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2ND EDITION

RAPID APPRAISAL OF RAIS

AGRICULTURAL INNOVATION SYSTEMS

CGIAR
RESEARCH PROGRAM ON
Root, Tubers and Bananas

RAAIS

Rapid Appraisal of Agricultural Innovation Systems

A toolkit for guiding research for development investment decisions and strengthening innovation capacity in agrifood systems

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The CGIAR Research Program on Integrated Systems for the Humid Tropics (Humidtropics, http://humidtropics.cgiar.org) provided the opportunity to further adapt, improve and implement RAAIS across different Humidtropics action sites in Central America and the Caribbean, West Africa, East and Central Africa, and in Central Mekong. Systems research components developed under Humidtropics will be advanced under the CGIAR Research Program on Roots, Tubers and Bananas from 2017 onwards (RTB, www.rtb.cgiar.org).

RAAIS elements were used to support research for development (R4D) activities implemented under projects funded by *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) in Burundi and Zambia, by the policy action for sustainable intensification of cropping systems (PASIC) project funded by the Embassy of the Kingdom of The Netherlands in Uganda, by Iles de Paix in Uganda, by IITA under the Alliance for a Green Revolution in Africa (AGRA) in Zambia, by the Coopération Nigéro-Allemande under their program to promote productive agriculture (PromAP) in Niger, as well as in research projects in Chili and Indonesia. We appreciate the interactions with and feedback from these projects and the people who facilitated the RAAIS process. This allowed us to further reflect upon and improve the methodology.

Finally, we acknowledge the contribution of all farmers, government officials, researchers, and civil society, NGO and private sector representatives who collaborated with us in developing, testing and implementing RAAIS. Special thanks to the NGOs and research projects that have adopted RAAIS, which allowed us to improve the methodology. We would like to thank Boru Douthwaite for his constructive feedback on the newly added RAAIS Theory of Change module.

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Foreword

This is the Second Edition of the Rapid Appraisal of Agricultural Innovation Systems (RAAIS) toolkit... A second edition that reflects the evolution in our thinking about what tools, methods and approaches can be useful to make Agricultural Innovation Systems 'work' for Research and Development.

While farm-level change remains an important dimension of agricultural innovation and development, it is widely acknowledged that farmers cannot change if others do not simultaneously change. Sustainable intensification may, for example, require innovation in the sphere of land-tenure contracts, pricing systems, credit arrangements, food processing, extension policy and/or the organization of trade. Thus, agricultural innovation is a multi-stakeholder affair, and requires a degree of concerted action in a network of interdependent actors, based on mutual expectations and some level of agreement on how to move forward. This has been recognized in the now increasingly used 'Agricultural Innovation Systems' framework.

Making Agricultural Innovation Systems work is easier said than done! In fact, it is far from easy to make stakeholders interact with each other in a productive way, and arrive at a common agenda for further investigation and action. Building on a large experience in innovation support methodologies, this 'toolkit' has been developed to help foster conducive interaction. Rapid Appraisal of Agricultural Innovation Systems (RAAIS) provides methods and frameworks for collaborative analysis of complex innovation challenges. It helps stakeholders and researchers to understand interdependencies, to take into account different levels and spheres of action, to balance technological and institutional innovation, and to identify concrete entry points for collaborative action and further research.

In this second edition, we have added several modules to the RAAIS toolkit that better allow ex-ante assessment of (1) feasibility and (2) perceived benefit of R4D interventions to project outcomes, as well as (3) guidance on how RAAIS can be a starting point for developing of a Theory of Change and Impact Pathway that can guide project implementation and Monitoring, Evaluation and Learning (M&E&L).

The feasibility analysis emerged from reflections of our initial usage of RAAIS. We

to increase effectiveness and efficiency of interventions in Agricultural Innovation Systems through developing M&E and learning systems that can deliver robust evidence and enhanced multi-stakeholder learning.
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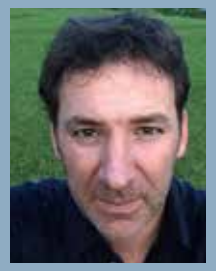

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experienced that the priorities set by stakeholders did not always match well with the human, financial and technological resources available. The feasibility analysis provides such an assessment of available resources and can support project teams in developing a realistic and coherent set of project activities that can actually contribute to achieving impact.

The benefit analysis looks at the extent to which alleviating stakeholder constraints contributes to achieving specific development outcomes (e.g. productivity enhancement, sustainable natural resource management, nutrition, social equality). It supports choosing a diverse set of entry points for innovation that will touch upon different development domains. In our initial use of RAAIS we found that projects tend to build on what they are good at (often activities to enhance crop productivity with a small group of farmers), while ignoring other areas such as policy advocacy and other sorts of institutional innovations (that have potential to influence lives of many more beneficiaries). This created a misbalance in project focus, and failure in terms of achieving projects' development outcomes.

The Theory of Change module was added to support stakeholders in thinking about the order or sequence of R4D activities towards achieving a specific impact. Previously, RAAIS promoted working simultaneously on a variety of R4D activities. We noticed that a more step-wise approach may be more realistic, and also provides better guidance in which stakeholder groups to involve during different stages in a development process.

Besides these major additions, this second edition of the RAAIS toolkit contains new thoughts on how to use RAAIS in different socio-political contexts, how continuous reflection and learning supports adaptive management of development interventions, and how RAAIS can form a starting point for multi-stakeholder action to realise common objectives.

We encourage researchers and development practitioners not to use the various building blocks as a blueprint, but rather to adapt them to the specific context at hand. We hope to learn along with you, so please share your amendments and experiences with us!

Cees Leeuwis
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1

Introduction

FIGURE 1 RAAIS supports a stepwise approach to achieving impact in R4D programs.

'RAAIS is an easy way to make people do a difficult job'

This was how a RAAIS (Rapid Appraisal of Agricultural Innovation Systems) workshop participant in Nigeria described his experience. It reflects the objective that we had in mind when developing RAAIS. We wanted to develop a lean, participatory, diagnostic tool for integrated systems analysis of constraints in agrifood systems, and identification of entry points for innovation.

RAAIS provides a stepwise approach to achieving impact in R4D programs (Figure 1) by supporting:

1. Participatory identification and analysis of constraints and opportunities for innovation in agrifood systems. The RAAIS toolkit can facilitate going from a broad Entry Theme (see Table 1 and Section 4.3) towards more specific Entry Points for innovation across specific levels (see Photo 1).
2. The design of a Theory of Change that consists of a coherent set of stepwise interventions that guide the implementation of research and development activities that are feasible and cost-effective.
3. The start of multi-stakeholder processes to overcome specific problems experienced by farmers and other value chain actors in a specific locality, as well as more generic constraints for innovation faced by policymakers and other scaling actors at higher levels.
4. Continuous monitoring, evaluation and learning (M&E&L) to enhance adaptive management of research for development projects with the objective to maximise outcomes and impact.

1.1 What is RAAIS?

RAAIS is a multi-method toolkit that combines qualitative and quantitative data collection and analysis techniques. RAAIS facilitates interaction between stakeholders (e.g. farmers, NGOs/civil society, the private sector, government and researchers) to:

- Identify, analyse and prioritise complex agricultural problems
- Create awareness that overcoming such problems requires collaboration
- Facilitate experimentation and joint action
- Alleviate structural constraints for innovation in the agricultural system
- Reflect and learn on what works and what does not work to ensure that objectives are being achieved.

PHOTO 1 RAAIS workshop participants in Burundi identify relations between constraints and challenges for crop-livestock integration faced by different stakeholder groups. PHOTO: M. SCHUT

In so doing, RAAIS provides a starting points for participatory action research and collective action (Figure 2) by working on R4D themes that are relevant for different stakeholder groups and is outcome and impact-oriented.

1.2 Where has RAAIS been used?

RAAIS was developed and tested under the PARASITE program to identify and analyse opportunities for dealing with parasitic weeds in rain-fed rice production in Tanzania and Benin. RAAIS was further developed and modified for usage in the CGIAR Research Program on Integrated Systems for the Humid Topics (Humidtropics). Workshops for identification of Entry Themes for innovation to support sustainable intensification of agrifood systems were implemented across study sites in Burundi, Rwanda, Democratic Republic of Congo, Nigeria, Cameroun, Ghana and China. *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) and the International Institute of Tropical Agriculture (IITA) used RAAIS to identify bottlenecks for improved banana systems in Burundi and for fertiliser use in Uganda. Wageningen

FIGURE 2 RAAIS provides a starting point for multi-stakeholder priority setting, design of innovations and collective action.

