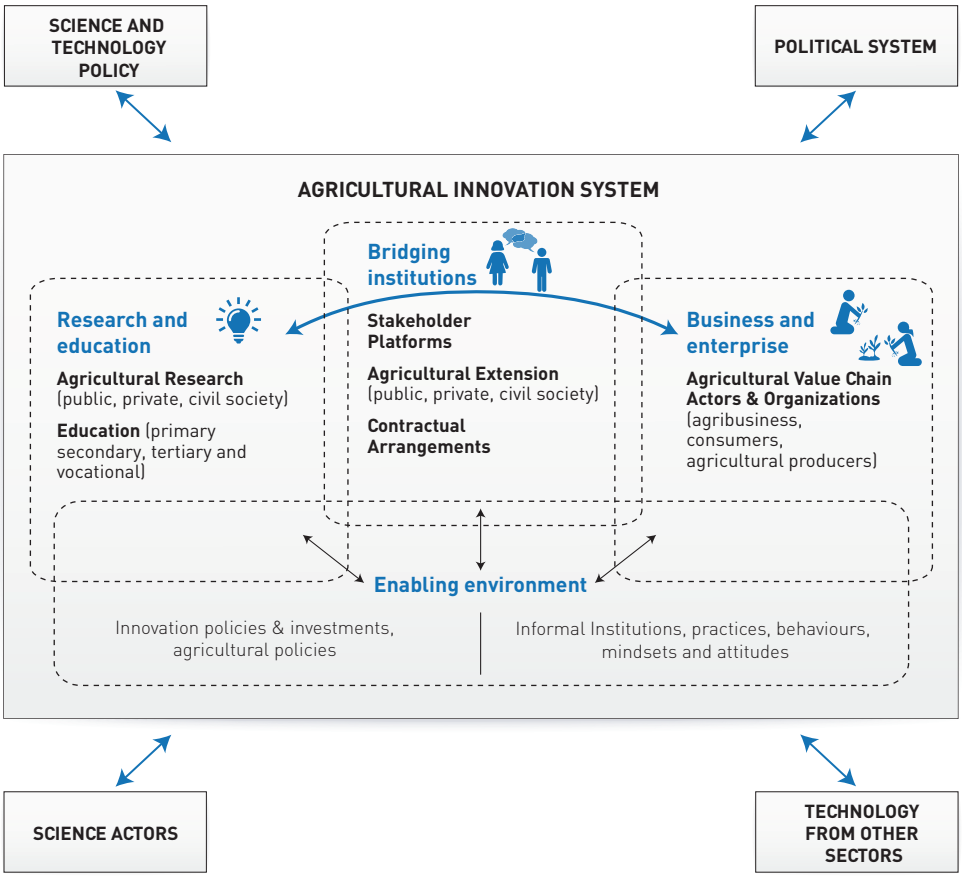
Source: Based on Klerkx *et al.*, 2012(a); World Bank, 2006; Pant and Hambly Odame, 2009.

stand the contribution (knowledge and skills) of different actors, and the quality of interaction among them. The roles of conventional actors (research and extension) in agricultural development have thus changed (see Tables 2.2 and 2.3) – they are no longer considered the sole drivers, initiators or owners of the process of agricultural innovation. While they play important roles in an agricultural innovation process, their services have to be considered in relation to the roles of other actors (Gildemacher and Wongtschowski, 2015). This view encourages pluralistic service provisions, where roles of different actors are negotiated and evolve over time based on comparative advantages – qualifications, skills and competencies – which different actors have in a given system (see Table 2.3).

Agricultural innovation thus takes place within a dynamic network of actors – individuals and organizations – fostering interaction and learning through adaptation and responsiveness to emerging challenges and opportunities. It is necessary to note the distinction between 'invention' and 'innovation'. Invention is seen as a novel idea that has been given form, e.g. as a diagram, model or technology, and has potential for application. Innovation, on the other hand, may take different forms (e.g. as a product, a process, a service or new organizational form). It must be useful in a given context and demonstrate practical application at scale. Agricultural innovation covers technological, social, economic, organizational and institutional dimensions of change. 'Institutional dimension' refers to the formal and informal rules as well as beliefs, values and frameworks for understanding, which create stability and order within the system. This is often referred to as the 'enabling environment'.

AIS is what is often termed a 'complex adaptive system', whereby the system, organizations and individuals develop and adapt themselves to complex situations and constantly changing environments. The system evolves on the basis of the countless interactions among huge numbers of elements, and function on the basis of interrelationships among people, groups, structures and ideas (Land *et al.*, 2009) making it a highly unpredictable process (cf. Klerkx, Aarts and Leeuwis, 2010). It is necessary to create synergies and interconnectedness among the actors

Figure 2.2 | **Conceptual diagram of an agricultural innovation system**



for the effective functioning of a given AIS. Systems become complex as the process of pay-off and gains (or losses) are supposed to mutually benefit different actors engaged in a web of strategic relationships (Spielman, 2005). For example, biotechnology can potentially play a role in poverty alleviation. However, the effectiveness of biotechnology as a pro-poor agricultural innovation is correlated with the process of negotiation and the need to meet the various interests of different actors, such as industry, research, market and policy-maker, while at the same time harnessing benefits for small-scale farmers. While realizing biotechnology as a pro-poor agricultural innovation, it is evident that the pay-offs and gains for a small-scale farmer group, a public extension agency, a private company and a crop breeding organization are multiple, and evolve over time and space (Glover, 2010). This is also related to the dynamics of a system - i.e. we need to conceptualize the system beyond a static state (a single payoff and gain solution) to systems with multiple states (system states are determined by multiple payoff and gain schemes) (See also Box 2.2).

Individuals operate within different spheres (e.g. social, economic, ecological and political), and at various scales – e.g. temporal

Table 2.3 | **Potential roles of different actors in AIS**

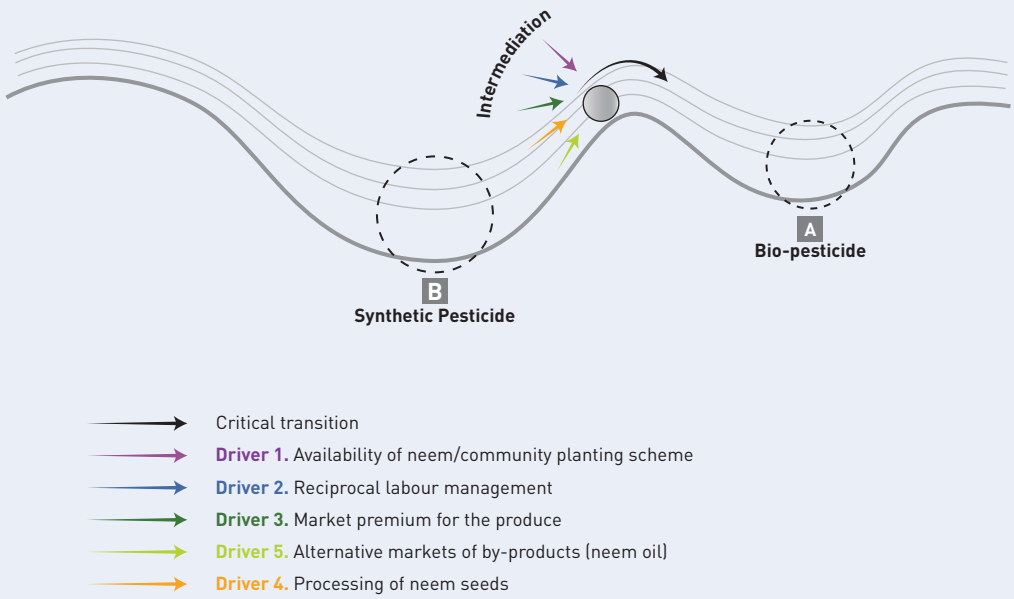
Actors	Roles in AIS
Farmer/Farm Familiy	• Users of knowledge to create, test and adapt new technologies to field conditions. • Apply and suggest innovative products and practices to increase agricultural productivity and market accesses.
Farmer Organizations *(including commodity networks and platforms)*	• Represent farmers (interests, needs, opportunities) in value chains and the community and policy arenas. • Brokerage of knowledge and technology between farmers and other actors. • Facilitating access to agricultural inputs, credit and markets. • Helping organize value chain. • Promoting specific innovation through collaborative research and organizing logistic support.
Advisory Services *(private, non-governmental and public)*	• Brokerage of knowledge between farmers and other actors. • Making new technology and practices available to farmers and other actors. • Forging networks, and supporting organization of producers. • Facilitating access to credit, inputs and outputs services. • Promoting equitable participation – especially disadvantaged people such as rural women, smallholders.
Agro-dealers *(input suppliers and processing)*	• Providing (new) agricultural inputs and output markets. • Identifying, piloting and mainstreaming new market opportunities. • Defining quality standards of agricultural products. • Facilitating investment in physical and human resources for product and process development. • Linking agricultural actors to rest of the market.
Tertiary education institutes	• Improving general education level of all actors. • Education and training of professionals in the agricultural sector. • Development of better knowledge and associated skills for farmers and other actors. • Facilitating investment in human resources for process and product development. • Developing approaches and methods of experiential and multi-actor learning.
Researchers *(public, non-governmental, private & universities)*	• Developing and improving technologies, practices, and processes relevant to local/regional/national contexts. • (Joint) testing of locally developed (indigenous) technologies and processes. • Documenting the ways new practices and technologies are adapted and further innovated with 9for both man women, poor and rich), to feed into other agricultural research efforts and policy decisions. • Cooperating with researchers of other countries/international organizations.
Policy makers	• Providing strategic orientation for the AIS. • Formulate, implement and enforce strategies, policies and regulations. • Allocate resources for research and human resources development. • Provide incentives to innovate and collaborate. • Enabling networks and partnerships.
Consumer organizations	• Influence research priorities and innovation practices. • Facilitate consumer acceptance. • Facilitating and brokering information of new products and processes.

Source: Based on Gildemacher and Wongtschowski, 2015; Sulaiman and Davis, 2012; World Bank, 2012.

(such as historical relationships and traditions) and spatial (such as geographical or organizational hierarchies) – making the system complicated to study. Individual actors in the system have their own interests and perspectives, informed by experience, but need to perform collectively for the system to function effectively in different spheres and at various scales.

Due to the differing interests and perspectives of actors, the system boundaries in AIS are determined arbitrarily. For instance, the definition of the system by the agricultural researchers may be different from that of the extension agent or the farmer (Hauser *et al.*, 2010). From the AIS perspective, innovation takes place at different scales, from the individual, to, for example, national scale, when an entire sub-sector may change practices (Gildemacher and Wongtschowski, 2015). Although an innovation (such as adopting a milk producing livestock variety perceived as new

Box 2.2 | **Dynamic and emergent properties of AIS**



The AIS perspective recognizes that a system does not have a stable 'equilibrium' or 'state': disturbances and uncertainties may flip (on account of emerging opportunities or effects of drivers of change) a system to another regime of behaviour, i.e. another stability domain. To understand this, we can consider the contemporary pest management system. Despite substantial efforts and interventions, the state of bio-pesticides remains 'marginal' while the state of synthetic pesticides dominates. For instance, different interventions or driving efforts have been undertaken to popularize use of Neem as a bio-pesticide in tropical countries. It is difficult to conclude whether drivers, such as establishing community planting scheme, reciprocal labour management, market premium for the produce (treated with Neem), processing of need seeds, and creating alternative markets for by-products (e.g. neem oil), have changed the system state - dominated by the use of synthetic pesticide (state B). It is because the precise state of the pest management system cannot be understood by only considering these two states (i.e. A or B), but rather it must be understood in relation to the positions of the grey ball (i.e. the system's behaviour in action), which usually tends to gravitate towards the state B. When the system is disturbed by different interventions (the drivers in the figure), the ball gains sufficient energy to reach the tip of the landscape and may shift suddenly towards state A. However, the outcomes are always uncertain as an intervention may have positive and negative effect on the web of relationships of the complex systems. For instance, the provision of increased subsidies to promote the behavioural pattern A may result in the strong coalition building of the actors (e.g. industry, pesticide dealer, scientists, policy-makers, etc.) who are promoting the competing behavioural pattern B, although the drives for bio-pesticide might not change the dominant practices of synthetic pesticide (because of the size of the bias in attraction), they might influence a system's dynamism and create opportunities for flipping the system at another time.

by a farmer or farmer group) can be conceptualized at a micro-scale (i.e. the individual farm or farmer group), we need to consider its implications across an entire system (e.g. the milk collection and marketing system in a district, region or country).

Systems patterns and behaviour (e.g. milk collection system) may emerge from micro behaviour (e.g. adoption of new breed producing large amount of milk or producing small amount of fat-enriched milk) and interactions of heterogeneous actors. Innovation process cannot simply be transferred or replicated from one place to another – taking a new 'practice' from one place to the next requires, by default, re-creation of the innovation process, to ensure local fit and the re-ordering of actor relations required for its success (cf. Gildemacher and Wongtschowski, 2015). Therefore, a new practice requires further adaptation at local level and actors need to reorganize relative to the practice. For example, a farmer or farmers' group may decide to replace an existing livestock breed with a new one that produces more milk. This practice will be effective and sustainable if different actors (e.g. farmers, processing facilities, transport agencies and retailers) reach agreement and organize themselves in order to ensure that the changes (e.g. volume of milk that each family is allowed to sell in the cooperative market circle, processing time, market demand) complement or enable the existing system.

2.2 Facilitation

AIS needs to fulfil several functions beyond the production, exchange and use of knowledge through the interaction of system actors. In needs to foster *"entrepreneurship developing a vision for change, mobilizing resources, building legitimacy for change and overcoming resistance to changes. Additionally, the AIS approach recognizes the influential role of institutions (i.e. laws, regulations, attitudes, habits, practices, incentives), in shaping how actors interact in innovation processes" (Devaux, Ordinola and Horton, 2011).*

In this respect, facilitation becomes crucial for enabling the interaction of system actors to address the target and to innovate. Agricultural innovation processes thus require a broadening of conventional facilitation tasks – such as communication and information sharing, listening, convening actors and managing logistics – to include fostering synergy by managing systemic interactions that link people and resources, while enhancing their ability to make collective decisions and to implement them (Pyburn and Woodhill, 2014; Suliaman *et al.*, 2010).

Facilitation is a purposeful intervention that enhances interaction and relationships of individuals, organizations, and their social, cultural and political structures through a process of network building, social learning and negotiation (Leeuwis and Aarts, 2011). In high-income countries, specialized actors (private-sector brokers, catalysts, activists, traders, processors) are increasingly taking on the role of facilitating agricultural innovation processes. In low-income countries, these roles are still dominated by specific types of organizations (extension, research, non-profit organizations). Specialized and skilled individuals are called for, as systemic intermediaries, facilitators or brokers – i.e. someone who can act as an intermediary in complex relationships (Klerkx *et al.*, 2012(b)).

An innovation platform is a multi-actor configuration deliberately set up to facilitate and undertake various activities around identified agricultural innovation challenges and opportunities at individual and organization level (Kilelu, Klerkx and Leeuwis, 2013; Ngwenya and Hagmann, 2011). These platforms require skilled facilitators using meth-

Box 2.3 | **Role of System facilitators and brokers in AIS**

DEMAND ARTICULATION: It includes articulation of needs and vision and corresponding demand regarding technology, funding and policy.

- Demonstrating and visualizing interdependencies among stakeholder practices.
- Exploring and exchanging stakeholder perspectives (values, problems, aspirations, context, etc.) through discussion, role playing, dramatization, visits, filmed interviews, informality, humour, fun, etc.
- Visualizing and understanding invisible bio-physical processes with the help of discovery learning tools or simulation.
- Using visioning tools and scenario analysis to imagine (and find common ground on) possible futures.
- Discussing institutional and other influences that reinforce existing patterns/problems.
- Eliciting uncertainties that hinder change and design collaborative investigation and experimentation to develop common starting points.

NETWORK COMPOSITION: It means facilitation of linkages amongst relevant actors.

- Making an inventory of existing initiatives, complemented with stakeholder analysis.
- Arranging contracts between disconnected networks who may have compatible interests.
- Working towards 'coalition of the willing' and exclude actors who do not feel indeoendent.
- Mobilising pressures from outside to enhance feelings of interdependence.
- Forging/brokering contact between existing networks and outsiders and/or outside expertise.

