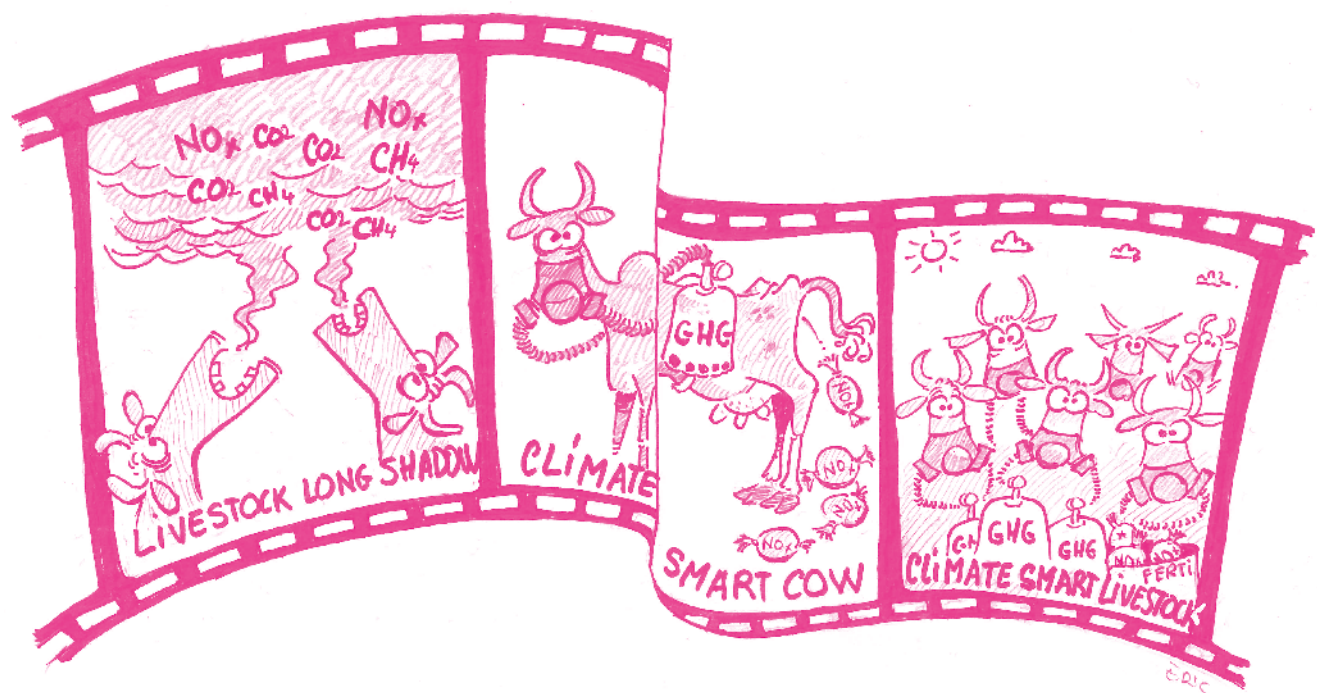# cirad

AGRICULTURAL RESEARCH
FOR DEVELOPMENT

IMPRESS *EX ANTE*

AN APPROACH FOR BUILDING *EX ANTE* IMPACT PATHWAYS

ImpresS team authors involved in developing and drafting this guide:
Blundo Canto G. • Barret D. • Faure G. • Hainzelin E. • Monier C. • Triomphe B.

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IMPACT OF RESEARCH IN THE SOUTH

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Contents

Preface

This document is the first iteration of an ongoing reflection on building *ex ante* impact pathways of a planned research (or research-for-development) intervention. It is not yet a definitive guide; as and when feedback is received, we will fine-tune recommendations for its use in different contexts. Scientists and research project managers will find this guide useful in designing projects or research programs because it focuses primarily on the changes that can result from research conducted with other actors. It is also useful for research partners and project development officers involved in the *ex ante* formulation of projects and programs. This guide follows a didactic structure by dividing the proposed approach into six different stages:

1. Building the narrative;

2. Mapping the outcomes;

3. Taking public policies into account;

4. Targeting capacity strengthening;

5. Finalizing the impact pathway and imagining alternative impact pathways;

6. Defining a participatory monitoring, evaluation and learning system.

In this guide, text boxes are used to clarify concepts, and tools are proposed to help users implement the method. Note, however, that the method involves frequent back-and-forth iterations between its various stages, because a reflection carried out at a particular stage can lead to a modification of what has been proposed in a previous stage. Text in red indicates when such iterations are needed.

This symbol beside a section's title indicates that work is currently underway for an improvement and a more in-depth description of the method proposed in that section.

ImpresS *ex ante* in brief

The research community is increasingly being asked to document the impacts it contributes to generate[1]. But merely filling in the "impact" section of calls for proposals and tenders is not enough; what is required nowadays is a better positioning of a research proposal's ability to respond to societal and environmental requirements. This document reflects a willingness on the part of an institution with a long history of research in partnership such as CIRAD to contribute to developing an "impact culture", at the individual as well as the institutional level, based on an improved understanding of the mechanisms at work in innovation systems and processes that generate long-term impacts.

It is in this context that this document provides a structured reflection, called the ImpresS *ex ante* approach, to guide and provide the tools for building impact pathways[2] at the time a research or research-for-development intervention in partnership is being designed[3], before its implementation. The main goal of the ImpresS *ex-ante* approach is to help researchers, their partners and project development officers build a shared vision of these interventions and of plausible impact pathways. While we clearly had CIRAD and its researchers specifically in mind when developing content and examples for this document, we believe it can also be useful to any research institution or researcher(s) engaged in research for development in a developing country context.

This approach encourages a collective reflection on the role of the research community in the emergence of societal and environmental impacts and on how its interactions with various actors generate changes in practices and behaviors that ultimately lead to these impacts. It focuses on the changes in the actors' perceptions, practices and behaviors that the intervention intends to, or can bring about. Such changes come about through the appropriation (including through possible transformations, adaptations or rejections) of research outputs. It also focuses on the analysis of the potential obstacles to this appropriation, in order to arrive at coherent and plausible intervention strategies to overcome them. This approach is ideally undertaken in conjunction with the major actors involved in an intervention.

The proposed approach is also intended to help the research community communicate better its intentions of intervention to different types of actors. It makes it possible to respond more credibly to calls for proposals from funders, especially on the issue of the contribution of the intervention to impacts, which has now become a discriminating evaluation criterion. It also makes it possible for civil society, supervising authorities and partners to engage in a rigorous and informed discourse on the impact to which research contributes, sometimes over the very long term. This approach is not normative; while being complementary to existing project development approaches, it remains flexible and adaptive, enabling teams that design an intervention to adjust it to the resources and time available, and to meet the expectations of the various actors concerned.

1   See: https://sciencebusiness.net/news/question-impact

2   The impact pathway consists of describing an innovation process by highlighting the causal relationships between the means (inputs) mobilized by the intervention, the products (outputs) of the intervention, the results (outcomes), which materialize directly at the level of the users of the intervention's products (outputs), and the 1st and 2nd level impacts.

3   In this guide, "intervention" is used as a generic term to designate a project, a program, a cluster of projects, etc. This choice is based on the fact that the proposed ex ante approach is applicable not only to different "granularities" of projects but also to different research interventions or development interventions that involve research.

The ImpresS *ex ante* approach is based on three key principles:

1. The crucial stage in building the impact pathway is the generation of outcomes, which are an appropriation (use, adoption, transformation, adaptation) by the actors of an intervention's outputs, leading to changes for some actors;

2. Because impact is generated over the long term, we have to think outside the ambit of an isolated individual project, and instead take into account clusters of projects that together contribute over time to an innovation trajectory;

3. The approach should lead to the production of a hypothetical impact narrative, describing *ex ante* plausible impact pathways. It is during the intervention's implementation that these plausible impact pathways will be progressively fine-tuned and transformed into actual (proven) pathways, which a monitoring and evaluation system will be able to document.

This participatory and adaptive approach is ideally undertaken in an iterative six-stage process: 1) building a hypothetical first impact narrative, 2) mapping the desired outcomes, 3) taking public policies into account, 4) strengthening capacity, 5) finalizing the impact narrative and imagining alternative pathways, and 6) defining a participatory monitoring, evaluation and learning system. With each stage enriching the ones that follows, the narrative is driven all through the reflection by the results of the other stages, through feedback loops that lead to a coherent and plausible impact narrative.

ImpresS *ex ante*: a six-stage participatory, iterative and adaptive approach

Introduction to the approach

Starting in 2013[4], CIRAD has decided to "go beyond a culture of promises" (Hainzelin *et al.*, 2017) in order to develop an "impact culture" within the institution while associating its research partners to this effort. It has first taken the form of an *ex post* impact evaluation method called ImpresS (IMPact of RESearch in the South) (Barret *et al.* 2017). In 2015 and 2016, CIRAD tested the *ex post* ImpresS method on 13 case studies illustrating the diversity of its activities and results around the world.

In order to further develop and equip this emerging impact culture at CIRAD, the ImpresS team then developed an *ex ante* approach, whose primary objective is to help CIRAD researchers, their partners and project development officers construct a shared vision and plausible impact pathways of interventions that involve research activities[5]. The goal is to improving this construction of interventions in a substantial manner by designing them in a strategic and participatory manner and laying out the mechanisms through which research teams and their partners expect to contribute to impacts. This requires, both individually and collectively, a good understanding of the mechanisms at work within innovation processes. In this way, the impact culture can become intrinsic to learning processes, research practices, and the capitalization of collective experiences, and should eventually increase the probability of generating expected and durable impacts.
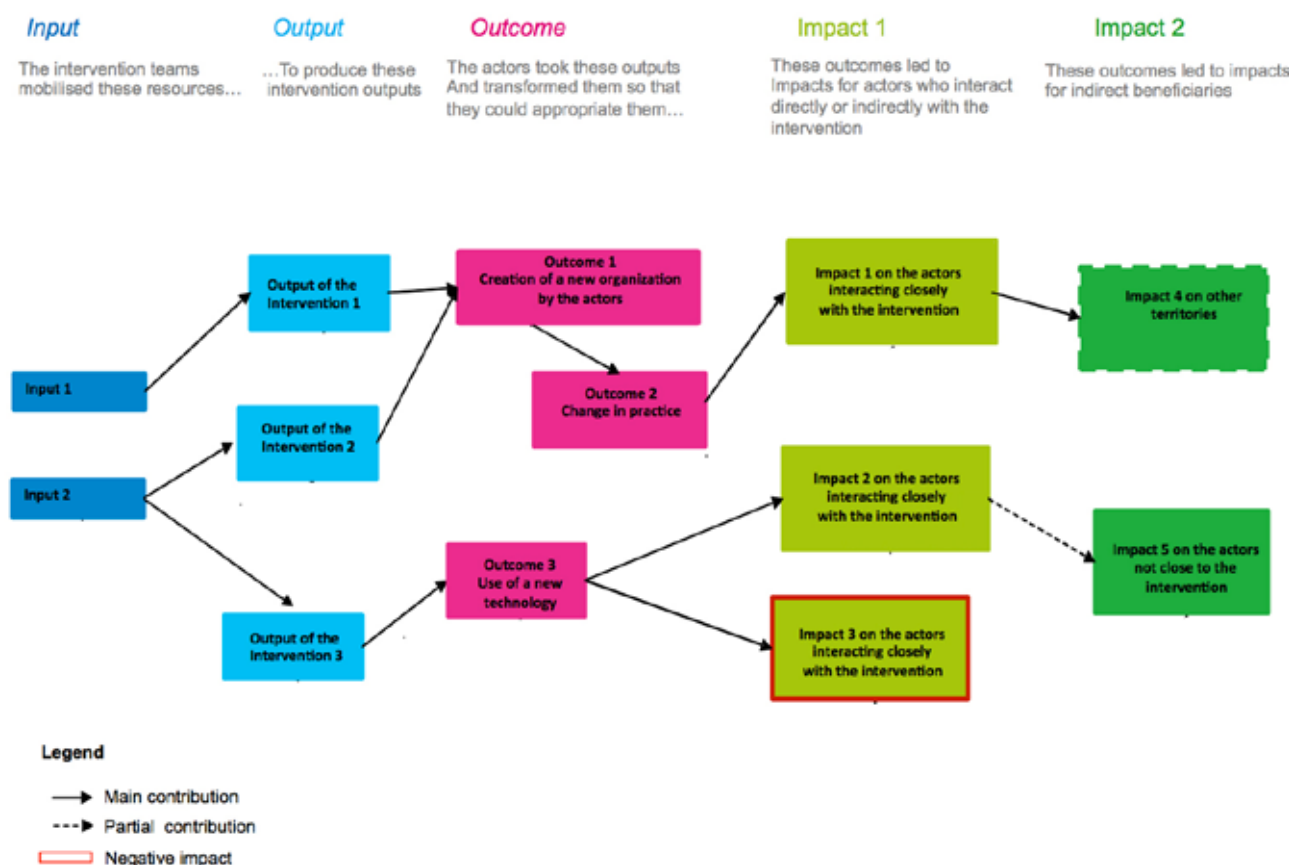
The ImpresS *ex ante* approach is conducive to a collective reflection on the place of research in the emergence of societal and environmental impacts and on its contribution to desirable changes in perceptions, practices and behaviors that lead to these impacts, through the involvement of the concerned actors. It is based on lessons drawn from the 13 *ex post* case studies, the literature on evaluation, four *ex ante* workshops involving CIRAD researchers and their partners, and a targeted workshop ("école-chercheurs") held in June 2017, during which nine project teams tested a draft version of the approach. The present document borrows concepts from action research in partnership (Faure *et al.*, 2010), participatory impact pathway analysis (Douthwaite *et al.*, 2007), outcome mapping (Earl *et al.*, 2001), applications of the theory of change (Alvarez *et al.*, 2014; Mayne, 2015), stakeholder power analysis (Mayers, 2005; Schiffer and Hauck, 2010) and, finally, lessons learned from the ImpresS *ex post* approach (Faure *et al.*, 2018, Temple *et al.*, 2018).

This document provides a structured reflection to guide and equip the construction of impact pathways during the design stage of an intervention, before it is launched. In this text, the term "intervention", generic and encompassing, is used to denote a project, a program, a cluster of projects, etc. This choice is

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4 What follows focuses specifically on the CIRAD' approach to impact, but can apply with a few adjustments to any Research-for-Development organizations

5 The diversity of the interventions carried out by CIRAD teams sometimes leads to the construction of impact pathways for which only certain outputs are generated by the research community. It is necessary to note that in the case of multi-actor interventions, the intervention's outputs can be the result of the work of researchers or of other partners with the support of the research community. Depending on the context and objectives, the teams may decide to focus solely on the appropriation of outputs resulting from the work of the researchers or to extend their reflection to outputs produced in collaboration with other actors.

based on the fact that the proposed *ex ante* approach is applicable to different types of initiatives, which can be of different nature. Building the impact pathway (Figure 1) makes it possible to identify (i) the intervention's outputs[6], (ii) the outcomes, which are the changes in practices (agricultural or managerial), organization, rules and behaviors (use, adaptation, transformation) arising from the appropriation of these outputs by the actors who interact directly or indirectly with the research community and, finally, (iii) the impacts, i.e. the effects of this appropriation on people or on the environment, whether positive or negative (risk anticipation). The ImpresS *ex ante* approach therefore elucidates the rationale of the research intervention[7]: Why can certain actions lead to the desired and desirable results?

Figure 1: Generic diagram of an impact pathway.

See Box 1 for the definition of some of the terms used in this document.

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6 The outputs of an intervention can be generated by the research "in isolation" (for example, a vaccine or biological control against pests), but they can also be generated by the coordinated activity of several actors (for example, participatory breeding schemes).

7 This document intentionally does not consider issues pertaining to the definition of evaluation based on the theory/theories of/for change. The expression "theory of change" can lead to some confusion in the French language – the original language of this document. Indeed, a theory normally refers to an "organized set of principles, rules, and scientific laws designed to describe and explain a set of facts." According to the Larousse dictionary, a theory is also a "system of hypotheses underlying the interpretations of events." However, the first definition is more often used and this definition may be problematic in the case of hypothetical changes in the future. To avoid going into questions of semantics, we will refrain from discussing the concept of the theory of change, even if, clearly, the ImpresS *ex ante* approach, which deals with the hypothetical mechanisms by which an intervention, and specifically research activities, contributes to impacts, refers to this notion as understood and used in the English-speaking world.

Box 1: Some definitions

Impact pathway: Description of an innovation process that highlights the causal relationships between the inputs mobilized by intervention, the outputs of the intervention, the outcomes – which materialize directly at the level of those who use the outputs of the intervention –, and the 1st and 2nd level impacts.

Inputs or "resources": All the means and resources that make it possible to undertake activities in an intervention (human and material resources, research budget, information, scientific or tacit knowledge, other knowledge, etc.) and thus to generate outputs of the intervention.

Output or "product": It consists of the product resulting from the intervention, including that which does not come directly from the research if the intervention is not purely a research intervention. It can take the form of scientific or non-scientific knowledge (publication, report, database, method, etc.), professional or academic training, expertise, technology, network or other forms of products.

Outcome or "result": It is the appropriation of a research or intervention output by actors interacting directly or indirectly with the research community, leading to change in practices (agricultural or managerial), changes in organizations or in interactions or new rules.

Impacts: Long-term effects, positive or negative, intended or unintended, direct or indirect, induced by an intervention. The impacts are what remains after the intervention is completed. When building *ex ante* impact pathways, we talk about hypothetical impacts. These hypothetical can be of different types: economic, social, territorial, environmental, political, health-related, etc. The notions of inputs, outputs, outcomes and impacts have different interpretations according to disciplines, authors, or institutions. Indeed, some authors sometimes break down outcomes into "intermediary outcomes" and "long-term outcomes". Conversely, others do not break down impacts into 1st and 2nd level impacts. Moreover, the distinction between outputs and outcomes is not always easy, especially in participatory research. Some classify in outcomes what others may classify as outputs, or vice versa. Similarly, it is not always easy to distinguish impacts and outcomes, as an impact for an actor can represent an outcome that will generate an impact for another actor who interacts with the first.

1st level impacts: These are the impacts on the actors interacting directly or indirectly with the team in charge of an intervention.

2nd level impacts: These are impacts that correspond to spillover effects (indirect impacts) or to the change of scale in two dimensions: horizontal (scaling out) and vertical (scaling up).

Actors: Individuals and organizations playing a role in the innovation process under study. The Impress *ex ante* approach distinguishes four categories of actors, not mutually exclusive, depending on the actor's role in the innovation process: 1/ Major partner actors of the intervention with whom direct interaction is desired; 2/ Major actors of the innovation process but who are not partners in the intervention; 3/ Influential actors likely to positively or negatively influence the innovation process without having a role as active actors in the innovation process; 4/ Impacted actors: actors who are positively or negatively impacted by the innovation process.

Chronology: A chart that allows the visualization of the narrative of the innovation in its temporal dimension by specifying the significant events and milestones.