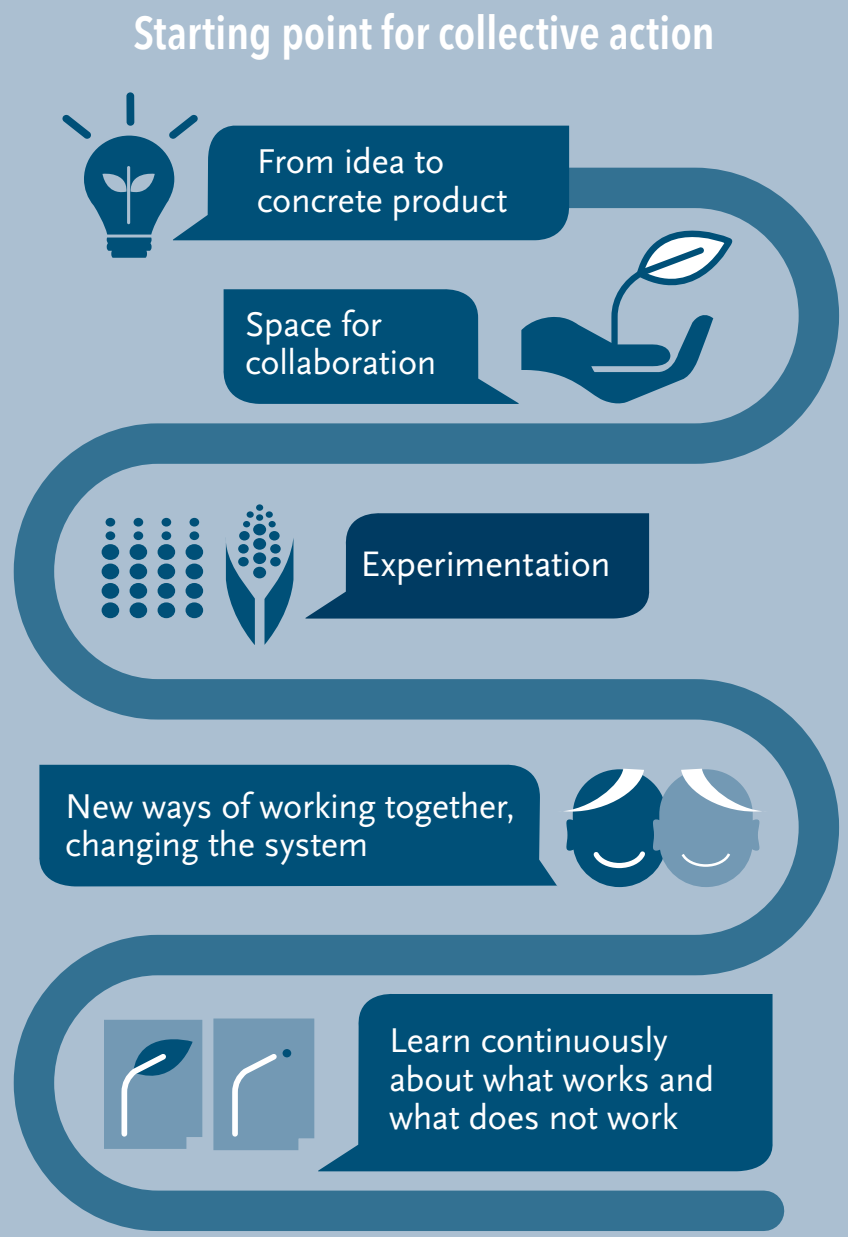


TABLE 1 Countries where RAAIS or elements of RAAIS have been used under different projects and programs.

Country	Project/program	Entry Theme
Benin	PARASITE program	Parasitic weeds in rain-fed rice production
Burundi	Humidtropics	• Introduction, evaluation and dissemination of improved varieties (e.g. high yield, nutritious, pest and disease resistant) adapted to farmer production systems and improving market value • Integration of agroforestry and livestock into farming systems for sustainable intensification and improving agro-ecological integrity • Improvement of natural resource management and soil fertility through the introduction, evaluation and dissemination of innovative technologies • Provision of innovative solutions for farmers' access to financial services and credits to intensify production and increase market opportunities
Burundi	GIZ-IITA project	Sustainable intensification of banana systems in rural Bujumbura
Cameroon	Humidtropics	Improvement (intensification and diversification) of integrated tree crop systems
China	Humidtropics	• What are the key challenges in relation to having a more diversified rubber sector? • Responsible scaling of sustainable ('green') rubber production systems
DR Congo	Humidtropics	• Improvement of banana–beans systems through livestock integration • Improvement of cassava–legume systems through livestock integration
Ghana	Humidtropics	Sustainable intensification and diversification of cocoa-based farming systems in Ashanti Region
Kazakhstan	United Kingdom Newton Fund Institutional Links Programme	Agricultural adaptation to climate change (under the Climate Change, Water Resources and Food Security in Kazakhstan (CCKAZ))
Laos, Cambodia and Vietnam	Humidtropics	Responsible scaling of improved forage systems among smallholders
Nicaragua	Humidtropics	Scaling up agro-ecology in mixed crop–livestock systems
Niger	Coopération Nigéro-Allemande	Small-scale irrigation in Niger under the program to promote productive agriculture (PromAP)
Nigeria	Humidtropics	Improvement (intensification and diversification) of integrated tree crop systems
Rwanda	Humidtropics	• Crop (potato)–tree–livestock integration (highlands) • Maize/banana–legume–livestock integration (lowland)
Tanzania	PARASITE program	Parasitic weeds in rain-fed rice production
Uganda	PASIC	Identification of value-chain constraints for fertiliser adoption among Irish potato farmers
Uganda	Iles de Paix	Sustainable agricultural production in the Mpanga river catchment area
Uganda and DR Congo	Humidtropics/ RTB	Adoption of Banana Xanthomonas Wilt (BXW) control methods
Zambia	GIZ - One World No Hunger - Green Innovation Centres for the Agriculture and Food Sector	Sustainable food supply through innovations along the groundnut (Katete) and soybean (Petauke) value chains
Zambia	Alliance for a Green Revolution in Africa (AGRA)	Scaling out soybean for Integrated Soil Fertility Management (ISFM)

FIGURE 3 World maps indicating the 19 countries across 3 continents where RAAIS has been used under the PARASITE program (Tanzania and Benin) and Humidtropics (Ghana, Nigeria, Cameroon, DR Congo, Burundi, Rwanda and China) and RAAIS used in other projects (Nicaragua, Uganda, Burundi, Kazakhstan, Zambia, Niger, Laos, Cambodia, Vietnam, Indonesia and Chili).

University in collaboration with the International Center for Tropical Agriculture (CIAT), Bioversity International and the World Agroforestry Centre (ICRAF) have used elements of the RAAIS workshops in their work on responsible scaling of innovation in Nicaragua (scaling up agroecology in mixed crop–livestock systems), Central Africa (adoption of Banana Xanthomonas Wilt (BXW) control methods), China (sustainable rubber production) and the Central Mekong (responsible scaling of improved forage systems among smallholders). More recently, GIZ used RAAIS to set priorities under their One World No Hunger program in Zambia. Also in Zambia IITA used RAAIS to assess progress made with outscaling soybean for integrated soil fertility management under the Alliance for a Green Revolution in Africa (AGRA) (Table 1 and Figure 3).

1.3 What can the reader find in this toolkit?

Section 2 provides the theoretical background on Agricultural Innovation Systems and reflects on the added value of RAAIS as compared to existing innovation systems tools and methods. Section 3 defines the three conceptual pillars of RAAIS and their interactions: (1) complex agricultural problems, (2) innovation capacity in the agrifood system and (3) the agricultural innovation system. Section 4 provides the methodological framework for RAAIS, including data collection methods and a short introduction to the proposed methods: interviews, surveys, workshops and secondary data analysis. The analytical framework for RAAIS is provided in Section 5. Section 6 provides the RAAIS workshop materials and facilitation protocol, the guide for note-taking, the RAAIS workshop analysis templates and an example of a RAAIS post-workshop questionnaire. How RAAIS can be used as a baseline for reflective monitoring and evaluation (M&E) is described in Section 7. In Section 8, we reflect on the initial testing of RAAIS and how lessons learned were incorporated to further strengthen it. Section 9 provides reference materials, including scientific papers, reports, and blog-posts and media. Where possible, we have used photographs and video clips to give the reader a better idea of how RAAIS is implemented.

1.4 More information?

Both the 1st and 2nd Edition of this toolkit are open access and can be downloaded from www.wageningenur.nl/raais-toolkit

Much of the information provided in this toolkit originates from a methodological paper on RAAIS:

Schut, M., Klerkx, L., Rodenburg, J., Kayeke, J., Raboanarielina, C., Hinnou, L.C., Adegbola, P.Y., van Ast, A., Bastiaans, L., 2015. RAAIS: Rapid Appraisal of Agricultural Innovation Systems (Part I). A diagnostic tool for integrated analysis of complex problems and innovation capacity. In: *Agricultural Systems* 132:1-11.
Available at: www.sciencedirect.com/science/article/pii/S0308521X14001115

Further development of and reflection on the RAAIS' methodological and analytical frameworks is reflected in the below research papers:

Schut, M., van Asten, P., Okafor, C., Hicintuka, C., Mapatano, S., Nabahungu, N.L., Kagabo, D., Muchunguzi, P., Njukwe, E., Dontsop-Nguezet, P.M., Sartas, M., Vanlauwe, B., 2016. Sustainable intensification of agricultural systems in the Central African Highlands: the need for institutional innovation. In: *Agricultural Systems* 145:165-176.
Available at: www.sciencedirect.com/science/article/pii/S0308521X16300440

Barrett, T., Feola, G., Krylova, V., Khusnitdinova, M., 2017. The application of Rapid Appraisal of Agricultural Innovation Systems (RAAIS) to agricultural adaptation to climate change in Kazakhstan: A critical evaluation. In: *Agricultural Systems* 151:106-113.
Available at: www.sciencedirect.com/science/article/pii/S0308521X16303778

2

Agricultural Innovation Systems

2.1 What are Agricultural Innovation Systems?

The agricultural innovation system (AIS) approach has become increasingly popular as a framework to analyse, and to deal with, complex agricultural problems (e.g. Hall et al., 2003; World Bank, 2006). The AIS approach evolved from a transition from technology-oriented approaches to agricultural innovation, to more systems-oriented approaches to agricultural innovation (e.g. Klerkx et al., 2012a; Röling and Engel, 1991). Within the AIS approach, innovation is perceived as a process of combined technological (e.g. cultivars, fertiliser, agronomic practices) and non-technological (e.g. social practices such as labour organisation or institutional settings such as land-tenure arrangements) changes (Hounkonnou et al., 2012; Leeuwis, 2004). Such changes occur across different levels (e.g. field, farm, region) and are shaped by interactions between stakeholders and organisations inside and outside the agricultural sector (Kilelu et al., 2013; Klerkx et al., 2010).

Despite the recent development and application of a variety of methods that can support AIS analyses (e.g. World Bank, 2012), the potential of the AIS approach to structurally address complex agricultural problems remains underutilised in many fields of study (e.g. Schut et al., 2014a). Four main reasons for this have been identified.

1. Methods used for the analysis of complex agricultural problems generally have a narrow, rather than a holistic, focus. They support the analysis of a specific dimension (e.g. the economic dimension in Beintema et al., 2012), level (e.g. the national level in Temel et al., 2003) or stakeholder group (e.g. farmers in Amankwah et al., 2012; Totin et al., 2012).
2. Studies that do include analysis of multiple dimensions of problems (e.g. Singh et al., 2009), interactions across different levels (e.g. Douthwaite et al., 2003) or multi-stakeholder dynamics (e.g. Hermans et al., 2013) often give limited attention to the integrated analysis of these features of complex agricultural problems.
3. Approaches that integrate the analysis of multiple dimensions of problems, interactions across different levels and multi-stakeholder dynamics (e.g. Lundy et al., 2005; van Ittersum et al., 2008) give limited attention to understanding innovation capacity in the agrifood system and the functioning of the agricultural innovation system.
4. The majority of AIS studies are conducted ex-post (e.g. Basu and Leeuwis, 2012), lack a clear structure to delineate systems' boundaries (Klerkx et al.,

PHOTO 2 Humidtropics Burundi Facilitator Cyrille Hicintuka inspecting piglets in Gitega. Crop-livestock integration was the Entry Theme that was used in RAAIS Burundi PHOTO: D. LAMERS

2012b), or are based on comprehensive studies which take considerable time (e.g. Jiggins, 2012). Although such studies provide a better understanding of the drivers of innovation in agrifood systems, their diagnostic ability to identify Entry Points for innovation is limited.