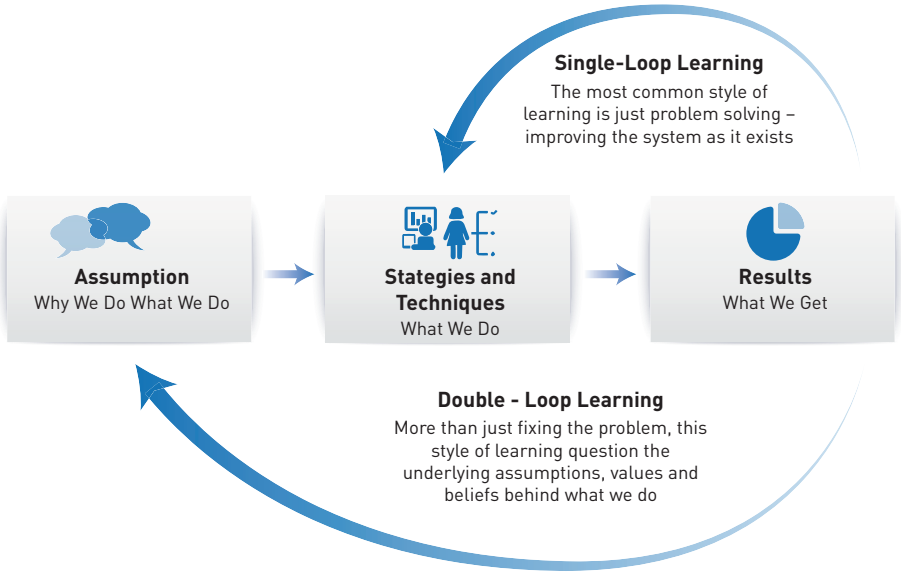
INNOVATION PROCESS MANAGEMENT: This is about aligning heterogeneous networks constituted by different actors affiliated to different institutional norms, values, incentive and reward systems.

- Identifying and proposing process facilitators who are credible and trusted by the stakeholders oinvolved.
- Working towards process agreements, including dealing with media, mandates etc.
- Steering collaborative research activities to questions relevant to less resourceful stakeholders.
- Ensuring regular communication with constituents to take them along in the process.
- Translating agreed upon problems and solutions into storylines that are likely to ersonate in society.
- Using media and lobby tactics to influence societal agenda'sand advocate solutions (with the help of storylines/symbols).
- Organising regular reflection on process dynamics and satisfaction with outcomes.

Source: Modified from Klerkx *et al.*, 2012.

ods and tools to enable the 'platform actors' to jointly realize their objectives despite differing world views and often competition for the same resources, by creating dialogue and the understanding of their interdependency. The experience of embedding systemic (system-wide) facilitation roles is emerging in agricultural innovation studies. Intermedia-

Figure 2.3 | **Double-Loop Learning**



tion and brokering – tasks related to bridging relationships among groups of individuals and organizations, and connecting them to different resources and services – are required for systemic facilitation of innovation processes. The systemic facilitation functions have been described using several concepts and approaches, such as *'innovation brokering'*, *'innovation championing'*, *'network facilitation'* (see Devaux, *et al.*, 2010; Kilelu *et al.*, 2011; Klerkx *et al.*, 2012b; Klerkx and Aarts, 2013). It is important to note (see Box 2.3) how roles of innovation brokers or systemic facilitators and researchers who intend to foster partnerships (e.g. action researchers), differ from classical roles in extension and advisory services.

Facilitation of local innovation processes is rooted in the notion of *'local innovation systems'* that encompass clients (e.g. farmers, pastoralists, a fishing community) and facilitating organizations (research, extension, input dealers, local traders), with an aim to solve a specific problem or support a particular outcome, e.g. enhancing farmer livelihood assets. Innovation outcomes depend on iterative, evolving interaction and learning among these actors. A local innovation system places emphasis on farmer's (or local client's) ideas, creativities, and skills (Wettasinha, Wongtschowski and Waters-Bayer, 2008; Waters-Bayer *et al.*, 2009; Wongtschowski *et al.*, 2010).

2.3 Collaborative learning

Facilitating innovation means supporting learning processes and enabling individuals to reflect on their experiences, to encourage critical thinking and challenge old and existing assumptions and preconditions. It is necessary to consider facilitation tasks and learning processes at individual, organizational and policy and environment levels.

As mentioned earlier, however, innovation does not take place at the level of an individual farm; rather it instead involves a plurality of actors and leads to a reconfiguration of relational patterns. Social or collaborative learn-

Box 2.4 | **PETRRA – Learning for pro-poor values in agricultural research**

Poverty Elimination through Rice Research Assistance (PETRRA) – a project supported by DFID, UK, and managed by the International Rice Research Institute (IRRI) – was implemented from 1999 to 2004 in partnerships with organizations representing research, education, public-sector development institutes, and non-profit organizations at national and local level as well as private sector and community organizations in Bangladesh. The objective of the project was to enhance the livelihood security of poor farmers by increasing the production and productivity of rice-based farming systems through poverty-focused research. The project established partnerships among multiple actors according to their potential roles in the project. The actors differed in their views of pro-poor rice technologies, knowledge and skills, and attitude towards working with poor-farmer. The project adopted an approach that allowed new ideas and innovative practices to emerge through action and reflection with partners, and then incorporated these into a management system that was coupled with capacity building to facilitate the process. Over the years, it created spaces for dialogue and reflection through several mechanisms, such as initiating new ideas, including new outputs, revising project purpose, inviting and entertaining new ideas from project stakeholders and outsiders, reviewing suggestions, and reacting according to the situations. Although the project was criticized for lack of implementation efficiency, it established an example of how to create a culture of learning and enthusiasm among a wide range of actors, i.e. its partners and wider stakeholders helping re-visit their existing knowledge, skills, values and attitude towards working with and for poor farmers, and developing a shared value and goal for enhancing their livelihoods.

Source: Modified from Klerkx *et al.*, 2012.

ing captures the fact that a change is connected with individual or collective, or both, cognitive changes of various kinds. It is a process through which actors of similar or different groups gradually develop complementary and overlapping, or even fully shared, understanding. Learning occurs when people start getting to know each other in a social space (such as meeting in an organization, or committee platform) and work together and concretely learn something together through action.

Facilitating innovation implies supporting learning processes and adaptation to specific socio-technical contexts (Knickel *et al.*, 2009). The facilitator enables individuals to reflect on their experiences, encourages critical thinking, and challenges old and existing assumptions and preconditions. As innovation actors operate at spatial and temporal scales, and may be thought of as comprising a hierarchy of levels where process operating at one level can affect stability and dynamics of other levels (Hall and Clark, 2010), it is necessary to consider facilitation tasks and learning processes at individual, organizational and policy, and environment levels.

Learning is about making sense of reality in order to understand what is happening and why, in order to act more effectively and meaningfully. Collaborative learning is the process by which communities, stakeholder groups or societies learn how to innovate and adapt in response to changing social and environmental conditions (Woodhill, 2010).

It aims at moving beyond mere reflection, to improving action, to questioning underlying assumptions and beliefs of the actors, i.e. to achieve double-loop learning.

In view of the fact that AIS is both complicated and complex, double-loop learning is essential, to respond adequately in rapidly changing contexts, to make learning an integral activity and ultimately achieve the desired results (Ministry of Foreign Affairs of The Netherlands, 2011). Single-loop learning is about improving existing actions ('Are we doing things right?') and leads to modification of action in accordance with the difference between expected outcomes and obtained outcomes. Small changes are made to improve existing practices, procedures or rules. Double-loop learning, in contrast, questions the assumptions or policies behind initial expectations ("Are we doing the right things?"), thus gaining insight into why something works or does not work (Argyris, 1977). Ultimately, interaction should lead to triple-loop learning with a focus on challenging and changing the underlying values and assumptions and on solving complex problems. Triple-loop learning answers the question "How do we decide what is right?" Or "What is the underlying assumption of how change happens?" For this reason, AIS emphasizes a continuous spiral of action, reflection, learning and revision, which of course requires skilled facilitation.

Facilitation of group or collaborative learning has long been a common task for enabling innovation processes at individual level. The goal is to support experiential learning through methods and tools, such as Farmer Field Schools (FFS), Farmer Participatory Research (FPR), Integrated Pest Management (IPM) Schools, Local Agricultural Research Committees (CIALs), Farmer-led research, Participatory Technology Development (PTD), or Participatory Innovation Development (PID). According to theory, learning occurs from a continuous feedback (through dialog e and interaction) between thinking and action: concrete actions result in certain experiences, which are reflected upon and subsequently generate cognitive changes, from which new actions can emerge. Collaborative learning can be enhanced by clarifying concepts, principles and steps, and by offering new learning opportunities, such as encouraging experimentation, stimulating processes of reflection, and assisting in drawing conclusions (cf. Leeuwis and van den Ban, 2004).

Facilitating complex change processes leading to system-wide learning calls for very specific orientation in systemic action research, not only to support actors in understanding and changing the system's dynamics and challenging their assumptions, but also to help connect multiple strands of learning processes occurring horizontally and vertically across social systems, organizations and networks. In other words, facilitation supports the implementation of a learning architecture to assess the significance and importance of what is being learnt (Burns, 2014).

2.4 Documentation and knowledge management

'Documentation and knowledge management' is one of the core issues to be considered in CD for AIS. Documentation of the change process and knowledge management (KM) are central to AIS to ensure joint learning among multiple actors. The essential difference between the traditional linear and the multidimensional views of the innovation process is one of different conceptions of what knowledge is relevant – tacit versus explicit – and how this knowledge is identified, captured, evaluated, retrieved and shared among all stakeholders (Hartwich *et al.*, 2007). In the multi-dimensional innovation system approach, relevant

knowledge is much more complex, both in its origins and content (Koutsouris, 2012). All actors are potential sources of knowledge, and this includes not only new agricultural technologies, but also management issues and their organizational matters, such as market information and government policies.

The perspective of AIS – where individuals and organizations act and survive by adapting and learning to organize themselves into communities – requires a significant effort in terms of supporting KM methods and techniques. In this sense, KM is concerned with a holistic and cyclical process of knowledge production (learning) and knowledge dissemination.

Agricultural and development organizations encounter challenges in moving beyond their internal KM system that emphasizes codification of knowledge to be used in their reporting and planning. They thus frequently ignore or overlook the value of local knowledge (Horton *et al.,* 2011). It is necessary to recognize that knowledge is socially constructed, and is mediated and enriched through negotiation and cooperation of different sources (actors) of knowledge. Tacit knowledge is a personal knowledge element embedded in individual experiences and involves intangible factors, such as personal belief, perspectives, and value systems. Tacit knowledge is relatively difficult to formalize, codify and/or communicate. In what follows, the KM task should focus on embedding tools and methods (see Box 2.5) that are sensitive to both 'tacit' and 'explicit' knowledge, and lead to an inclusive innovation process. For instance, video has usually been used as training and technology transfer tool for agricultural development. Recently, however, there is a growing amount of literature on approaches and methods of using video as a tool for documentation of knowledge and stimulating group and multi-actor learning processes from an innovation systems perspective in Asia and Africa (see van Mele, 2006; van Mele, Wanvoeke and Zossou, 2009; Chowdhury, van Mele and Hauser, 2011; Chowdhury *et al.,* 2015).

KM is defined from the 'situated mutual learning' perspective (see Box 2.5), in which different groups and organization, while recognizing their unequal social positions, interact with each other and seek to share and co-produce knowledge with an aim to advance their interests (Horton *et al.,* 2011; Klerkx *et al.,* 2011). For instance, when an organization (whether national or international) and its local partners engage in mutual learning in a specific context, they co-produce new knowledge that is considered valid and useful to both sides of the organizational boundary. Knowledge exchange amongst individuals and organizations does not take place automatically; it needs to be supported by a process of negotiation and reconciling of differences among the participating groups. Similarly, the institutional dimension of KM needs to be considered. Institutions, organization and the policy environment determine the goal and objective of knowledge sharing and utilization, ability of actors to share knowledge, the types and legitimacy of knowledge, decision about use of methods and tools of knowledge management (see Nyirenda-Jere and Kazembe, 2014; Klerkx *et al.,* 2011; Pol and Nederlof, 2010).

There are various tools and methods that can be used for KM and documentation for AIS. Many of these tools and methods are also relevant for learning and facilitation. For an overview of KM tools, please consult the KM course available at www.imarkgroup.org; KM toolkit http://www.kstoolkit.org/; CTA KM and communication programme http://www.cta.int/en/our-programmes.html; and tools and cases at http://knowledge.cta.int/. Broadly, KM tools and methods can be categorized as follows:

- *Methods and tools requiring face-to-face interaction:* Most of the learning and facilitation methods and tools can be used for capturing, storing, and

Box 2.5 | **Knowledge management for fostering innovation through a Participatory Market Chain Approach (PMCA) in the potato value chain, Bolivia**

Papa Andina – a regional project hosted by the International Potato Centre (CIP) and supported by the Swiss Agency for Development since 1989 – fostered agronomic, technical, and commercial innovations in Andean potato-based food systems to improve farmers' access to more dynamic and lucrative markets. The network reaches about 4000 poor rural households and includes about 30 partners in Bolivia, Ecuador and Peru. It pursues several strategies: increasing demand for native and commercial potato varieties; adding value to potatoes; improving contractual arrangements; and facilitating access to commercial information. The project applied several approaches: 'participatory market chain approach (PMCA)', 'stakeholder platforms', and 'horizontal evaluation', to foster innovation by facilitating mutual learning and collective action among individuals and groups with differing, often conflicting, interests. Although the approaches to developing the networks are common (namely the PMCA and stakeholder platforms), different organizational arrangements, involving different partners and interaction patterns, emerged in each project implemented by Papa Andina. The success of the project largely resulted from the exploration of alternatives to reaching its goal (poverty alleviation), the involvement of different actors in developing and testing innovations, and the continued support of its funders. Papa Andina's approach to KM focuses not only on universally valid codified knowledge (e.g. peer-reviewed scientific publications, training manuals), but also on learning and use of locally relevant knowledge in decision-making. For instance, approaches, such as the PMCA and horizontal evaluation, have produced new knowledge that has been useful for both the international and the local organization involved. The KM tools and techniques were necessary, but the critical factors were those helped in strategically using the tools to achieve broader innovation goals. One of the most important factors in the success of a PMCA application is the extent to which an appropriate innovation network is established, with adequate representation of, and ultimately leadership from, entrepreneurs within the market chain. Another important success factor is the extent to which the exercise is focused on innovation that is market driven, by which innovation is defined that is linked to a market opportunity and emerges from the interaction of actors along the value chain. This type of knowledge cannot be simply captured, stored and transmitted using different tools and methods (e.g. sending publications, manuals or user guides). It requires use of skilled facilitators/innovation brokers to lead multi-stakeholder groups through unfamiliar types of discussions, negotiations and product-development processes over a period of months.

Source: Cited from Horton *et al.*, 2011; World Bank, 2012.

transmitting knowledge to support multi-actor innovation processes.

- *Traditional Information and Communication Tools (ICT):* These include use of radio, video, mobile 'phones and podcasting.
- *New ICTs, online methods and tools:* These are broadly internet-based tools that help knowledge sharing and creation through a systemic interaction of different actors. The tools include Web 2.0 and social networking sites.

- *Hybrid tools:* These tools are based on media convergence, integrating online and traditional media, such as integrating mobile SMS with the internet, integrating video and audio with the social networking and learning and KM systems.

Various initiatives for harnessing the potential of ICT for agricultural development – such as use of internet-based tools, mobile 'phones, social and collaborative media (Web 2.0) for knowledge sharing, co-generation and utilization – could further support knowledge creation and sharing. However, the extant practices of ICT for agricultural development have been dominated by the linear development approaches of a 'digital-divide' and 'information access'. It is necessary to explore use of ICT technologies for bringing 'systemic' interaction in an innovation system (Sulaiman *et al.,* 2012). The 'digital evolution' with an increasing availability of internet and mobile 'phones and opportunities for convergence of old and new media, offer new avenues for creating, processing and communicating knowledge and enabling conversations among different stakeholders, leading to collective action and solution of development problems. Video, mobile phones, radio and virtual platforms including social networking media should be used in enabling new types of relationships, networking, and negotiation processes, where local, national, regional and global actors of research, development and public spheres can jointly learn from each other based on their comparative advantages (see: Chowdhury and Hambly Odame, 2013; World Bank, 2011). ICT tools should also be used to foster voice and enable inclusive decision-making processes (Kleine, 2010; Kalas and Spurk, 2011; Asiedu, 2012).