Project cluster: A grouping of all research projects, research and development projects, and development projects (as well as interventions that have not been formalized as projects) pertaining to an innovation. It is therefore all past and current projects and initiatives that contribute to an innovation trajectory.

Intervention – In this document, an intervention can refer to a project, a program, or a cluster of projects, since the ImpresS *ex ante* approach can be applied to projects of different nature, or also to different research interventions or to development interventions that involve research.
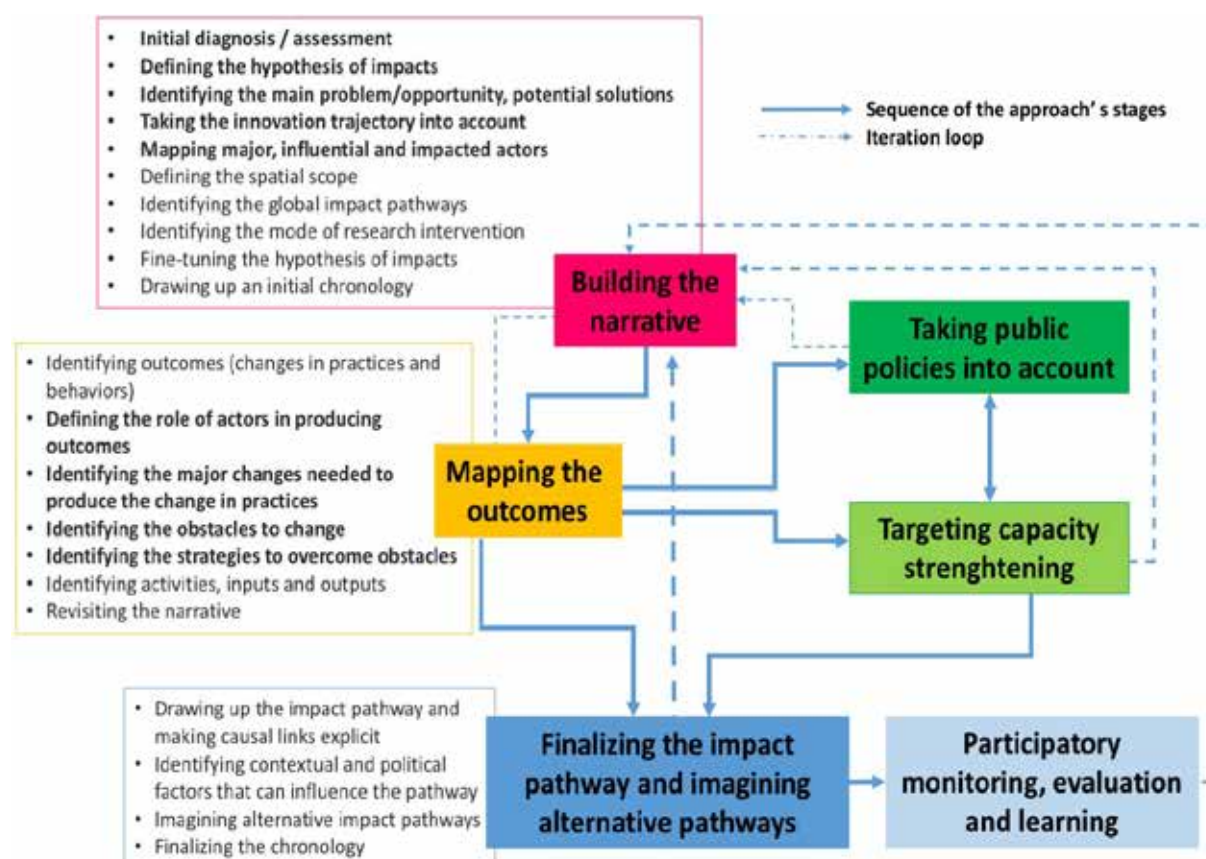
Guiding principles of the approach

The ImpresS *ex ante* approach is based on three key principles:

1. The crucial stage in building the impact pathway is the generation of outcomes, which are an appropriation (use, adoption, transformation, adaptation) by the actors of an intervention's outputs, leading to changes for some actors;

2. Because impact is generated over the long term, we have to think outside the ambit of an isolated individual project, and instead take into account clusters of projects that together contribute over time to an innovation trajectory;

3. The approach should lead to the production of a hypothetical impact narrative, describing *ex ante* plausible impact pathways. It is during the intervention's implementation that these plausible impact pathways will be progressively fine-tuned and transformed into actual (proven) pathways, which a monitoring and evaluation system will be able to document.

The ImpresS *ex ante* approach helps to (i) define strategic planning and implementation of the intervention by targeting and elucidating the processes that produce the outcomes, (ii) communicate internally and externally about research interventions, and (iii) facilitate the design of a system to monitor and evaluate actions to better guide the intervention's implementation, inform collective reflection and capitalize on lessons learned.

The approach's six stages

This document presents an approach structured into six stages, and adjustable to the specific intervention(s) concerned (Figure 2). Each stage involves the use of specific tools, some of which are described in this document. However, intervention teams can choose to use other existing tools that they consider more suitable to achieve the same result.

An adaptive, iterative and participatory approach

The ImpresS approach is not a normative approach; it is most definitely not a recipe to apply blindly. Indeed, it is flexible and adaptable to available time and resources. If necessary, only some of its stages can be deployed, at a level commensurate with the available human and material resources and imposed deadlines (see section "Adapting the ImpresS *ex ante* approach to different situations"). While the approach consists of a single process, how its results are presented and the level of detail provided, especially for the presentation of the narrative, depend on the targeted audience (producers, funders, researchers, public actors, NGOs, etc.).

Even though the aim of the ImpresS *ex ante* approach is to cover all types of interventions – projects considered in isolation, programs and "project clusters" –, the level of specificity and detail will vary depending on the intervention's actual nature. The identification of the actors, the outputs and the outcomes will be more or less detailed depending on whether the intervention consists of a project cluster or one that will take place on several sites, or an intervention that will take place in a locally circumscribed area. When the intervention is a project cluster, a generic impact pathway will be drawn up for the most encompassing level and over the long term, while specific impact pathways will be developed at more local levels (for each project of a cluster, for each site of the same project, etc.). These specific impact pathways will be nested in a coherent manner in the global impact pathway, which will reflect the common orientation and vision of the project cluster or program. The global impact pathway will feature more generic types of actors, while specific impact pathways will include the actors actually involved in the project, in order to accurately describe the actions to be carried out and the corresponding monitoring indicators.

This approach is therefore adaptive. On the other hand, following through with the entire approach as presented here can help build a more robust narrative and more plausible impact pathways, and lead to more strategic planning.

The approach consists of an iterative process. Each stage of the process provides results or feedback that may improve the previous stages (see Figure 2). However, how iterative the process is in practice depends on the nature of the intervention and the resources that researchers and their partners can mobilize.

Ideally, the *ex ante* reflection is carried out within the framework of a participatory process involving the partners and the major actors of the intervention. This allows building a shared vision and making the envisaged impact pathway more plausible. Nevertheless, it is possible to implement the approach usefully even if there aren't enough resources to involve partners before submitting a proposal for funding. In such a case, it will be desirable, if not essential, to include a budget line in the proposal for organizing a participatory workshop at the very beginning of the intervention in order to improve and validate the *ex ante* impact pathway with the partners and/or the major actors.

In an *ex ante* evaluation, we are clearly in the domain of hypotheses – since it takes place before the intervention's implementation (Box 2). It will therefore be necessary to make a case for these hypotheses' plausibility, i.e. for the effective capacity of the proposed intervention to generate the desired impacts. This argument will have to be backed by thorough work on the following aspects: demarcation of the scope of the innovation and, in particular, of the project clusters contributing to innovation trajectories; identification of the impact hypotheses, the actors and the interactions which favor the innovation; drawing up of impact pathways including an analysis of risks and success factors; and, finally, reflection on alternative scenarios.

Box 2: *Ex ante, in itinere* and *ex post*

An *ex ante* evaluation is undertaken during an intervention's pre-implementation phase, i.e. during the design phase. An *in itinere* evaluation refers to an evaluatio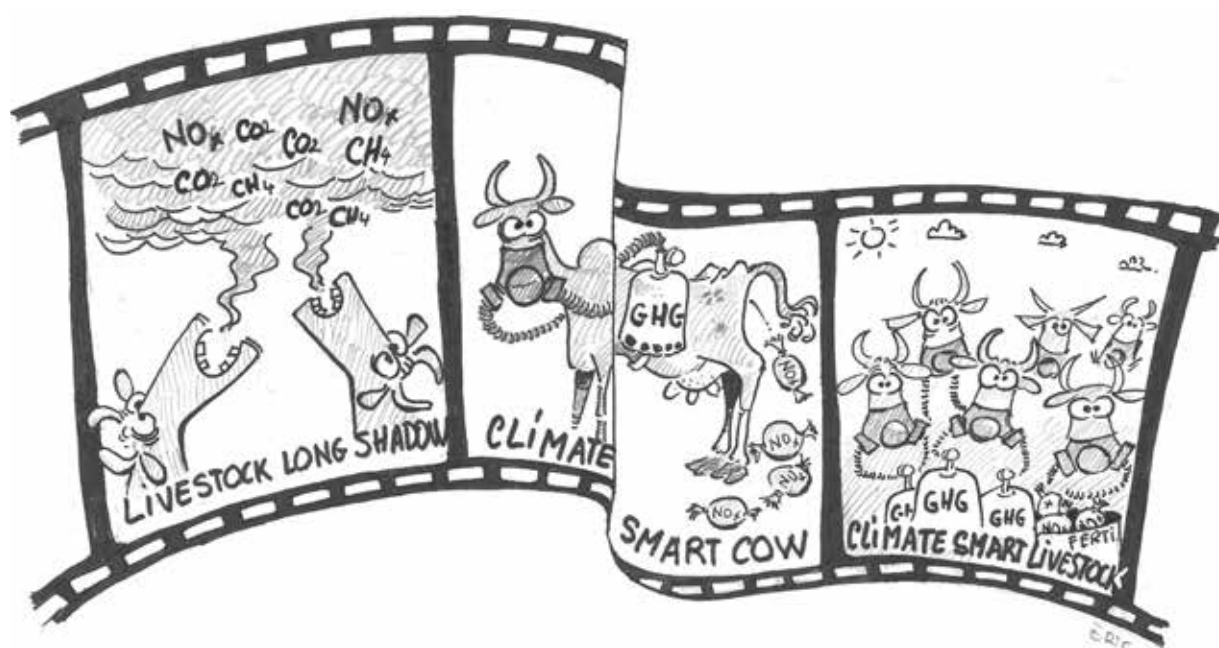n conducted along the way, during the implementation of the action or intervention. An *ex post* evaluation is done once the intervention – project, project cluster or program – whose impact we want to measure is over.

The six stages of the ImpresS *ex ante* approach

Stage 1.   Building the narrative

The ImpresS *ex ante* approach attempts to construct a compelling and plausible impact narrative in order to encourage a shared vision and a mobilization of actors towards a common goal. This narrative draws on past interventions that focused on similar issues, knowledge the actors have of them, as well as earlier research. However, it does not amount to a sequence of arguments or steps to be taken, but is a result of a true rhetorical exercise – thorough and plausible – to shape the actions that the intervention proposes to implement and the objectives that it wishes to achieve for different audiences (various actors, funders). The *ex ante* approach is built on the basis of a narrative that answers the questions: "What intervention? Where and for which aims? For whom and with whom? How can these goals be attained?" These diverse elements help develop a coherent narrative and a plausible impact pathway based on the outcomes.

Constructing narratives and impact pathways *ex ante* is a useful exercise for improving project planning practices, implementing and monitoring projects, building a common vision and establishing strong partnerships. It also serves to clearly highlight the links between an intervention's outputs and the developmental changes that the team aspires to. The final product is a simple, short and compelling narrative which presents the aim of the intervention and the modalities of the planned actions, and takes the role, interests and influence of various actors into account.

We propose using the thirteen elements detailed below to construct the narrative. It is not a matter of simply bringing these elements together, but instead of connecting them in a coherent way in a literary exercise, to encourage appropriation and to make a compelling and convincing case about the plausibility of the intervention impact.

1.1 What is the initial diagnosis/assessment?

To begin with, it is necessary to undertake a quick diagnosis through collection and analysis of information on a situation, an issue or a context (actor-related issues, social issues, political or environmental issues, etc.) that justifies the intervention for bringing about concrete improvements.

This first stage can be wide open when those who wish to intervene do not have any prior knowledge of the situation. Or, on the other hand, it may also be circumscribed to an issue that is well known because of a preliminary analysis, existing information or initial consultations with interested actors. It is also an opportunity to identify constraints and available resources and to learn about projects that other actors have carried out on the same theme.

Tips & tricks n°1: Undertaking the initial diagnosis

Project development officers at CIRAD typically consider addressing the following list of topics during the initial diagnosis:
- contexts (research-related, geographical, social, political, etc.);
- actors (who is acting to change the situation?);
- target actors (who comprises the target audience of the activities to be implemented by the intervention?);
- funding possibilities and opportunities;
- existing projects.

They also suggest using analytical tools such as:
- data collection tools (documentary research, questionnaire, interview, observation);
- brainstorming, 5W2H (What, Why, Where, When, Who, How, How much);
- the cause-effect diagram or Ishikawa diagram, the force field analysis diagram.

1.2 What is the initial impact hypothesis / vision of the future?

The initial diagnosis/assessment must be linked to a first impact hypothesis. This expectation of impact is based on the nature of the proposed intervention and the way it might contribute to generating impacts. This involves elucidating a vision of the future 10 to 15 years out, and of the change for which the intervention wishes to create favorable conditions.

This first impact hypothesis, this vision of the future, can be oriented by the needs or objectives expressed by local actors (local expectations) or partners (expectations of partners), by expected impacts of a tender (expectations of funders), or by societal expectations as formulated in policy orientation documents (societal expectations). A few examples are presented in Box 3. To develop a convincing narrative, it is good to keep in mind the origin of this impact hypothesis.

Box 3: Some examples of impact hypotheses from *ex ante* analyses

"In 2025, as a result of the systematic and widespread application of improved pest management practices, fruit losses due to fruit fly and anthracnose in Kenya and Senegal will decrease dramatically. This will lead to increased fruit production and quality, increased income for smallholders, improvement of food and nutrition security, and better health. The subsequent reduction of pesticide use should benefit the environment, including the restoration of biodiversity and its ecological functions such as natural pest control" (CIRAD BIOPHORA Project).

"The sustainable and legal use of wildlife populations by local rural stakeholders in key landscapes for wildlife conservation, as well as the diversification of the supply of alternative proteins from domestic animals, should provide sufficient and quality meat to ensure the food and nutritional security of populations, reconciling food security and wildlife conservation in African, Caribbean and Pacific countries" (CIRAD Sustainable Wildlife Management programme).

Tips & tricks n°2: Envisioning the future

A relatively simple way to envision the future is to position oneself in relation to the past and present trajectory (Altamirano, 2015). In the case of an intervention that will cover a particular territory, working groups formed on visioning during a planning workshop team chooses relevant topic, for example soil, water, biodiversity, gender, families, etc. For each topic, they describe the territory's, the actors and their interactions in four situations:

1. as it was 30 years ago;
2. as it is at present;
3. as it is expected to be in 15 years from the present, if the current trajectory is maintained;
4. as it is expected to b in 15 years from the present, if the intervention works towards the change.

In the end, the group writes a sentence or paragraph that summarizes its vision of the future.

1.3   What are the key problems, the main opportunity and the potential solutions?

Formulating an initial impact hypothesis makes it possible to elucidate expectations of certain actors. The reflection is taken further by identifying the problems for which the intervention must provide solutions. An analysis based on a "problem tree" and a "solution tree" (Chevalier and Buckles, 2008, p. 121) can help define the problems, their root causes and their consequences (the "lower" and "higher" branches of the tree are used to rank the problems), as well as the potential solutions (outputs) (Figure 3). These proposed solutions are a first – and far-from-final – result of the reflections, since it is through an iterative process, and especially through the results of the following steps (2, 3, and 4), that the solutions (outputs) the intervention wishes to provide are clearly defined, along with the conditions of their emergence.
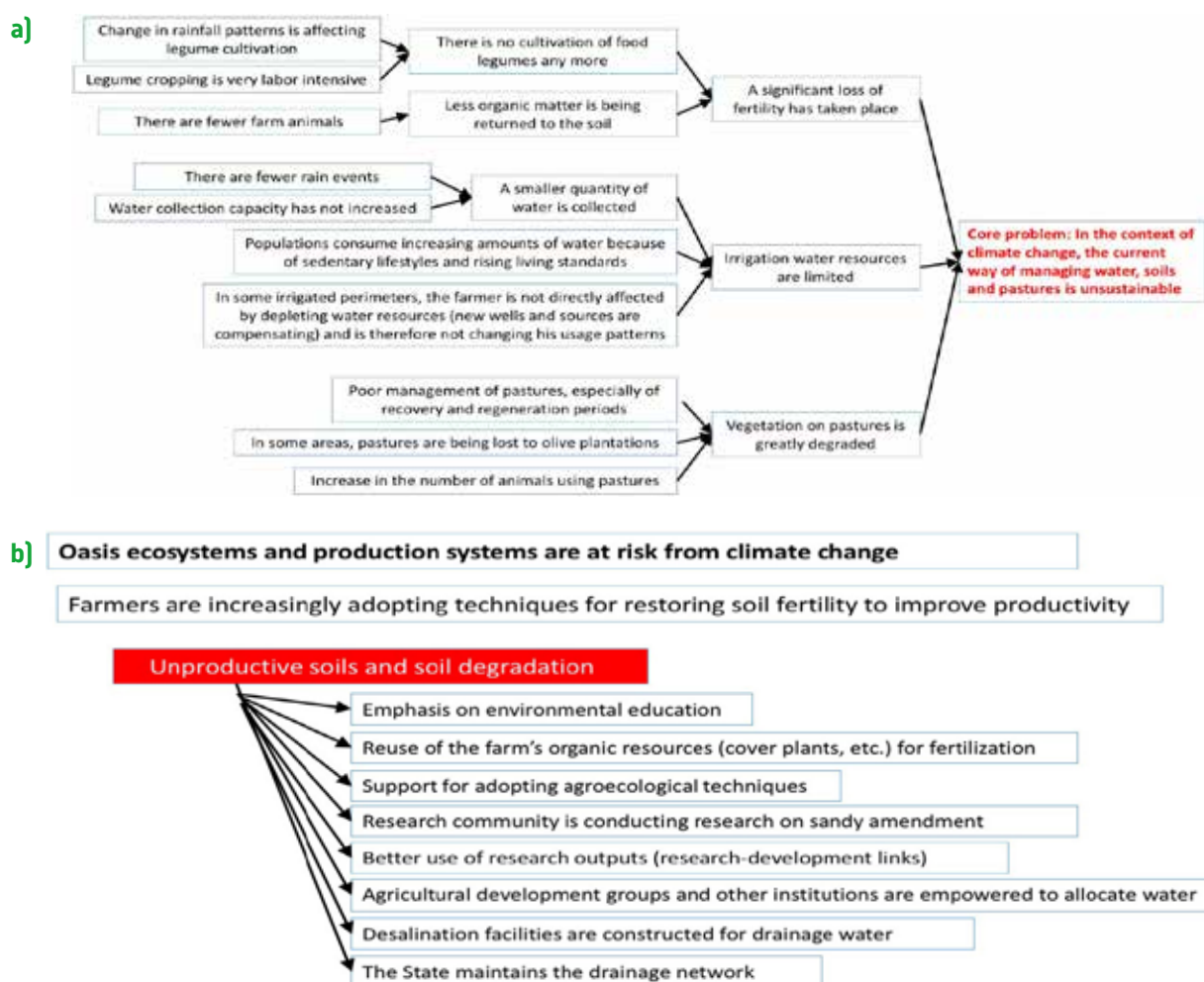

Figure 3: Examples of a problem tree (a) and a solution tree (b) (CIRAD GITES project example).