2.2 Rapid Appraisal of Agricultural Innovation Systems

On the basis of the above review of the availability, scope and use of methods for AIS analyses, we have developed and tested a diagnostic tool that can support the Rapid Appraisal of Agricultural Innovation Systems (RAAIS). RAAIS integrates and builds upon existing (agricultural) innovation system concepts and combines multiple methods of data collection. RAAIS fits within a tradition of rapid appraisal approaches used in the field of agriculture, including Rapid Appraisal of Agricultural Knowledge Systems (RAAKS: Röling and Engel, 1991; Engel, 1995). Like RAAKS, RAAIS aims to improve the social organisation of innovation processes. In doing so, it pays relatively more attention to identifying specific entry points for research intervention, and to addressing institutional constraints that hinder the use of promising technological innovations.

The objective of RAAIS is to provide a coherent set of (1) specific Entry Points for innovation to address complex agricultural problems and (2) generic Entry Points that can enhance innovation capacity in agrifood system and the performance of the agricultural innovation system. Identifying both specific and generic Entry Points for innovation enhances the likelihood of complex agricultural problems being addressed in an effective and durable manner.

Photo 2 shows the Burundi Humidtropics Action Site Facilitator inspecting piglets in Gitega. Introduction of the piglets was identified during RAAIS as a specific Entry Point for innovation to address problems relating to declining soil fertility. Such interventions need to be complemented by innovations at higher levels that, for instance, enhance access to high quality inputs and (veterinary) services for farmers, and improve knowledge and education on integrated soil fertility management.

3

Conceptual underpinnings

3.1 Complex agricultural problems

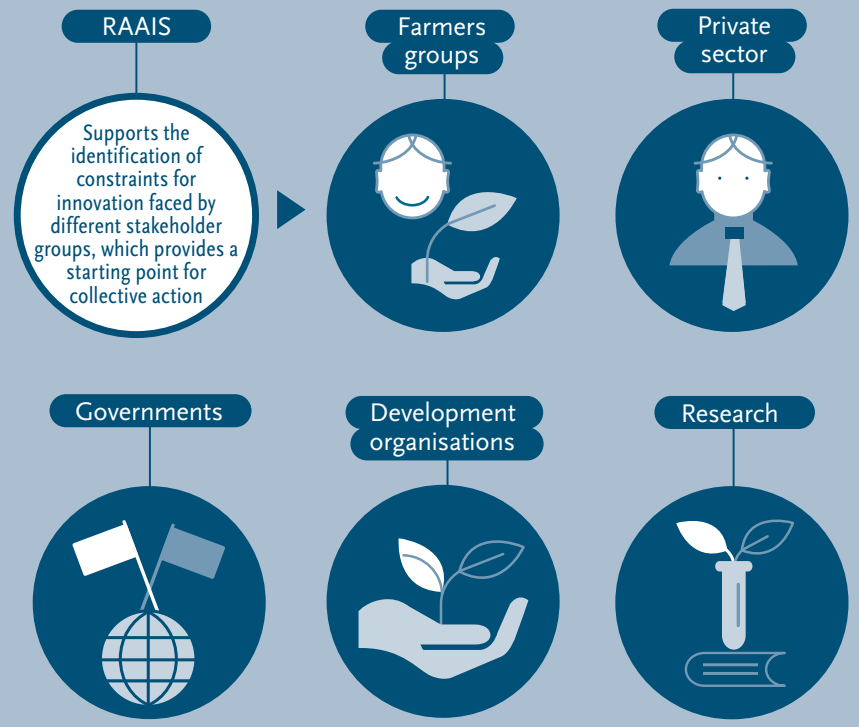
Complex agricultural problems are defined as problems (1) that have multiple dimensions (Schut et al., 2014b), (2) that are embedded in interactions across different levels (Giller et al., 2008) and (3) where a multiplicity of actors and stakeholders are involved (Funtowicz and Ravetz, 1993).

Regarding the first, complex agricultural problems arise from an interplay of biophysical, technological, socio-cultural, economic, institutional and political dimensions. To exemplify this, we use a case by Sims et al. (2012), who analyse constraints for the upscaling of conservation agriculture in sub-Saharan Africa. They demonstrate how import taxes on steel, but not on imported agricultural machinery (institutional dimension), disadvantage manufacturers in the development of locally adapted agricultural equipment such as no-till planters (technological dimension) for effective soil conservation for sustainable crop management (biophysical dimension).

Concerning the second, the dimensions of complex agricultural problems often have different implications across different levels. Mitigating the impact of agro-industrial biofuel production on food security, for instance, will require different strategies when approached at the national level (e.g. policies avoiding agro-industrial biofuel production in regions where pressure on agricultural land is high) than when approached at the farm household level (e.g. balancing the allocation of household labour to on-farm crop production and off-farm biofuel plantation work) (Schut and Florin, 2015). Nevertheless, the different levels are interrelated, and, consequently, coherent multi-level strategies are required.

Regarding the third, complex agricultural problems are characterised by the involvement of a variety of actors, stakeholders and the organisations they represent (Figure 4) (Hounkonnou et al., 2012; Ortiz et al., 2013). Actors include anyone who is related directly or indirectly to a problem, or to the potential solution to a problem. Stakeholders are those actors or actor groups with a vested interest in addressing the problem (McNie, 2007) and whose participation in exploring solutions is perceived as a critical success factor (e.g. Giller et al., 2011). Stakeholder participation can provide insights into the different dimensions of the problem and the types of solutions that are both technically feasible and socio-culturally and economically acceptable (Faysse, 2006).

FIGURE 4 RAAIS provides space for interaction, negotiation, collaboration and joint action among different stakeholder groups.



3.2 Innovation capacity in the agrifood system

The agrifood system is defined as the operational unit of agriculture including all actors and organisations at local, regional and national level involved in the production, processing and commercialisation of agricultural commodities (Spedding, 1988). Consequently, innovation capacity in the agrifood system is defined as the ability of these actors and organisations to develop new, and mobilise existing, competences (including knowledge, skills and experiences) to continuously identify and prioritise constraints and opportunities for innovation in a dynamic systems context (Leeuwis et al., 2014).

Following the typical system boundaries used in generic (i.e. non-agricultural) studies of innovation systems (Carlsson et al., 2002; Papaioannou et al., 2009; Wieczorek and Hekkert, 2012), we conceptualise the agrifood system as a combination of interrelated institutional, sectoral and technological subsystems. The institutional subsystem comprises different types of institutions, which are the formal and informal rules and structures that shape perspectives and practices (Leeuwis, 2004). We examine six types of institutions: policy, research, education and training, extension, markets and/or politics across different aggregation levels (e.g. national, regional or district) (e.g. Cooke et al., 1997; Freeman, 1988, 1995). The sectoral subsystem is defined around a commodity or segments of a value chain (e.g. rice or cocoa) (e.g. Blay-Palmer, 2005; Gildemacher et al., 2009). The analysis of the sectoral subsystem seeks to understand interactions between, for instance, access to credit, inputs and services, agricultural production, post-harvest activities, trade, marketing and consumption relating to the functioning of that value chain (e.g. Thitinunsomboon et al., 2008). Technological subsystems are defined around an existing or novel technology (e.g. irrigation, mechanised weeding) or field of knowledge (e.g. integrated pest management) to address a particular problem that may well cut across different sectoral subsystems (Carlsson and Stankiewicz, 1991; Chung, 2012; Hekkert et al., 2007).

3.3 The Agricultural Innovation System

The agricultural innovation system provides the structural conditions that can enable (when present) or constrain (when absent or malfunctioning) innovation within the agrifood system and its subsystems (Klein Woolthuis et al., 2005; van

TABLE 2 Structural conditions that enable or constrain the functioning of innovation systems [a]

Structural conditions for innovation	Description
Infrastructure and assets	Knowledge, research and development infrastructure; physical infrastructure including roads, irrigation schemes and agricultural inputs distribution; communication and financial infrastructure
Institutions	Formal institutions including agricultural policies; laws; regulations; (food) quality standards; agricultural subsidies; monitoring and evaluation (M&E) structures; organisational mandates; market (access) and trade agreements; informal institutions such as socio-cultural norms and values
Interaction and collaboration	Multi-stakeholder interaction for learning and problem solving; development and sharing of knowledge and information; public-private partnerships; networks; representative bodies (e.g. farmers' association); power dynamics
Capabilities and resources	Agricultural entrepreneurship; labour qualifications; human resources (quality and quantity); education and literacy rates; financial resources (e.g. number of extension officers and funds to backstop farmers)

[a] Based on: (Klein Woolthuis et al., 2005; van Mierlo et al., 2010; Wieczorek and Hekkert, 2012)

Mierlo et al., 2010; Wieczorek and Hekkert, 2012) (Table 2). Whether effective strategies to deal with complex agricultural problems will be identified depends to a large extent on the functioning of the agricultural innovation system.

Structural conditions include (1) adequate knowledge infrastructure in the form of research, education and extension, physical infrastructure and assets such as roads and vehicles, and functional communication and finance structures, (2) institutions comprising clear regulatory frameworks and their proper implementation and enforcement, (3) interaction and collaboration between multiple stakeholders in the agrifood system and (4) stakeholder capacities and adequate human and financial resources.

Under Humidtropics, interaction and collaboration between local stakeholders were supported through the establishment of so-called innovation platforms (Photo 3).

3.4 Interactions in agri-food systems

The integrated analysis of complex agricultural problems, the innovation capacity of the agrifood system and the performance of the agricultural innovation system can provide a coherent set of specific and generic Entry Points for innovation.