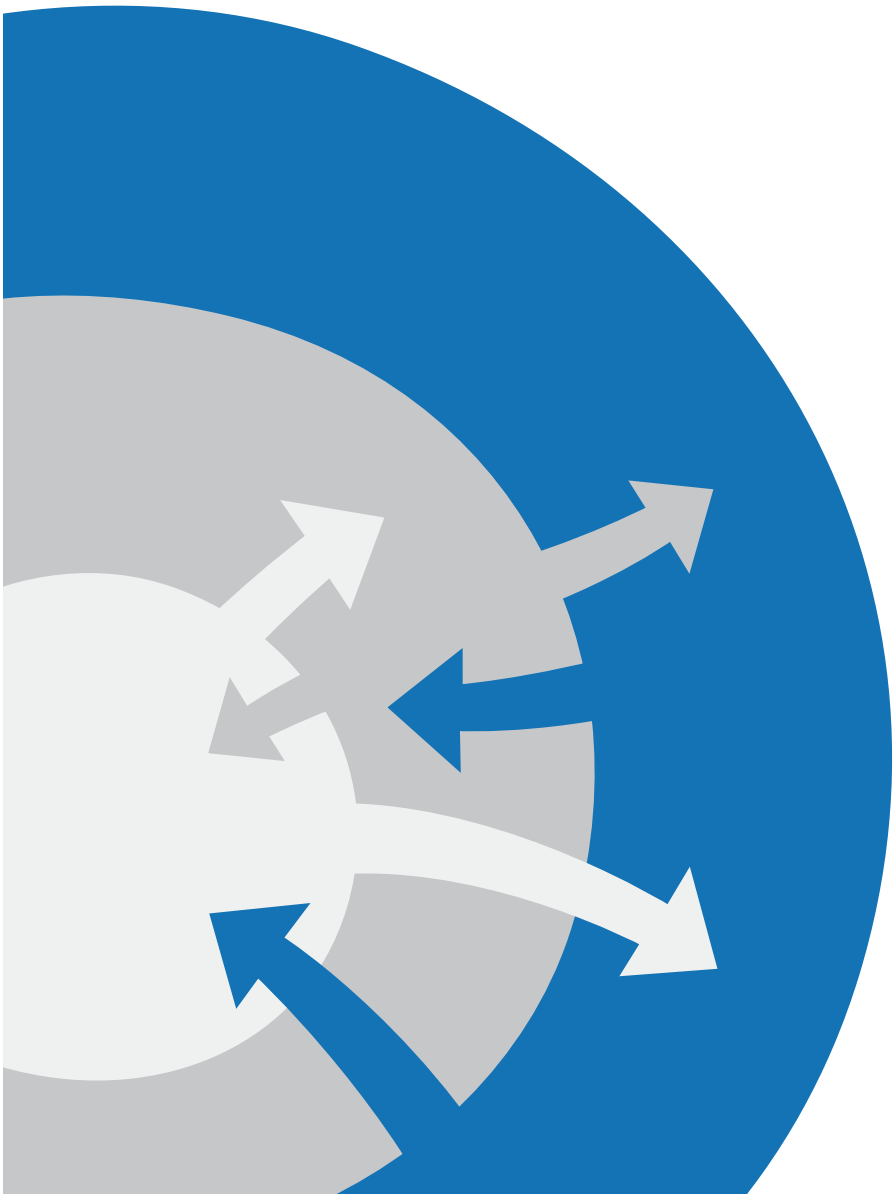
Each situation of agricultural development exhibits a unique combination of socio-economic, political, institutional and technological conditions. Introducing a new knowledge-intensive project to a new setting requires adaptation of a KM approach for each new situation. This implies exploring approaches aiming at promoting and organizing learning from experience and collective behaviour, not managed from above but emerging out of the system's network of interactions, calling for mechanisms facilitating experience documentation, and learning spaces among multiple agents, such as communities of practices and other networking tools (See Box 2.5).

From the above discussion, it is arguable that 'knowledge in action' is neither unequivocal nor straightforward. It involves bringing together perspectives of a variety of actors who are part and parcel of a problematic context, through facilitation of a collective process in which new social and technical solutions, or at least their contours, are designed, agreed, and/or acted upon (See Box 2.5). The conventional problem-solving or learning process tends to be ill-equipped to handle uncertainty, ambiguity, risks and unintended consequences. Methodologies such as Reflexive Monitoring in Action (RMA) focuses on analysis of the dynamics of network building, social learning and negotiation processes, and/or the effectiveness and efficiency of individual and/or collective activities, with a view to adapting interventions in the immediate future. It builds on the assumption that recurrent collective reflection on the current system (barriers as well as opportunities) helps to stimulate collective learning and to design and adapt targeted systemic interventions (Mierlo, Arkesteijn and Leeuwis, 2010, Arkesteijn, Mierlo and Leeuwis, 2015). The methodology comprises a large number of interventions (a flexible set of tools) for stimulating the learning process within a project. With the aid of the various tools and skills, a reflective monitor (or a knowledge manager-

cum-facilitator) encourages participants to reflect upon the relationships between the project's activities and results and its institutional setting, and the ambition to change both short-term actions and long-term goals and future perspectives (for details see Mierlo *et al.*, 2010).

CHAPTER 3

Capacity Development for Agricultural Innovation Systems



The review of the discourse around AIS in the previous chapter highlights that innovation results from the conscious provision of space for networking and facilitation of interaction of multiple actors in the system. Such multi-stakeholder processes aim at building trust and mutual understanding, stimulating collective learning, and creating the conditions for collective decision-making and action. The concept of AIS not only calls for a shift in the roles of various actors in agricultural development, with new ways of knowledge creation, sharing and learning, and concomitant changes in the institutional and policy setting, but it also calls for innovative and systemic approaches to capacity development to enable that shift.

3.1 Defining Capacity Development

The OECD (2006) defines 'capacity' simply as 'the ability of people, organizations and society as a whole to manage their affairs successfully'. Capacity can be generally viewed as the ability of individuals, organizations or society as a whole to set and implement development objectives as well as to identify and meet development challenges in a sustainable manner (Land, 2000) thus creating value for themselves and others (Morgan, 2006).

Capacity requires that the individuals acquire competencies – the core knowledge, skills, attitudes and energies needed to work effectively. Organizations need to coordinate and use individual competencies in such a way that their collective potential is realized. This includes the 'collective' ability of a group or system to function as effective organizations and provide the space for organizational learning, adapt to changing circumstances, build effective partnerships and take risks, not only to act towards organizational goals, but also to acquire and manage the necessary resources. The collective skills involved may be technical, logistical, managerial or less tangible, such as the ability to earn legitimacy, to create trust, to adapt and to create meaning (Morgan, 2006).[9]

CD is increasingly recognized as a multi-dimensional and multi-actor process that goes well beyond the transfer of knowledge and skills at the individual level and encompasses organizational and institutional dimensions (Pearson, 2011). Institutional dimensions, or the "rules of the game", cover on the one hand formal aspects such as laws, policies, regulations and standards, and on the other hand, informal aspects, such as cultural values, beliefs, behavioural patterns and mindsets, all of which determine, to a large extent,

[9] The distinction made between competencies, capabilities and capacity (see Baser and Morgan, 2008) is a compelling one. Given, however, the purpose of the framework to be implemented globally and the difficulty of translating the niceties of this distinction into other languages, the TAP taskforce decided not to use this distinction.

the capacity of individuals and organizations to be effective. For all these dimensions the terms 'capacity' and 'capacity development' are used referring to a wide variety of inputs and activities from standardized training of skills, to adaptive process facilitation.[10]

One widely accepted definition of CD is that *it is the process whereby people, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time* (OECD, 2006). The emphasis here is on process rather than one-off, time-bound interventions. This process is an endogenous one, owned by the stakeholders involved. As with agricultural innovation, capacity is seen to 'emerge' over time, influenced by multiple factors, both internal and external (local, national and international), and formal and informal (Watson, 2010). No single factor or constituent element – incentives, leadership, financial support, trained staff, knowledge or structure – can by itself lead to the development of capacity.

If capacity is understood as emerging over time in an unpredictable fashion, involving collective learning, with adaptation to numerous factors, opportunities and challenges, then it cannot be designed and implemented by external actors with a well-defined and standardized set of products and services (Horton *et al.,* 2003). This calls indeed for a fundamental change in our perception of capacity and CD.

A systems' approach views capacity as an "innate, natural process following complex, shifting and often unpredictable pathways that defy central steering and control" (Kaplan, 1997). Defined in this way, capacity of the system has to do with collective ability, i.e. "that combination of attributes that enable a system to perform, deliver value, establish relationships and renew itself" (Morgan, 2006). Effective capacity is: *"visible and exists when people identify and act on issues of shared concern. And thus real capacity lives among actors and in the ways that they deal with each other to solve problems or to realize their ambitions. In doing so, they build up relational competencies and generate trust"* (Woodhill, 2010).

CD is often seen narrowly as a process of improving the ability of individuals and organizations to perform their assigned tasks in an effective, efficient and sustainable manner. In other words, capacity is viewed primarily in terms of improved performance. Indeed, as Watson (2010) notes, performance of individuals or organizations tends frequently to be seen as a proxy for capacity. The connection between capacity and performance is, however, murky and seldom immediate. Investments in capacity can take days or even years to yield significant results. This is partly due to fact that an organization's performance is influenced by both its internal environment and by the external environment in which it operates (Horton *et al.,* 2003). Whilst the immediate aim of CD may be the improvement of performance of individuals, organizations and, by extension, the system, the terms capacity and performance should not be seen as synonymous (Mizrahi, 2003; European Commission, 2012).

Oritz and Taylor (2008) point out the need for capacity and capacity interventions to go beyond improving immediate performance and to develop what they term "standing capacity".[11] Individuals, organizations and systems, they argue, need capacity well above that which they use on specific projects each day, in order to adapt to new and constantly changing environments, to learn and analyse

[10] Capacity is also used to refer to aspects of finance and infrastructure, which are not considered here.

[11] The present framework uses the term "capacity to adapt and respond in order to realize the potential of innovation" in a way similar to "standing capacity". This is discussed in detail below.

internal and external context and to relate and build partnerships. If individuals and organizations are only prepared for limited results and immediate programme needs, then they are not preparing systemically. Developing the capacity of a system with its actors, incentives, norms, processes, etc., they argue, is paramount if results are to be achieved.

CD therefore is not just about 'delivery of results', but about facilitating processes to enable stakeholders to avail themselves of opportunities, build trust and take joint action (Ministry of Foreign Affairs of the Netherlands, 2011). CD 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).

As highlighted already in the previous chapter, for complex problems to be solved, new knowledge and new practices are required. Through the interaction of stakeholders with different backgrounds, perspectives, values, interests and knowledge related to the issue at hand, collective learning *"contributes to a 'learning system' in which people 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).

It is the heterogeneity of the group that offers the opportunity of producing new knowledge and creating a shared awareness of the various interests involved. Collaborative learning and capacity development are interdependent, continuous, iterative processes building on the experience of actors continually offering new insights.

Indeed, the World Bank views learning leading to change as the CD process, defining CD as *"a locally driven process of learning by leaders, coalitions and other leaders of change that brings about changes in socio-political, policy-related and organizational factors to enhance local ownership for and effectiveness and efficiency of efforts to achieve"*, i.e. in the case at hand, a functioning AIS (adapted from World Bank, 2009).

3.2 Dimensions of Capacity Development

Conventionally, capacity has been viewed and addressed in a sort of hierarchy composed of various levels: individual, organizational, inter-organizational and system. More often than not, there is simply an implicit assumption that competencies at individual level will enhance capacity at organizational level, which in turn will contribute to the emergence of capacity at institutional or systems level, creating an enabling environment. The rather static categorization of levels gives no indication of the interconnections among them. There is some indication that CD at an institutional level or the provision of an enabling environment stimulates organizational CD, which in its turn calls for enhanced competencies of individuals within them (Mur and Nederlof, 2012). The three dimensions are understood to "influence each other in a fluid way" – the strength of each depending on, and determining the strength of the others" (UNDP, 2011). Indeed, the dimensions must be viewed as interconnected, affecting each other in complex ways through push and pull factors. Within the context of AIS, it is pertinent to also stress the dimension of partnerships and networks that are crucial in creating that interconnectedness, bringing together individuals and organizations to co-create new knowledge. In order to highlight the interconnectedness, we talk here of dimensions rather than levels. The present Common Framework emphasizes the interdependent relationship among dimensions to strengthen 'system-wide' capacity.

Figure 3.2 | **The 3 dimensions of Capacity Development**

Source: FAO 2010.

Strengthening "system-wide" capacity involves factors that influence the management of organizations, and in particular the interaction among these organizations and other stakeholders, and builds trust between them. CD for AIS must ensure the design and implementation of an appropriate institutional framework (or enabling environment) if organizations and individuals are to sustainably improve their own capacity and innovate. A system's capacity to innovate (Leeuwis *et al.*, 2014) requires conducive incentive structures and political commitment in order for stakeholders and organizations to acquire and effectively manage knowledge, to learn as well as coordinate and collaborate. One cannot assume that CD of individuals and organizations will somehow automatically influence or create the enabling environment. The Common Framework thus specifically looks at if and how the capacity of the enabling environment can be developed in order to create the incentives for interaction, exchange of knowledge and collaborative action of all actors in the system.

3.3 Defining the enabling environment

Given the nature and complexities involved in the innovation process, all those factors that influence society's attitudes towards innovation, short- and long-term perspectives, investment behaviour, and, in general, shape human interactions in relation to innovation – all these play a significant role in influencing the relationships among the direct actors in the innovation process.

In general terms, the "enabling environment" is the context in which individuals and organizations put their competencies and capabilities into action (and where capacity development processes take place). It includes the institutional set-up of a country, its implicit and explicit rules, its power structures and the policy and legal environment in which individuals and organizations function (FAO, 2010). Beliefs, values, legislation, economic policies and variables thus define the specific action spaces in which the different social actors interact in a consistent way to develop, access and put to work knowledge and new ideas. The concept of the enabling environment is thus very broad, including both "intangible" components, such as social conventions and rules of action, values and beliefs, social habits, etc., as well as "tangible" aspects linked to the formal structures dealing with governance, formal rules and regulations, and policy aspects.[12]

Although both informal and formal factors are significant in influencing the behaviour of the actors in innovation processes, which inevitably change over time, informal aspects may be beyond the range of the immediate influence of capacity development efforts, i.e. outside the immediate system boundaries. Aspects usually dealt with within the formal

[12] In the context of the present discussion, policy is the set of decisions that make action happen, i.e. in essence, non-legislative decisions, such as setting standards, allocating resources between organizations, changing the levels of subsidies or taxes, decisions about whose voice to include in debates, and on what evidence to base decisions (see ODI, 2015 – Global Mental Health Policy Influence Toolkit).

Box 3.1 | **Creating enabling agricultural innovation policies in Latin America**

Latin American countries have experienced many successes and failures with innovation interventions for agricultural development over the years. The majority of these were based on research-centred technology transfer. Even though this approach brought some success, there has generally been innovation and agricultural productivity improvement, without concomitant institutional sustainability. Lack of a shared vision among system actors, missing effective linkages to other agricultural policies, poor coordination, and opaque funding mechanisms have, among other factors, been identified as challenges. Increasingly, the AIS perspective is being viewed as a workable alternative, with the objective of facilitating the coming together of different actors to develop and share knowledge and options for better use of resources and to improve productivity.

Mexico, Peru, Bolivia and Chile, among other countries, have moved in this direction and set up basic structures to facilitate coordination. Although they have adopted different approaches, they share the objective of creating formal coordination of AIS. Efforts are centred on development of the capacities of the existing research and extension organizations to undertake broader coordination and facilitation functions among system actors. Most of these interventions have received substantial resources from international organizations to support transition processes. It is still too early to assess the effectiveness of the new approaches, but existing information seems to suggest that CD for AIS needs to be pursued more aggressively to ensure success. Explicit innovation-support policies, creation of a shared vision and objectives, and better collaborative learning mechanisms are emerging as the key elements in need of improvement.

Source: Trigo *et al.*, 2013.

institutional structures where legislation, policies and regulations are designed, implemented and enforced, can be tackled more directly. This institutional space – "governance, regulatory and policy-making organizational structures" – should be an integral part of CD efforts. It is necessary to understand how existing legislation and policies influence and affect – positively or negatively – specific innovation processes, and from there identify possible responses, leading to changing the conditions and creating more proactive environments. Ideally, this will lead to the creation of those conditions and decision-making processes consistent with existing innovations needs and opportunities.

Viewing matters from the above perspective and for operational purposes in the context of capacity assessment and development efforts, it is useful to work with a concept of enabling environment that concentrates on gaps in competencies, capacities and skills that can clearly be identified, and where strategies for their improvement can be developed. For this purpose the "enabling environment of AIS" is defined as the set of factors that influence agricultural innovation, but that are controlled by governance, regulatory and policy-making organizational structures other than those directly linked to agricultural innovation. At the AIS level, the role of the agricultural innovation policy is to seek and promote effective coordination with these other domains to ensure that together they enable agricultural innovations (see example in Box 3.1).

Within the "governance, regulatory and policy-making organizational structures" three main clusters of enabling factors can be identified:

1. agricultural and rural policies aimed at improving infrastructure, credit, and markets;
2. innovation policy and corresponding governance structures, providing vision and priorities and linking AIS to the general knowledge infrastructure; and
3. institutional conditions, which includes all the macro-rules and regulations that define the country's business environment, guiding resource allocation and production decisions.