The "problems and solutions tree" is a tool that is often used by researchers and project development officers. Manuals and guides from various sources are available to help implement and use it. It is possible to draw a problem or solution tree in PowerPoint or other software, or by using the ImpresS online tool (see the "ImpresS interface" section).

The CCAFS program proposes the following facilitation methodology (Jost *et al.*, 2014, p. 48):

1. Ask the participants what are the two or three main problems that prevent the vision of the future from becoming a reality. Write these problems on the far right part of a flip chart, one problem per sheet;

2. Start with the first problem and ask why it exists, preferably in terms of social, economic, environmental causes. A single major cause or several minor ones can usually be identified. Write them on the left of the problem and connect them with an arrow to the problem;

3. Look at the causes identified and ask why they exist. Write these second types of causes on the left and connect them to the causes identified first.

4. Notice that you are drawing a tree with branches to the left. We must continue to draw the other branches by asking "Why?" This exercise is called "5 Why," because one has to normally ask "why" five times to arrive at the determining and central causes (roots). These are all causes that need to be addressed in order to progress towards the vision of the future, and they help define the outputs that the intervention has to generate to contribute to the desired change;

5. You can stop once all the branches have been completed up to the roots. After reviewing the tree, you can mark the causes that the intervention can address in red, and those that it cannot in black;

6. Repeat the same exercise for the other problems.

CIRAD's project development officers also offer guidelines for constructing problem and solution trees. The following example is taken from the facilitation guide of the design workshop for the "Adaptation to climate change in Tunisia" project:

1. You have an idea for an intervention that you think will address a problem that is posed (initial observation/hypothesis of impacts). In order to identify suitable solutions, you must first analyze this problem, i.e. think about its causes and consequences: WHY: What are the reasons/causes of this situation? AND SO: What does this situation entail as consequences (in the short/medium/long term)? Try to think with an open mind, i.e. without preconceived ideas about the intervention:

- Mention each cause/consequence/idea on a separate index cards;

- Each statement/idea must be expressed as a negative situation (lack of ..., absence of ...);

- Start by identifying all the causes/consequences, and then link them together in small groups before proceeding with constructing the tree.

2. You have built a problem tree from your diagnosis/initial observation. But you will not be able to solve everything with a single intervention.

- What are the issues on the problem tree for which you think the intervention can make an improvement?

- If several paths are possible, which ones will you choose and why? Specify how the routes chosen to improve the initial situation define the project's goal and scope.

3. At this point, you can move to the solutions tree. You will first formulate the specific goal you want to achieve through the intervention, using the central problem you want to solve. What is the concrete goal that you think you can achieve through the intervention?

- Use an active verb in the infinitive (to increase, to improve, to know, to solve, etc.);

- Formulate the more general objectives to which your intervention will contribute;

- What are the long-term consequences of the intervention? Use the phrase "contribute to ..."

1.4 What other initiatives, what other past, present or future projects have intervened or will intervene on the same innovation trajectory? How to take a cluster of projects into account?

It takes usually a relatively long time (10 to 20 years or more) for impacts to materialize and a single project, which usually lasts from 3 to 5 years, cannot claim to have a significant impact on its own. In fact, an innovation trajectory (see Glossary) is built on a set of past and ongoing interventions, linked between themselves, which cumulatively contribute to the production of an impact. The ImpresS method refers to this set of projects as a project cluster (also sometimes called the project "ecosystem"). The relevant scope to be considered in the design of any new intervention therefore includes past, ongoing and future projects that contribute to an innovation trajectory.

In concrete terms, this requires retrospective and prospective diagnoses based on various interventions that have addressed the issue we are proposing to work on:

– In retrospective mode: Will the new intervention be part of an existing innovation trajectory?
  • Who has worked on the subject (interventions as well as unorganized actors)?
  • What solutions have been implemented?
  • With which partnerships?
  • What outputs and/or outcomes have been obtained?
  • What learnings can you draw from their experience to create the impact narrative?

– In prospective mode: Will the new intervention be part of a cluster of projects or interventions that will work on this issue, on the same territory, or on the same value chain?
  • Are there other funded projects or other initiatives ready to take up this issue?
  • Do we need to coordinate to benefit from shared learning or synergy of actions?
  • How can the risks be reduced if the objectives of these other projects or initiatives compete with or diverge from those of the planned intervention?

The following example illustrates an analysis of a project cluster. In the GITES project workshop ("Integrated management of territories in semi-arid areas"), the analysis of the project cluster consisted of asking partners to position their ongoing projects in reference to the four GITES pillars: governance, foresight, information-sharing mechanism, and knowledge generation. The objective was to obtain an overview of the domains of intervention and research invested in by the workshop participants and their interests in relation to these four pillars, as well as to explain their involvement and positioning in GITES. Figure 4 depicts the mapping of a cluster of projects in which the participants of the GITES workshop were involved. It shows how GITES is placed in the ongoing work, which facilitates the positioning of every project on the work to be done together.
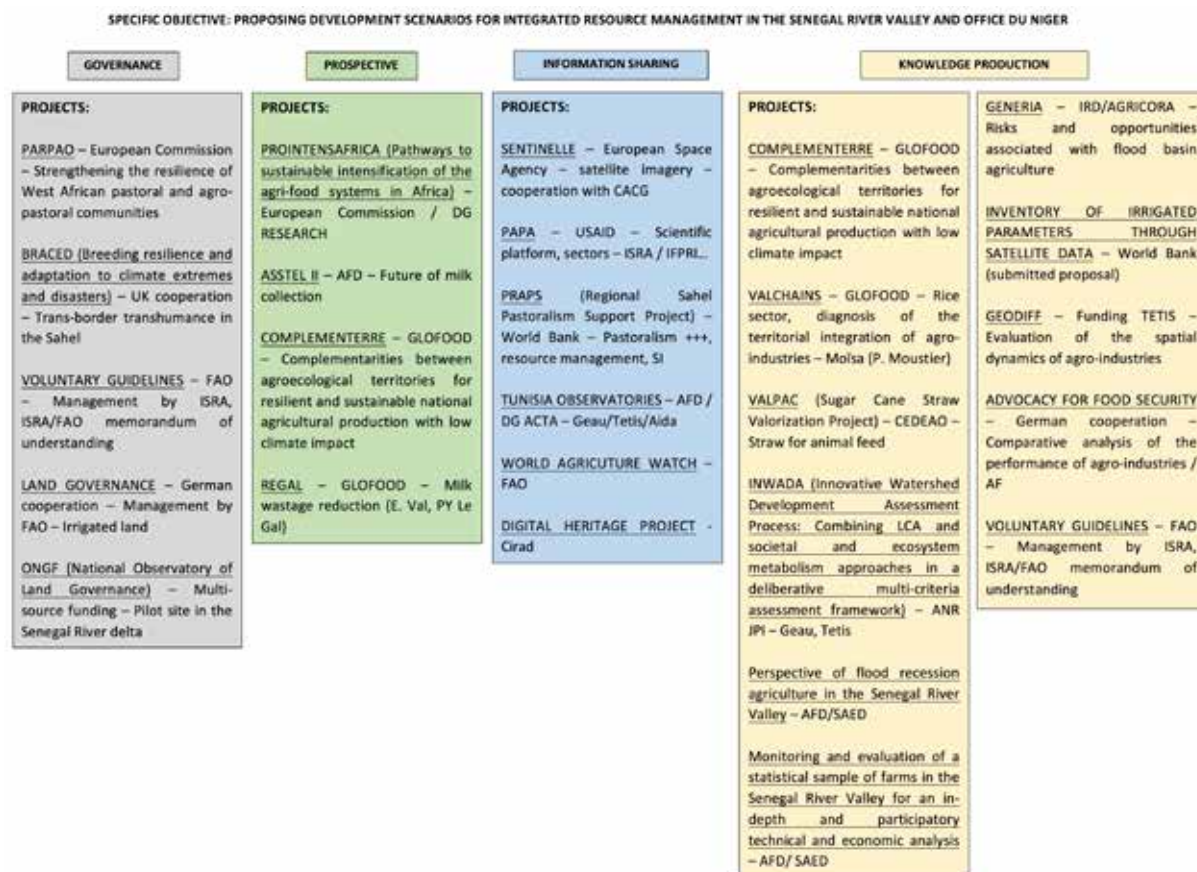

Figure 4: Part of the project cluster identified by the CIRAD GITES project.

An approach for building *ex ante* impact pathways

1.5 Who are the major, influential and impacted actors of the intervention?

It is now necessary to define with greater accuracy the actors involved in the innovation process (see Glossary) targeted by the intervention. The "map of actors" drawn up at this point is not necessarily final. However, it will tend to be more accurate if the project team has participated in similar interventions in the same region and/or has involved these different actors early in the intervention's development. Four categories of actors are used in the mapping of actors:

1. **The major partner actors** of the intervention with whom the project team will interact directly to jointly deliver the outputs[8]. A partner actor is an actor who contributes substantially to the intervention in the form of intellectual, material, human or financial resources. A partner actor's formal participation in the intervention is based on an agreement defining the terms of the partnership between the major actors, and sometimes with the funder;

2. **The major actors**, who are key in the innovation process but who are not formal partners of the intervention;

3. **The influential actors**, who are able and likely to influence the innovation process positively or negatively (including the appropriation of outputs and the generation of outcomes) without having a role as active actors in the innovation process;

4. **Impacted actors**, who are positively or negatively impacted by the innovation process.

If, in any particular case, it is found difficult to assign an actor to one of these distinct categories due to ambiguity, it will be necessary to make a reasoned choice. Indeed, the categories are not mutually exclusive: the major actors, as well as influential actors, can also be impacted actors. They can even change categories over time.

Box 4 highlights the differences and similarities between the ImpresS terminology and the typical project approach terminology.

Box 4: Partners, service providers, beneficiaries?

The ImpresS approach has adopted a well-defined terminology for actors, results, impacts, etc. This terminology is aimed at facilitating a common understanding of the different concepts for the sake of unambiguous and efficient communication. Nevertheless, different definitions and concepts exist in project planning procedures, in the literature, etc.

A **partner** participates in the project because the project is part of its action strategy and its mandate as an organization or institution. An agreement, defining the terms of the partnership is entered into between the organization leading the project and the partner organization (or indirectly between the partner organization and the funder).

A **service provider** is an actor who performs a task defined under a contract against remuneration. A service provider has no decision-making role in the project. This type of actor, who could be brought in to manage or implement an intervention, is not specifically taken into account in the ImpresS terminology.

Target groups: set of individuals for whom the outputs and outcomes of the activities that will be implemented by the intervention are intended. The ImpresS approach distinguishes the major partner actors involved in the intervention, who participate in the production of the outcomes (some farmers, for example, may be partners), from the actors who are impacted, especially in the scaling phases. Target groups can refer to both types of actors.

End beneficiaries: individuals who will have their situation modified indirectly by the intervention (multiplier effect, change of scale, etc.). They can, in addition, leverage the intervention's outcomes to pursue their own objectives. In the ImpresS terminology, they correspond to impacted actors and may include those impacted negatively.

Stakeholder: an individual or group (collective/organization) concerned by an intervention, whose interests may be affected positively or negatively as a result of its implementation (or non-implementation). In the ImpresS terminology, they correspond to impacted actors or possibly to major actors.

1.6 What interactions and relationships exist between the actors?

To map actors also means to identify their interactions (Box 5). Actors may be linked, for example, by joint research or development activities, funding or information flows, common interests or conflicting relationships.

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[8] For example, if only researchers produce the outputs in an intervention, these outputs can simply be called research outputs. If other types of actors are involved in the intervention, such as NGOs or producer organizations, then the intervention's outputs are those of the partnership.

Box 5: Mapping of actors

A network is a set of actors who maintain relationships – relatively strong or weak – between themselves. The map of actors is a visualization of these relationships. It makes it possible to analyze which actors/individuals play an influential role in the network (at the center of different exchanges, role of intermediaries, etc.) and which actors are on the network's periphery or dependent on others. The map of actors focuses on the relationships between actors rather than on their individual characteristics (Durland and Fredericks, 2005). Mathematical tools can be used to analyze the relationships between members in a social network. Data are collected through surveys, interviews or focus groups. Mapping the actor network is the first step in the analysis of social networks.

In the ImpresS approach, we seek to understand the relationships between the different actors of an innovation, as well as their roles in the innovation process. A map is drawn up in which actors are represented by nodes, and the relationships between actors by links between these nodes. Actors can be specific individuals acting within an organization or, more broadly, organizations themselves. While links can be shown in a simplified way, without specifying their nature or strength, it can be useful to interpret them more dynamically. For example, the strength of the links can be indicated by varying the thickness of the arrow. It is also possible to represent these links over time to show, for example, how they might become stronger during the innovation process.

The links can symbolize exchange flows of different nature: information and knowledge, material or funding. In addition, these links can represent different interactions of collaboration or rivalry with varying gradients (cooperation, coopetition, competition, conflict, etc.). These links can also correspond to certain actors' relationships of hierarchy or influence over others.

The ImpresS team offers a digital tool to map actors in a relatively simple manner, (see the "ImpresS interface" section). The ImpresS interface makes it possible to visualize the actors, use colors to classify them according to their role (major partner, major, influential, impacted) and assign a name to the type of relationship between them. It is a simple visualization that helps the mapping exercise during a workshop with partners or helps to quickly capture and depict information.

It is necessary to characterize these relationships within the framework of the intervention's core issue. And it is important to identify the influence some actors have over others in order to understand the aspects that must be considered and the institutional structure in which the intervention will take place (see Figure 5).

It is especially important to take into account the links between the major actors and the impacted actors, on the one hand, and between the influential actors and the impacted actors, on the other, in order to analyze scaling up and scaling out processes.
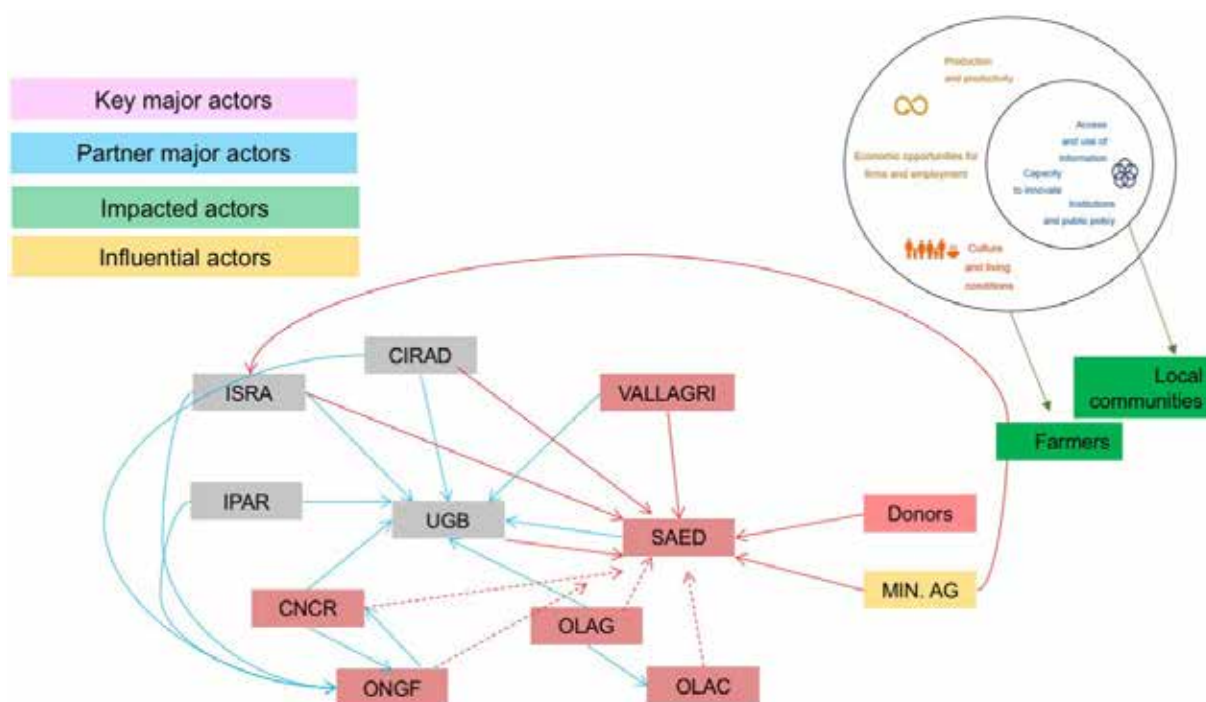

Figure 5: Example of mapping of actors (adapted from the CIRAD GITES project).
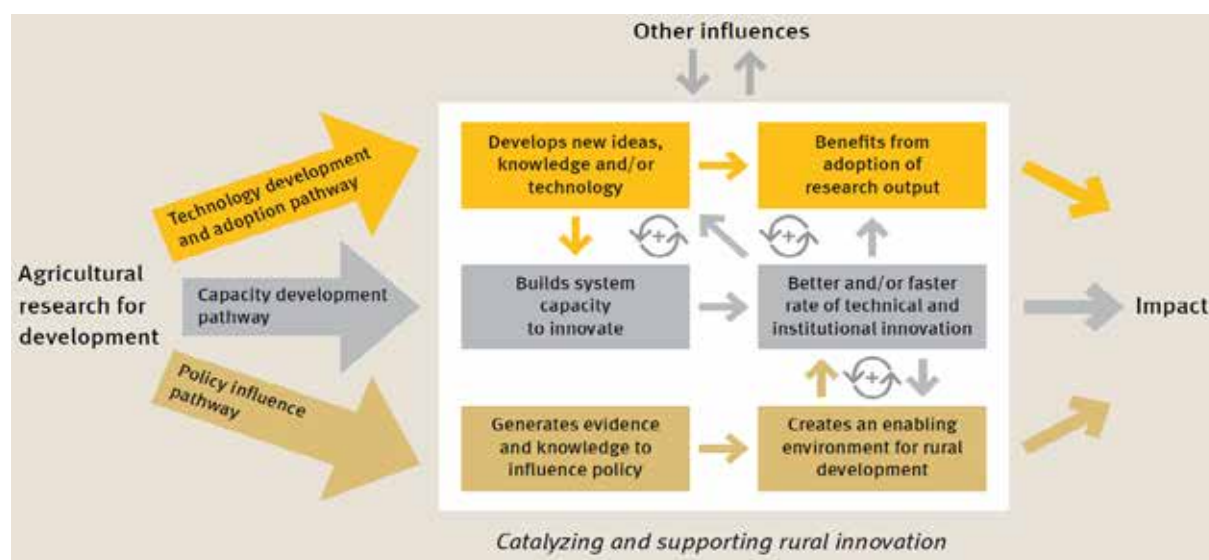
1.7   What is the intervention's scope?