- **Specific Entry Points** for innovations relate to those innovations that directly contribute to addressing the complex agricultural problem under study.
- **Generic Entry Points** for innovation relate to strengthening the innovation capacity of the agrifood system and the functioning of the agricultural innovation system.

For example, to reduce fruit waste in developing countries, existing technologies for conserving fruits can be adapted to fit the local context (specific Entry Point for innovation in the technological subsystem). This may trigger access to export markets (specific Entry Point for innovation in the sectoral subsystem) and require certification policies to supply such fruit export markets (specific Entry Point for innovation in the institutional subsystem). To support the development, implementation and enforcement of certification policies, the establishment of a national agricultural certification bureau may be required (generic Entry Point for

PHOTO 3 Innovation platform meeting in Nigeria to foster continuous interaction and collaboration between farmers, extension officers and researchers. PHOTO: LATIFOU IDRISSOU

innovation). The existence of such a bureau can provide an incentive for investing in the export of other agricultural produce, for instance, vegetables; this, in turn, can trigger the development or adaptation of conservation technologies to reduce vegetable waste.

The above example shows how structural adaptations of the agricultural innovation system can enhance innovation capacity to address the complex agricultural problem under review (fruit waste), but can also have a spill-over effect on addressing other complex agricultural problems (vegetable waste).

3.5 RAAIS as a starting point for developing a Theory of Change

Depending on the Entry Points identified, RAAIS can provide a starting point for a multi-stakeholder process. Although RAAIS was initially designed as an analysis tool, the collective identification, analysis and prioritisation of constraints and opportunities for innovation turned out to be a solid basis for collective action. During its application in Ghana, we provided stakeholders space to develop re-

search for development action plans, which provided a starting point for development of multi-stakeholder platforms. In line with what Leeuwis et al., (2000; 2014) mentioned, participatory methodologies such as RAAIS can support stakeholder groups (including researchers) in becoming more aware of their fundamental interdependencies and can facilitate negotiation that is needed for concerted action to address their constraints and reach their objectives.

It is therefore that we have decided to develop a Theory of Change module that can support stakeholders in:

1. Developing a coherent set of R4D activities that address productivity, natural resource management, institutional, nutrition, gender and other innovation domains.
2. Thinking about the sequence of R4D activities towards achieving specific outcomes or impact, as we noticed that a step-wise approach may be more realistic as compared to implementing many different R4D activities at the same time.

According to Vogel (2012), there is consensus on the basic elements that make up the Theory of Change approach. As a minimum, theory of change is considered to encompass a discussion of the following elements:

- Context for the initiative, including social, political and environmental conditions, the current state of the problem the project is seeking to influence and other actors able to influence change
- Long-term change that the initiative seeks to support and for whose ultimate benefit
- Process/sequence of change anticipated to lead to the desired long-term outcome
- Assumptions about how these changes might happen, as a check on whether the activities and outputs are appropriate for influencing change in the desired direction in this context.
- Diagram and narrative summary that captures the outcomes of the discussion.

The Theory of Change is not fixed or prescriptive. It should rather be seen as a flexible pathway for achieving a certain objective. The Theory of Change can and should be adapted as an (innovation) processes moves along.
Recommended reading on Theory of Change:
Vogel, I., 2012. *Review of the use of 'Theory of Change' in international development*

UK Department for International Development (DFID), p. 83. Available at: https://assets.publishing.service.gov.uk/media/57a08a5ded915d3cfd00071a/DFID_ToC_Review_VogelV7.pdf

Alvarez, S., Douthwaite, B., Thiele, G., Mackay, R., Cordoba, D., Tehelen, K., 2010. Participatory Impact Pathways Analysis: a practical method for project planning and evaluation. In: *Development in Practice* 20, 946-958. Available at: http://dx.doi.org/10.1080/09614524.2010.513723

Recommended watching on Theory of Change: Video blog by Dr Boru Douthwaite on using theory of change and impact pathways to leverage results: www.youtube.com/watch?v=YcyhrlZx07Y

3.6 RAAIS as a baseline for adaptive management of R4D projects

Based on the Theory of Change and the developed action plans, R4D activities will start to be implemented by the stakeholders. However, we acknowledge that:

- Interactions between innovation projects and their environment are only plannable and steerable to a limited extent
- Activities that seemed promising, may still have disappointing or unforeseen negative results
- New (technological) insights may emerge, that may trigger new ideas about what type of innovations are needed to overcome stakeholder constraints
- The context (biophysical, economic or political) within which activities are implemented can change (e.g. extreme drought, market collapse, political turmoil)
- Stakeholder needs, interests and priorities may change over time

To anticipate these and other changes, continuous Monitoring, Evaluation and Learning (M&E&L) is required to facilitate the adaptive management of R4D projects and programs. Adaptive management means that we strengthen what works, but also that we can drop those activities that we see do not work. This increases the likelihood that R4D projects contribute to the desired outcomes and impact that the stakeholders defined.

RAAIS provides a baseline that captures stakeholder needs and interests, as well as priorities at the start of R4D projects. Annual or seasonal multi-stakeholder reflection moments can be used to re-assess whether needs, interests and priorities have changed, and whether the current mix of R4D experiments and innovations are still seen as promising to achieve the commonly defined objective. Besides that, these reflection moments also provide space for stakeholders to provide feedback on the collaboration process.

Recommended reading:
Klerkx, L., Aarts, N., Leeuwis, C., 2010. Adaptive management in Agricultural Innovation Systems: the interactions between innovation networks and their environment. In: *Agricultural Systems* 103, 390-400. Available at: www.sciencedirect.com/science/article/pii/S0308521X10000429

4

Methodological framework

Since its first application, the RAAIS methodology was adapted and updated based on our learning experiences. RAAIS was designed as a multi-method tool, and we still deem it critical that different data collection methodologies are used as this provides a basis for triangulation and validation of the outcomes.

However, in practice we learned that R4D organisations and NGOs do not always have the time to conduct the full range of RAAIS methodologies, including the workshops, interviews, surveys and secondary data analyses. Projects are often under time pressure to start the implementation of R4D activities and show tangible results to their donors. That is why the RAAIS workshops were mainly used to set R4D agendas, as they bring together key stakeholder groups to identify, analyse and prioritise constraints, and provide a starting point for designing and implementing interventions to overcome these constraints. We build some additional modules into the RAAIS workshops that assess (1) the feasibility of addressing specific constraints (within a specific project context and its (time, finance and human) resource limitations, and (2) perceived costs of overcoming the constraints in relation to the extent to which overcoming the constraint will contribute to the project or program outcome (ex-ante benefit assessment based on stakeholder perceptions) (Figure 5).

Results from the RAAIS workshop can – after some more detailed analyses of feasibility and ex-ante assumed benefit – provide a starting point for thinking about which mix of interventions have a high likelihood of contributing to addressing stakeholder constraints. This kind of information can inform a Theory of Change, which is in fact nothing more than a roadmap towards desired outcomes and impact. We propose that the Theory of Change is developed in a participatory way, with the same stakeholder groups that were involved in the initial RAAIS workshop in which constraints were analysed and entry points for innovation were identified.

Whilst implementing 'best bet' interventions (i.e. activities that stakeholders are comfortable with and confident about that they will have the desired impact), the more in-depth analyses based on surveys, interviews, modelling and secondary data can be conducted. Information resulting from this can inform decision making during M&E&L moments in the R4D implementation process.

FIGURE 5 RAAIS provides coherent entry points for innovation that are supported by stakeholders, targeting different levels, and feasible within the scope of a project.

Based on the above, we decided to break down RAAIS into four different modules:

- RAAIS Lite: Multi-stakeholder workshops around a broad Entry Theme, during which different stakeholder groups identify, analyse, and prioritise constraints for innovation, and design pathways for overcoming such constraints.
- RAAIS Complete: Follow-up in-depth interviews, surveys and secondary data analysis to validate RAAIS Lite workshop outcomes and further assess the feasibility of the prioritised entry points for innovation.
- RAAIS ToC: Participatory Theory of Change (ToC) workshops to develop action plans for the implementation of R4D interventions.
- RAAIS M&E&L: RAAIS reflection workshops for Monitoring, Evaluation and Learning (M&E&L). These multi-stakeholder reflection workshops provide a basis for ongoing reflection on the Theory of Change and the implementation of action plans to ensure that outcomes and impacts are achieved.

4.1 Criteria for selecting RAAIS methods

RAAIS combines multiple methods of data collection, building on existing experiences with rapid appraisal approaches and (participatory) innovation systems analysis. Five criteria have been identified for the selection of methods.

1. **Methods should be diverse, rigorous and able to generate both qualitative and quantitative data**
   This enhances the credibility and strength of the analysis (Spielman, 2005). Qualitative data provide the basis for the identification and analysis of the different dimensions of complex agricultural problems and structural conditions enabling or constraining innovation capacity. Such data may also provide narratives regarding the underlying causes and historical evolution of constraints and challenges. Quantitative data analysis can build on this by providing (descriptive) statistics and trends on, for instance, the distribution of constraints and challenges across different levels, stakeholder groups or study sites.

2. **Methods should facilitate both 'insider' and 'outsider' analysis**
   Insider analysis implies data analysis by stakeholders who can provide highly detailed explanations of specific phenomena based on their knowledge and experiences. However, insiders such as farmers or policymakers often have an incomplete or insufficient critical view of the broader agrifood system or the agricultural innovation system. Consequently, it is important to complement insider analysis with outsider analysis of data by researchers. Combined, the insider and outsider perspectives provide a thorough analysis of the issue under review (van Mierlo et al., 2010).

3. **Methods should be able to target different stakeholder groups across different levels**
   When complex agricultural problems are being studied, it is essential to include different groups of stakeholders, their perceptions on what constitutes the problem and what are perceived feasible or desirable solutions (Faysse, 2006; Ortiz et al., 2013).

4. **Methods should be able to target stakeholders individually, in homogeneous groups and in heterogeneous groups so as to capture individual, group and multi-stakeholder perceptions on problems and solutions.**
   Discussion and debate in both homogeneous and heterogeneous stakeholder groups generally provide a rich analysis of complex problems and potential solutions. Furthermore, multi-stakeholder interaction may reveal asymmetric power relationships that are key to understanding innovation capacity in the agrifood system. On the other hand, power relationships, group pressure or mutual dependencies between stakeholders may result in situations where sensitive questions are avoided, or receive socially desirable responses. Methods that target stakeholders individually are more likely to provide insights into such questions (International Institute for Sustainable Development, 2014).