The following paragraphs elaborate further on the characteristics and specific components of each of these three clusters.

Agricultural and rural policies – such as sector and commodity priorities, promotion of agricultural industries, and infrastructure and market development – constitute the most immediate "ring" of enabling conditions for agricultural innovations, as they form the direct context of the agricultural enterprise and have direct impacts on production and other decisions of importance in relation to the innovation process.

A second 'ring' of enabling conditions are key issues linked to the **formal recognition of innovation as a policy objective,** namely the extent to which these issues are recognized and addressed, as well as the nature of the existing coordinating mechanisms (with other policy areas and across innovation sectors), and the type of instruments in place for implementation. Issues here include governance of innovation systems, priorities of innovation education and research policies, as well as the creation of a conducive investment climate.

Finally, **institutional conditions** represent the outer 'ring' of the governance, regulatory and policy-making structures, and cover macro-economic and other economy-wide policies and the general legal and regulatory environment. They include aspects that, though they definitively have implications for the behaviour of innovation actors in general, it would be difficult to argue that they are subject to the influence of specific innovation system-related CD processes. If they are influenced, it is through long-term processes that extend well beyond the planning span of most CD initiatives. Nevertheless, keeping track of them is crucial to the understanding of this process and the design of effective intervention strategies, as framework conditions significantly influence the innovative behaviour of individuals and organizations.

Framework conditions include macro-economic policies, the most relevant of which are those that facilitate priority setting and facilitate investments in the creation and adoption of innovations (mainly, but not only, related to investment and entrepreneurship, and risk management issues) and those pertaining to the legal and regulatory environment.

3.4 The Capacity for Change

Conventional CD approaches have tended to focus on individual and organizational capacity, distinguishing between technical and functional capacities. Both effective functional and technical capacities are essential for individuals and organizations to achieve their set developmental goals. Technical capacity refers to knowledge and skills that are task or mandate specific and linked to organizational objectives and goals. Functional capacities are the skills, knowledge, attitudes and behaviour needed to organize and coordinate technical capacities so that individuals and organizations work effectively. They may include, for instance, strategic planning and programme implementation, ability to formulate and implement relevant policies and norms, capacity to harness and manage

Box 3.2 | **Basic CD for AIS principles promoted by the TAP Common Framework**

1. CD for AIS interventions must respond to expressed needs of actors. It cannot be designed and implemented by external actors with a well-defined and standardized set of products and services.
2. CD for AIS is an endogenous process, ownership by local actors is paramount to its success; collective energy, motivation and commitment of stakeholders to engage in a process of change are crucial.
3. CD for AIS is not politically neutral, it involves questioning and sometimes upsetting the status quo and may lead to conflict; it therefore needs strong, facilitative leadership and commitment.
4. CD for AIS is an iterative process rather than a one-off time-bound intervention. Capacity needs of today will change tomorrow based on experience gained in the face of new challenges or emerging opportunities.
5. CD for AIS is a multi-dimensional and multi-actor process that goes well beyond the direct transfer of knowledge and skills at the individual level and addresses in an integrated manner organizational and institutional dimensions.
6. CD for AIS interventions go beyond improving immediate performance to develop the capacity to adapt to new and constantly changing environments, to learn and analyse the internal and external context and to relate and build partnerships and pro-actively plan the future.
7. CD for AIS is context-specific and no blueprint or on-size-fits-all recipe can be applied.

knowledge, the ability to build and maintain partnerships (see Box 3.2), strong leadership or the ability to navigate the political dimensions of organizations.

The TAP Common Framework highlights **specific functional capacities** essential for AIS, and these are presented in the following section.

Developing the overall capacity of the agricultural innovation system with its various actors, incentives, norms, and processes, focuses not only on the competencies needed to achieve technical results but also on what it takes to build more effective and dynamic relationships among multiple actors and to 'facilitate resourcefulness'. Individuals and organizations must analyse internal and external context; bring various perspectives to bear through interaction, reflection and learning; access, create as well as take advantage of opportunities (e.g. technologies, markets, policy windows), in order to co-create and use knowledge, learn and chart the future. Organizations and institutional arrangements must support and facilitate the networks, partnerships and enabling environment that allow for the unleashing of this capacity over time in a sustainable manner.

Whilst there is agreement about the central role of CD to AIS, it is generally quite sparse on how to achieve a systems approach to agricultural innovation, Historically, building competencies and capacity for agricultural innovation has focused mainly on the individual and organizational levels in the areas of tertiary agricultural education, agricultural research for development, advisory services, individual farmers and farmer associations through both formal training and organizational development interventions. Several individual cases of capacity interventions regarding, for instance, curriculum change (Ochola *et al.*, 2013), restructuring of ministry departments (World Bank, 2014b), or specific extension programmes (Mbabu and Hall, 2012) can be found in the literature. However a comprehensive approach to CD for AIS

Box 3.3 | **Commercializing kale seed production through partnership with the private sector**

Brassicas are grown by over 90% of Kenyan small-scale producers, with kale the most important, providing food and income-generation opportunities through sales to urban centres. Researchers from CABI and the Kenyan Agricultural Research Institute (KARI), aiming to work with farmers to design appropriate Integrated Pest Management (IPM) approaches for kale, discovered farmers in one area were already using kale tolerant to a major disease. The variety flowered easily in one part of Kenya and farmers from elsewhere came to seek seed, although availability was limited. Activities shifted to addressing how to facilitate farmers' access to these landraces. At the same time growing and selling seed was identified as a potential income-generation activity for farmers in the area where the landrace flowered. Work took place with farmer groups to identify potential varieties and develop a clean landrace. Five distinct, uniform lines were developed, and enough clean seed produced to allow a thousand small-scale farmers in different kale-growing regions in Kenya to evaluate them. Farmer groups were trained in clean seed production, learning how to prepare and maintain disease-free plots and use safe packaging and storage. However, training was not enough for them to profit from seed production as a business, and it soon became clear that the farmer-research-extension coalition could not solve the problem alone.

To a large extent, policies determined how seed is marketed and a number of issues were identified. In Kenya it is illegal to sell uncertified and unregistered seed, and farmers also need to be registered to operate a business. Although farmers were interested in commercializing seed production they did not necessarily have the skills and capacity to operate independently, or the necessary networks or distribution capability. The project started to partner with other organizations and bodies to address these issues. The project engaged with Kenya Plant Health Inspectorate Services (KEPHIS), responsible for seed certification. KEPHIS provided inputs on seed regulatory procedures in training sessions showing farmers how seed plots are inspected, describing standards to be met and practical ways of achieving them. They also worked closely with the original partners to develop seed characterization procedures for kale, and implement multi-locational trials. Two out of 5 lines are currently being registered so they can be traded legally. Community development authorities and Ministry of Culture and Social Services were engaged to register the groups growing the kale. To become a registered seed merchant in Kenya is expensive and demanding and the project engaged with an existing private sector company to explore options. The private company saw an opportunity to commercialise varieties expected to find a ready market. Farmers would generate income by bulking seed and selling to the private company that would distribute and sell seeds commercially.

Source: courtesy of CABI Kenya.

that simultaneously addresses CD initiatives at individual, organizational and institutional dimensions has not been addressed.

'CD in its contemporary sense requires skills or competencies of both a scientific and non-scientific kind; it requires linkages between producers and users of knowledge; it requires the types of relationships and institutional setting conducive to knowledge sharing and interactive learning; it requires a policy environment that is sensitive to the need to create the conditions needed to make productive use of knowledge rather than focusing solely on the creation of that knowledge; and it needs the

science and technology and innovation policy foresight to prepare for the future' (Hall, 2005).

As discussed above, CD for agricultural innovation must facilitate the creation of synergy among research institutions, institutes of higher education (see example in Box 3.4) and public and private sector actors, small-scale farmers and development organizations, and ultimately enable innovation actors to address a whole range of activities, investments and policies that make change happen, while improving the way the different elements work together, take action and ensure iterative learning of the innovation system, continuously revisiting performance and how it is managed.Based on the above discussion of AIS and CD, and recent debates on "capacity to innovate" (see for instance Leuwis *et al.*, 2014), five key capacities[13] have been identified that relate to all three dimensions of CD (individual, organizational and the enabling environment). Thus beyond the skills, technical expertise and experience in their relevant fields to perform a given function, CD for AIS requires that individuals and organizations and the system as a whole develop:

- **Capacity to Navigate Complexity.** A shift in mind-sets, attitudes and behaviour to comprehend the larger system and to create an understanding of the whole system, as well as a shift from mainly reductionist understanding of the parts to systemic understanding of the relationships among 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 and managing conflicts, managing diversity in order to combine individual skills and knowledge, and create an awareness of their complementarity; and building synergetic partnerships and networks to enhance collaboration. It also involves communication skills and strategies, both internally and externally.
- **Capacity to Reflect and Learn.** Bringing stakeholders together, designing and leading processes of critical reflection and following a double-loop learning process leading to action and change. It 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, and analysis undertaken in an iterative fashion so as to promote experimentation and adaptive capacities as new opportunities for learning emerge.
- **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 in a number of dimensions, including: economic interests; the balance of power among elites; and civil society-state relations. Understanding and influencing the politics and power relations between individuals, within organizations and of the wider society, is crucial for bringing about new forms of interaction among stakeholders. It includes the conscious empowerment of vulnerable and often marginalized groups.

These four capacities are the core of an overarching **Capacity to Adapt and Respond in order to Realize the Potential of Innovation,** shifting focus from reactive problem solving to

[13] These capacities are adapted from four capacities originally put forward by Jim Woodhill for institutional innovation (Woodhill, 2010). The authors also acknowledge the influence of the Five Capabilities framework developed by the ECDPM that has also informed the thinking around capacities for AIS (Baser and Morgan, 2008).

Box 3.4 | **Strengthening of University Capacity for promoting, facilitating and teaching Rural Innovation processes (SUCAPRI)**

The SUCAPRI project was an initiative to promote IAR4D (integrated agricultural research for development) in Kenya and Uganda, involving five universities, agricultural research organizations and other stakeholders. It was realized that universities were not producing graduates with the requisite skills to promote innovation processes, and not sufficiently engaging with non-university partners in IAR4D. The project, facilitated by the International Centre for Development-Oriented Research in Agriculture (ICRA), sought therefore to support the universities to provide professionals with the competences needed to promote agricultural and rural innovation. This involved training of staff in more interactive teaching and research methods, agricultural curriculum development, and development of learning resources.

Specifically, the project set out to form 'communities of practice' of teaching and managerial staff to spearhead the improvement of teaching practice, facilitate rural innovation processes and develop teaching programmes in rural innovation.

Whilst the programme could not be fully implemented, mainly on account of bureaucratic bottlenecks, some impact was achieved, but with very marked differences among each university:

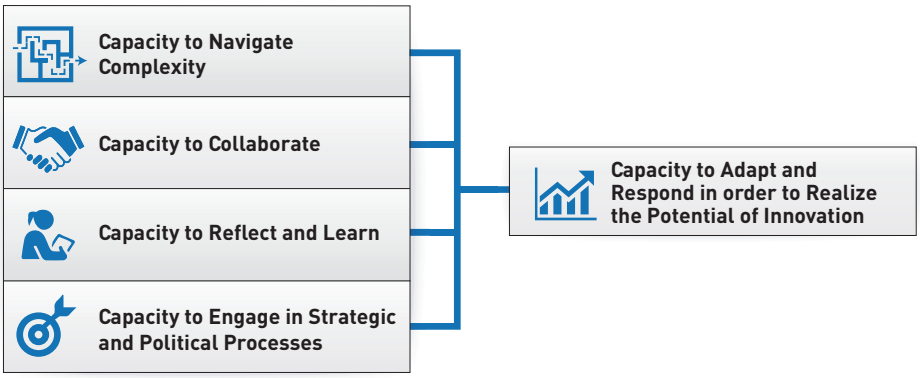
- Formation of core teams of change agents was achieved at three of the universities. These teams were active both within and outside the university, with improved skills and confidence for communication and collaboration. These teams gained increasing recognition for facilitation skills in workshops and meetings, both locally and internationally, and staff in these core groups were also recognized internally through promotions.
- Curriculum development. New courses and content areas included in Diploma and Undergraduate curricula were agricultural communication skills; adult education; educational technology; and extension methods. Team building and systems thinking were included as a common unit for some Masters-level courses. New Masters and PhD programmes included greater lecturer-student interaction and content areas in: systems thinking, networking, personal development and communication; as well as enhanced participatory development of new programmes (e.g. agribusiness management, natural resource management, food service hospitality management, nutrition and dietetics).
- Teacher practices. Changes included greater team and collaborative teaching; more varied teaching methods (more focus on facilitation rather than lecturing; group work; improved quality of individual and group assignments; debates; field visits; pictures; videos; use of games; energizers; etc.); more concern for holistic development of students (knowledge, skills, attitudes); improved student assessment through peer assessment; use of higher order questions in exams.
- Internal linkages and collaboration between faculties. The core team at one university was involved in forming cohesive research and consultancy teams, and active on university committees and assignments. Knowledge management and sharing, as well as the soft skills, gained enhanced internal and external networking for the success of other activities unrelated to the project, and increased personal effectiveness.
- Strengthened external linkages through training consultancies with one of the participating universities developing public-private partnerships. During the SUCAPRI project, contacts made with the 'Private Sector Development in Agriculture' Programme of the

Box 3.4 *(cont.)*

Ministry of Agriculture in Kenya, with the intention of facilitating multi-stakeholder groups within that programme as part of the project, lead to reciprocal training of (the Kenyan) university staff in value chain concepts and approaches. This led to a further project to mainstream value chains in the curriculum at the universities.

Source: Salm *et al.*, 2013.

Figure 3.3 | **The 4 + 1 capacities**



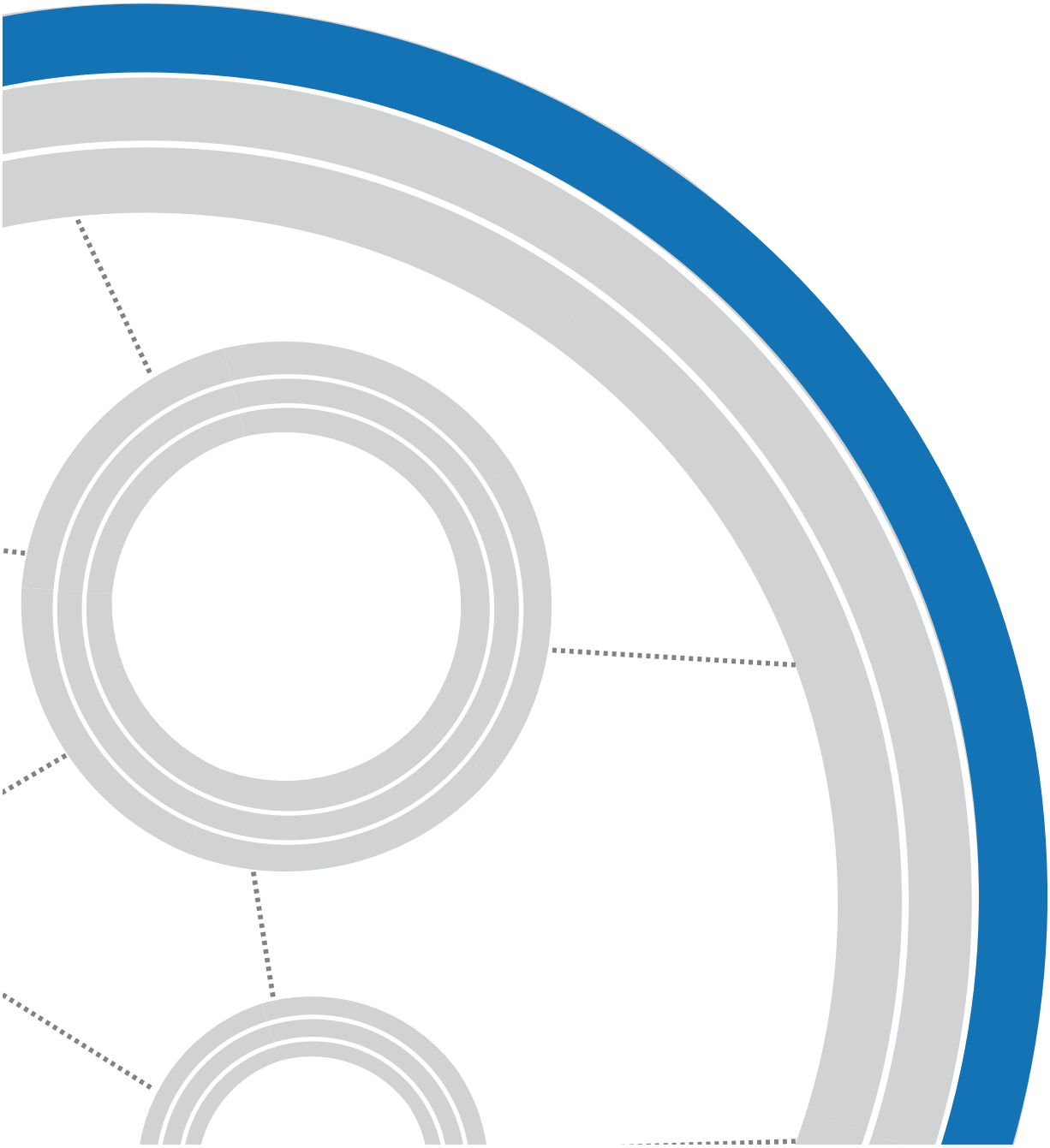
co-creating the future. This requires facilitative leadership to enable all of the above to happen. The five capacities are interdependent and are relevant at each of the three dimensions of CD.