Following the evaluation of the actors, the scope of the intervention is identified in detail. This exercise involves defining both an intervention area and a broader area that we expect to be impacted as a result of scaling mechanisms. The scope can represent a geographical area (territory) or time period (i.e. duration of the intervention), as well as a supply chain or an entire agro-industrial sector. The key questions to ask are: What scope of intervention is consistent with the partners and the available resources? What space does the intervention expect to impact through scaling activities beyond the intervention area?

1.8   Along which global impact pathways should we work?

It will be useful to position the intervention in relation to (i) three global impact pathways indicated by the literature on innovation as well as (ii) a research intervention model that the project team is able and willing to implement to support the innovation process. Douthwaite *et al.* (2017) propose a model in which agricultural research for development contributes to societal and environmental impacts along three interconnected impact pathways (Figure 6):

1. Impact through the adoption of technologies by actors: the ***technology development and adoption pathway***. This pathway is familiar to most researchers (Douthwaite *et al.*, 2017) and refers to the linear technology transfer model. It is a simplification of the reality of technological development in existing innovation trajectories, such as breeding for disease resistance, or the mechanization of agriculture;

2. Impact as a result of building capacity to innovate within agricultural innovation systems, or through local initiative or social conquest. This is the ***capacity development pathway***: collaborative and participatory research processes build the capacity to innovate of rural actors and of organizations providing support to them. This pathway is based on the need to build the capacity to innovate and the interactions between actors who contribute to common development objectives. Participatory and collaborative approaches are essential and identify common challenges by building structural cognitive social capital into the process, thus fostering endogenous development;

3. Impact through the influence of the political sphere: the ***political influence pathway***. The research community comes up with ideas and establishes facts with the intention of influencing political decision-making. Political change helps create an enabling environment for rural innovation.

Figure 6: Three interconnected global impact pathways which show the contribution of research to the impact (Douthwaite *et al.*, 2017).

According to Douthwaite *et al.* (2017), every agricultural research intervention for development will have an impact resulting from a combination of these three pathways. In fact, interactions and positive feedback loops between these pathways are often triggers for generating outcomes. For example, a technology-oriented research activity will require that the capacity of actors to innovate will have to be built up

so that they can appropriate the planned technology, and will also require interactions with the political sphere to enable the scaling of impact.

During the implementation of an intervention, these three impact pathways can be interconnected in time, and the researchers involved can contribute to impact along different pathways at different times.

Identifying how the intervention is positioned in relation to these three possible pathways can help guide the subsequent stages of the evaluation in terms of activities, actors to engage and types of outcomes to target. As far as the narrative is concerned, this helps to determine directly and simply the type of pathway the intervention is positioned on (technological adoption, endogenous development through capacity building, or policy influence).

1.9 What is the main mode of intervention of the research community?

To guide the reflections on the activities to carry out, the actors to engage and the outcomes to aim for, it may be useful to analyze how the research team may function within the intervention. The way in which the research team interacts with other actors of the innovation has a bearing on the impact pathway. Three elements are important: (i) the significance of scientific knowledge in the innovation process and the level of control that the research team will exert on the technologies which are derived from it, (ii) the role the research team will play to orient the impact pathway, and (iii) the influence of other actors in the innovation process and orientation towards the impact. The research team stance and its degree of control over the inputs, outcomes and the entire process will vary depending on these elements and on its mode of intervention (Devaux-Spatarakis *et al.*, 2016).
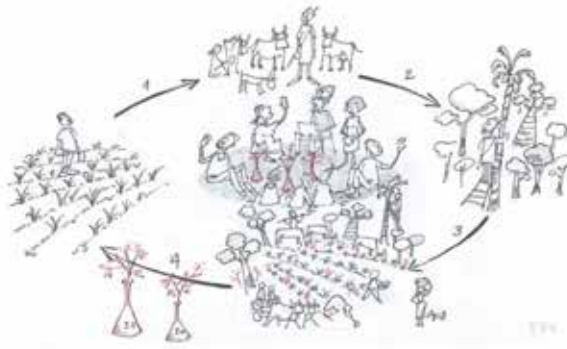
Based on its own analysis of how it conducts research and particularly the analysis of the 13 *ex post* ImpresS case studies, CIRAD has formalized four "archetypes of research" which can help research teams choose and clarify how they propose to intervene (Figure 7):
– Participatory transfer of knowledge and technology (strong control);
– Co-construction of innovations (medium control);
– Supporting the innovation process (weak control);
– Open innovation (weak control).

Figure 7: Archetypes of CIRAD's research intervention situations (Drawings: Éric Vall).

As far as the impact narrative is concerned, describing the mode of intervention a research team proposes to act can help better articulate the manner in which the intervention will build its outputs, what processes it will use to achieve its outcomes, and how the latter will catalyze impacts. It can also help to elucidate how the research team will achieve its goals when, in some cases, it does not have control over the impact pathway.

1.10 Loop: fine-tuning the hypothesis of impacts

After thinking through the various key points of the narrative, it is useful to go back to the impact hypothesis and to begin to fine-tune it (bearing in mind that the impact hypothesis will be finalized only at the end of stage 5).

The following impacts can be observed:
– 1st level impacts, concerning the actors interacting directly or indirectly with the research community[9];
– 2nd level impacts, following the scaling out (horizontal) or scaling up (vertical) of this innovation to other territories or other populations, or spillovers (unexpected and unplanned effects of the innovation). These impacts concern actors other than those who interact directly or indirectly with the research community.

We must not limit ourselves to the positive impacts during the reflections on impacts that are sought to be generated; we must also consider potential negative impacts – direct or collateral –, which will be termed as risks (Figure 8).
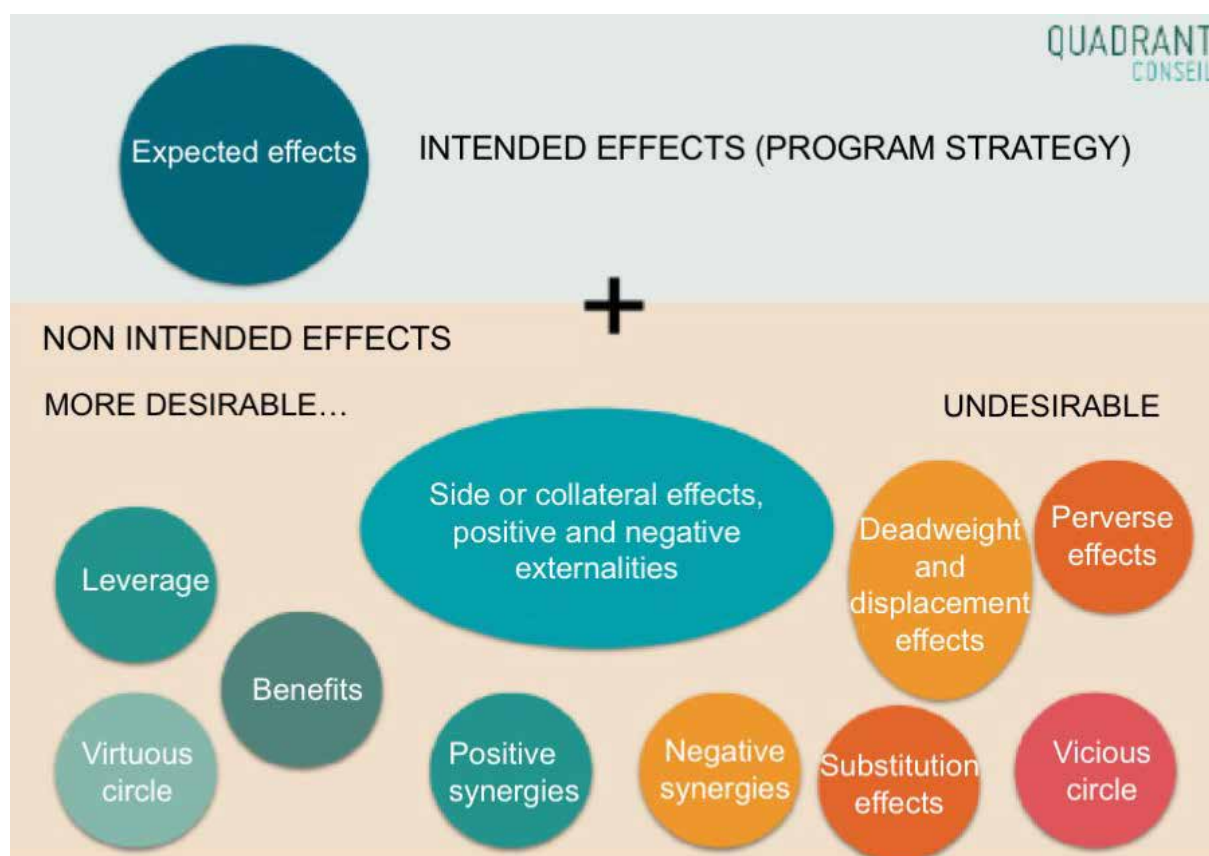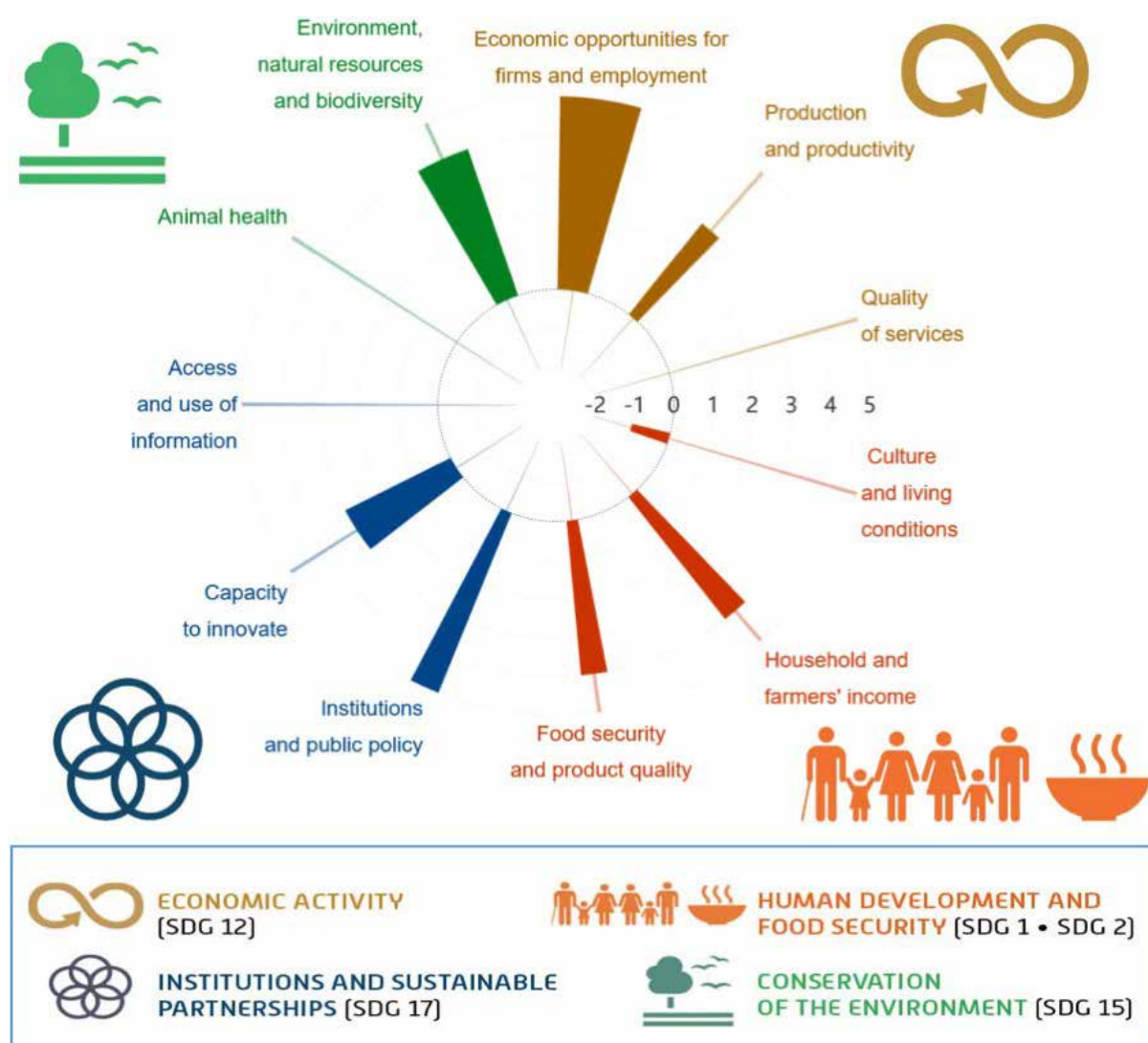

Figure 8: The different types of impacts.

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9 Positive 1st level impacts from a case study carried out as part of the ImpresS *ex post* approach include an increase in the income of fonio processors, an improvement in the quality of husked fonio, etc. The positive impacts of the 2nd level impacts pertain to the increase in the income of fonio producers in the wider production zone.

While it may not be possible in the *ex ante* approach to foresee all the effects, the reflections must cover actors who could possibly be negatively impacted by the intervention and the ways to reduce these risks. These reflections will be undertaken in Stage 2, during which outcomes and barriers to appropriation of outputs by actors will be examined.

The project team can define the desired impacts of its intervention with reference to the eleven impact domains identified by CIRAD on the basis of the 13 *ex post* case studies, with each impact domain corresponding to one or two of the UN's Sustainable Development Goals (Table 1 next page). The "impact radar" (Figure 9) directly and clearly shows the impacts expected from the intervention. The impact radar can be used not only for interventions that define impacts quantitatively, but also for those that do so qualitatively. However, during the *ex ante* design phase of an intervention it will not be possible, with some exceptions, to indicate the intensity for the targeted impact domains (length of the radar branch).

Figure 9: Impact radar for the *ex post* case study "Participatory breeding of sorghum in Burkina Faso."

The impact radar was built for the *ex post* case studies according to eleven impact domains that encompass the different missions CIRAD, and many similar organizations, typically play (Barret D. *et al.* 2017). During the *ex post* studies, a panel of experts scored each domain through an aggregation of the associated impacts. The length of each branch indicates that impact's intensity (from -5 to +5) and its thickness indicates the impact's magnitude (from 0 to 3).

Table 1: The 11 impact domains identified within the framework of the ImpresS approach.

Impact domains (11)	Impact dimensions (4)	Concerned SDG	
Culture and living conditions	Human development and food security	End poverty in all its forms everywhere	SDG 1
Food security and product quality		End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	SDG 2
Household and farmer incomes			
Environment, natural resources and biodiversity	Conservation of the environment	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss	SDG 15
Animal health			
Economic opportunities for firm and employment	Economic activity	Ensure sustainable consumption and production patterns	SDG 12
Production and productivity			
Quality of services			
Institutions and public policies	Institutions and sustainable partnerships	Strengthen the means of implementation and revitalize the global partnership for sustainable development	SDG 17
Access and use of information			
Capacity to innovate			

1.11 A provisional chronology to be finalized at the end of the reflection (Stage 6)

At this point, the project team is in a position to draw up a provisional chronology of the entire intervention and its impact pathway. This chronology reflects not only the short-term outlook for the funder, who primarily focuses on the outputs, but also the long-term horizon over which the outputs, outcomes and impacts can materialize. What can really be achieved in the timeline specified for the intervention in the funder's agenda? Is it possible to show through the clusters of projects that the intervention is part of an innovation trajectory that extends beyond the project's life span and that the impacts will materialize over the long term?

1.12 Loop: adding the outcomes

The narrative will progressively be improved as the *ex ante* process unfolds and acquires depth. Subsequent to reflections on the outcomes (see section "Stage 2: Mapping the outcomes"), including capacity building and interaction with public actors (see sections "Stage 3: Taking public actors into account" and "Stage 4: Targeting capacity strengthening"), one has to go back to the narrative and add to it the desired outcomes. In the structure of the narrative, the outcomes are placed just before the desired impacts (listed in detail at the end of Stage 5) in order to explain the link between them.

1.13 Loop: improving the narrative with the finalized impact pathway

After finalizing Stage 5 (see section "Stage 5: Finalizing the impact pathway and imagining alternative impact pathways"), the narrative will have been improved: the impact pathway will represent a synthetic visualization of the narrative. The narrative must provide a compelling elucidation of the impact pathway and the mechanisms underpinning the generation of outcomes and impacts.

ImpresS *ex ante*

Tips & Tricks n°4: What makes a good narrative?

Ingredient n°1: Orientation

The beginning of a narrative must grab the reader's attention, orient him/her to the setting, and introduce one or more protagonists. The reader must feel engaged in what is being experienced by the protagonists.

Ingredient n°2: Crisis/problem

The protagonists cannot immediately solve this crisis or problem that confronts them. The challenge this crisis represents will drive the narrative forward.

Ingredient n°3: Discovery/innovation

At the climax of the narrative, the protagonists make a discovery/create an innovation that changes their lives (the intervention!). Typically, this discovery/innovation is the result of a choice made by the protagonists. They can be accompanied by others in this process of discovery/innovation (for example, researchers!), but the final decision is up to the protagonists (appropriation by the actors!).

Ingredient n°4: Change

The solution of the crisis/problem is marked by a change, and it helps conclude the narrative. We show that the actions, perceptions and attitudes of the protagonists have changed from the beginning of the narrative (outcomes!). These changes lead to effects on their daily lives (the impacts!).

Based on http://www.writersdigest.com/online-editor/the-5-essential-story-ingredients

Stage 2. Mapping the outcomes

Once the intervention's underlying stakes and elements such as impacts, clusters of projects, global impact pathways and the mode of intervention of the research community have been described, the reflection must focus on the actors and their role as protagonists of the changes likely to generate the desired societal and environmental impacts. The intervention must aim at plausible and realistically achievable changes that it can catalyze given the capabilities and resources that can be mobilized within its framework.

If the changes required are outside the scope of the intervention, alternative strategies will have to be defined to achieve them, for example through collaboration with other projects. At the end of this second stage, we will be in a better position to define the contours and limits of the intervention, which constitutes a loop back to stage 1.

2.1 What are the desired final outcomes? Who does what differently?

To begin with, our focus must be on the actors and on how the intervention helps some of them use, adapt, transform and finally appropriate the outputs that it will generate or, in other words, how the intervention can achieve its outcomes. Thus the main question to which the intervention team must respond is to identify the desired outcomes it wants to achieve.