5. **The methods together should provide sufficient detail on the complex agricultural problem under review, the innovation capacity in the agrifood system and the functioning of the agricultural innovation system** (World Bank, 2012).
   For RAAIS ToC an additional focus of analysis is the development of Impact Pathways and R4D intervention plans, and for and RAAIS M&E&L the analysis focus is on reflection on the ToC and its Impact Pathway, and based on that potential revision of the R4D activities.

Combining different types of methods and data collection techniques provides an opportunity to triangulate and validate data. Depending on the nature of the agricultural problem under review and the available resources and time, different types of data collection methods can be used for RAAIS, taking into account the criteria for method selection.

Based on the five criteria, different types of complementary data collection methods were selected to be part of RAAIS under its four main modules (Table 3). Other data collection and analysis tools (e.g. modelling, constraint network analysis) can be included depending on the specific theme and objective of RAAIS. Under Humidtropics, for example, social networks analysis was conducted to continuously examine (changing) stakeholder configurations in implementing the R4D interventions.

PHOTO 4 RAAIS workshop participants in Uganda developing work plans in small groups. One of the key characteristics of RAAIS is that it targets stakeholders individually, in homogeneous groups and in heterogeneous groups so as to capture individual, group and multi-stakeholder perceptions on problems and solutions. PHOTO: M. McCampbell

4.2 RAAIS multi-stakeholder workshops

Multi-stakeholder workshops focus mainly on insider analyses of innovation capacity in the agrifood system and the structural conditions provided by the agricultural innovation system. A participatory workshop methodology facilitates different groups of stakeholders – individually and in homogeneous and in heterogeneous groups – to identify, categorise and analyse constraints and challenges for innovation in the agrifood system. Depending on the type of problem, workshops can be organised with stakeholders representing national, regional and/or district levels or, for instance, across different study sites that share a specific problem. To keep the workshops manageable, and to stimulate interaction and debate, the participation of a maximum of 25 participants per workshop is proposed – for instance consisting of five representatives from each of the following: farmer organisations, NGOs/civil society, the private sector, government and research. As far as possible, each group should be a representative sample with respect to, for instance, gender, age, income, ethnic groups.

The workshops should be held in a language spoken by all participants and be facilitated by someone who is familiar with the relevant cultural norms, has affinity with the problem and understands the realities of the different stakeholder groups. The proposed workshop methodology consists of different sessions subdivided into three categories, each with their own objective: (1) identifying constraints and challenges, (2) categorising constraints and challenges, and (3) exploring specific and generic Entry Points for innovation.

The starting point for the workshop is a broad Entry Theme. An Entry Theme can relate to a specific commodity (e.g. sustainable intensification of banana production in Burundi) or be more generic (e.g. improved access to market information for farmers in Kenya). The Entry Theme is usually closely related to project/program objectives, but should be validated with representatives of different stakeholder groups before the start of the RAAIS workshop. Table 4 provides an overview of the sessions, their sequence and relations, and their specific objective in RAAIS.

Workshops are designed to take one-and-a-half to two days. Depending on the specific objective of the workshop, sessions can be included or excluded, or new sessions can be added.

Many complex agricultural problems have gender dimensions. Men and women often experience different constraints and have different objectives that need to be captured when strategies for agricultural innovation are being explored. RAAIS provides tools to capture these different constraints and opportunities and can facilitate their gender-disaggregated analysis (see Photo 5). Table 5 gives an overview of the essential and optional sessions, and which are suitable for conducting gender-disaggregated analysis.

TABLE 3 Methodological framework indicating how different data collection methods correspond to the selection criteria for methods.

RAAIS module	Methods for data collection	Selection criteria for methods																				
		Type of data		Insider/ outsider		Stakeholder group				Stakeholder group			Stakeholder participation		Focus of the analysis				Additional focus for RAAIS ToC and RAAIS M&E&L			
		Qualitative	Quantitative	Insider	Outsider	Farmers	NGO/ civil society	Private sector		Government	Research and training		Individual	Homogeneous groups	Heterogeneous groups	Complex agricultural problems	Innovation capacity in the agrifood system	Agricultural innovation system	Development of Impact Pathways and intervention plans	Reflection on ToC and Impact Pathway, revision of R4D activities		
RAAIS Lite	Multi-stakeholder workshops	x	x	x	x		x	x		x	x		x	x	x		x	x				
RAAIS Complete	Semi-structured in-depth interviews	x	x		x		x	x		x	x		x			x	x	x				
	Questionnaires		x		x	x				x			x	x		x						
	Secondary data analysis	x			x		N/a				N/a			N/a			x	x	x			
RAAIS ToC	Theory of Change workshop	x		x		x	x	x		x	x				x	x	x	x	x	x	x	
RAAIS M&E&L	Reflection meetings	x	x	x		x	x	x		x	x		x	x	x			N/a			x	

TABLE 4 Workshop sessions and their specific objectives and importance in RAAIS.

	Sessions	Activities	Objective(s) in RAAIS
IDENTIFYING CONSTRAINTS AND CHALLENGES			
1	Opening and participant introduction	Participants (1) introduce themselves and receive information about the workshop methodology and (2) are subdivided over different stakeholder groups, identified by coloured cards	• To ensure an equal representation of participants over the different stakeholder groups
2	Individual brainstorming about constraints and challenges	Participants individually identify five constraints and challenges they face in their work. On the back of their coloured cards, participants write their gender (male/female) and age	• To make an inventory of general constraints and challenges in the agrifood system faced by stakeholders • To capture constraints and challenges of gender and age groups
3	Developing a Top 5 of constraints and challenges in stakeholder groups	Participants (1) discuss constraints and challenges within respective stakeholder group, (2) develop a stakeholder group Top 5 of constraints and challenges, (3) present the Top 5 to other stakeholder groups and (4) have discussions within and between stakeholder group(s)	• To gain insights into the key constraints and challenges experienced by different stakeholder groups • To create awareness and stimulate learning among stakeholders
4	Identifying root causes of constraints and challenges	Participants discuss about the root causes of the constraints and note down a maximum of three root causes for each of their constraints	• To get better insight in the underlying causes of stakeholder constraints • To stimulate discussion among participants on what is causing the constraints
CATEGORISING CONSTRAINTS AND CHALLENGES			
5	Identifying the type of constraints and challenges	Participants (1) categorise Top 5 constraints and challenges as relating to biophysical, technological, socio-cultural, economic, institutional or political constraint, (2) present results to the other groups and (3) have discussions within and between the stakeholder group(s)	• To gain insights into types of constraints and challenges • To create awareness and stimulate learning between stakeholders
6	Categorising constraints and challenges along structural conditions that can enable or constrain innovation	Participants (1) categorise Top 5 constraints and challenges along the structural conditions driving innovation (Table 2) and (2) discuss them within and between the stakeholder group(s)	• To gain insights into how the stakeholder constraints and challenges relate to structural conditions provided by the agricultural innovation system and whether these enable or constrain innovation capacity • To create awareness and stimulate learning between stakeholders
7	Categorising constraints and challenges across different (administrative) levels	Participants (1) categorise Top 5 constraints and challenges across different administrative levels (e.g. national, regional, district), (2) discuss results with other stakeholder groups and (3) have discussions within and between the stakeholder group(s)	• To gain insights into how key constraints and challenges relate to different institutional (administrative) levels • To identify and analyse interactions between different levels • To create awareness and stimulate learning between stakeholders
8	Identifying relationships between constraints and challenges, and identifying key constraints	Participants (1) jointly discuss and identify relations between the different constraints and challenges, (2) identify constraints or challenges that are central in the analysis and (3) have discussions within and between the stakeholder group(s)	• To analyse relationships between different constraints and challenges • To identify key constraints and challenges • To create awareness of the interconnectedness of stakeholder constraints and stimulate learning between stakeholders
9	Categorising constraints and challenges along segments of the value chain	Participants (1) categorise stakeholder group Top 5 constraints and challenges along the value chain and (2) have discussions within and between the stakeholder group(s)	• To analyse constraints and challenges along the agrifood value chain • To create awareness and stimulate learning between stakeholders

TABLE 4 Workshop sessions and their specific objectives and importance in RAAIS (continued).

Sessions	Activities	Objective(s) in RAAIS
EXPLORING SPECIFIC AND GENERIC ENTRY POINTS FOR INNOVATION		
10 Categorising constraints that are Entry Theme specific or more generic constraints in the agrifood system and agricultural innovation system	Participants (1) subdivide between (a) constraints that are Entry Theme specific or more generic in the (b) agrifood system and (c) agricultural innovation system and (2) have discussions within and between the stakeholder group(s)	• To distinguish between constraints that: (1) are specifically related to the Entry Theme, (2) are more broadly related to innovation capacity in the agrifood system, (3) are related to the agricultural innovation system
11a Subdividing between constraints that stakeholder groups can solve themselves versus problems solved with or by other stakeholder groups	Participants (1) categorise Top 5 constraints and challenges as: 'can be solved within the stakeholder group' or 'can only be solved in collaboration with other stakeholder groups' and (2) have discussions within and between the stakeholder group(s)	• To identify constraints and challenges that require collaboration between stakeholder groups • To create awareness and stimulate learning between stakeholders • To identify Entry Points for innovation in the agrifood system
11b Subdividing between constraints and challenges that are easy/difficult to solve	Participants: (1) categorise Top 5 constraints and challenges as relatively 'easy' or 'difficult' to address and (2) have discussions within and between the stakeholder group(s)	• To explore which constraints and challenges require system optimisation (easy to address) and those that require system transformation (difficult to address) • To create awareness and stimulate learning between stakeholders • To identify Entry Points for enhancing the innovation capacity in the agrifood system
FEASIBILITY ANALYSIS		
12a Assessing the costs of the intervention to overcome the constraints and challenges	Participants rank the constraints according to the costliness of interventions needed to overcome them (1=very low costs, 2=low costs, 3=medium costs, 4= high costs, 5= very high costs)	• To get an idea about the costs of the interventions required to overcome the constraints • To get an idea about whether it is feasible to address the constraints within the financial capabilities of the project
12b Assessing the required time to address stakeholder constraints and challenges	Participants indicate how much time addressing the constraint would require (very short (<1 year), short (1-2 years), medium (2-4 years), long (4-6 years) or very long (>6 years)	• To subdivide between constraints and challenges that can be addressed within a relatively short term and those that require more medium- and long-term efforts • To assess whether it is possible to address the constraints within the timeframe of the project
12c Assessing the availability of technological or institutional innovations to address the constraint?	Participants assess the availability of innovations to overcome their constraints (1=very low, 2=low, 3=medium, 4= high, 5= very high)	• To assess whether technologies or institutional innovations are readily available, or whether these need to be developed and tested • To enhance discussion on the feasibility of addressing specific constraints within the scope of the project
12d Assessing the availability of knowledge and skills to address the constraint?	Participants assess the availability of knowledge and skills to overcome their constraints (1=very low, 2=low, 3=medium, 4= high, 5= very high)	• To assess whether competencies are readily available in the project, or whether these need to be developed • To enhance discussion on the feasibility of addressing specific constraints within the scope of the project
BENEFIT ANALYSIS		
13 Assessing the assumed impact of addressing the stakeholder constraints	Participants reflect on how addressing constraints would contribute to achieving project/program objectives (1=very low, 2=low, 3=medium, 4= high, 5= very high)	• To categorise constraints along project/program objectives • To stimulate participants to relate constraints to project/program objectives

TABLE 4 Workshop sessions and their specific objectives and importance in RAAIS (continued).