The 'capacity to innovate' or capacity to adapt and respond 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; and (iii) creating an environment in which actors actively interact, exchange new ideas and expertise, and collaborate (Gildemacher and Wongtschowski, 2015).

- 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. Further indication on how to operationalize these capacities is given in "Guidance Note on Operationalization", the companion volume to this volume.

CHAPTER 4

Dual Pathways to CD for AIS



In line with the presentation in the previous chapters on AIS thinking, underlying concepts and assumptions, as well as understanding of CD as the facilitation of resourcefulness of actors in the system, a multilevel, conceptual approach (see Figure 4.1) aimed at developing capacity for effective AIS is proposed. The conceptual approach should be considered as a meta-direction for transformational change achieved through implementation of the operational approach outlined later, in Chapter 5 of this volume.

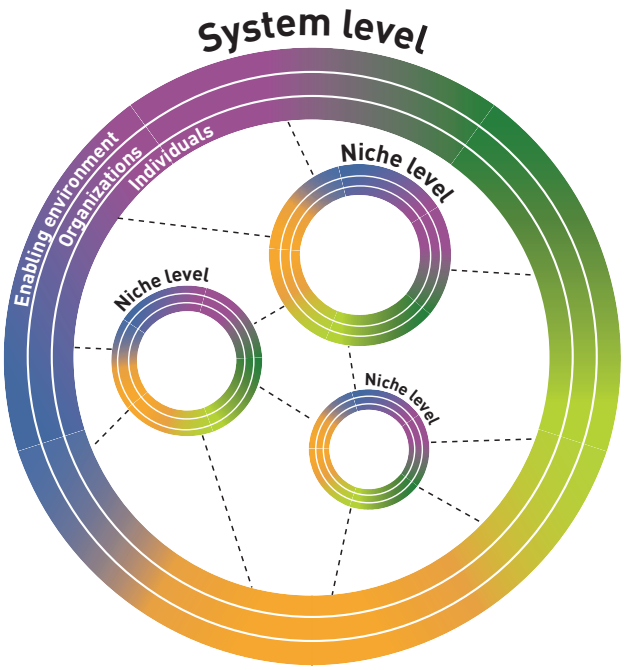
The conceptual approach uses the 'system innovation' or 'process view of innovation' – a process of interactive development of technology, practices, markets and institutions – which takes place in a system of networks of actors. Interaction among actors leads to the emergence of new insights, practices, processes or ways of interacting within a dominant production system or value-chain configuration. With time, an alternative to the incumbent system is developed or even replaces it (Klerkx *et al.*, 2012a) or combinations emerge (of resources, technical procedures or different bodies of knowledge) for better functioning of a process of production, or a network, or integration of two different activities (Knickel *et al.*, 2009). The origin of this thinking is rooted in socio-political and political economic studies, and a "Strategic Niche Management" approach. This has been discussed conceptually in relation to the CD for AIS (see for instance, Sarapura and Puskur, 2014; Klerkx *et al.*, 2012; Elzen et al., 2011; Hall *et al.*, 2010; Knickel *et al.*, 2009; World Bank, 2006).

Figure 4.1 illustrates how actors at both system and subsystem levels have conventionally been disconnected. Working through innovation niches as networks of AIS actors, joint learning and innovation at local level is achieved. These niches and the organizations linked to them are supported through CD interventions. Similarly, at system level, the CD cycle ensures interaction of actors. Linking the two levels through a learning architecture leads to system-wide learning and strengthening of the AIS. Strengthening of the overarching **Capacity to Adapt and Respond in order to Realize the Potential of Innovation** will result in trust building, new networks and partnerships to create an effective AIS and ultimately improve people's livelihoods. The process is however not a straightforward, linear one, and several enabling conditions (such as individual attitudes, technical competency, biophysical environment, organizational and institutional culture and capacity, as well as policy environment and market conditions) will influence the interaction of individuals within the system and the system as a whole.

The conceptual model distinguishes two levels of CD, the:

- **Innovation Niche:** the locus of learning and experimentation and micro-level transformation – developing

Figure 4.1 | **A Conceptual approach to CD for AIS**



innovation that has the potential, if managed strategically, to seed sustainable transformation. Innovation niches are spaces in which small groups of actors become part of a learning process – similar to pilot projects (see Box 4.1) – in which alternative socio-technical practices can be experimented with and developed in such a way that they subsequently inform and influence mainstream transformation (Hall *et al.*, 2010). The strength of the niche results from the interplay among three niche processes: (1) articulation and negotiation of shared expectations by participating actors giving direction and legitimacy to the niche; (2) a growing social network, including all relevant types of actors within the niche, both creating opportunities for stakeholder interaction and a micro-market that provides the resources necessary for experimentation and temporary protection; and (3) a learning mechanism (between experiments, between actors, etc.) that is a vital ingredient for the establishment of new rules and design heuristics (Witkamp *et al.*, 2010). Niches allocate time, knowledge, capabilities, and resources to alternative socio-technical practice, from which lessons are generated and disseminated. Such lessons, however, need to be acted upon in networks, wherein societal processes (e.g. capital formation, set-up of distribution, dissemination of knowledge, gaining of user acceptance) are activated. Although, the term "experimentation" is used here, it is vital to understand that the innovation niche

Box 4.1 | **Innovation niche and regime in AIS thinking**

Sesame in Burkina Faso

Sesame used to be a crop of negligible economic importance in Burkina Faso. NGOs supported producers to enter organic and fair trade niche markets, which created the first interest in Burkina Faso as a source of sesame. Over the last decade sesame demand from Africa has soared. Farmers in Burkina Faso have responded to this strong demand and gradual increase in prices by increasing both the area of production and the productivity of sesame. In 2012, sesame was the second most important export crop, covering more than 3% of the cultivated land, with a farm-gate value estimated at more than 60 million Euro. Producer training in production techniques and a liberal market, which allows buyers paying producers on the spot to compete for the produce, are important elements that contributed to this sub-sector development.

Source: Gildemacher *et al.*, 2015.

Integrated Pest Management in Ghana

Technological innovation does not suffice for wider impact of alternative pest management, such as bio-pesticides and integrated pest management. The wider impact can be achieved, if the technological innovation is supported with a socio-institutional regime that include new modes of regulatory approval, and new production and supply chains. For instance, a diagnostic study conducted in Ghana showed that increased capacity for integrated pest management for cocoa production is dependent on regime change in terms of land tenure arrangements, norms and standards in the cocoa market, and prevailing extension services, i.e. a 'technology transfer' model of extension.

Source: Dormon *et al.*, 2015.

Alternative marketing scheme for agricultural produce

In many countries, it is encouraged that producer and consumer start new organizational forms (e.g. farmers' markets or solidarity purchasing groups) in order to bypass traditional intermediaries. The innovation process requires 'trying out' and 'activating' different technical, organizational and consumption approaches that may differ from the existing ones. New arrangements, such as the pricing, food choices (organic, seasonal, local based on social justice), planning for production, collection and provision, may infringe existing rules and bring new ones.

is a continuing activity and is not a protected space with counterfactuals for rigorous scientific measurement. The term is used as in the term pilot, to emphasize the need to learn internally and to inform learning within the system as a whole to create an enabling environment for out- and up-scaling.

- **System:** The wider system of which the niche is a part consists of the multiple and diverse actors within the boundaries of a defined AIS. Learning from the innovation niche is one input to inform actors at system level in their own interactions to create an enabling environment for AIS. CD at system level recognizes social, cul-

tural and political structures in which power relations, social and institutional dimensions determine opportunities for different groups of actors to initiate an innovation niche, and then acting upon the interventions to attain sustainability.

A purposeful intervention is necessary that enhances capacities of individuals and organizations (actors in the innovation niche) on the one hand, and capacities of other social, institutional and political actors for improving enabling environment on the other hand. The CD of individuals and organizations will be linked to their involvement within niches or at system level.

4.1 Entry points and pathways

The conceptual approach takes into consideration the development of capacities of different dimensions (individual – organizational – enabling environment), and tracks synergies and inter-relationships among the levels. It is proposed that CD for each dimension has to be dealt with in its own right, whilst understanding the interaction among the dimensions. This can be done through multiple but complementary pathways of change. The conceptual approach includes two aggregated processes: (1) at system level, focusing on functionalities and performance of the system as a whole, without emphasis on any specific actors, or types of change; and (2) in an innovation niche, where CD will take place around a specific innovation agenda, such as food safety, nutritional security, curriculum for life-long learning in agriculture and food, farmers' market groups, food processing, constraints within a value chain, etc. CD at system level recognizes social, cultural and political structures in which power relations, social and institutional dimensions determine opportunities for different group of actors to initiate an innovation niche and acting upon the interventions to attain sustainability.

4.2 Identification of an innovation niche

Identification of opportunities and CD needs is an important step in initiating an innovation niche. Niche initiation should be based on articulation of different world views, interests, experience and visions of different actors, so that it provides direction to learning processes as well as continuous commitment of actors to nurture it. New ideas or entry points may come from scientists, individual farmers, traders, extension workers or policy-makers. Although an innovation niche will normally emerge from collective interaction and participation of broader actor groups, specific actor groups may be encouraged to play the roles of 'change agents' or 'champions'. In general, actors with genuine, serious interests in the niche are better placed to mobilize commitment and resources within their own organization and networks. Pre-intervention choices are helpful for determining broad boundaries of an innovation niche. The choices can be made based on certain criteria, such as commodity, geographical area, interest of target groups, types of market, concepts and guiding principles of development (e.g. gender, food security, food safety, value chain, etc.).

4.3 Facilitation, learning and alignment

Once niche choices have been made, interaction and iterative learning processes among the interested actors should be put in place. Experimentation allows for risks of failure and learning at multiple dimensions, technical aspects, market and user preferences, partnerships and networks (e.g. infrastructure, maintenance, production and knowledge), regulations and government policy, societal and environmental effects. Learning should

not only be directed at the accumulation of facts and data (a focus on technical experimentation), but also to changes in cognitive frames and assumptions (socio-institutional). An innovation niche gains momentum (opportunities created for wider application) as the process of learning and critical reflection unfolds and new ideas evolve.

It is suggested that an innovation niche may not automatically or directly influence the wider system. Intervention at system level is necessary to create opportunities for the 'growth' of the innovation niche. CD outcomes from the two levels (niche and system) need to be integrated and aligned for effective functioning of AIS. Iterative learning processes from the two levels allow for the identification of incentives needed for growth and emerging CD needs.

It is hypothesized that the interactions and integration of CD outcomes at two levels may generate different forms of politics among group interests, and modify perceptions, which further affect the functioning of AIS. Therefore, a purposeful intervention (system facilitation) is necessary that enhances capacities of individuals and organizations (actors in the innovation niche or protected space) on the one hand, and capacities of other social, institutional and political actors for improving the enabling environment on the other hand.

The multi-level perspectives will provide useful insights into the underlying dimension of change. This calls for the development of a learning architecture to bring together the learning from multiple, parallel and interlocking innovation niches across the system, with interconnected issues. This might involve hundreds of people and several dozen organizations and networks (see Burns, 2014).

Within the niche, interaction and iterative learning processes among the interested actors will be put in place. Experimentation allows for risks of failure, and learning occurs at multiple dimensions – technical aspects, market and user preferences, partnerships and networks (e.g. infrastructure, maintenance, production and knowledge), regulations and government policy, societal and environmental effects. Learning should not only be directed at the accumulation of facts and data (a focus on technical experimentation), but also address changes in attitudes and revisiting of assumptions. An innovation niche gains momentum (opportunities created for wider application) as the process of learning and critical reflection unfolds and new ideas evolve.

4.4 Outcomes

Whilst strengthening the AIS benefits various actors in the system, it is important to stress that CD for AIS aims ultimately at improving the livelihoods of small-scale farmers, together with small-scale entrepreneurs, to ensure more equitable distribution of the benefits of an improved system.

The conceptual approach recognizes two outcomes. Intermediate outcomes are issues of immediate change and may be achieved within a short time. Time required to take the change in effect depends on types of innovation. For instance, technological (e.g. agronomic practices) may require 1 to 3 years (at least 1 or 2 production cycles), while changes in specific institutional norms or traditions may require longer (3 to 5 years). In contrast, long-term outcomes involve changes requiring effective functioning of the AIS for improved livelihoods, which generally require considerable time to take effect. It will be important that the actors themselves identify the expected and desired outcomes at niche and system levels. Expected and desired learning, and long-term outcomes, are discussed further in Chapter 6.

CHAPTER 5

CD for AIS
An Operational Approach

In many countries in the tropics, initiatives related to CD for AIS (such as promotion of innovation platforms; creation of innovation research institutes or innovation departments within Ministries of Agriculture; new curriculum development for agricultural students) are underway. Such initiatives, however, tend to be addressed through a "watering-can" approach with little thought to synergy between them or mechanisms for learning and CD across the system. A central challenge to CD for AIS is indeed how it can be employed systemically across the whole research, innovation and development spectrum, addressing both mind-sets and the policies that shape the process (Mbabu and Hall, 2012) and not just confined to piecemeal "pilot projects" addressing only individual elements of the whole system. In particular, the underlying assumption still seems to prevail that by addressing individual and organizational capacities, the enabling environment (institutional arrangements and policies) will somehow adapt. Hawkins *et al.* (2009) suggests that not only is the creation of favourable organizational and institutional environments critical for agricultural innovation, it is lack of progress in this regard that is the main reason why it has remained largely at the level of "pilot projects".

As discussed in chapter four, CD is a locally-driven process of learning addressing socio-political, policy-related and organizational factors and enhancing local ownership for and effectiveness and efficiency of efforts to achieve a functioning AIS (adapted from Otoo *et al.*, 2009). CD for AIS is about creation and new uses of knowledge for social change and enhancing interactions among actors, as well as institutional development that creates an enabling environment for such interaction, learning and innovation (see Box 5.1). Learning is both aimed at changing people's behaviour and the development of more sustainable practices, as well as building capacity of actors to bring about societal transformation. CD and learning take place in multi-stakeholder settings in which a group of actors are confronted with new perspectives on an issue and jointly find solutions to complex societal challenges (cf. Zouwen *et al.*, 2010). Enabling interaction among actors in the agricultural innovation systems is therefore core to CD for AIS.

The TAP Common Framework thus attempts to identify mechanisms to bring the diverse actors of the system together creating the said synergies, identifying and putting in place new initiatives to enable an effective AIS. The dual pathways set out in the previous chapter proposes that in order to systemically bridge the

Box 5.1 | **Promoting attitudinal change – Plantwise, innovation through plant healthcare networks**

Plant healthcare networks evolved over time as a way of providing direct support to farmers seeking advice on crop health problems. Clinic doctors operate within in a heterogeneous network of actors, including technical experts, diagnostic laboratories and input, linking supply of knowledge to the demand, but also incorporating the tacit knowledge of local farmers. Doctors request advice and alternative control options from experts, and in some cases research projects have emerged to address problems with no known solution.

Linkages with local input suppliers ensure plant doctors know the availability of products on the market, and in Bangladesh, for instance, certification of suppliers following training courses has encouraged reduced sales of fake products. Training programmes for plant doctors teach them to look carefully at symptoms, interview farmers and visit farms where necessary. Doctors are taught only to make a diagnosis and give advice if confident they are right, and to only recommend inputs available locally. Fact sheets are used to convert tacit to codified knowledge, which can be shared more widely. A condition of GPC support for clinics (training and materials) is that doctors record and share data related to clients, symptoms, diagnoses and recommendations. The records provide the basis of a quality control system in which data are shared at monthly meetings of clusters of clinic doctors and associated technical experts. They also provide the basis of a community surveillance system.