The ImpresS approach defines an outcome as the appropriation of a research (or more generically: an intervention) output by actors interacting directly or indirectly with the intervention, which leads to change in practices (agricultural or managerial), changes in organizations or in interactions or new rules. This appropriation takes the form of changes in the practices or behaviors of various actors as compared to the initial situation (before the intervention). These changes allow the actors to generate a process of

innovation, ultimately producing impacts. Several examples of outcomes were identified in the 13 *ex post* ImpresS case studies. Some of them are listed below, with explanations of the links between outputs and the impacts:

– Farmers who adopt or adapt (outcome) a new agricultural or managerial practice (output) experience a reduction in their production costs and post-harvest losses, which leads to an increase in production and incomes (impact);

– A project which tries out a new process to transform products and proposes new standards (output) works with agricultural advisory services that, together with other actors, encourage and support rural artisans in implementing new technologies (outcome), leading to increased household incomes (impact);

– Actors who implement a new training mechanism (outcome), following popularization or promotion of the project (output), increase the recycling of their household waste (impact);

– The actors who develop new activities or change their managerial practices (outcome) due to an improved organization of production, marketing, or territorial management that is developed with the help of the intervention (output) contribute to a more equitable exploitation of the commons (impact);

– The actors who change the way they work their land and the way they manage their farms (outcome) by taking advantage of new coordination and/or monitoring organizations set up due to the project (output) contribute to improving the management and preservation of biodiversity (impact);

– The actors who build up their capacities and organize themselves better (outcome) through multi-actor and/or network partnerships driven by the intervention (output) contribute to conflict resolution (impact);

– On the basis of scientific work undertaken by the intervention (output), a government sets a new standard (outcome), thus succeeding in reducing the ecological footprint of processing companies (impact).

Each of the examples above may seem to portray very linear processes. Bear in mind however that this simplification of a more complex underlying reality is meant for pedagogic purposes, aiming at facilitating the identification of causal links. Moreover, the distinction between outputs, outcomes and impacts is not always clear-cut. It is a terminological convention commonly used in the evaluation domain, and the ImpresS approach has adopted it.

In order to be consistent with the problem/opportunity identified in the "problems and solutions tree" (see section 1.3), we must ask ourselves at this stage if the changes in practices and behaviors identified will actually resolve some of the main causes of the problem inspiring the intervention.

2.2 What is the actors' role in the production of outcomes?

When the narrative was being constructed in the previous stage, the actors involved in the innovation process that is being planned by the intervention were mapped and classified as major partner actors, major actors, influential actor and/or impacted actors.

In order to better understand how the desired outcomes can be produced, some questions must be asked that pertain to the actors' roles and attitudes concerning the intervention's outputs:

– What is each actor's specific role in the production of outcomes? What is the actor's likely influence?
– How does the production of outcomes affect each actor?
– What is the expected reaction of the actor to the proposed solution?

The answers to these questions must be obtained for each type of actor, especially for major and influential actors. Should the project team not be in a position to answer these questions, it can plan to conduct a diagnostic at the start of the intervention. Such diagnostic can help determine the best strategy to adopt for engaging the different actors and for promoting the appropriation of the outcomes. Based on its results, the project team may even decide to modify the intervention, in particular its outputs.

2.3 What major changes are desirable to generate the expected final outcomes, and what are the main barriers in the way of these changes?

At this stage, it is necessary to ask what major changes in knowledge, capacities, attitudes, and interactions/relationships between actors are needed to produce the expected outcomes, and in some cases, to enable them to participate in the generation of outputs.

It is a matter of asking, for each intended outcome, what changes are necessary and desirable for the actors to be able to appropriate the intervention's outputs.

The major changes resulting from the intervention represent intermediate outcomes that lead to a plausible final outcome. The distinction between intermediate and final outcomes is once again a matter of convention: some interventions will consider as final outcomes those that others will consider only intermediate. This should not create any problems since the idea is to reflect on the actors' strategies and practices and the changes wished for in order to modify the current state of things and trigger impacts.

Some questions can be asked as part of the reflection:
– To address the core problem/issue, which actors should do things differently to achieve the desired impacts?
– What changes are needed in the actors' practices and behavior to help solve the problem and achieve the desired impacts?
– Who should learn to do what? Who should be able to change their practices, and how?

Once the desired changes are identified, it is important to determine what are the foreseeable **barriers** to these changes, why one or other particular actor would possibly not do what would be desirable to generate the impacts, and what aspects of the context would make these changes difficult or impossible.

Asking specific questions can help identify and understand the barriers to change:

Barriers related to actors
– Do the identified actors wish to implement the change? Why or why not? How is the change consistent with their values?
– To what extent do actors have the capacities, knowledge, resources, opportunities, and power to do things differently?
– Are there actors with interests that can make change difficult or impossible?
– Do we observe power struggles that can influence the desired changes for certain actors?
– For which desirable changes do the researchers (or partner actors of the project) have legitimacy? Are they capable of supporting such changes?

It is important to consider influential actors when mapping outcomes. An influential actor opposed to the solution proposed by the intervention may imperil its success (for example, an inputs-producing company that would feel threatened by the introduction of a new agroecological practice). If this is the case, a strategy has to be formulated for responding to these actors, communication and awareness-raising activities planned to convince them, etc. It is not necessarily the research community that should undertake these activities, but it is essential to formulate an anti-risk strategy, and to identify the partner actors to involve.

In some cases, it is an aspect of the context that may form a barrier. For example, by listing the barriers, one can find that a technology proposed by the intervention is only appropriate if there is access to credit, yet the context does not guarantee this is the case.

Questions that can help identify and understand context-related barriers
– Do the conditions of the physical environment (soils, climate, natural resources) constrain change?
– Is the economic environment conducive to change (price structure, existence of markets, infrastructure, etc.)?
– Is there a regulatory or legislative framework that proscribes or limits change?
– Do the culture and values of territorial actors define which changes are possible and which not?

Once again, the intervention alone will not necessarily be able to tackle all the identified barriers. The reflection will have to focus on the major barriers that the intervention considers it can overcome. For the others, the intervention could look for links with other projects or interventions that can handle them. However, the possibility exists that some of the barriers that the intervention cannot overcome may constitute risks for the appropriation of research outputs. For example, a bureaucratic organization and culture could prove to be a barrier to the production of an outcome. Overcoming such barriers may often be outside the ambit of the intervention's goal or even beyond its capacities. In this case, these barriers should be considered potential risks.

2.4 What strategies to formulate with partners to overcome barriers?

Once the barriers are identified, the strategies to overcome them have to be formulated. A strategy is the art of combining resources to achieve one's goal. We limit our attention to the barriers concerning the actors, because those pertaining to the context often require actions that are beyond intervention's ambit or capacities. The question thus is: How to make the intervention contribute to the use, adaptation, or appropriation of its outputs?

Strategies for overcoming barriers can be narrowed down by asking a few questions:
– If an actor does not want to change, can one convince him to do so? How? Who can do it?
– If an actor is unable to change, how can we facilitate his access to resources (cognitive, financial, material, human) that would allow him to do so?
– Training may be necessary for some actors to enable to them to overcome barriers, but how to plan the training? Who can impart it? With which method?
– Will the setting up of new mechanisms for consultation between two actors resolve conflicts between them? Under what conditions?

An intervention will not be able to implement all possible strategies; it will have to focus only on those that are most likely to engender actual activities. At the end, if the set of partners involved in the intervention do not have the capacity, the means or the mandate to implement certain strategies, they may have to consider obtaining support from or integrating with other projects, programs or actors who are better equipped to do so.

Box 6 presents an example of reflection on expected changes, the barriers identified and strategies to overcome them.

Mapping and subsequently linking outcomes, barriers, and strategies to overcome these barriers eventually means to think about how to show that the intervention's outputs and the outcomes actually result in change for the actors.

Box 6: Deliberating on desirable changes, barriers to them and strategies for overcoming them

In order to be able to adopt a new agricultural machine, farmers must first learn to operate it and be able to use it or adapt it to their requirements. They must also be able to afford it (acceptable cost, loan, subsidy, etc.). The machine can generate tensions within the family by increasing the work of some family members, or with employees who may find themselves replaced by the machine. Some farmers may be skeptical about the new machine as it conflicts their culture. The machine must be available (on the market or through public measures), and there must be no conflict between the actors in connection with its distribution. For example, suppliers of competing machines may be less than enthusiastic towards this new equipment.

This analysis of the situation helps identify the measures to be taken:

- Coordination between the researchers and extension services may be needed to facilitate interactions between actors, and the adaptation of the machine in order to have farmers adopt it, which entails creating new links between actors, planning new activities for the intervention, etc.

- It may be necessary to develop new business strategies for the distribution of the new machine, e.g. by including suppliers of alternative machines in the process, by building up the negotiating capacity of some actors, etc.

These actions may be outside the scope of the intervention being implemented and, in some cases, it will be necessary to enter into alliances with other interventions.

2.5 Defining the intervention's activities, inputs and outputs

So far, we have characterized in detail the outcomes, the actors who are protagonists in the intervention, the barriers to desirable changes that bring about the outcomes, and strategies that the intervention can adopt to overcome these barriers. In fact, the strategies chosen represent the major areas of activity that the intervention will implement, in whole or in part. It is at this stage that the intervention's activities and, consequently, the outputs that the intervention will generate, can be defined or be reviewed (if they had already been envisaged).

Characterizing the intervention's activities in detail involves defining:
– the type of intervention (analysis, expertise, experimentation, training, provision of a service, etc.);
– the method chosen to carry out each type of intervention and, in particular, the degree of participation of actors in its implementation (experimental research, action-research, participatory research, etc.);
– interactions between actors who are part of the intervention and actors who are not;
– a precise chronology that depicts the activities in relation to a Gantt chart of the intervention;
– the actor responsible for each activity and the actors who participate in the activity.

The intervention's inputs include all the resources that make it possible to carry out an activity (human and material resources, research budget, information, tacit or other knowledge, etc.) and thus generate research outputs. According to the ImpresS *ex ante* approach, these inputs refer to the investments made and the resources mobilized before the period chosen for the start of the intervention (funding or recruitment of a researcher may occur during the intervention period and hence are classified as inputs).

The details of the activities are, however, defined depending on the granularity with which the impact pathway is built. For an intervention that focuses in specific areas and with specific actors, the activities and their progress have to be defined in detail. In this case, the strategies have to be more finely detailed, and preferably have also to be directly translatable into specific activities and outputs (Table 2).

Table 2: Example of how "fine-grained" strategies translate into activities and outputs (CIRAD Maggi project on clove in Madagascar).

"Fine-grained" strategy	Activities	Outputs
Local production of stills makes artisanal production by farmers possible	Development of a still prototype Training in the production and use of the still	Still Trained local artisans Trained farmers
Land certification allows sustainable management of wood used as fuel for stills	Training on sustainable management at each site, for each actor Training of nurserymen for reforestation	Land certificates issued Trained nurserymen
In-depth discussions with Givaudan (industrial distillery) on an approach that would allow a partnership to be formed between the private sector and the farmers involved in distillation	Proposal for an operational project to evoke Givaudan's interest	Operational project

For large programs, clusters of projects or interventions in partnership, it is very likely that activities cannot be described in detail. The hypothetical impact pathway should thus be defined through generic strategies and activities. As and when more specific projects become part of these programs, clusters or interventions, or when specific intervention sites are identified, it will be possible to define the activities in more detail.

In cases in which the activities originate from "coarse" strategies (Table 3), the activities could even become the intervention's work packages.

Table 3: Example of how "coarse" strategies translate into activities and outputs (CIRAD Wildmeat project in Central Africa).

"Coarse" strategy	Activities	Outputs
The participatory diagnosis of the supply chains helps identify the key bottlenecks	Participatory workshop and interviews of key actors for a diagnosis of each supply chain at each site	Publications on the basis of the diagnoses Participatory actions
Building the management capacity of actors allows them to better manage their territory's resources	Management training activities at each site for each actor type using participatory methods Setting up of local resource management committees	Training activities Identification of capacities to be built up for each actor type Local resource management committees
Negotiation of sustainable resource exploitation contracts	Discussions with public and private actors to define the content of an exploitation contract Working sessions with management committees for negotiation of contracts Discussion of contracts in local government bodies	Content of an exploitation contract Contracts negotiated and implemented

Reflections on the outcomes, barriers and strategies to overcome them will, in all likelihood, lead to the identification of complementary activities that can contribute to the generation of the expected outputs or new outputs.

Since we are constructing the *ex ante* impact pathway using an iterative process, we have to revisit the narrative at this point in order to:

– clarify the outcomes the intervention hopes to achieve through the generation of outputs, and the strategies chosen to realize them;

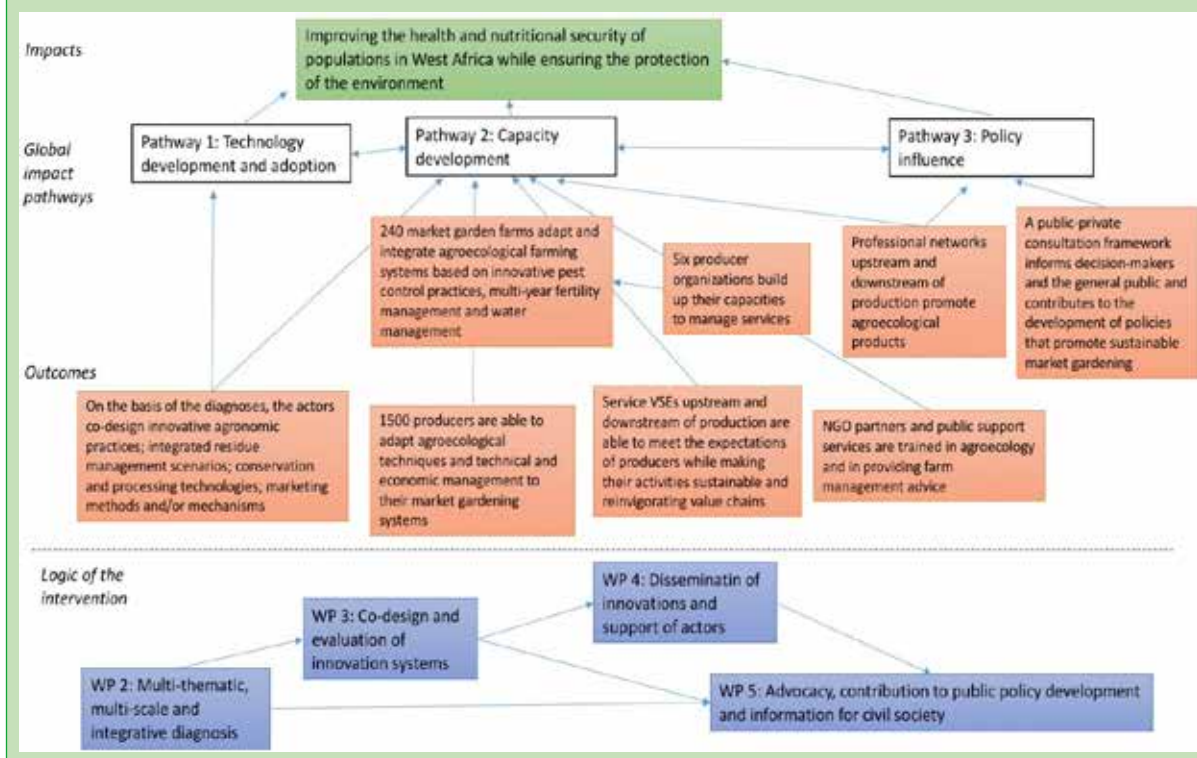– review the plausibility of the impacts on the basis of the outcomes identified along with their causal links.

In order to build a common vision, it may be useful to present the structure of the narrative in the form of a graph. This is especially helpful when undertaking the initial *ex ante* reflections after a proposal or concept note has been submitted, for example, at the start-up workshop of the intervention.

To do so, the constitutive elements of the narrative as proposed by the ImpresS approach must be retrieved from the existing proposal, and organized and structured into a short, clear and compelling narrative. Once this is done, we can present such structured re-reading of the proposal during the start-up workshop to the intervention team, its partners and possibly the major actors. While this re-reading can assume different forms, two actions are considered particularly useful: sending of the narrative by the project team to the participants before the start-up workshop to initiate a discussion; and developing a graphic representation of the intervention's key elements. The latter, useful for initiating a debate, shows the global impact pathway(s) the intervention is part of by elucidating the impacts and outcomes and by presenting the work packages into which the work has been organized. We can thus represent two ways of viewing the intervention on the same diagram: based on mechanisms of causality and on the project logic.

Indeed, this re-reading and visualization exercise is meant to encourage a debate around the intervention's key elements in order to be able to appropriate them, transform them and, finally, arrive at a shared vision.

The figure shows an example of visualization after a re-reading of the CIRAD TAMA project proposal.

Stage 3. Taking public policies into account

While deliberating on outcomes and major changes, it is necessary to focus in particular on two topics analyzed in the ImpresS *ex post* approach: interactions with public policy actors, and capacity strengthening of actors. Even though these aspects have already been addressed in the preceding stages, given their importance, two specific stages are dedicated to them.

3.1 Why should we take public policies into account?

The institutional context has a strong bearing on the innovation process. One of the lessons learned from applying the ImpresS *ex post* approach is that it is necessary to interact with public policy actors in order to move the innovation process forward and generate impacts. Interactions between the research community and public policies are essential if research has to contribute to societal impacts. Research activities form part of an institutional context, shaped by past and present public policies, which can be more or less conducive and favorable to innovation. The emergence of certain priorities in political agendas, either over the long term or in response to a crisis, can orient the choices and modes of intervention of researchers and the ability of their research to have an impact. Public policy actors, through very diversified means, have a leverage effect that can make it possible for research to have a substantial impact. By interacting with public actors, especially when they are included in a participatory research process, researchers build up the capacities of public actors and thus play a role in the development of public policies. But when the purpose of the research does not explicitly concern helping public actors in their decision-making, the researchers rarely communicate with them or seek their opinion. Furthermore, public actors in developing countries are sometimes not very receptive to the work of researchers.

Public actors can play a key role at the various stages of the impact pathway by directly influencing the orientation of the research, channeling funding and grants for innovators, coming up with favorable rules or standards, or orienting training organizations. They also play a crucial role in the scaling up/out stages.

The participation of public actors in innovation processes, especially in multi-actor participatory research, enhances their capacity to interact with researchers and other actors of the innovation system and to facilitate long-term impacts of research.

Research also influences public policy through the drafting of policy recommendations and through participation in the creation or evaluation of public policies. However, political agendas do not coincide with scientific ones. Researchers are advised to be flexible in their interactions with public actors, for example by maintaining informal relationships or by participating in coalitions aimed at influencing certain public policies so that they become more conducive to innovation.