Sessions	Activities	Objective(s) in RAAIS
PRIORITISATION AND DEVELOPMENT OF BASIC ACTION PLANS		
14 Identifying different types of research for development (R4D) domains that can support addressing the constraints	Participants collectively subdivide constraints under four R4D categories: (1) Technological innovation, (2) Institutional innovation (3) Gender, (4) Nutrition, (5) Other innovation	• To subdivide constraints and challenges over the R4D intervention categories
15a Prioritising constraints under different R4D domains by different gender groups	Females and males separately prioritise constraints under R4D categories (covered in Session 12)	• To gain insight into men's and women's prioritisation of constraints under the different R4D categories • To become aware of differences and similarities between men's and women's priorities
15b Prioritising the Top 3 constraints under different R4D domains by women and men together	Participants jointly discuss and develop an overall Top 3 constraints and challenges under the R4D categories	• To explore opportunities for addressing system constraints and challenges through multi-stakeholder collaboration • To identify key Entry Points for innovation

TABLE 5 Essential and optional workshop sessions and indication of suitability of workshop sessions for gender-disaggregated analysis.

Session	Objective	Essential	Optional	Suitable for gender analysis?
1	Opening and participant introduction	x		
2	Individual brainstorming about constraints and challenges	x		x
3	Developing a Top 5 of constraints and challenges in stakeholder groups	x		x
4	Identifying root causes of constraints and challenges	x		
5	Identifying the type of constraints and challenges	x		
6	Categorising constraints and challenges along structural conditions that can enable or constrain innovation	x		
7	Categorising constraints and challenges across different (administrative) levels	x		
8	Identifying relationships between constraints and challenges, and identifying key constraints	x	x	
9	Categorising constraints and challenges along segments of the value chain		x	
10	Categorising constraints that are Entry Theme specific or more generic constraints in the agrifood system and agricultural innovation system		x	
11a	Subdividing between constraints that stakeholder groups can solve themselves versus problems that can only be solved with or by other stakeholder groups		x	
11b	Subdividing between constraints and challenges that are easy/difficult to solve		x	
12a	Assessing the costs of the intervention to overcome the constraints	x		
12b	Assessing the required time to addressing stakeholder constraints and challenges	x		
12c	Assessing the availability of technological or institutional innovations to address the constraint?	x		
12d	Assessing the availability of knowledge and skills to address the constraint?	x		
13	Assessing the assumed impact or benefit of addressing the stakeholder constraints	x		
14	Identifying different types of research for development (R4D) domains that can support addressing the constraints	x		
15a	Prioritising constraints under different R4D domains by different gender groups		x	x
15b	Prioritising the Top 3 constraints under different R4D domains by women and men together		x	x

Alongside the facilitator, a note-taker documents the outcome of the different sessions and captures discussions among participants. Workshop facilitation and note-taking protocols ensure that the workshop organisation, facilitation and documentation are standardised; this is essential for comparing or aggregating the outcomes, for instance across different study sites. The protocols for workshop facilitation and guide for note-taking can be found in Section 6 of this toolkit.

A crucial element in the workshops is the use of coloured cards. At the start of the workshop (Session 1), each of the stakeholder groups is assigned a different colour. During Session 2, the participants individually list five constraints or challenges they face in their work and write them down on their coloured cards. If five stakeholder groups are equally represented, this results in 125 cards. Session 3 facilitates discussion within stakeholder groups. In homogeneous stakeholder groups, participants discuss the listed constraints and challenges, explore overlapping issues and jointly develop a stakeholder group Top 5. If necessary, constraints and challenges can be reformulated based on discussions within the group. Each stakeholder group uses its Top 5 throughout the rest of the workshop sessions; hence, 25 cards (five cards per stakeholder group) (Photos 5-8).

The use of the coloured cards facilitates the analysis of different sessions during and after the workshops. As the cards are coded and recycled throughout the successive sessions, photographs can be taken to capture the results (for example, Photos 6 and 9). Such photographs can be analysed after the workshop and can also be used to validate the note-taker's data. Furthermore, the cards provide insight into the relations between constraints and challenges identified by different stakeholder groups (Photos 7 and 8). Combining the results from different sessions can stimulate integrative analyses. For instance, combining data resulting from Sessions 6 and 7 provides insight into the drivers of innovation across different levels. Similarly, the outcome of Sessions 8 and 15 can be compared to triangulate the data, as both seek to identify key constraints for innovation in the agrifood system.

PHOTO 5 A female participant presenting constraints prioritised by women during RAAIS workshop in Ghana, April 2015. PHOTO: M. SCHUT

4.3 RAAIS interviews

RAAIS interviews with representatives of farmers, the private sector, NGO/civil society organisations, government and researchers can provide insight into the problem under review (its dimensions, levels and stakeholder dynamics). Furthermore, interviewees can provide insight into the functioning of innovation systems, including collaboration between stakeholder groups, effectiveness of policies and other institutions, and what constrains or enables innovation capacity in the agrifood system (see Photo 10).

To guide the semi-structured interviews, a topic list is prepared and fine-tuned for each interview. Using a topic list provides a degree of flexibility to identify and to anticipate interesting storylines relating to the problem under review, and allows validation of data gathered during previous interviews or during the workshops. Interviews should take a maximum of one hour, ensuring a high level of attentiveness of both the respondent and the interviewer.

Sampling of interview respondents should follow a stratified approach to ensure that stakeholders representing different study sites, different stakeholder groups and different administrative levels are included. Within those strata, respondents can be selected purposively or on the basis of snowball sampling, where interview respondents make suggestions about who else should be included in the sample (Russell Bernard, 2006). The sample size can be based on the concept of *saturation*, or the point at which no new information or themes are observed in the interview data (Guest et al., 2006). Interviews can be recorded and transcribed electronically. From an ethical point of view, interviewees should give permission for interviews to be recorded, and researchers should ensure the confidentiality of all interview data. Recording may not always be desirable, as the voice recorder can create a barrier between the researcher and the respondent, especially when it comes to discussing politically sensitive issues. Instead of recording, detailed notes can be taken and transcribed electronically. The transcribed interviews can be coded. Ideally, interviews should be conducted and coded by two researchers, as this will enhance the quality of the analysis.

4.4 RAAIS questionnaires

Some of the constraints derived from the workshops and the interviews may be eligible for broader study among specific groups of stakeholders through the use of surveys. Such surveys may provide more insights into, for example, the socio-economic impacts of climate change on smallholder agriculture in specific regions, the quality of agricultural extension received by farmers in addressing complex agricultural problems, or access to agricultural inputs for male- or female-headed households.

Surveys are not necessarily limited to farmers; they can also be conducted with any of the other stakeholder groups involved. For the data to be complementary, surveys should be completed in the same study sites as where the workshops were organised and among a representative sample of the targeted stakeholder group. To achieve this, a stratified random sampling strategy can be used to identify respondents across different study sites, levels or stakeholder groups. An efficient sampling method that allows for optimal allocation of resources should be used to determine the sample size (e.g. Whitley and Ball, 2002).

PHOTO 6 (TOP LEFT) Top 5 constraints of NGO/civil society representatives and their categorisation under the different dimensions of constraints (Session 5).

PHOTO 7 (TOP RIGHT) The categorisation of the Top 5 identified by the different stakeholder groups along different structural conditions that can enable or constrain innovation (Session 6).

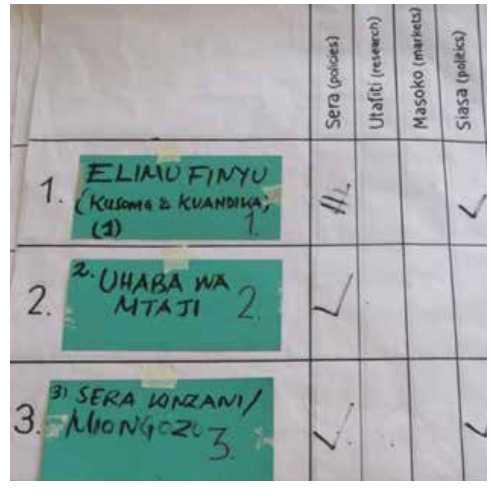
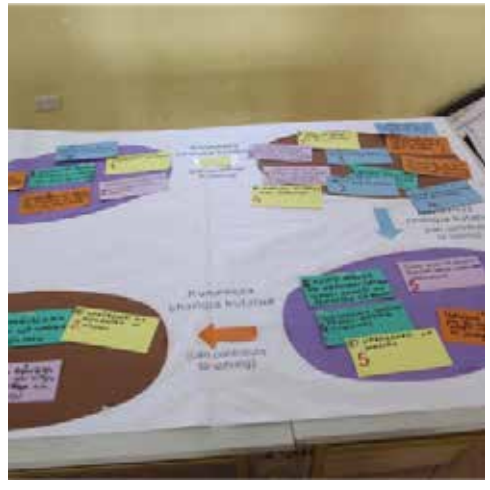


PHOTO 8 (BOTTOM LEFT) The identification of relationships between different constraints (arrows) and key problem (circled cards) (Session 8).