Clinics have now been run in 4 countries in Asia; 9 in Africa; and 5 in Latin America, and there have been efforts to learn about key factors affecting success through a learning-by-doing approach. Thus, it was observed that organizations with an existing mandate to carry out extension and those that were well run, assigning clear roles and responsibilities for staff, and with direct accountability to farmers, were more likely to run clinics effectively and maintain a regular service. Interaction at all levels within organizations was essential for the clinics to become integrated with their daily activities. In some cases facilitating greater understanding among actors was needed to encourage attitudinal change. For example, plant doctors were taught not to be dismissive of farmer explanations, and laboratory staff encouraged to change a patronizing attitude to extension staff through better understanding of how clinics worked and farmer needs. Experience also showed the importance of understanding local contexts. For example, there were differential attitudes amongst men and women farmers and plant doctors and how they perceived, used and interacted with plant health services in Bangladesh; in Africa, economic incentives to motivate staff to run clinics or undertake farmer outreach activities were often needed, in contrast to Asia, where many took independent initiatives.

Source: courtesy of CABI.

whole research, innovation and development spectrum all three dimensions – enabling environment, organization and individual – must be addressed concurrently. The proposed CD for AIS Cycle aims to stimulate learning and interaction among these dimensions to develop an effective AIS that is capable of adapting and responding to new and emerging challenges. The following section looks closer at how to operationalize an approach to CD for AIS addressing the multiple dimensions of a system in an integrated manner with regards to assessing capacity needs, developing a strategy and implementing action and learning.

The dual pathways for operationalization of CD for AIS means that CD processes take place at institutional, organizational and individual levels as well as within networks of organizations and individuals, as in identified "innovation niches". The CD cycle presented in this chapter is put forward as an idealized framework for an integrated approach to CD for AIS. In reality, however, operationalization of the cycle will depend on country-specific dynamics, individual commitments, opportunities and available resources.

Responsibility for CD for AIS does not "sit" squarely within the mandate of any one single organization or institution. Each actor in the system is called upon to devote effort and resources to ensure capacities are developed internally, to link with other actors and to reflect on their own role within the wider system (cf. Hawkins *et al.*, 2009).

5.1 The CD for AIS Cycle

A cycle of five stages is proposed here (see Figure 5.1) for the operationalization of the proposed CD interventions at the level of an innovation niche, within organizations and networks (and individuals within these) and addressing the enabling environment. Each cycle will in many ways be identical for each of these three dimensions, although the actors involved and the methods used may vary. The stages are "Galvanizing Commitment", "Visioning", "Capacity Needs Assessment", "CD Strategy Development and Action Plan" and "Implementation". Five stages are presented briefly below and expanded on in the "Guidance Note on Operationalization" which complements this present document.

In contrast to a typical project, the "the CD for AIS Cycle should not be viewed as a one-off, closed process with a clear start and finish. It represents just one cycle in a continuum or spiral of action, reflection, learning, adaptation and implementation of the CD process. It requires embedding an iterative process of reflection and documentation of learning throughout the cycle, leading to a further cycles of adaptation and implementation (Figure 5.2).

Whilst the the CD for AIS Cycle is described as a logical sequence of consecutive stages, operationalization of the framework may not be a linear process. Depending on the context of the country in which it is being implemented and the extent to which CD for AIS is already being addressed, stages may be merged or addressed simultaneously. For instance, in a given context, actors may consider capacity needs assessment as a composite part of the CD strategy and action plan rather than an input into the strategic planning process; in other cases, it may be decided to conduct a capacity needs assessment before embarking on a visioning exercise. Nor are the stages seen as separately bounded actions. Thus galvanizing commitment and visioning might be combined in one stage. It will be a decision to be made by country actors based on available resources (people, time and finances), available documented information, as well as existing programmes and past experience. The country context will also dictate whether the CD for AIS Cycle is initiated only at national level, or if regional- and district-level processes need to be initiated concurrently, or if the entry point might initially only be at a regional or district level within a country.

The CD for AIS Cycle, therefore, is not a blueprint for achieving effective CD for AIS, but is proffered as a guide for contextualized action. Country approaches may differ significantly in content and process on account of context, opportunities, commitment of individuals, organizations and institutions, as well resources that can be mobilized to support the process. The practicalities of the proposed approach need to be piloted and the proposed the CD for AIS Cycle further

Figure 5.1 | **The CD for AIS Cycle**

refined, informed by experience and learning from these pilots. The key element that should be common to all countries is the systemic approach through dual pathways, which ensures all actors within the system have the opportunity to participate, to create joint learning and formulate joint solutions.

FACILITATION AND INTERMEDIARIES

As set out in Chapter 2, the role of facilitators or brokers is central to the AIS approach of interaction and joint learning. The process of CD that this implies also calls for skilful facilitation by individuals whose role goes beyond linking actors to relevant sources of expertise and knowledge, and who are able to navigate potential misunderstandings and even conflict among actors with divergent views and interests. Facilitators must be in a position to create the trust among actors that enables the learning process, and to support actors in tracking and reflecting

on the process of transformation. An important process that should run parallel to the CD for AIS Cycle, therefore, is the identification and strengthening of those organizations and individuals that can play an intermediary role (see Figure 2.1) – including extension services, private consulting firms, university departments, capacity building organizations and NGOs – and their orientation to CD for AIS enabled through tailor-made and on-the-job training, as well as through reflection sessions and documentation of learning (see Box 5.2).

Figure 5.2 | **Continuous cycle of action, reflection, learning and adaptation**

STAGE 1
Galvanizing Commitment

Convincing actors within the AIS to question deep-seated attitudes and behaviours embedded in a "business-as-usual" mentality, and to embrace an approach to promoting agricultural innovation through participation, reflection and joint learning, the outcome of which may not be predictable, is by no means a straight forward task. It requires a systematic sensitization of key actors providing knowledge and those representing the demand side, as well as those organizations and networks that bridge the knowledge divide and institutions within the wider systems responsible for creating an enabling environment for this interaction (see Figure 2.2).

To advance a coordinated process of strengthening CD for AIS at national level[14] and to create mechanisms of learning across organizations, sectors and the system as a whole, it is important to ensure both a common understanding of CD for AIS and creation of ownership and high level support of the process by those that head and lead representative bodies of actors within the system. Especially, a conscious process of sensitizing and appropriation to galvanize commitment to a dual pathways approach is thus called for. This is not to say that individuals within the system are not aware of an AIS approach or are not already involved in AIS interventions (see Box 3.1 and others throughout this document). Creating commitment of relevant stakeholders at system level, with a joint understanding of what a dual pathways to CD for AIS would involve, as well as soliciting commitment to a coordinated approach, nonetheless requires effort and conviction.

[14] As stated above, countries may decide on operationalizing the cycle at national, regional or district levels concurrently, or select one of these levels for the initial CD for AIS interventions. The Framework here departs from the national level to initiate the process.

STAGE 2
Visioning

A visioning process brings together the representatives of actor groups within the AIS to build on the common understanding of AIS and the need for a coordinated approach to CD of actors within the system. This is a process to further ensure high level commitment and to determine further actions and relevant responsibilities. It will involve a wide spectrum of interested parties, such as from ministries, legislator bodies, representatives of private sector-based associations (for instance input suppliers, processors, transporters and retailers), commodity-based associations, farmer organizations and cooperatives, relevant parastatal bodies, financial institutes, providers of business development services, research bodies, tertiary and vocational education, extension services, development partners and civil society.

During the visioning process, the initial identification occurs of innovation niche(s) that will in themselves be systems of learning and innovation, and also inform learning and adaptation of the system. This might involve building on existing multi-stakeholder-cum-innovation platforms around a single commodity or value chain, or it might consist of establishing such a platform or other multi-stakeholder processes that encourage interaction among actors in the system.

This process should also lead to coordination arrangements for the further process, by identifying a process leadership team representing the actors within the system (i.e. from private and public sectors, and from research). Whilst the leadership of the process may sit within a specific institution or organization, it is necessary to also identify "champions" of AIS, who are enthusiastic about the idea and will ensure that agreed steps are carried out. How and when this leadership team reports back to the larger group could also be agreed during this process.

STAGE 3
Capacity Needs Assessment

Capacity needs assessments are at the core of the cycle and fundamental to strengthening the AIS. The assessments aim to ascertain the levels of technical, functional capacity, and in particular the capacity to adapt and respond at the various dimensions.

Within the AIS the number of actors, organizations can be boundless, and an attempt to systematically assess the capacity of all relevant organizations becomes a herculean task. The assessment should therefore focus on selected organizations and institutions that are deemed catalytic for system development (e.g. national research organizations, ministries, parliamentary working groups, farmer associations, university departments, extension service or commodity-based associations), and are either linked to innovation niches or to the wider system CD process.

With regards to innovation niches representing networks of organizations and individuals, it will be necessary, as far as these already exist, to assess how coherence of the group is achieved and how learning within the network is taking place, and what mechanisms of feedback to the constituencies of network members are in place.

The capacity needs assessment will provide an analysis of capacity needs across the sector to inform the setting of priorities and development of strategic CD interventions in a bounded system. This could be around organizational functional capacity, such as strategic planning, leadership support and finance, or around more conceptual issues linked to AIS, such as systems thinking, or the acquisition of soft skills.

As with the other steps in the CD for AIS Cycle, the needs assessment is not a one-off activity, as experience and exposure will call for development of new capacities. The needs assessment gives a comprehensive baseline

at a certain point in time. Organizations, institutions and networks are called upon to regularly reflect on capacities needed and, above all, reflect on how the strengthening of any one element in the system gives rise to changes to other elements in the system. With time, areas of capacity, such as political engagement, may be more openly addressed as actors build relationships of mutual understanding and trust.

STAGE IV
CD Strategy Development and Action Plan

Building on the visioning exercise and based on the analysis of capacity needs assessment of actors in the system and priorities suggested by the larger, system-level group, the CD leadership team (possibly with the recruitment of other actors) will decide on goals, objectives, priorities and options for a system-wide CD strategy. Options for CD interventions will depend on the country context, active programmes and funding opportunities. Options might be cross-organizational initiatives such as: leadership or change management programmes that enable interaction and joint learning among actors within the sector; training-of-trainers for facilitators of multi-stakeholder processes supporting innovation niches, recruited from different organizations; the setting up of multi-stakeholder initiatives at national level to inform higher education on the needs of end users; the formation and capacity building of an "agricultural innovation" unit that coordinates the innovation activities of each actor; inter-ministry dialogue; policy dialogue with sector actors and clear mandates to act on these; orientation of legislators, for instance of relevant parliamentary working groups; or the establishment of incentive funds to set up and facilitate multi-stakeholder processes. Prioritization should also include identification of activities that can start immediately so as not to lose enthusiasm and commitment generated by the process so far.

Three main criteria determine the prioritization process within the strategy development: (1) existing initiatives in a country that can be built on or adapted to be included in the strategy; (2) the commitment of various actors to implementing parts of the programme; and (3) the availability or commitment of funding for the activities identified. Indeed, a CD strategy must also cover a strategy for mobilizing resources for various activities from domestic and external sources.

The action plan forms part of the strategic planning exercise. The process leadership group with additional support if necessary, should design a "master action matrix plan" or "action map" outlining activities to be undertaken by different actors in the system. The term "master action plan" is used here as many of the activities and interventions will require subsidiary action plans. Given that for many activities and interventions, funding may first have to be sourced, the "master activity plan" may take the form of a rolling plan to be updated as new activities are able to take off.

Due to the rapidly evolving dynamics of the system, it is essential that learning from implementation of the strategy and consequent adjustments are factored into the strategy developments. The "master action plan" should therefore clearly show how learning throughout the system will be enabled, i.e. when and which actors will come together to reflect on the various initiatives, analyse if and how they reinforce each other to strengthen the AIS, and adapt, where necessary, in the context of trends within the agricultural sector.

Endorsement of the action plan by the larger system group must be sought. It may be possible to combine validation of the strategy and endorsement of the action plan in one and the same meeting.

STAGE V
Implementation

Implementation of the plan will fall to those individuals or organizations who have taken on the responsibility for a certain activity. The process leadership group should, however, maintain a coordinating role throughout the implementation phase.

An important part of the implementation will be the cycles of learning and reflection, both within individual organizations and institutions and within innovation niches, but equally important across the sector. Opportunities to regularly reflect upon and re-assess interventions and their appropriateness in a given context should be embedded within projects and programmes. This requires documentation of the change process by different actors. It will fall to the process leadership group to ensure that documentation of the change process takes place and agreed learning mechanisms are adhered to.

5.2 The CD for AIS Cycle in organizations, innovation niches and networks

The CD for AIS Cycle (Galvanizing Commitment, Visioning, Capacity Needs Assessment, CD Strategy Development and Action Plan, Implementation), as described above for the system, is mirrored within organizations that have committed themselves to a CD process within the framework of the system-level CD strategy. Often this process of CD at organizational level will have begun with the involvement in the system-level process.

The innovation niche will in most cases be a form of network. Networks are created around enthusiasm and interest rather than around objectives, goals and concomitant structures and procedures. The coming together of different actors within the network is already a CD activity, leading to the challenging of embedded perceptions and modes of working. Interest in assessing the capacity of participating organizations may come at a later stage once the network has been formed. A CD needs assessment is therefore not a prior step to establishing an innovation niche.

Within the niche, it will be important to gauge the dynamics of the group over time and track how trust among actors is built, and the coherence of the group achieved. This will require the skills of a facilitator not only versed in AIS but who can ensure inclusiveness of the network, negotiate power relationships and possible conflicts within as well as supporting the joint learning process.

CD through the proposed five-stage cycle takes place within organizations and individuals linked to their involvement in innovation niches as locations of joint learning and innovation. Through interaction within innovation niches, trust is built, assumptions questioned and attitudes changed. At the same time, system-level actors of the AIS interact to learn from the innovation niches and from organizational CD processes. In turn this informs their action and the creation of incentives and an enabling environment for AIS actors to interrelate and strengthen the entire AIS. The process is one of mutual influencing, learning and creation of synergies. An overall learning architecture enables various strands of CD experience at niche, network and organizational level to ensure system-wide learning.

PILOTING

As already stressed, the proposed TAP Common Framework, with its dual pathways approach to implementing CD for AIS, is a novel concept that needs to be piloted in a number of selected locations to assess the practicalities of its operationalization as set out in this guidance note.

On the basis of learning from these pilot activities on what works and what does not work in which context, it will be possible to provide more concrete guidance to individual countries on how to institutionalize the Common Framework, and on how system-wide CD can move from pilot projects to iterative CD processes at national level.

Box 5.2 | **Strengthening the capacity of facilitators of innovation platforms – The experience of NARO and NAADS in Uganda**

Agricultural Innovation through multi-stakeholder interaction is at the core of the strategy of the National Agricultural Research Organisation (NAR) and the semi-autonomous National Agricultural Advisory and Services (NAADS) in Uganda to achieve development results within the framework of the Agricultural Technology Agribusiness Advisory Services (ATAAS) programme. The ATAAS programme promotes better coordination between the two organizations in nine eco-agricultural zones across the country.

To strengthen the capacity of facilitators from NARO and NAADS to support multi-stakeholder innovation platforms (MSIPs), a series of reflection and learning workshops was implemented over the course of a year, interspersed with periods of working with the MSIPS. During the workshops facilitators reflected, based on their experience, on the challenges faced in establishing and running MSIPs, identifying the knowledge and skills they required to address these challenges. As a result of this combination of practical experience and reflection, participants built up a sound understanding of the change process through multi-stakeholder engagement. This enabled them to acquire and internalize skills, knowledge and personal attitudes relevant for implementing MSIPs and facilitation of joint learning and knowledge creation.

By the end of twelve months each Zone had established at least one commodity-based MSIP at zonal level, as well as several District-level MSIPs. Six of the nine zones had already established two MSIPs, one MSIP being a cross-border (Uganda/Kenya) initiative on dairy. The status of development reached by the individual platforms varied from zone to zone on account of the social and economic contexts, opportunities arising, the external enabling environment, motivation of platform members and leadership within the MSIP. Facilitators also formed links with other MSIPs for other commodities, and forged partnerships with civil society groups for continued support of the MSIPs.

The workshop series was envisaged as a Training of Trainers activity to put in place a core team of skilled trainers-cum-coordinators from both organizations. Action plans for training other NARO/NAADS staff were developed during the workshop series. After each workshop, participants trained other staff members in the agricultural research institutes and advisory services teams on AIS and imparted the acquired facilitation skills, thus ensuring wider understanding and acceptance across the involved organizations.

In addition, two planning sessions with the directors of the 9 zonal Research Institutes and Agricultural Advisory Services took place, addressing principles of Agricultural Innovation, ensuring support for the trainers to impart their knowledge and skills and allocate the necessary resources. On-the-job backstopping by local consultants was also planned, to strengthen the performance of the facilitators.

As participants became more aware of the complexity of the innovation process, and the influence of factors beyond their control that contribute to the success of the multi-stakeholder platforms, they identified the need to develop a framework to enable them 'make-meaning' of the change process. The developed framework aims at assisting NARO/NAADS to track and understand the change process so as to respond and adapt in a timely fashion.

Source: Based on direct experience with the programme.