3.2   How to identify and reinforce interactions with public actors?

While defining the major, influential and impacted actors and the major changes desired in the first stage (see section 1.5), it is important to focus in particular on public actors who contribute to the design or implementation of public policies at the national and local levels. A public actor can be defined as a major actor, an influential actor, and/or an impacted actor depending on the innovation process being considered. Four types of public actors were identified in the 13 ImpresS *ex post* case studies:

– national public actors (the State, ministries, central services, etc.);
– deconcentrated State services (administrations, prefecture/sub-prefecture, etc.) which are the representations and vehicles of action of national public actors;
– local public actors in local authorities (actors administratively and politically independent from the State, even though they are largely funded by the State, such as regions or municipalities);
– international organizations and other public actors outside the country where the intervention is taking place (donors, bilateral or multilateral cooperation agencies, etc.), who follow their own political strategies and influence the behavior of governments in developing countries.
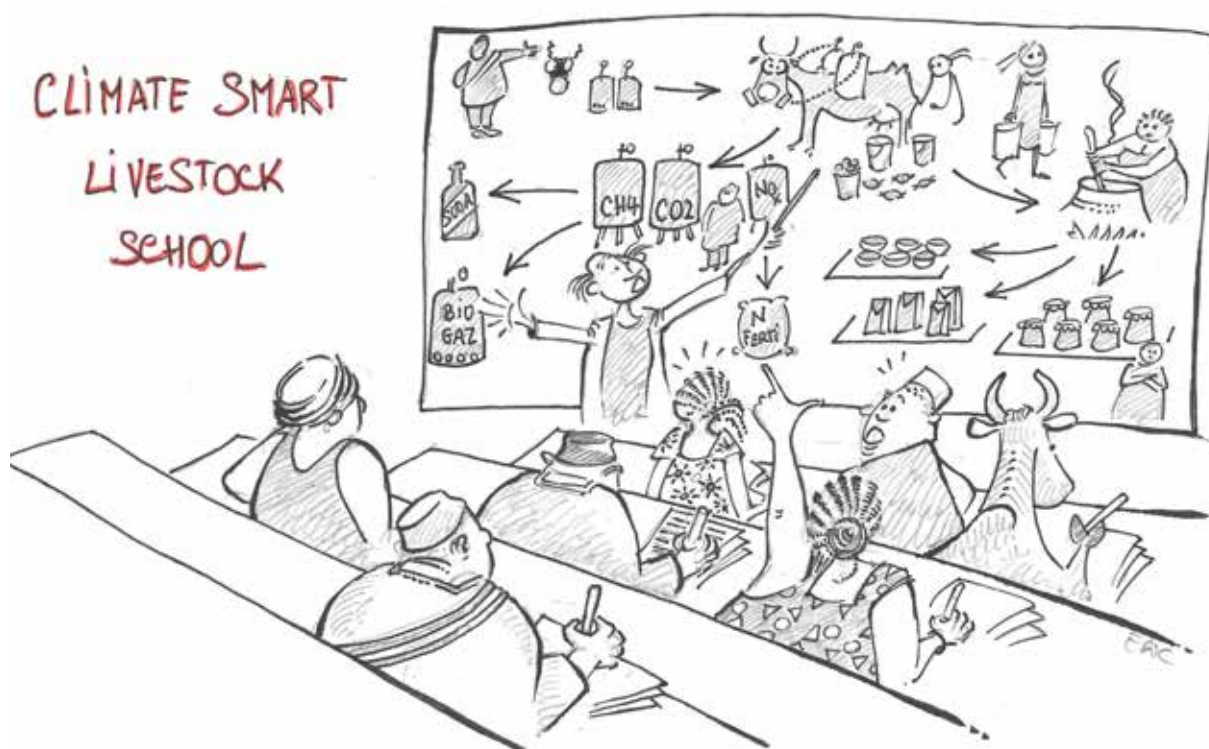
When the outcomes are being mapped, the ones concerning public actors must be clearly identified. Due note should also be taken when a particular public actor should be involved in the innovation process, and the role(s) he or it could play in fostering the impact.

One has to be aware of the concrete modalities of public action and of the specific times at which public actors are likely to interact with the others actors of the innovation to facilitate (or hinder) the process leading to the impact. Thus, public actors can have a leverage effect on innovation (creation, scaling up/out) during the various phases of the impact pathway:

– as regards investments (inputs): public funding, orientations of research programs, putting in contact with other actors, etc.;
– as regards research outputs: contribution of public actors to multi-actor participatory research; creation of a framework conducive to innovation;
– as regards the creation of outcomes: mobilization of actors, establishment of standards and rules, creation of dialogue or management structures, financing of communication operations, financing of investments, etc.;
– as regards impacts: financial incentives, creation of an environment that is favorable to the innovation, facilitation of scaling up/out.

Even though this reflection was already carried out in Stage 2, revisiting the interactions with public policies helps avoid any omission of specific activities or strategies essential to obtaining outputs and outcomes. Reflections on interactions with public actors also help to fine-tune the outcomes and changes that we wish to encourage. Undertaking this loop also leads to enriching the narrative.

Stage 4. Targeting capacity strengthening

4.1 Why should we take capacity strengthening into account?

Individuals, communities and organizations change their practices and behaviors because they acquire new skills or capacities. By undertaking their research activities in partnership, Cirad and other similar organizations contribute to the strengthening of capacity of their partners. The aim is to empower researchers from developing countries and their institutions, as well as development actors (farmers, representatives of farmers' organizations, technical agents of NGOs, managers of private companies, officials of public institutions, etc.), to better respond to the challenges of development.

Capacity strengthening involves a process of acquisition and accumulation of knowledge, know-how and social skills, followed by their application by individuals or organizations in order to carry out their functions and achieve their objectives (Morgan, 1998). Capacity strengthening is realized in large part through action, in the context of learning situations. A learning situation (Toillier, 2012) is defined as a set of conditions and circumstances that can lead a person, a collective or an organization to build new knowledge and to apply it to solve problems, seize opportunities or improve ways of doing things. Learning results in new capacities. A learning situation can be organized or informal, intentional or indirect.

Several formal learning situations were identified in a case study from the ImpresS *ex post* analysis, "Rainfed upland rice in Madagascar", where research was carried out in "participatory transfer" mode (see 1.9). In one such situation, extension technicians and research partners participated in the training organized by the research team on cropping and cultivation techniques and on capacities necessary to provide technical assistance about such techniques.

4.2 What kind of capacity strengthening, and for which actors?

In the ImpresS *ex ante* thinking, strengthening capacity of major and impacted actors is a key tool for achieving outcomes and generating impacts. Capacity strengthening includes strengthening of human capital (individuals) and of social capital (organizations, relationships between individuals or organizations through formal or informal networks). The capacities to be built up are very diverse – technical,

managerial, ability to experiment, to learn, to interact with others – and depend on the specific innovations to be developed. Taken together, they enable actors to develop a greater capacity to innovate (Table 4).

Table 4: Types of capacities defined in ImpresS *ex post* case studies.

Technical capacities	Management capacities	Ability to experiment and learn	Ability to interact with others	Capacities which, when strengthened, increase the power to act
Mastering a new technology Mastering new processes	Knowing how to analyze one's situation and environment Knowing how to plan one's activities Knowing how to monitor and evaluate one's activities and outcomes Knowing how to mobilize resources (financial and other) Knowing how to manage one's farm and evaluate the performance of innovations based on explicit criteria (diagnosis)	Knowing how to experiment, to adapt Knowing how to formalize knowledge to solve problems Knowing how to share knowledge and skills with peers and other actors	Knowing how to work together to design and implement an innovation Knowing how to act collectively to design and set up an organization and engage in a political process Knowing how to interact with other actors of the innovation system (State, companies, markets, etc.)	Being self-confident Changing one's perception of a problem and solutions Becoming pro-active Increasing the decision-making power and participation of women and marginalized groups in innovation systems

4.3   How to identify capacity strengthening requirements?

It is important to reflect as part of the *ex ante* approach on ways to promote learning situations that will help build capacity. Learning situations can occur all along the impact pathway and can constitute a pre-requisite for the generation of research outputs, for example when the research community co-designs the outputs with farmers. It can also be a strategy for overcoming obstacles and achieving outcomes: for example, in a participatory transfer of technology, farmers cannot adopt a new variety without being trained in its agronomic management.
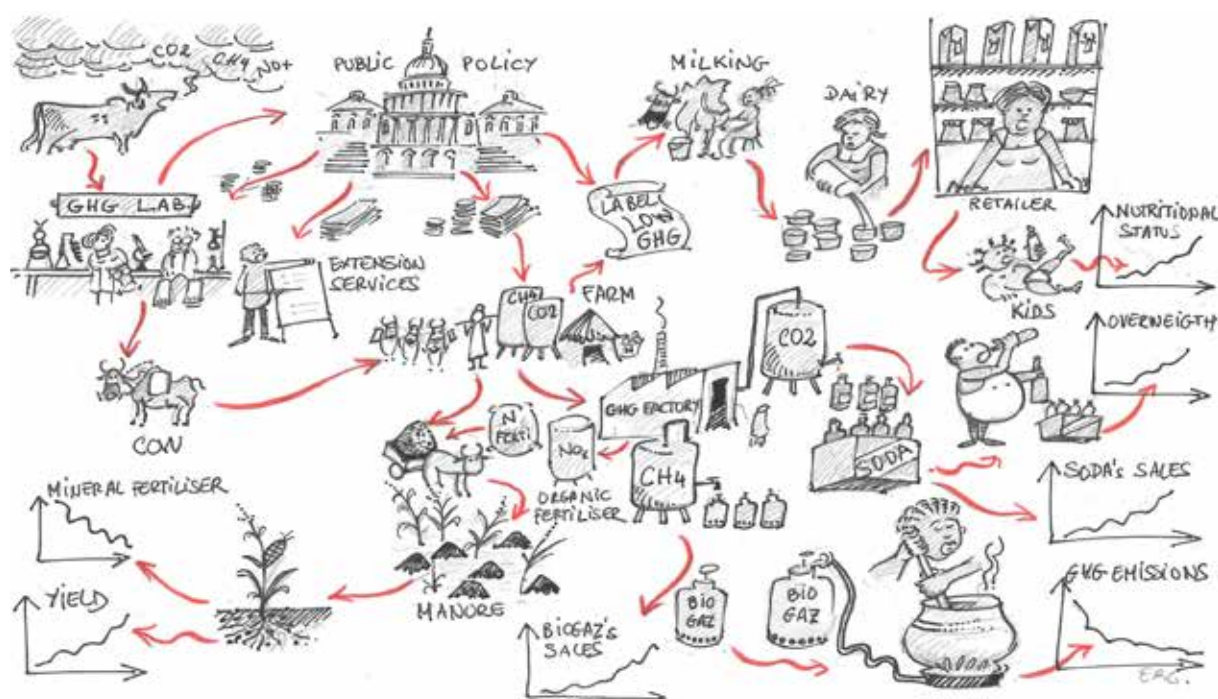
In an *ex ante* evaluation, it is necessary to identify the capacity strengthening requirements for each actor type so that the outputs and outcomes can be achieved, as well as the learning situations to be encouraged. We can do so by asking the following questions:
– What are the capacity strengthening requirements of farmers, farmer leaders, technicians, companies, researchers, policy makers, etc.?
– What are the most appropriate methods for capacity strengthening (classroom training, peer exchanges, field visits, farmer trials, roundtables with decision-makers, access to information, etc.)?
– What are the most suitable moments to carry out these capacity strengthening activities?
– Who can support the capacity strengthening process (researchers, technicians, educators, farmers, experts, etc.)?
– Does the research team have the capacity to design and participate in capacity strengthening activities? Can or should it build up its own capacities to do so?

Even though this reflection was, by and large, already carried out in Stage 2, revisiting capacity strengthening helps avoid any omission of specific activities or strategies essential to obtaining outputs and outcomes. Finally, as in the case of interactions with public actors, reflections on capacity strengthening lead to an enriched narrative.

Stage 5. Finalizing the impact pathway and imagining alternative impact pathways

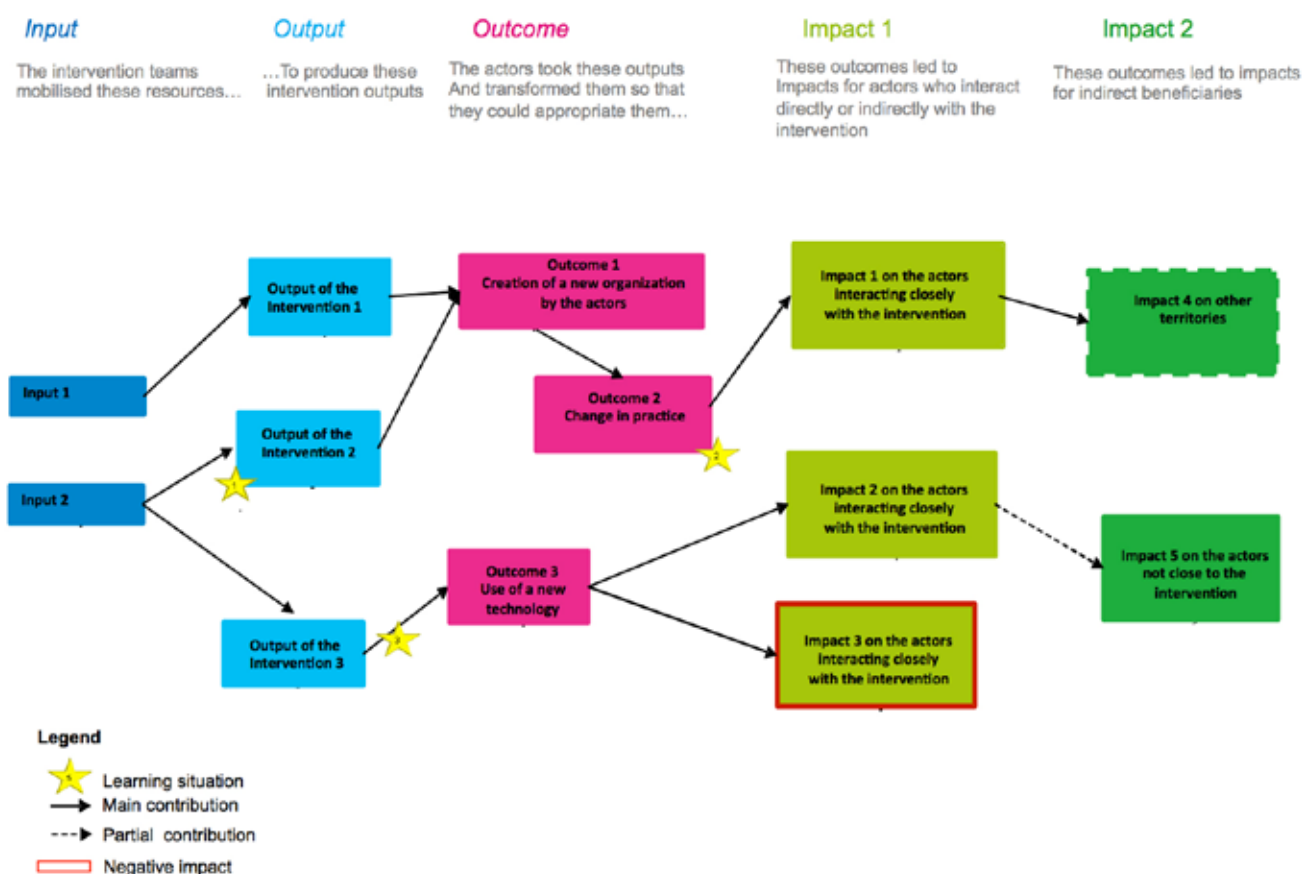
5.1 Drawing the diagram of the main impact pathway

At this stage, all the elements needed to draw the intervention's impact pathway have been discussed and are available: impacts, outcomes, outputs, and inputs. It is now necessary to go back to the narrative, to the mapping of the outcomes, to the identification of the strategies in order to connect the various boxes of the impact pathway. These links represent the causal relationships between outputs, outcomes and impacts.

The strategies chosen help elucidate the causal links, including those pertaining to public actors and capacity strengthening. For example, the proposed link between the production of a still (output) and its use by artisans (outcome), may be caused by the "co-design and local manufacture of the still" and the "training of/consultation with farmers." Proposed capacity strengthening activities can be made more visible by highlighting critical learning situations on the impact pathway, for example with a star (Figure 10, next page).

5.2 Identifying contextual factors that can influence the impact pathway

The institutional context is important to an improved understanding of an innovation process and of how it unfolds. It is therefore necessary to assess the institutional context in which the intervention takes place, and which may have an influence over the intervention's implementation and its impacts.

It is a matter of identifying the contextual factors that are considered to influence the innovation process, including the ones that are intrinsic to the intervention itself: the composition of the intervention partnership, the level of collaboration between actors, the lead actors, access to additional funding, etc. Such factors can either facilitate or complicate the pathway to the impact desired in the future. Known or expected contextual factors that could promote (or hinder) the desired changes should be identified; they form what is called the "enabling environment" (see Douthwaite *et al.*, 2017). While actors often have ideas about how their context may change in the coming years on the basis of economic trends, new laws, etc., there may also exist prospective studies or national strategic plans which establish priorities of public action for the next 5 years, 10 years, etc. If such documents or studies exist, they have to be taken

Input

The intervention teams mobilised these resources...

Output

...To produce these intervention outputs

Outcome

The actors took these outputs And transformed them so that they could appropriate them...

Impact 1

These outcomes led to Impacts for actors who interact directly or indirectly with the intervention

Impact 2

These outcomes led to impacts for indirect beneficiaries

Figure 10: Schematic diagram of the impact pathway with highlighted learning situations.

into account. The intervention can be planned to modify these factors, or simply consider them as risks or opportunities.

The following public or private policies can be cited as examples of contextual factors to consider:
– scientific, research, innovation and training policies, which control the human, technical and financial resources allocated to research;
– investments planned by the private sector in agriculture;
– prioritization of issues in public agendas;
– development or sectoral policies that research projects directly support: policies on agriculture, credit, food, health, land, energy, etc.

For example, if the pathway envisaged to bring about a sustainable increase in agricultural productivity involves implementing agroecological techniques, favorable factors may include access to, and availability of, means of communication, the existence of a law promoting agroecology, and the availability of international funding. Conversely, factors that may hinder the desired change may include policies for subsidizing chemical inputs, land policies that do not support secure access to land, or the continued promotion by large companies of conventional input-based technologies, etc.

Another example is of an impact pathway based on participatory consultations and decision-making to manage natural resources. In such a context, the favorable factors would include policies favoring decentralization, or instituting and making mandatory certain types of public consultations with civil society actors, while unfavorable factors would include centralized and vertical rules and routines for public decision-making, or the lack of funding for communities, paternalistic decision-making, etc.

5.3 Imagining alternative impact pathways

Several likely impact pathways can often be imagined due to various reasons. Contextual factors can be appreciated or assessed differently by different actors involved in the intervention. Some actors may attribute a strong influence to a certain factor, for example, while others may not. There may also be divergent preferences for the modes of action, with some actors favoring more vertical approaches, considering them more effective, while others choosing to opt for more collaborative ones. Depending on these different readings of the context, and the associated risks or opportunities, there can be different ways of perceiving the interventions to be carried out and the best ways to achieve the desired outcomes.

On this basis, it is possible to easily imagine *ex ante* two or three different, alternative impact pathways that are equally plausible. To do so, it is necessary to identify two or three outcomes essential to the intervention's contribution to the impact and to think of one, or even two, alternative strategies, different from those envisaged in stage 2 (section 2.5: "Defining the intervention's activities, inputs and outputs"). If implemented, they should lead to these same outcomes in a way that is considered plausible, on the basis of explicit reasoning. In other words, the question to ask is: What other strategy(ies) can be implemented to obtain the same outcomes, and lead to these same impacts? In some cases, this may lead the *ex ante* team to think not only on different ways to obtain outcomes, but also on other outputs to be developed, which can lead to the outcomes of these different scenarios.