PHOTO 9 (BOTTOM RIGHT) The subdivision between stakeholder constraints that are easy or difficult to address (Session 11b)



PHOTOS: M. SCHUT of multi-stakeholder workshops in Tanzania held in October 2012

PHOTO 10 RAAIS interview with District Agricultural Officers in Kyela, Tanzania, in November 2012. PHOTO: M. SCHUT

4.5 RAAIS secondary data analysis

Secondary data are written data with relevance for the analysis of the complex agricultural problem, the innovation capacity of the agrifood system or the functioning of the agricultural innovation system. Examples are policy documents, project proposals and reports, laws or legal procedures, project evaluations, curricula for agricultural education and training, (agricultural) census and organisational records such as charts and budgets over a period of time.

During the analysis of secondary data on parasitic weed problems in Tanzania for instance, we discovered Striga Rules under the Tanzania Crop Protection Act of 1997 (see Figure 6). Interviews showed that the majority of crop protection officers – responsible for coordinating crop protection measures – were not aware of these *Striga* rules. This forms a good example of how data can be triangulated by using different methods.

The sampling of secondary data is not clear-cut. Key agricultural documents such as agricultural policies or agricultural research priorities should be included. These documents often refer to other relevant data. Furthermore, secondary data are often provided during or following interviews. Insights from secondary data can be verified in subsequent interviews with stakeholders (e.g. the extent to which policy is implemented and enforced).

4.6 RAAIS Theory of Change (ToC)

The RAAIS Theory of Change workshops follow in many ways a similar organisation as the RAAIS Lite workshops (Section 4.2). Preferably, the same participants are invited. This will prevent going back over the Entry Themes and re-negotiating the Entry Points for innovation that were prioritised during the RAAIS Lite workshop. However, based on the selected Entry Points some additional experts could be invited. For example, if one of the key bottlenecks was related to market access, a value chain or marketing expert could join the ToC workshop. Similarly, if stronger involvement of gender and youth were identified as opportunity, then these groups could be stronger represented (if not yet represented in the initial RAAIS Lite workshop).

This is how the Netherlands Organisation for Scientific Research (NWO, 2016) defines Theory of Change and Impact Pathway:

"A Theory of Change articulates the assumptions about the process through which change will occur, and specifies the ways in which (the expected or anticipated) early and intermediate outcomes related to achieving a desired long-term change will be brought about and documented as they occur (Anderson, 2005). Here, it comprises the description or visualisation of the change process and accompanying assumptions from problem definition to the identification of knowledge gaps through research design and execution to the realisation of expected output and outcomes and the desired contribution to impact. It is an important tool for monitoring and evaluation, and in particular for learning."

Figure 7 shows that developing a Theory of Change requires structured thinking about the relations between development outcomes, constraints to achieving these outcomes, and the preconditions and interventions needed to overcome the constraints. The Center for Theory of Change [1] identified several stages for developing a ToC, which we have built upon:

Step	Activity / objective	RAAIS Module
1	Identifying long-term goals or outcomes (Entry Theme)	RAAIS Lite
2	Identifying constraints for achieving those goals	RAAIS Lite
3	Defining root causes to these constraints	RAAIS Lite + RAAIS Complete
4	Map relations and interactions between stakeholder constraints	RAAIS Lite + RAAIS Complete
5	Explore technological and institutional innovations that can overcome constraints (Entry Points)	RAAIS Lite + RAAIS Complete
6	Backwards mapping and connecting the preconditions or requirements necessary to facilitate innovation (processes) and explaining why these preconditions are necessary and sufficient.	RAAIS ToC
7	Identifying your basic assumptions about the context.	RAAIS ToC
8	Identifying the interventions that your initiative will perform to create your desired change.	RAAIS ToC (building on action plans developed during RAAIS Lite)
9	Developing indicators to measure your outcomes to assess the performance of your initiative.	RAAIS ToC + RAAIS M&E&L
10	Writing a narrative to explain the logic of your initiative.	RAAIS ToC
11	Developing a Monitoring, Evaluation and Learning Strategy	RAAIS ToC + RAAIS M&E&L
12	Periodic reflection of outputs and outcomes against the Theory of Change and Impact Pathway	RAAIS M&E&L

1 www.theoryofchange.org/what-is-theory-of-change/how-does-theory-of-change-work

FIGURE 6 Example of a legal document (secondary data source) relating directly to a parasitic weed problem in Tanzania.

GOVERNMENT NOTICE NO ..... published on .....

THE. PLANT PROTECTION ACT
(CAP.133)
RULES

Made under section 3

THE PLANT PROTECTION (DECLARATION AND CONTROL OF STRIGA) RULES

Citation — 1. These Rules may be cited as the Plant Protection (Declaration and Control of *Striga*) Rule, 2010.

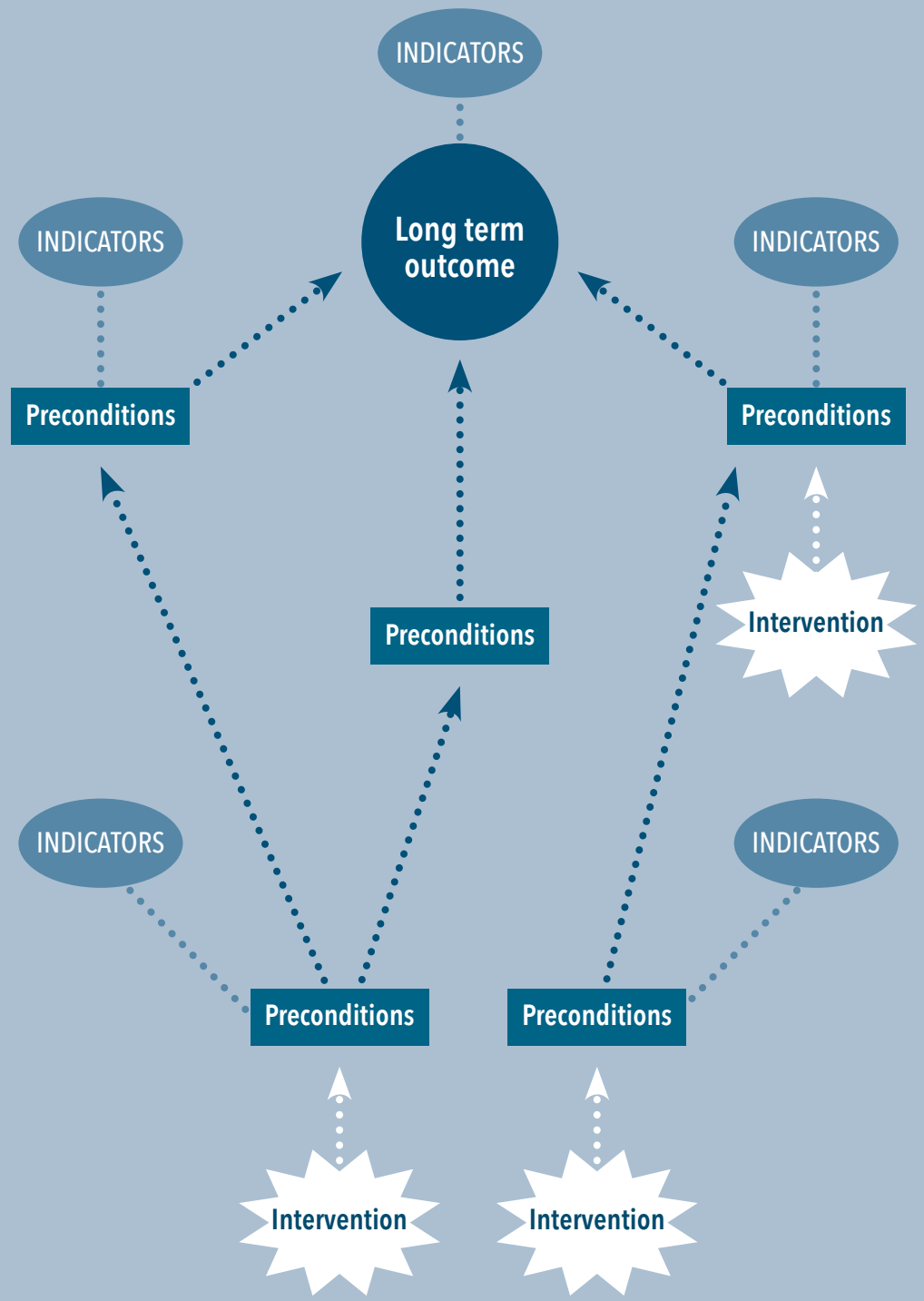
Interpretation Capt. 133 — 2. In these Rules unless the context requires otherwise-
"Act" means the Plant Protection Act;
"authorized officer" means agricultural officer, agricultural extension officer or any Other administrative officer at the Local Government Authority;
"inspector" means a Plant Protection Inspector appointed under section 33 of the Act;
"*striga*" means a plant of the family *scrophulariaceae* that is parasitic on the roots of the plants.

Declaration of striga — 3. *Striga* commonly called "witchweed" or "kiduha" is hereby declared to be a pest for the purposes of the Act.

Declaration of striga infested area — 4.-(1) Areas listed in the Schedule to these Rules are hereby declared to be *striga* infested areas.
(2) The Minister May by notice published in the *Gazette* amend the Schedule.

Duties of Inspector and authorized Officers in respect to the *striga* management — 5. Where an inspector or an authorized officer has established that any land or plant is infested with *striga*, he may issue a notice that traditional measures be undertaken by the occupier or, in the absence of the occupier, the owner or a person having the charge or management of the land as he may deem fit.

FIGURE 7 Building blocks for developing a Theory of Change (Anderson, 2005, p. 6).



As the reader can see, the Steps 1-5 match with objectives of the RAAIS Lite Workshops and RAAIS Complete. RAAIS Complete will focus on the validation of the Entry Points through more in-depth analysis of root causes to the constraints. That provides a solid starting point for developing the Theory of Change (Steps 6-8) and the development of indicators to measure progress against the Theory of Change (Step 9). This provides a basis for RAAIS M&E&L (Figure 8). While R4D interventions are being implemented, it is likely that new information will enter the process (e.g. based on trade-off and synergy analyses). This may re-focus the research questions or R4D interventions, and therefore, modify the Theory of Change.