CHAPTER 6

Integrated Monitoring and Evaluation of CD for AIS

A Monitoring and Evaluation (M&E) architecture is generally considered to be a plan for the M&E of a programme or project. Generally, it describes the WHAT (i.e. what activities and results need to be monitored and evaluated); the WHO (i.e. who is responsible for M&E activities); the WHEN (when M&E activities are planned "timing"), and the HOW (i.e. how M&E is implemented "methodology").

Typically, an M&E architecture is built on a logical results chain, assessing progress and results at different stages of the results chain.

The M&E architecture that is being described in the following, however, attempts to establish an architecture of performance evaluation that integrates measurement at two levels:

- **the country level,** where the M&E system for measuring CD for AIS will be one of the defining elements of the TAP Common Framework; and
- **the programme level,** where the validity and success of the Common Framework model in its entirety can be assessed.

Box 6.1 | **Definitions of Monitoring and of Evaluation**

Monitoring is a "continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing development intervention with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds".

Evaluation is the "systematic and objective assessment of an on-going or completed project, programme or policy, its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, development efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors. Evaluation also refers to the process of determining the worth or significance of an activity, policy or programme. An assessment, as systematic and objective as possible, of a planned, active or completed development intervention".

Source: OECD DAC, Glossary of Key Terms in Evaluation and Results Based Management. 2010 reprint, http://www.oecd.org/dac/2754804.pdf

Box 6.2 | **Key evaluation questions being answered by the proposed integrated M&E architecture**

Capacity Development for Agricultural Innovation Systems at country level
How do we define and measure the performance of CD for AIS interventions within the CD cycle, and what is the evidence on factors influencing the observed intended and unintended outcomes? Particularly, can a link between CD and the performance of national AIS or value chains be established?

Monitoring and Evaluation of the performance of the "TAP Common Framework" at programme-level
How do we monitor and evaluate the performance of the Common Framework itself, and its contribution to the performance of AIS and the pro-poor outcomes that emerge? Is the Common Framework, the way it is designed and implemented, relevant to the intended users? In other words, does it suit the priorities and policies of the target group, recipients and development partners? Does it in fact engage target populations and promote learning? What factors influence the sustainability and replicability of CD at global level? Can we plausibly attribute improvements in the effectiveness of AIS to the CD interventions that are being advocated through TAP and the Common Framework on CD for AIS?

Certain mechanisms that are being established (e.g. overview and governance of the TAP and the *country projects*, and recurrent policy dialogues, *TAPipedia*) will help to facilitate the timely flow of knowledge and lessons learnt.

6.1 Overview of an integrated M&E architecture

The proposed M&E architecture is composed of two elements that are interconnected through learning cycles within each:

- a system for M&E of CD for AIS at country level; and
- a system for M&E of the performance of the "TAP Common Framework".

The first element refers to M&E of progress and results at each of the CD steps laid out within the Common Framework, whereas the second element evaluates the success of the Common Framework approach in its entirety (i.e. the overall performance of the Common Framework as a new approach to CD for AIS).

Conceptually, the two elements of the M&E architecture have their own evaluation questions, but are being integrated by design, whereby empirical evidence, findings and learning from one element feed into the other, and vice versa. During this process, the Common Framework and its implementation at country level will undergo continuous adaptation through the use of M&E approaches that encourage and facilitate collective knowledge building and adaptive learning (please see Box 6.2 and Figure 6.1). The adaptive character that is being facilitated and fostered through the proposed M&E architecture mainly builds on:

- the use of formative, developmental and utilization-focused evaluation techniques (see Box 6.1 for definitions);
- structurally embedding M&E functions of CD into the stages of the CD cycle, and more specifically as part of building CD to learn and reflect; and
- institutionalizing recurring learning cycles between the two elements,

Figure 6.1 | **The M&E architecture of the TAP Common Framework**

i.e. from country pilot projects to the "owners" of the Common Framework (i.e. the TAP partners) in order to further advance the validity and robustness of its design, and thereby its effectiveness and legitimacy as a global approach for facilitating CD for agricultural innovation. An advanced Common Framework model would then inform improvements to the design of the CD for AIS Cycle, etc.

In other words, performance findings from CD pilot interventions at country level feed into a formative evaluation of the Common Framework, thereby allowing for an assessment of the validity and reliability of the Common Framework (i.e. *proof of concept*). Subsequently, the Common Framework would be refined, implemented and further tested at country level (i.e. a continuous *ground truthing*) before a new learning cycle would begin again.

The following sections lay out a proposed common approach to monitoring and evaluating progress and results of CD interventions based on the Common Framework on CD for AIS.

It is intended that the proposed M&E architecture be used as a tool that the CD for AIS country pilots would have in common and apply in a systematic and harmonized way. The advantage of using a common approach is that it would **help structure and support monitoring and evaluative thinking within individual pilot projects, and also build a systematic evidence base supporting the Common Framework on CD for AIS.** The

Box 6.3 | **Summative, formative, developmental and utilization-focused evaluations**

Evaluations are carried out for many different purposes. Among them, three main purposes stand out: (1) reaching critical judgments about a programme; (2) programme improvement; and (3) programme and organizational development over time.

Summative, or judgment-oriented evaluations
These are carried out to determine the overall merit, worth, significance or value of something. These evaluations are generally carried out to provide judgments that can inform major decisions, such as whether or not to continue a programme, expand it, or change it in some basic way. The intended users of summative evaluations are often external to the programme, for example, the agencies that fund the programme or potential users (customers) of programme outputs.

A formative, or improvement-oriented evaluation
These are carried out to improve a programme. Whereas a judgment-oriented evaluation requires predetermined, explicit criteria and values that form the basis for judgment, improvement-oriented evaluations tend to be more open-ended, gathering a variety of data about strengths and weaknesses with the expectation that both will be found and each can be used to inform an ongoing cycle of reflection and innovation.

A developmental evaluation
This involves changing the intervention, adapting it to changed circumstances, and altering tactics based on emergent conditions. Developmental evaluations are designed to be congruent with and nurture developmental, emergent, innovative, and transformational processes. In this sense, they can be particularly useful for programmes that evolve over time as they address emerging issues in changing environments.

Utilization-focused evaluation (UFE)
This is done for and with specific, intended primary users for specific, intended uses. FE requires moving from the general and abstract to the real and specific – from possible audiences and potential uses to actual, primary intended users and concrete, specific uses. The evaluator facilitates decision-making by intended users rather than acting simply as an independent judge. UFE can include any evaluative purpose (summative, formative, or developmental), any kind of data (quantitative or qualitative), any kind of design (ranging from naturalistic to experimental) and any kind of focus (e.g. on programme design, implementation, or results). UFE offers a process for making decisions about these issues in collaboration with an identified group of primary users focusing on the intended uses of the evaluation.

Source: Excerpt from Patton and Horton, 2009.

expectation is that the M&E architecture will continuously undergo an adaptation process based on lessons learned from the field, and thus will evolve over time into a more validated and robust system guiding M&E of CD for AIS initiatives.

6.2 Core characteristics of the CD for AIS M&E architecture

These are:

- *Primarily developmental in nature.* One of the key principles of the design of this component of the M&E architecture has been that M&E must not be viewed as an add-on exercise that is largely conducted once the intervention is completed, but rather that it must be used as a mechanism that is embedded in each stage of the proposed CD for AIS Cycle, as to help identify issues, test quick iterations, and track developments in a timely manner. Patton (2010) describes this continuous learning or development loops as "developmental evaluation". It involves real-time feedback about what is emerging in complex dynamic systems as innovators seek to bring about system change. Developmental evaluation applies to an ongoing process of innovation in which both the path and the destination are evolving. Developmental evaluation typically applies participatory evaluation techniques throughout the process.
- *Guided by a 'utilization-focused' approach to evaluation.* Utilization-focused evaluation (UFE) is a term that was introduced by Patton (2010), and it is based on the principle that an evaluation should be judged by its utility. UFE is meant to be a framework for enhancing the likelihood that evaluation findings will be used and lessons will be learnt from the evaluation process (see Box 6.3).
- *Contributes to the broader evidence base on CD for AIS and its results* measuring progress and results across the pilot activities will help to draw more robust conclusions from evidence for more systematic learning, management and decision-making.
- Finally, it will allow consideration of differences in the scale and scope of CD for AIS programmes (i.e. individual versus organizational, national and global), and the audience potentially applying the common M&E architecture for measuring and understanding the performance of their CD intervention (e.g. donors, associations, research, extension).

6.3 A CD for AIS Results' Framework

The CD for AIS Cycle described in Chapter 5 promotes a systems approach to CD for AIS, whereby continuous learning and adaptation are key principles in achieving results. The notion is that CD is an endogenous process, so its outcomes and the final impact are driven by the "facilitative" performance of both the enabling environment and the capacity of AIS actors to "adapt and respond" to challenges and emerging opportunities.

The main elements of the proposed CD for AIS Results Frame are set out below (see Figure 6.2):

1. A clearly specified **development objective** that motivates the CD effort. It would be *'improving the livelihoods of the poor in the tropics through CD for more effective AIS'*.
2. **Two long-term CD outcomes** that determine the extent of national and local ownership of the effort, in order to achieve the stated development goal(s), as well as the efficiency and effectiveness of that effort.

The two long-term CD outcomes are (please see Table 6.1):

- improved capacity to create an enabling environment of the AIS;[15] and
- improved capacity of AIS actors to adapt and respond in order to deliver results.

A change process that leads to advances in the **targeted Intermediate Outcomes (IOs)** at the hands of AIS actors, and when effectively integrated will lead to more responsive change and innovation (please see Table 6.2):

- improved Capacity to Navigate Complexities;
- improved Capacity to Collaborate;
- improved Capacity to Engage in Strategic and Political Processes;
- improved Capacity to Reflect and Learn; and
- activities, instruments, and outputs designed to achieve the necessary capacity outcomes for the AIS actors or agents of change in the AIS.

As discussed earlier, an effective AIS is a function of four *technical and functional capacities*, and a fifth: **the Capacity to Adapt and Respond in order to Realize the Potential of Innovation.** The effectiveness of the actor's response to changes depends on the reflection of the four capacities at individual and organizational dimensions.

Human and financial capital, and other endowments can influence whether the AIS development goal can be achieved in a given timeframe, but depending on the four capacities described in Chapter 3, achievement may be delayed or blocked altogether.

A change process, i.e. interventions (along the CD cycle) that lead to improvements in the targeted capacity factors (that are in the hands of AIS actors), empowered through *learning and its effective application through change in behaviour* would eventually lead to what are being called "intermediate outcomes".

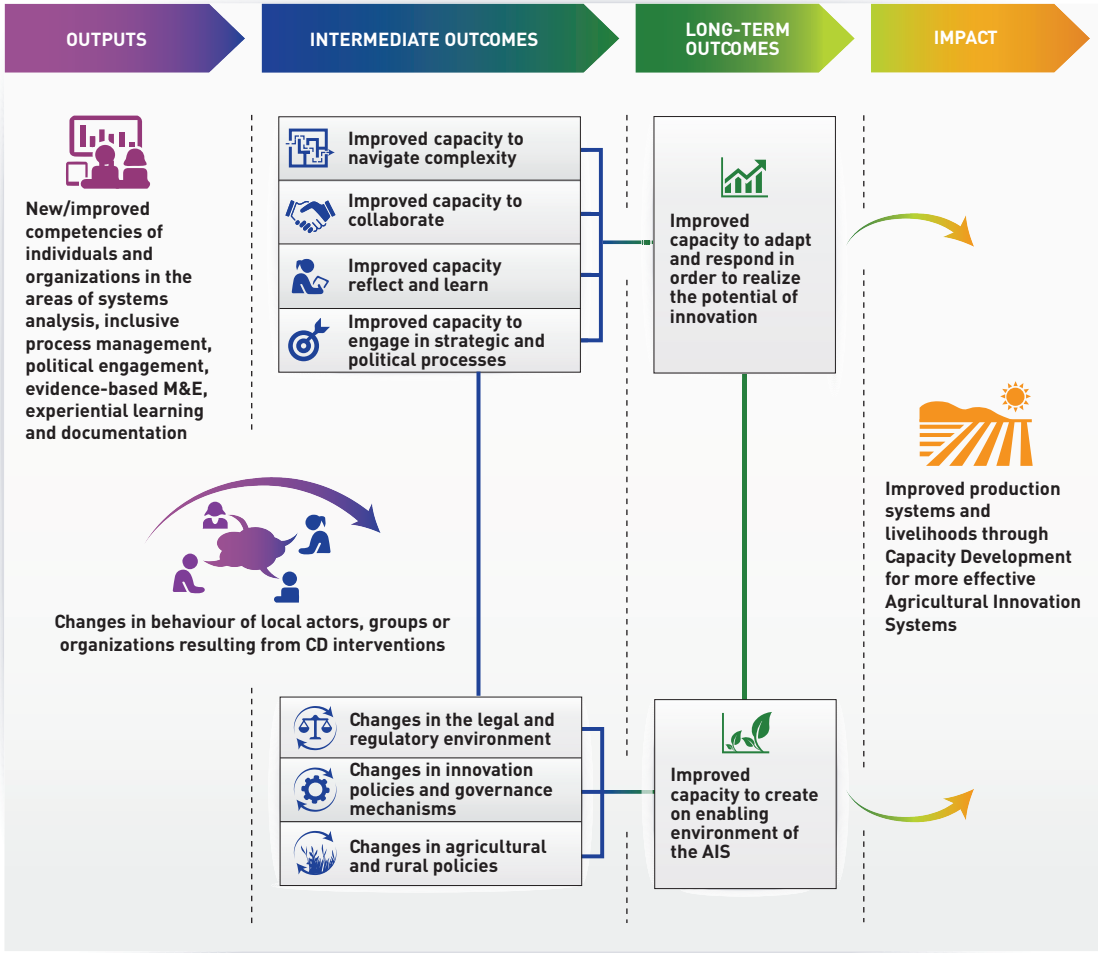
- **IOs** *describe the results from the behavioural change that can be attributed to changes in competencies* at the level of the individual or organizational actors for each of the four identified capacity factors.
- **IOs indicators** *are proxies for measuring the results from the behavioural change that can be attributed to changes in competencies* at the level of the individual or organizational actors for each of the four capacity factors identified.

IOs should be measured empirically by conducting (1) targeted surveys (at baseline during the *capacity needs assessment*, at mid-term, and at the end of the project) across those organizations that have a substantial stake in the AIS; and (2) staff surveys by organizations to gain insights into changes in individual capacities, and the perceived leadership and managerial competencies.

In contrast, the **CD outcome indicators** measure *whether the actions taken by the AIS actors after learning have a favourable effect on the larger system* (e.g. improved performance of a value chain) that conditions the achievement of the development goal. Based on the theoretical discussion laid out in Chapter 3, **the enabling environment will be influenced by CD interventions, although the incremental improvements may not be directly attributable to a CD intervention** (reflected as shaded arrows), **and are not being measured directly**

[15] The enabling environment of an agricultural innovation system, is usually defined as the set of factors that influence agricultural innovation but are controlled by institutional, regulatory and policy domains other than those directly linked to agricultural innovation. Please refer to Section 3.4 for more information.

Figure 6.2 | **The CD for AIS Results Frame**



Note: The enabling environment will be influenced by CD interventions; however, the incremental improvements may not be directly attributable to a CD intervention. This is being reflected by using shaded arrows.

as part of the RF.[16] Yet, it is recommended that the M&E architecture monitors changes in the enabling conditions, since it is the context in which the AIS operates and the CD takes place, and in which changes in behaviours and learning outcomes can be observed.

Finally, the CD for AIS Results Frame includes *outputs from CD interventions, which are the new and/or improved competencies that individuals and organizations have gained.* As part of the M&E architecture, these would be monitored and evaluated systematically along the 5 steps of the CD for AIS Cycle.

[16] In general terms, the "enabling environment" is the context in which individuals and organizations put their competencies and capabilities into actions (and where capacity development processes take place). It includes the institutional set up of the countries, its implicit and explicit rules, its power structures and the policy and legal environment in which individuals and organizations function (FAO, 2010).

Table 6.1 | **Long-term CD outcomes with indicators**

Long-term CD outcomes at systems level	Indicators
Improved capacity to create an enabling environment of the AIS.*	Changes in agricultural research intensity in the target country. Improvements in "Enabling the Business of Agriculture" indicators of target country.
Improved capacity of AIS actors to Adapt and Respond in order to Realize the Potential of Innovation.	Change in the summary score of reported learning outcomes by AIS stakeholders (aggregated at national or value-chain level). % of AIS organizational actors that demonstrated the ability to advance their role within the AIS by having undergone a systemic change process (i.e. adopt, adapt, expand, respond), since the intervention has been implemented.

Note: * "This enabling environment of an agricultural innovation system", is being defined as the set of factors that influence agricultural innovation but are controlled by institutional, regulatory and policy domains other than those directly linked to agricultural innovation. Please refer to Section 3.4 for more information.