After this exercise, we end up with a main impact pathway and one to three alternative pathways that can be followed during the implementation of the intervention.

It may be useful to rely on prospective studies on the core issue of the intervention to inform the discussions on the various possible scenarios. Methods used in prospective studies can help identify major trends and envisage different futures for a given situation. These methods, however, do not describe the behavior of each actor as far as the generation of an outcome or the overcoming of an obstacle is concerned.

At this point, all the elements required to complete the narrative are available; it can now faithfully reflect the story that the impact pathway (and its alternatives, if required) depicts. It will be a compelling and plausible narrative and will be able to communicate the shared vision of the partners to mobilize them towards a common goal.

Reworking the chronology at this point (see section 1.11 "A provisional chronology to be finalized at the end of the reflection") will help us approximate when the outcomes will be generated.

Stage 6. Participatory monitoring, evaluation and learning

The participatory monitoring, evaluation and learning (PMEL) aspect of the ImpresS *ex ante* approach is still a work in progress. While this section does indicate some general directions for PMEL, it will see future methodological developments.

Donors usually focus on monitoring a project's outputs and are not overly concerned about outcomes. They do not accord any importance to the consolidated outputs and outcomes obtained by a cluster of projects. In contrast, the ImpresS *ex ante* approach aims to monitor the progress towards outcomes and the associated learning over the long term (cluster of projects). This is a finalized monitoring, which helps in the adaptive management of the intervention.

The ImpresS task force strongly suggests that a participatory approach to monitoring be adopted. FAO defines participatory monitoring as "having all passengers on the bus know their destination and decide how they will measure their progress"[10]. On this basis, it is clear that developing a PMEL system and implementing it necessarily implies the active participation of the intervention's major actors–passengers as well as the bus drivers for some of them. And this also implies that the destination of the bus (the desired impact) has been validated by everyone and may even have been proposed by consensus.

In this section, we discuss the identification of indicators, the deployment of PMEL, and the use of its results to guide the intervention.

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10 www.fao.org/docrep/x5307e/x5307e05.htm

6.1 Indicators: What type? With what characteristics? Measured by whom?

On the basis of the common objectives identified for the intervention (outcomes and impacts), two types of indicators have to be identified or developed, if possible in a participatory manner (Lennie *et al.*, 2011): monitoring indicators, which document the intervention's progress towards the outcomes and which make it possible to report on the nature of the ongoing innovation process, and final indicators, which show whether the outcomes have been achieved. These two types of indicators must not only help in monitoring changes in progress, but also help determine how and why the changes are what they are. The possibilities of collective learning and control over the intervention depend to a large extent on the answers to these latter questions.

Even though indicators focus mainly on monitoring the outcomes and the innovation processes that make it possible to obtain them, indicators that help monitor key changes in contextual factors are also worth defining. By doing so, the team in charge of the intervention can favor certain scenarios envisaged during the *ex ante* reflections over others, or better interpret the progress observed or lack thereof.

Finally, the indicators selected by the team in charge of the intervention have to be limited in number and be sufficiently "easy" to interpret in order to avoid an excessive workload and undue expenses for periodic collection and analysis of indicators, which would cause other intervention activities to suffer. In other words, PMEL does not mean that the progress, the outcomes obtained or the evolution of the context must be monitored exhaustively and in detail. PMEL should take place instead in a low-key manner, helping detect strategic problems during the implementation, and offering insights in terms of understanding and for purposes of fine-tuning.

In some situations, for example in a new context or when working with new actors, it may be worthwhile retaining some flexibility and not lock-in the PMEL with a particular set of indicators, and instead wait for the innovation process to take shape before identifying outcome indicators to adopt.

For example, in the Sustainable Wildlife Management Program in Zambia, the following outcome was identified: "Conservation communities have been established, and manage and commercialize the wildlife." In this case, ***monitoring indicators*** could pertain to the setting up and evolution of conservation communities (number, type, participating or opposing actors, formalization of relationships between actors, etc.) and the establishment of management rules, while the ***final indicators*** could focus the management outcomes (number and type of contracts, participating actors, conflict resolution), the environment (state of natural resources) and the wildlife commercialization outcomes (number of trades, actors involved, quantities brought to market).

The choice of indicators also partly depends on who will be in charge of implementing PMEL, and thus of the strategy for collecting indicators. For example, an indicator to monitor the evolution of crop yields will not necessarily be the same if a producer organization is responsible for monitoring it – it may want to focus on visual qualitative indicators (conditions of crops, size of the ears) –, or if it is a researcher – who would tend to favor a more quantitative indicator based on measurements (kg/ha).

Participatory methods of collecting data for indicators are often advisable, even if they are accompanied by disadvantages (higher costs, difficulty of standardization and comparison, etc.). They tend to increase collective learning during the course of the intervention, as well as promote the emergence of consensus on the possible need for adjustments in the implemented strategies. More importantly, they also promote the appropriation of outcomes by the actors. They make most sense when the intervention is co-designed. In such a context, PMEL may include the collection of indicators during multi-actor workshops, or in focus groups according to types of actors. This allows the collection of disaggregated information, as opposed to a collection via an analytical work conducted by researchers or technicians that is less easily shared. Intervention kick-off workshops are a good occasion to plan and initiate this participatory work on indicators. During the *ex ante* design phase of the impact pathway, work on the outcome monitoring indicators can be particularly useful if the actors who will define the monitoring are present.

The Equal Access Participatory Monitoring and Evaluation Toolkit[11] provides recommendations for the participatory definition of monitoring indicators.

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11 Lennie *et al.*, 2011, http://www.betterevaluation.org/sites/default/files/EA_PM%26E_toolkit_module_2_objectives%26indicators_for_publication.pdf.

6.2 Implementing and using the results of the PMEL

The aim of monitoring outcomes using PMEL is to promote collective learning and to allow regular participatory reassessments and adjustments of the initial impact pathway, if required. The PMEL data must confirm that the intervention actually is on course to contribute to the impact, rather than represent a mechanical and rigid monitoring of a pre-established work plan. This latter approach could easily lead to unwanted drifts, even failures, for various reasons: error or omission of the contextual factors considered or of the initial assessment of the obstacles, non-attainment of certain outputs thus invalidating the impact pathway that incorporates them, unforeseen dynamics of the partnership, etc.

In this vision, the PMEL can and must interact with the intervention partners and other actors to draw lessons from the ongoing intervention, to evaluate the innovation process and to help actors adapt their activities and actions, especially those concerning the intervention. Such reflections must be based on a shared understanding and interpretation of the results obtained, changes that have (or have not) occurred for the major actors (perception, skills, attitude, strategies), the innovation processes generated, and the evolution of the context.

One of the factors needed for PMEL to play such a role is the identification of **key moments** when the intervention team will need to give itself the time and the means to undertake, based on monitoring data, a critical assessment of its actions and activities. It will also need to reassess and validate the outcomes and the hypotheses of the impacts, the actors actually involved and the changes taking place in their practices or attitudes, the evolutions of the context that it is necessary to consider, etc. These moments of reflections and learning can take place during dedicated periods in annual workshops for reporting on outcomes and planning of future activities, or during periodic mini-workshops (or virtual meetings) dedicated to this purpose. Specific intermediate evaluation moments, when internal or external evaluators undertake these evaluations, may also be planned.

PMEL can be incorporated into the intervention with specific dedicated human and financial resources. But it can also be entrusted, as least partly, to external evaluators who will collect information to assign values to indicators and facilitate the workshops.

In any case, it is important to give ourselves the time and resources to collectively and periodically "step back" from the daily activities and reflect critically and strategically on the question: Are we on the "right" impact pathway? Do our activities actually bring us closer to the desired impact? The form that PMEL will assume will ultimately depend on the nature, size, and complexity of the intervention, and also on the preferred mode(s) of intervention (see section 1.9, "What is the main mode of intervention of the research community?"). Finally, we must of course ensure that the investment allocated to PMEL is not disproportionate in terms of time or financial resources, which would indeed be detrimental to the implementation of the activities themselves. In truth, there is no standard formula.

The ImpresS *ex ante* workshop

While applying the ImpresS *ex ante* approach, the teams are asked to work in an iterative and, if possible, participatory manner on the issues and questions raised. Constructing an intervention that includes a reflection on the impact is thus a process that includes virtual and face-to-face meetings, back and forth consultations for drafting documents, diagnoses and/or workshops that include researchers and key partners who are together setting up the intervention.

Irrespective of how thoroughly or loosely the approach is implemented, we strongly recommend to include at least one face-to-face *ex ante* workshop. Depending on available funding, such a workshop should ideally include the representatives of all partner actors and, if possible, the representatives of influential actors and the impacted actors who are targeted by the intervention.

As an illustration, Table 5 shows what can be included in this workshop's agenda when it is held over 1, 2 or 2.5 days. One has, of course, to remain flexible in terms of timing, and be ready to adjust the schedule on the fly if the participants wish to delve deeper into any particular topic.

Table 5: Different modalities of *ex ante* participatory workshops depending on the time available for conducting it.

Before the workshop	Available time	Day 1	Day 2	Day 3	After the workshop
1. Initial diagnosis: contexts, actors, existing projects 2. First draft of the narrative based on the initial diagnosis 3. Send the narrative to the participants (2 pages max.)	1 day	Introduction, expectations and presentation of the diagnosis or draft narrative (1h), stage 1.1 and vision of the future (30') Problems and solutions tree (1h30) Mapping of actors (1h) Determination of outcomes (1h) Obstacles to change and strategies (1h)			Activities based on strategies Outputs based on activities and outcomes Impact pathway Finalization of the narrative Monitoring, evaluation and learning Final document
	2 days	Introduction, expectations and presentation of the diagnosis or draft narrative (1h) Vision of the future (30') Problems and solutions tree (2h) Mapping of actors (1h) Determination of outcomes (1h) Obstacles to change (1h)	Strategies to overcome obstacles (1h) Activities based on strategies (1h30) Outputs of activities (1h) Impact pathway & alternative pathways (1h30) Revisiting the narrative (30')		Finalization of the narrative Monitoring, evaluation and learning Final document
	2.5 days	Introduction, expectations and presentation of the diagnosis or draft narrative (1h) Vision of the future (30') Problems and solutions tree (2h) Mapping of actors (1h) Determination of outcomes (1h) Obstacles to change (1h)	Strategies to overcome obstacles (1h) Activities based on strategies (2h) Outputs of the activities (1h30) Impact pathway & alternative pathways (1h30)	Finalization of the narrative (1h30) Monitoring, evaluation and learning (2h)	Final document

If the **workshop lasts only one day**, focus should be on the problems and solutions tree, the actors, and the outcomes we want to generate. If the group is active and its discussions conclusive, it may be possible to also work on the obstacles and the strategies to overcome them. After the workshop, it will be necessary to identify the activities that translate these strategies as well as the outputs, construct the impact pathway and imagine alternative scenarios, finalize the narrative and, if possible, identify the indicators for the expected outcomes.

In a **two-day workshop**, in addition to what is covered in one day, more time can be devoted to the discussion on obstacles, on strategies to overcome them and on identifying the activities that will derive from these strategies and, consequently, on defining these activities' outputs. There will also be time to visualize the impact pathway, as well as alternative scenarios. If possible, some time can be allotted to work on the narrative by combining all the elements obtained.

Finally, **if another extra half-day can be added to the workshop**, the participants can define the participatory monitoring, and evaluation system on the basis of outcome indicators. In this case, the narrative can either be finalized, or, alternatively, more time can be allotted in the sessions proposed on the workshop's first two days to delve deeper into the corresponding topics.

Note that the existence of a more or less detailed diagnosis is an essential pre-requisite for the workshop's success. If such a diagnosis is not available, it will have to be conducted with the participating actors at the very beginning of the workshop. Only then will it be possible to construct an overall vision of the impact pathway.

Tips & Tricks n°6: Workshop management

1. For the mapping of actors, you can use a role play: each participant represents a type of actor (PO, NGO, ministry, research institute, etc.). Each participant has to answer the following questions:

- With which other actors is this actor connected in the current situation? What kind of relationship links them?

- What will be the impact on this actor of the solution/innovation proposed by the intervention? Is it a positive or negative impact?

- Is this actor favorable or not to the solution/innovation proposed by the intervention? What is the level of positive or negative influence (weak, intermediate or strong) of this actor over the proposed solution?

2. With respect to the outcomes:

- What changes do you think are necessary to generate the impact? What are the obstacles?

- How will each actor behave in relation to the changes in practices and behaviors that the intervention wishes to bring about in the actor? Will the actor view these changes favorably or will the actor resist them?

3. If your audience is responsive and participates easily and naturally, you can use the ImpresS interface to generate the problems and solutions tree, the mapping of actors, the graph of outcomes, and the impact pathway. If your audience is less responsive, we recommend the use of Post-It notes or flip charts to carry out the exercises.

4. If you divide yourselves into groups to work on certain sections, such as outcomes or strategies to overcome obstacles, you can also apply a World Café. This tool enables everyone to contribute to the analysis of several elements. For example, when there are very many outcomes and changes identified, it is more efficient to work on them in small groups (a maximum of 3 persons), but in order to get all the participants to discuss them all, all the groups will take turns to work on them for a period of 30 minutes. Each group discusses and complements the work done by the previous group. The exercise ends with a summary plenary session. For more information on World Cafe, see http://www.pratiques-collaboratives.net/World-Cafe-une-presentation-du-comment-faire.html

The ImpresS interface

The ImpresS task force has set up an **information system** to capitalize on the results of the ex-post ImpresS case studies and to facilitate the visualization and systematization of impact pathways resulting from the application of the *ex ante* approach. The resulting tool consists of an online input and dialogue interface called the "ImpresS interface" [Figure 11]. What follows is mostly relevant for researchers affiliated with CIRAD and their partners. If this is not your case, but you are interested in accessing the ImpresS interface, please contact us at impress@cirad.fr to explore options. Note that currently this interface is available only in French.

Cirad researchers can connect to the interface using their CIRAD login credentials via the link: https://intranet-impress.cirad.fr/index.php

To create a new *ex ante* scenario, follow this link: https://intranet-impress.cirad.fr/index.php/scenario/nouveau_scenario

This interface allows teams to visualize, in a flexible and adaptable manner, some key elements useful for participatory construction. The tools provided by the interface can be adapted for the mirror exercise (see Tips & Tricks n°5), through a dialogue between the project teams and the ImpresS team. In the end, it helps generate an institutional memory and systematization of knowledge on impact assessment at Cirad.

Figure 11: Creating a new *ex ante* scenario in the ImpresS interface.

Data can be entered while viewing the available tools even in off-line mode. This facility helps prevent loss of data and time due to power failures or loss of internet connectivity while entering data to create an *ex ante* scenario. A synchronization of the input interface with the ImpresS server allows the updating and storing of data on the internet.

In addition to creating or deleting an *ex ante* scenario, the user can also duplicate an existing scenario in order to build a new scenario on the basis of an existing one. As a measure of security, an *ex ante* scenario is accessible only to its creator. Graphical representations that are created with the interface can be downloaded.

The interface allows you to store information and view the following graphical tools:

1. Identity card: This tool stores basic information from the *ex ante* reflection, including the ability to export the narrative in Word format (Figure 12).

Figure 12: Identity card of the *ex ante* scenario in the ImpresS interface.

2. Problems and solutions tree: this tool allows to create and show the problem tree, the solutions tree or both on the same graph (figure 13).

Figure 13: Representation of a problem tree in the ImpresS interface.

3. Mapping of actors: This tool allows to enter and show the role of the actors, the relationships between them, and to characterize the types of relationships (Figure 14).

Figure 14: Mapping of actors in the ImpresS interface.

4. Graph of outcomes: This tool allows to enter and show the impacts, outcomes, major changes, obstacles, strategies and activities in a single graph (Figure 15).

Figure 15: Example of a graph of outcomes from the RTB Foods project in the ImpresS interface.

5. Impact pathways: This allows to create and show the impact pathway. It can also duplicate the impact pathway so that the user can construct up to two alternative impact pathways (Figure 16).

Figure 16: Alternative impact pathways in the ImpresS interface.

6. The impact radar: This tool allows to create the impact radar with the impact domains and, in some specific cases, the aggregated magnitudes and intensities of each of them (Figure 17).

Figure 17: An impact radar in the ImpresS interface.

Adapting the ImpresS *ex ante* approach to different situations

Adapting the approach to different available resources

The ImpresS *ex ante* approach is adaptable to different time constraints, resources and capacities. However, even if time is not a strong constraint, not too much of it must be spent in developing overly detailed hypothetical impact pathways; you have to find the right balance between a narrative that is too simple and one that is too detailed. The reflection must, above all, help design and plan more plausible and effective interventions by asking strategic questions and by maximizing the probability that outputs of intervention will be transformed into suitable outcomes by the actors. The participation of the actors and iterative work (looping back to previous stages) are crucial in this construction as they help enrich the hypothetical impact pathway, make it progressively more realistic and credible, and promote the learning and collective appropriation of the intervention's vision that emerges from this exercise.

Overall, the proposed approach is far from rigid. While it does propose following its coherent stages and using some of its tools, it lets the teams choose the methods they consider most appropriate to address the questions raised. Obtaining answers that are relevant to these questions is of greater strategic importance than using this or the other tool. As a result, researchers are encouraged during the intervention's design phase not to implement the ImpresS *ex ante* approach on their own. Instead, as far as possible, they should rely on and become part of multidisciplinary and multi-partner teams, and, if working for or with CIRAD, ask for support by the ImpresS team and Cirad's project development officers. For non CIRAD researchers, contact us at impress@cirad.fr to discuss any possibility of interacting with us if you wish to apply the Impress approach.

Even if the resources available in the setting-up phase of an intervention do not allow an adequate participation of future intervention partners in the *ex ante* reflection, the team in charge of this setting-up will always be able to take advantage of all of the reflection's stages and components. In this case, however, it is strongly recommended to include a budget line in the intervention's proposal to organize a multi-actor workshop at the very start of the intervention, whose purpose will be to share, improve and validate with the partners and/or the major actors of the intervention the *ex ante* impact pathway visualized by the researchers who participated in the process. Indeed, some donors may be very appreciative of such a request, as it demonstrates that researchers truly understand the participatory and multi-actor nature of the innovation processes on which depends the attainment of the desired impact(s).

Figure 18 (next page) shows different options for developing the approach depending on the resources available before or after obtaining the funding.

Figure 18: Adaptability of the ImpresS *ex ante* approach.

Adapting the narrative for different audiences

In the approach proposed in this document, the team responsible for the *ex ante* reflections produces a single narrative. However, the narrative is intended to facilitate communication with different audiences, each with its own expectations. It is therefore necessary to fine-tune the narrative, without distorting it in any way, to make it conform to the expectations of the different audiences.

The partners of the intervention are the first to be involved in the narrative, so we must make sure that the narrative will convince them of the relevance and plausibility of the proposed intervention and of the impact pathway visualized, and that it will be able to motivate them to participate actively.

The scientific community, including researchers, forms another audience that the narrative must be able to convince. For them, it is important to highlight the initial stages of the impact pathway, which are those in which the research community often has a fundamental role, and which are the sources of the outputs.

Donors are, no doubt, one of the key audiences for the *ex ante* narrative: the idea is to convince them to "buy into the narrative" by ensuring to the extent possible that the narrative produced echoes their own concerns, expectations, priorities and ideas of the impact, and their particular thought structures (e.g. the expectation by many donors of the presentation of a logical framework, which the ImpresS *ex ante* approach can well contribute to developing, see Box 7). But this must be done without masking the complexity of the proposed interventions or the need for flexibility in planning to account for contingencies, and without obfuscating the time required to achieve the desired impact. The narrative may also require fine-tuning based on the fact that some donors not only fund interventions, but are also partners who would want to know the roles they will be expected to play.

Cirad's project development officers, or their equivalent in other institutions, are particularly well positioned to guide the implementation of the ImpresS *ex ante* approach so that it is in line with the expectations of donors.

The ImpresS *ex ante* approach makes it possible to think about different elements requested in certain calls for tenders and proposals, or required to fill a given logical framework, etc. See examples below of the different formats that have been filled in using the ImpresS approach.
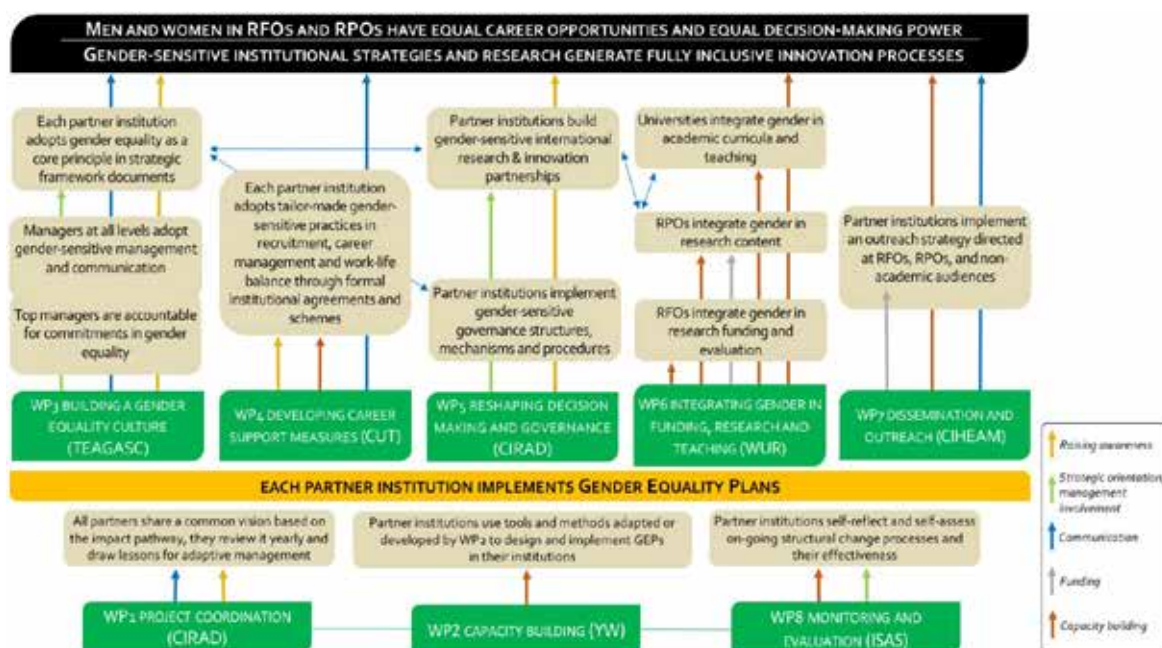
1. BIOPHORA: Logical framework filled in following a reflection carried out according to the ImpresS *ex ante* approach (LEAPAGRI)

Research outputs	Indicators
Gene bank for native entomopathogens	Candidate strains (>3) Patent (>1)
Optimal phoretic agent-entomopathogen system	Candidate combinations
SIT-based biocontrol technologies for fruit flies and mango anthracnose	Patent (>1)
Auto-dissemination stations ready-for-use	Commercial availability of station (1)
Academic publications	(>4) scientific papers in peer-reviewed journals
Implementation strategy	Technical guidelines
Risk monitoring plan	Monitoring plan for regulatory agency
Technical guidelines, communication and field demonstration	Nb of field demonstrations (>2) Nb of attendees (>100)
Stakeholder platform for biocontrol innovations	Nb of annual meetings
Training workshops for producers, governmental bodies, pesticide retailers, etc.	(>4) training and educational operations Nb of attendees (>100)
Training for graduate students	Nb of graduate students trained
Policy briefs	Nb of policy briefs (3)

Outcomes	Indicators
Improved pest management practices (better knowledge of IPM and innovative technologies)	Quantity of insecticide use Nb of farmers using developed technologies and IPM strategies
Organizational capacity of mango producers (for better access to and use of biopesticides and collective pest management)	Nb and size of farmer organizations engaged in pest biocontrol (good practices)
Emergence of local private units dedicated to biopesticide production and commercialization (valorisation of indigenous biocontrol agents)	Nb of partnerships between local entrepreneurs and Biobest Nb of local entrepreneurs Conventional phytosanitary industry shift to biocontrol
Emergence of a new regulatory framework for SIT and biopesticides	New national regulation and support framework Sustained risk monitoring
Governmental bodies and private sector strengthened for innovation outscaling	Nb of field schools Nb of authorized biocontrol products
Research community informed on biocontrol	Nb of publications and courses on biocontrol
Evidence-based policy making	New policy supporting pest biocontrol

Impact
Economic impact Increase of fruit production and quality (residues) and organoleptic quality of mangoes Increased income along the chain value Enhanced resilience of mango production systems New market opportunities for mango production (conventional, organic/certified/export, processing)
Social impact Improved food and nutrition security, better health Employment opportunities Organizational capital and capacities developed Women and youth benefit from new income generating activities including transformation
Environmental impact Reduction of pesticide use Benefits for functional biodiversity in ecosystems

Beneficiaries: growers, private sector, public extension and regulatory services, policy makers, scientists, NARES

Crosscutting: Gender and youth, capacity building, monitoring and evaluation

2. Gender-SMART: Example of a global impact pathway articulated with Work Packages (H2020)

Arrows indicate how to reach and promote the outcomes, i.e. the chosen strategy (yellow: raising awareness, green: strategic orientation and management involvement, blue: communication; gray: funding; orange: capacity building)

Conclusion

The ImpresS *ex ante* approach aims to elucidate the mechanisms through which a research or re-search-for-development intervention can help generate outcomes, and the strategies that can be adopted to achieve them. In the conventional way of designing and implementing research activities, these mechanisms are often implicit, unexpected or unintentional, and the proposed approach is therefore demanding. It guides the collective – and, if possible, participatory – construction of "hypothetical and plausible impact pathways," taking into account the major actors, the desired changes, the obstacles and alternative scenarios to deal with them, the strengthening of capacities, and the interaction with policy makers. The ultimate goal is to guide research teams and their partners towards an intelligent structuring of the design, implementation, management and monitoring of the interventions they wish to undertake in order to maximize the chances they will contribute to the desired impact.

It is never easy to implement a fully participatory approach to designing and planning a research action. The ImpresS approach, however, considers participation to be highly desirable, if possible as the intervention is being designed, or at a minimum just as it is being launched. The participation of actors who are partners in the intervention in the *ex ante* reflections enhances the plausibility and feasibility of the proposed impact pathways. It also helps to build a truly shared vision of an intervention's objectives and thus facilitates the mobilization of actors during its subsequent implementation.

While it is not necessary for all researchers and partners to master the proposed approach in its entirety, it is nonetheless important to keep some of its key components in mind: actors, scope, obstacles, strategies, and impact pathways, along with the ability to use a variety of tools, many of which are fairly simple, dealing with these aspects. The ImpresS approach is neither a formula to apply, nor an imposed framework; it is instead an approach to structure collective thinking, improve reflexivity and develop an impact culture within research institutions such as CIRAD, and their partners.

When it is well conducted, the approach leads to a plausible narrative explaining how an intervention contributes to impacts. This narrative is the distillation of various constituents whose organization helps partners and donors believe in it – or even get enthusiastic about it –, albeit without providing a guarantee these impacts will indeed be achieved. Rather applying ImpresS *ex ante* allows to formulate hypotheses in a rigorous way, and elucidate them in a transparent and direct manner. The form of this narrative can be adapted to address donors, actors, or partners, but its various versions must remain consistent among themselves.

The ImpresS team hopes that this approach will help teams design more effective interventions. It will be happy to provide support for the approach's implementation in different projects and will welcome and make use of critical feedback and suggestions received from users to fine-tune and improve it.

Lists of figures, tables, text boxes, and tips & tricks

Figures

Tables

Text boxes

Tips & tricks

Glossary

1st level impacts: These are the impacts on the actors interacting directly or indirectly with the team in charge of an intervention.

2nd level impacts: These are impacts that correspond to spillover effects (indirect impacts) or to the change of scale in two dimensions: horizontal (scaling out) and vertical (scaling up).

Actors: Individuals and organizations playing a role in the innovation process under study. The Impress *ex ante* approach distinguishes four categories of actors, not mutually exclusive, depending on the actor's role in the innovation process:
– Major partner actors of the intervention with whom direct interaction is desired;
– Major actors of the innovation process but who are not partners in the intervention;
– Influential actors likely to positively or negatively influence the innovation process without having a role as active actors in the innovation process;
– Impacted actors: actors who are positively or negatively impacted by the innovation process.
If it is found difficult to assign a particular actor to one of these distinct categories because the demarcation between them is not clear cut, the project team can make a reasoned choice.

Capacity: Ability to perform functions, solve problems, set and achieve goals.

Capacity strengthening: Actions undertaken by a third-party actor with the aim of helping the actors engaged in innovation acquire new capacities or enhance existing ones.

Chronology: A chart that allows the visualization of the narrative of the innovation in its temporal dimension by specifying the significant events and milestones.

Ex post/ex ante/in itinere evaluation: Determination of the outputs, outcomes and impacts of an intervention after the activities have been carried out (*ex post* evaluation), before the activities are carried out (*ex ante* evaluation), or while the activities are being carried out (*in itinere* evaluation). These evaluations can be external, and thus carried out by a third-party actor, or participatory, i.e. with participation of the actors engaged in the activities.

Focus group (or interest group): A discussion group usually created in a research process or transformation project, bringing together individuals belonging to the same social group or confronted by the same situation, in order to determine this group's position regarding a problem, proposals for actions or the development of innovations.

Impact pathway: Description of an innovation process that highlights the causal relationships between the inputs mobilized by intervention, the outputs of the intervention, the outcomes – which materialize directly at the level of those who use the outputs of the intervention –, and the 1st and 2nd level impacts.

Impacts: Long-term effects, positive or negative, intended or unintended, direct or indirect, induced by an intervention. The impacts are what remains after the intervention is completed. When building *ex ante* impact pathways, we talk about hypothetical impacts. These hypothetical can be of different types: economic, social, territorial, environmental, political, health-related, etc. The notions of inputs, outputs, outcomes and impacts have different interpretations according to disciplines, authors, or institutions. Indeed, some authors sometimes break down outcomes into "intermediary outcomes" and "long-term outcomes". Conversely, others do not break down impacts into 1st and 2nd level impacts. Moreover, the distinction between outputs and outcomes is not always easy, especially in participatory research. Some classify in outcomes what others may classify as outputs, or vice versa. Similarly, it is not always easy to distinguish impacts and outcomes, as an impact for an actor can represent an outcome that will generate an impact for another actor who interacts with the first.

Innovation: At the entrepreneur level, an innovation can be defined as a new product, a new process, a new way of accessing services, or a new way of marketing products or services. In a very general way, an innovation can also be defined as an idea implemented by actors who desire change (see the European Union's definition in the European Partnership for Innovation). It always involves a combination of new techniques or practices (hardware), new knowledge and ways of thinking (software), new organizations and institutions (orgware). Depending on the context, the term "innovation" can also refer to

the process of developing an innovation (see "Innovation process", below) rather than to the output of that process.

Innovation process: Complex, interactive, sometimes haphazard and unpredictable process, highly influenced by its environment and which is difficult or even impossible to manage. It consists of phases of acceleration, slowdown, and crisis, and involves many back-and-forth interactions between the actions of the researchers and actions undertaken by their partners, until the implementation of innovations by end-users.

Innovation trajectory: Curve summarizing the cluster of projects connected to a particular innovation. An innovation trajectory is the result of past choices that determine an innovation's future.

Inputs or "resources": All the means and resources that make it possible to undertake activities in an intervention (human and material resources, research budget, information, scientific or tacit knowledge, other knowledge, etc.) and thus to generate outputs of the intervention.

Learning: The process of acquiring knowledge, know-how or social skills by an individual or a group through observation, exchange between individuals, and implementation into practice.

Learning situation: All conditions and circumstances that can lead an individual to construct knowledge or apply and transform knowledge into know-how and skills. Such a situation may arise spontaneously or be organized in a systematic or informal manner. It acts on the learners by presenting them with an observation, meeting or event that represents a problem and challenges their representations. In these situations, learning is made possible by an activity.

Outcome or "result": It is the appropriation of a research or intervention output by actors interacting directly or indirectly with the research community, leading to change in practices (agricultural or managerial), changes in organizations or in interactions or new rules.

Output or "product": It consists of the product resulting from the intervention, including that which does not come directly from the research if the intervention is not purely a research intervention. It can take the form of scientific or non-scientific knowledge (publication, report, database, method, etc.), professional or academic training, expertise, technology, network or other forms of products.

Partner: The partner is an actor, usually an organization, which brings a substantial intellectual, material, human, or financial investment to the intervention. A partner is formally involved in the intervention because the intervention forms part of the partner actor's strategy of action and its mandate as an organization or institution.

Project cluster: A grouping of all research projects, research and development projects, and development projects (as well as interventions that have not been formalized as projects) pertaining to an innovation. It is therefore all past and current projects and initiatives that contribute to an innovation trajectory.

Radar: Graphical representation that summarizes the data concerning the different impacts identified. The ImpresS method proposes to represent impacts after grouping them into 11 "impact domains."

Scaling (or change of scale): Geographic extension of an innovation or increase in the number of its adopters (scaling out) or increase in the number of types of actors or arrangements between actors related to the deployment of an innovation (scaling up). Scaling implies a transformation of knowledge and techniques through the networks of actors involved in this change of scale, and the extension of learning processes. The scale can be local (village, municipality, etc.), regional (sub-national), national, regional (geographically contiguous supranational) or global (geographically non-contiguous supranational).

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Appendix. Complementarities and integration with the project approach and traditional tools

The ImpresS approach calls for the use of various existing tools, in particular those mobilized by the CIRAD research teams, for designing projects. The *ex ante* approach incorporates all the stages of the project approach. Figure 19 shows a project's life-cycle and the linkages with the stages of the ImpresS *ex ante* approach.
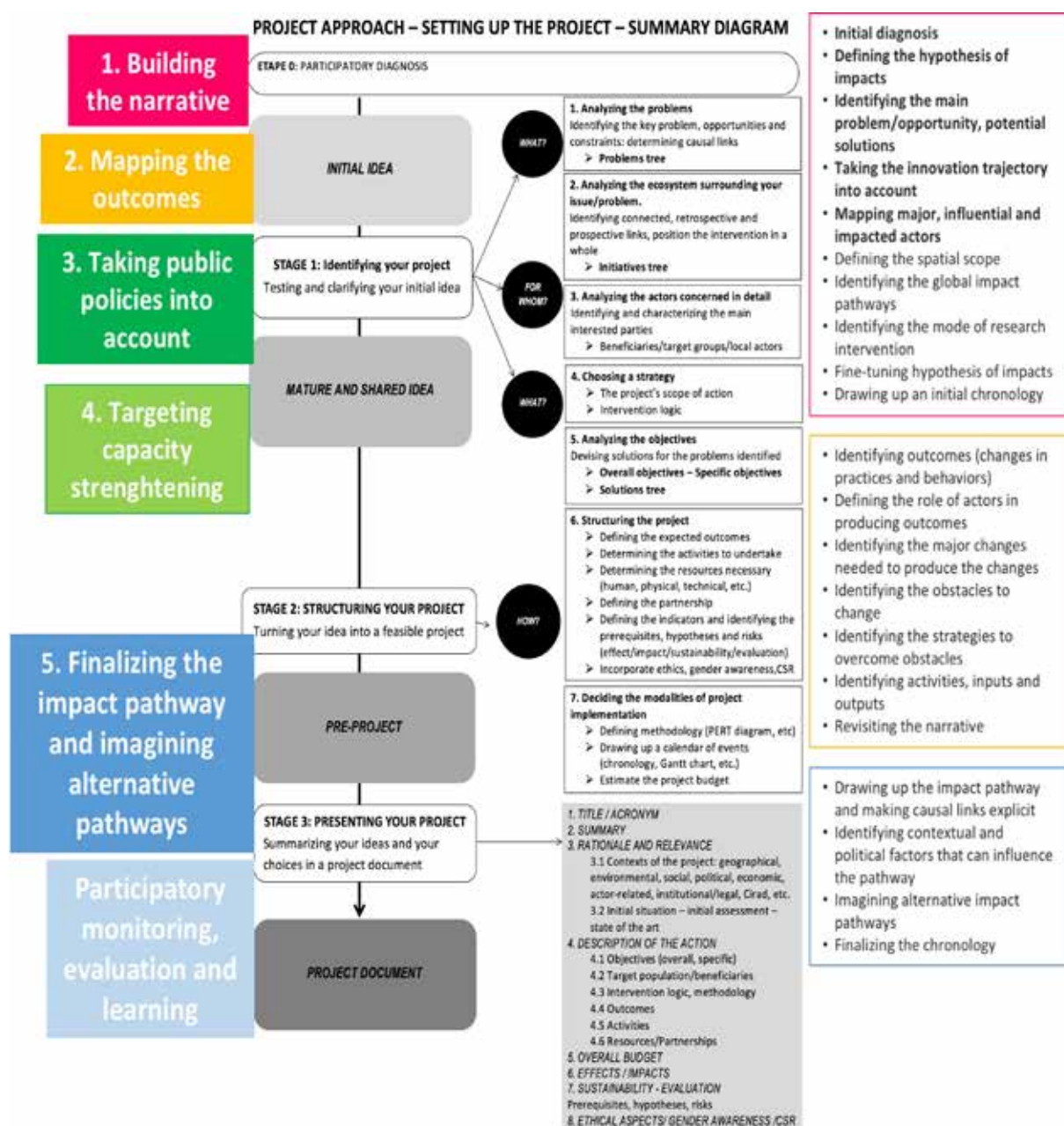

Figure 19: Linkages between the project approach and the ImpresS *ex ante* approach.

https://impress-impact-recherche.cirad.fr/