Table 6.2 | **CD outputs, IOs and IOs indicators**

IO 1	IO indicators	CD intervention output
Improved (systems) Capacity to Navigate Complexity.	• Level of cost reductions and revenue gain of AIS organizational actors. • Increase in number of co-innovations (between individuals and among organizational actors).	Improved analytical competencies (e.g. systems thinking, complexity theory, value-chain analysis, gender analysis.
Improved (systems) Capacity to Collaborate.	• Inclusive decision-making processes about xyz in place. • AIS actors views themselves as part of aligned interlinked system. • Perceived level of trust and commitment by AIS actors.	Improved process competencies (e.g. team building, listening, conflict negotiation, leadership, emotional intelligence, participatory methodologies.
Improved (systems) Capacity to Engage in Strategic and Political Processes.	• Resources (time, budget) dedicated for engaging in joint activities with other AIS (organizational) actors with the objective of advancing the functioning of AIS (e.g. joint publication). • Progress made in advocating for reforms.	Improved Political Engagement Competencies (policy analysis, influence and negotiation skills).
Improved (systems) Capacity to Reflect and Learn.	• 'Developmental evaluation tools' are being effectively implemented (on a scale from 1-5).*	Improved Competencies in developmental evaluation, evidence-based and experiential learning and documentation (e.g. Participatory Action Research, appreciative inquiry, tracking the change process, reflexive monitoring and evaluation, horizontal evaluation, revised and emergent modelling).

Note: * A generic checklist that is compatible across all country cases would need to be developed to help evaluate the quality and the effectiveness of the developmental evaluation techniques used by each country case.

The aim is that, with time, all countries implementing the TAP Common Framework commit to reporting along an agreed set of "core" measures, including the joint development of survey instruments for collecting the necessary information for the indicators. This will allow consolidation of information about country results and learning, and serve as evidence about the potential developmental performance of the Common Framework as whole. In addition, each project may have outputs and indicators that are specific to its context and project design.

Table 6.1 provides an overview of long-term development outcomes, and Table 6.2 is a list of core learning outcomes. Details about their definition and measurement are being provided in the Guidance Note on Operationalization document of the Common Framework.

Box 6.4 | **OECD DAC Criteria for Evaluation of Development Assistance**

OECD DAC – Criteria for Evaluation of Development Assistance.
Relevance – The extent to which the aid activity is suited to the priorities and policies of the target group, recipient and donor.
Effectiveness – A measure of the extent to which an aid activity attains its objectives.
Efficiency – Efficiency measures the outputs – qualitative and quantitative – in relation to the inputs.
Impact – The positive and negative changes produced by a development intervention, directly or indirectly, intended or unintended.
Sustainability – Sustainability is concerned with measuring whether the benefits of an activity are likely to continue after donor funding has been withdrawn.

Source: OECD DAC, 2010.

6.4 M&E of the Performance of theTAP Common Framework on CD for AIS (Element 2)

The TAP Common Framework can be regarded as one of the mechanisms for achieving the objectives of TAP. TAP needs to know (both for learning and accountability reasons), whether this tool (i.e. the Common Framework on CD for AIS) for facilitating CD in tropical AIS, is adding value to improving the functioning of AIS locally, as well as adding value as a new conceptual approach (i.e. a global public good) in its own right, with the potential to be replicated and scaled-up globally, with the ultimate objective of contributing to improving the livelihoods of small-scale producers in the tropics.

Element 2 of the overall M&E architecture lays out how and against what criteria the Common Framework on CD for AIS – as the *new conceptual foundation for shaping the global CD for AIS development agenda* – will be evaluated and its performance assessed.

Core characteristics of the approach to assessing the performance of the "Common Framework" are that:

- it is results-based using internationally agreed and widely accepted assessment criteria – relevance, effectiveness, sustainability, efficiency and impact (OECD DAC, 2010);
- it is formative in nature to inform decision making – the Common Framework will constitute a new model of how to globally foster CD for AIS. The model will be piloted and evaluated to inform decision-making aimed at improvement (formative) of the model (i.e. the Common Framework);
- it helps to meet accountability requirements – systematic M&E of progress and results is critical for the partnership's ability to demonstrate achievements, which in turn helps to justify the expenditures made, and supports advocacy for further investments; and
- it contributes to the broader knowledge base about CD investment in agriculture. New insights and evidence about how CD can improve the effectiveness of AIS will be relevant for guiding investment decisions in global agricultural development.

This element of the overall M&E architecture will have three vital roles to play, it will help:

- track progress in and results from piloting, learning and advocating for a Common Framework on CD for AIS;

Box 6.5 | **Contribution Analysis**

Contribution analysis explores attribution through assessing the contribution a programme is making to observed results. It sets out to verify the theory of change behind a programme and, at the same time, takes into consideration other influencing factors. Causality is inferred from the following evidence:

1. The programme is based on a reasoned theory of change: the assumptions behind why the program is expected to work are sound, are plausible, and are agreed upon by at least some of the key players.
2. The activities of the programme were implemented.
3. The theory of change is verified by evidence: the chain of expected results occurred.
4. Other factors influencing the programme were assessed and were either shown not to have made a significant contribution or, if they did, the relative contribution was recognised.

Source: Excerpt from Mayne (2008).

- facilitate the collection of evidence for assessing the relevance and validity of the Common Framework on CD for AIS ("proof of concept"); and
- improve global understanding and learning about the factors contributing to an effective CD for AIS. (What works and what does not, and in which context?).

There are five internationally recognized criteria for measuring usefulness or value addition of a development intervention: *relevance, effectiveness, efficiency, impact and sustainability* (please see Box 6.4). The expectation is that a high performing intervention tool, such as the Common Framework would be more effective, efficient, relevant and sustainable, and also would also be in a better position to achieve its stated objectives and contribute to lasting local solutions and well-being (impact).

As a next step, the five assessment criteria are applied to the context of CD for AIS. This involves first the formulation of assessment questions, and, second, the formulation of potential proxy measures for providing evidence on performance for each of the five performance criteria (please see Table 6.3). It is not suggested, that necessarily all of the proposed indicators must be applied. In the interest of keeping the system lean and simple, and also depending on strategic considerations and preferences by TAP partners, only the most "suitable" measures would be selected for each criterion, and then used to regularly assess value addition and the evolving performance of the Common Framework as whole.

The time horizon necessary for measuring change in a meaningful way will be at least 3 to 5 years, also depending on the assessment criteria. The relevance measures will yield insights far earlier, whereas the other measures will require a longer implementation period before change can be detected and measured.

At this point it is important to note that given the complexity of an AIS and the multitude of actors and contributing factors that make up an AIS, a statistically rigorous approach to impact evaluation is not advisable. Questions of cause and effect, however, are critical to assessing the performance of programmes and projects. Therefore, when it is not practi-

cal to design an experiment to assess performance, then contribution analysis can provide credible assessments of cause and effect. Verifying the dual pathways to change at the core of the Common Framework and paying attention to other factors that may influence the outcomes, provides reasonable evidence about the contribution being made by the programme (Mayne, 2008). In a contribution analysis, various perspectives are sampled to gather different perceptions about the degree of impact an effort has made on observed results. While not perfect, it can offer a general indication of the influences that an effort is having in a given area (Gamble, 2008).

6.5 Conclusion

The proposed M&E architecture with its two core elements – one measuring the value addition of the TAP Common Framework on CD for AIS as a whole, and the second one measuring the CD for AIS at national or local level, by using a common results frame – provides an overarching system that:

- helps to generate evidence and understanding about *whether, how and to what extent* CD can contribute (1) to creating an enabling environment that is favourable for an effective functioning of an AIS; and (2) to facilitating better adaptation and a timely and positive response to emerging changes in the AIS;
- measures performance of CD interventions locally/nationally, while also allowing *aggregation of results, inter-country benchmarking,* and *learning at programme level;* and
- is *dynamic* and *works in complex systems,* by incorporating tools of developmental evaluation.

Going forward, when piloting the M&E architecture, it will be critical to uphold the objectives and the integrity of the overall intention and design of the Common Framework, and not to lose track of the aligning characteristics and mechanisms that are being built into the Common Framework. Only then it will be possible to make a meaningful assessment at programme level, which is not only based on a number of individual case studies /country projects, but on findings that have some demonstrated programmatic legitimacy and reliability for scaling up.

Table 6.3 | **Applying the OECD DAC Evaluation Criteria to the CD for AIS context**

Criterion	Evaluation questions to be answered	Potential Outcome Measures	Potential sources of information
Relevance	To what extent does the Common Framework on CD for AIS suit the priorities and policies of the target group, recipients and donor; does it engage target populations and promote learning? To what extent are the objectives of the Common Framework on CD for AIS still valid? Are the proposed activities and intended outputs, including guidelines and tools, consistent with the Common Framework's overall goal and the attainment of its objectives? Are the activities and intended outputs proposed by the Common Framework consistent with the intended impacts and effects?	Increased number of countries and/or value chains in a country applying the new Common Framework. Total # of TAP partner countries using the new Common Framework on CD for AIS. # of TAP partner countries with CD for AIS Needs Assessment available. # of TAP partner countries with CD for AIS action plan in place. # of TAP partner countries with CD for AIS that have completed a first cycle. # of direct beneficiaries.[a] # of TAP donor partners that have embraced the Common Framework on CD for AIS in their portfolio of agricultural investment projects in the tropics. Stakeholder perception about the relevance of the Common Framework.	TAP Secretariat, in collaboration with country projects and donors Stakeholder Perception Survey
Effectiveness	What is the evidence on the extent to which the Common Framework can attain its objectives? To what extent are the objectives of CD for AIS likely to be achieved through using the Common Framework? What were the major factors influencing the achievement or non-achievement of the objectives?	CD driven progress in the AIS change process. # of countries that demonstrated the ability to advance their AIS using a systemic change process (i.e., adopt, adapt, expand, respond),[b] since the Common Framework has been institutionalized. Stakeholder perception about the effectiveness of the Common Framework. Capacity to adapt and respond in order to realize the potential of innovation has been increased in target countries. Changes in the target countries 'index of learning outcomes'.[c] Enabling conditions improved in target countries. Changes in agricultural research intensity. Improvements in "Enabling the Business of Agriculture" country indicators.[d]	TAP Secretariat in collaboration with country projects Stakeholder Perception Survey TAP Secretariat in collaboration with country projects ASTI World Bank
Efficiency	What are cost-benefits of using this Common Framework for CD for AIS – also compared to alternative approaches?	Improved Cost-benefit performance of CD in a target country or value chain, e.g. • Changes in the agricultural research intensity ratio (ARI) by country and region.[e] • Fiscal return on public investment. • Total factor productivity.[f] • Technical efficiency in agriculture.[g]	ASTI FAO IFPRI
Impact	What are the positive and negative changes (e.g. social, economic, environmental) created by an AIS CD intervention (developed and implemented consistent with the Common Framework) - directly or indirectly, intended or unintended?	Changes in the long-term social, economic and environmental benefits to communities served by AIS. Change in value of agricultural production per hectare. Changes to average farm household income (by country, region).	National Statistics

(cont.)

Table 6.3 *(cont.)*

Criterion	Evaluation questions to be answered	Potential Outcome Measures	Potential sources of information
Sustainability	To what extent are the benefits of a CD for AIS intervention likely to continue after donor funding ceases or has ceased? What were the major factors influencing achievement or non-achievement of sustainability of the CD for AIS interventions?	Improvements to resource mobilization, social /human capital development, and social cohesion (by country and/or region). Changes in financial sustainability. Public Financial Management Performance. Quality of Budgetary and Financial Management Rating 1-6 Financial Inclusion Score. Social Cohesion.[h, i] Measure of income inequality (e.g., Gini index). Social inclusion. indicated by access to health (life expectancy at birth, in years). indicated by access to education and human capital. Trust (Question in World Value Survey). Memberships rates of organizations and civic participation. Rate of participation in voluntary associations.	World Bank - Country Policy and Institutional Assessment, Global Financial Inclusion Index[l] World Bank Poverty and Equity Database, Povcalnet (http://iresearch.worldbank.org/PovcalNet/index.htm?0) World Value Surveys (http://www.worldvaluessurvey.org)

Notes:

[a] This measure can be probably best estimated using demographic surveys, or along a value chain by using data from national agricultural surveys (e.g., farming system survey, crop forecast surveys).

[b] Nippard, Hitchins and Elliott (2014) measure systemic change in four stages: adopt, adapt, expand, and respond. The intention is to track whether those at the adoption stage are in fact moving to more advanced stages and if so, at what pace. The measures that will determine whether a country's AIS falls under one or the other category would need to be clearly defined, using the framework proposed by Nippard, Hitchins and Elliott (2014).

[c] Please see section on element 1 for more information.

[d] Includes measures of enabling conditions for registering agricultural land, accessing financial services, strengthening seed systems, improving fertilizer supply, transporting agricultural goods, selling agricultural goods. Under testing: Contracting agricultural production, electrifying rural areas, connecting farmers to information http://eba.worldbank.org/

[e] National expenditure on public agricultural R&D as a share of agricultural GDP. Recommended benchmark is 1%.

[f] A broad concept of agricultural productivity is total factor productivity (TFP). TFP takes into account all of the land, labour, capital, and material resources employed in farm production and compares them with the total amount of crop and livestock output. If total output is growing faster than total inputs, this would be called an improvement in total factor productivity ("factor"= input). USDA-ERS provides a comprehensive overview about methodological aspects, including links to reference about Growth and Total Factor Productivity in Agriculture; http://www.ers.usda.gov/data-products/international-agricultural-productivity.aspx Accessed 2015-09-02.

[g] Mekonnen, Spielman and Fonsah have done some explorative research work using production function analysis within a comprehensive innovations systems approach to agricultural production, and found that several measures of agricultural R&D achievement and intensity, along with educational enrolment, are found to enhance agricultural efficiency See Mekonnen *et al.*, 2015. TAP may want to encourage further research in this direction to collect evidence about the positive relationship between agricultural efficiency and CD for AIS.

[h] Jenson, J. 2010. Defining and Measuring Social Cohesion.

[i] An assessment tool can be found at http://siteresources.worldbank.org/INTSOCIALCAPITAL/Resources/Social-Capital-Assessment-Tool-SOCAT-/annex1.pdf

[l] http://databank.worldbank.org/data/views/variableselection/selectvariables.aspx?source=global-findex-(global-financial-inclusion-database)

ANNEX

Membership of the Tropical Agricultural Platform as of May 2015

AARINENA	Association of Agricultural Research Institutions in the Near East and North Africa
AFAAS	African Forum for Agricultural Advisory services
AGREENIUM	Consortium National pour l'Agriculture, l'Alimentation, la Santé Animale et l'Environnement
AGRINATURA	European Alliance on Agricultural Knowledge for Development
APAARI	Asia Pacific Association of Agricultural Research Institutes
ARC	Agricultural Research Council
ASBRAER	Associação Brasileira das Entidades Estaduais de Assistência Técnica e Extensão Rural
CAAS	Chinese Academy of Agricultural Science
CABI	Centre for Agricultural Bioscience International
CACAARI	Central Asia and Caucasus Association of Agricultural Research Institutes
CATAS	Chinese Academy of Tropical Agricultural Sciences
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
CGIAR	Consultative Group on International Agricultural Research
CREA	Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria
CTA	Technical Centre for Agricultural and Rural Cooperation
EC	European Commission, DEVCO
EFARD	European Forum on Agricultural Research for Development
EMBRAPA	Brazilian Enterprise for Agricultural Research
FAO	Food and Agriculture Organization of the UN
FARA	Forum for Agricultural Research in Africa
FORAGRO	Foro de las Américas para la Investigación y Desarrollo Tecnológico Agropecuario
GCHERA	Global Consortium of Higher Education and Research for Agriculture
GFAR	Global Forum on Agricultural Research
GFRAS	Global Forum for Rural Advisory Services
GIZ	Gesellschaft für Internationale Zusammenarbeit

IAARD	Indonesian Agency for Agricultural Research and Development
ICIMOD	International Centre for Integrated Mountain Development
ICIPE	African Insect Science for Food and Health
IFAD	International Fund for Agricultural Development
IICA	Inter-American Institute of Agricultural Sciences
INIA	National Institute for the Agricultural and Food Research and Technology
INIFAP	Instituto Nacional De Investigaciones Forestales, Agrícolas y Pecuarias
INTA	Instituto Nacional de Tecnología Agropecuaria
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture Secretariat
JIRCAS	Japan International Research Center for Agricultural Sciences
NRI	National Resources Institute, University of Greenwich/AGRINATURA
PROCITROPICOS	Programa Cooperativo de Investigación, Desarrollo e Innovación Agrícola para los Trópicos Suramericanos
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WB	World Bank
YPARD	Young Professionals for Agricultural Research for Development

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