Development of the Theory of Change, Impact Pathway and Action Plans together with stakeholders

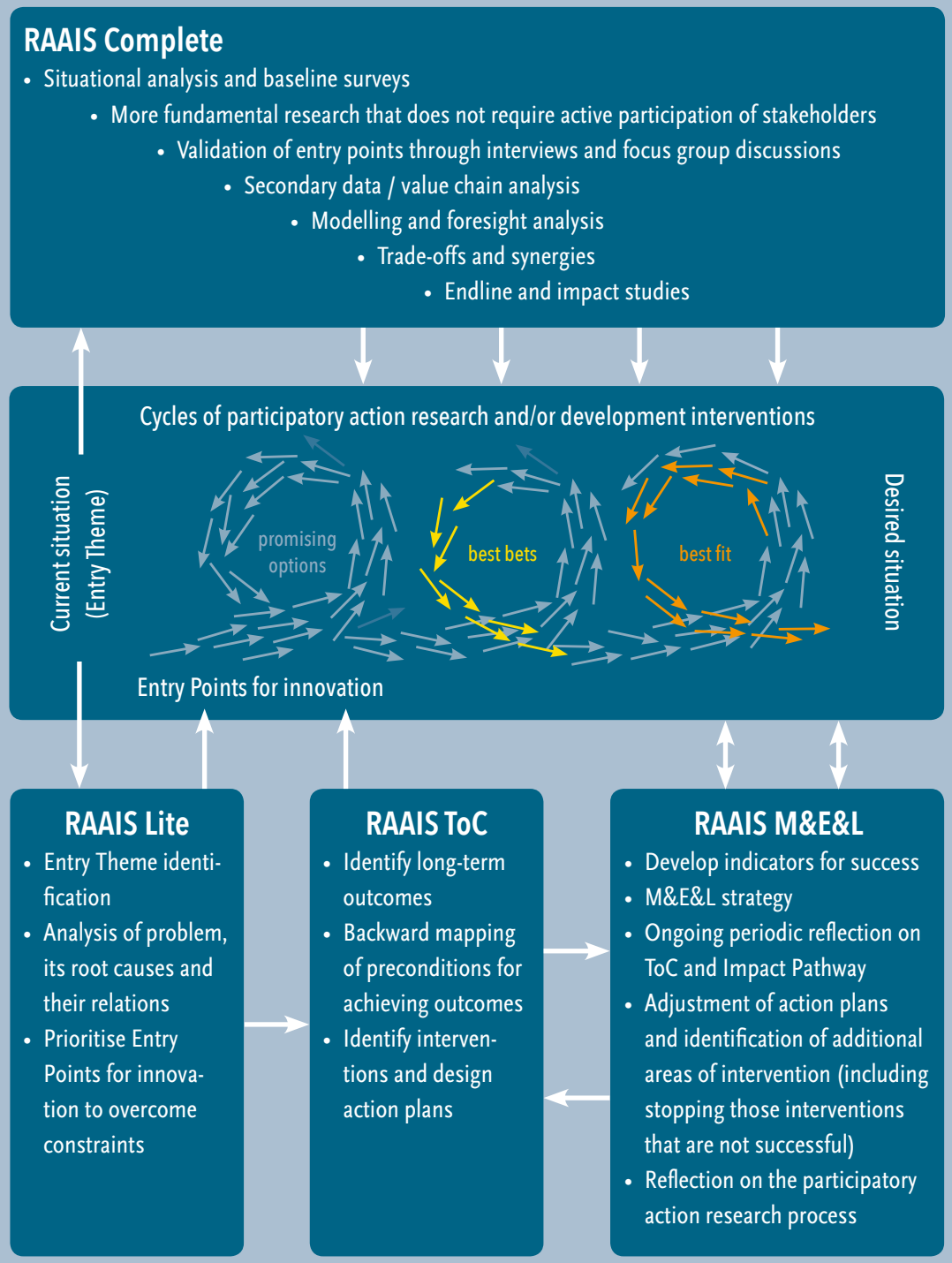
In a context where collaboration and participatory action research is needed to overcome complex agricultural problems, a Theory of Change can benefit from being developed by different groups of stakeholders. It is not just a matter of 'anything goes' but the Theory of Change should be based on a combination of scientific theories about how change happens in society, and stakeholder insights of how to overcome the most important technological and institutional barriers towards achieving development impact.

Developing a Theory of Change can result in a so-called Impact Pathway. An Impact Pathway is a sequence of activities, outputs and outcomes towards achieving a defined development impact. An Impact Pathway provides a base for monitoring and evaluation and describes in detail the output (i.e. the direct and tangible results) to outcome (e.g. changes in awareness, skills or understanding resulting from use of research results) and impact relations, with verifiable and preferably measurable indicators for output and outcome (NWO, 2016).

Can change be predicted in complex adaptive systems?

As mentioned earlier, one of the key characteristics of complex agricultural problems is their unpredictable nature. This concerns both how problems develop over time, as well as how innovations will lead to the desirable solutions or impacts. It is therefore important to acknowledge and appreciate that change processes in practice will always differ from the anticipated change process described in the Theory of Change.

FIGURE 8 Interactions between the different RAAIS Modules.



Theories of change can support thinking about where to start, with whom to work, and it can guide the choice of interventions. Subsequently the Theory of Change needs a certain level of testing and grounding in practice. This will occur through the interventions that will show us whether the Theory of Change is actually unfolding as was assumed, and whether the desirable outputs and outcomes are being achieved. Based on this, stakeholders can start thinking about which outcomes and processes to support and amplify, and which outcomes and processes to dampen or stop. The key focus of M&E&L (Section 4.7) should be to capture desired and undesired outcomes, which provides a basis for continuous revision of the Theory of Change.

Recommended reading:
Anderson, A.A., 2005. *The Community Builder's Approach to Theory of Change: A Practical Guide to Theory Development*. The Aspen Institute, available at:
www.seachangecop.org/node/215

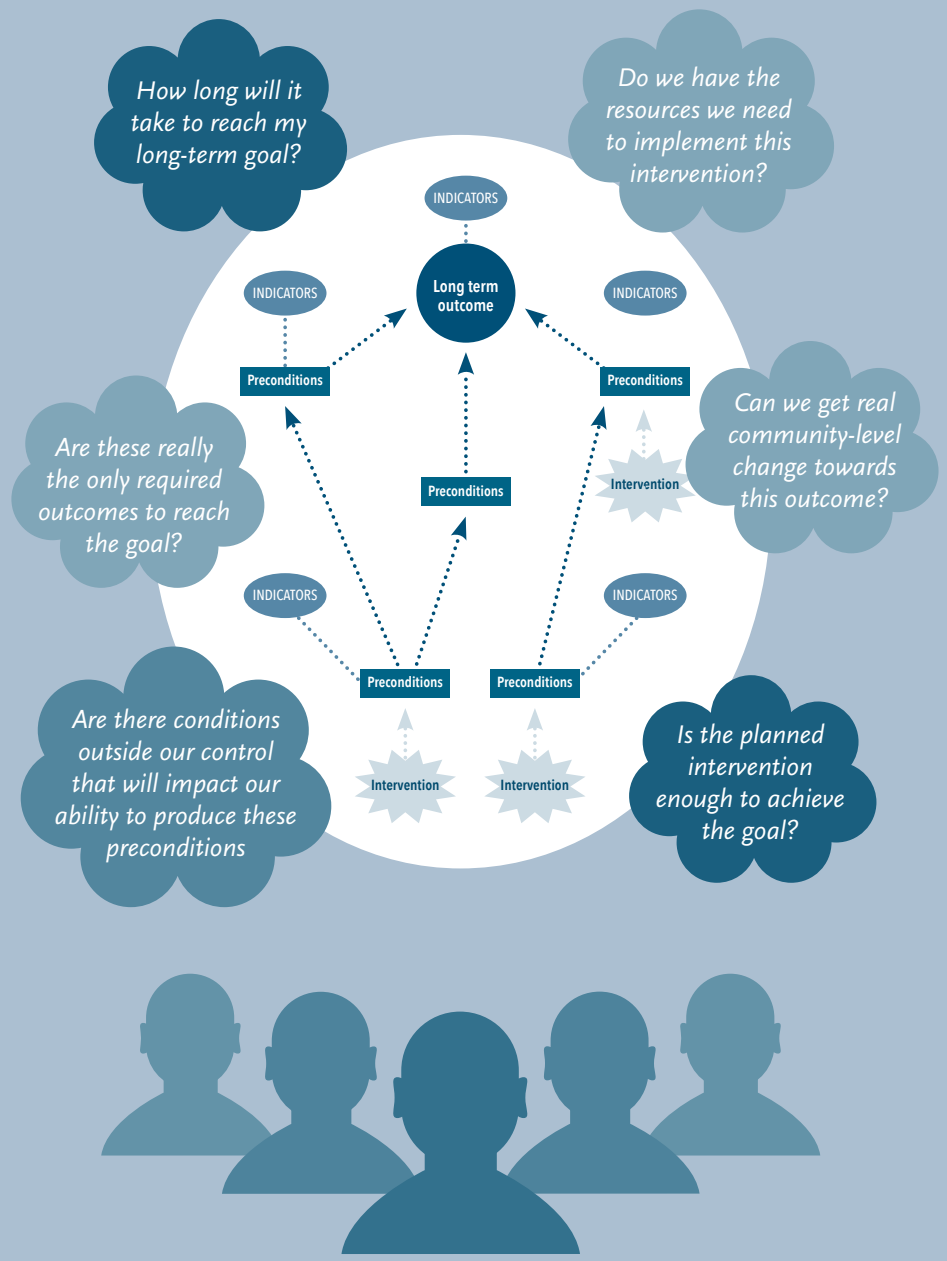
More information at:
www.nwo.nl/en/about-nwo/organisation/nwo-domains/wotro/Impact+toolkit/Impact+toolkit+-+tools+and+methods

4.7 RAAIS Monitoring, Evaluation and Learning (M&E&L)

Monitoring, Evaluation and Learning in multi-stakeholder processes should be ongoing, and not be limited to the reflection meetings that we propose. However, it is good to have fixed moments at the end of a R4D intervention cycle (e.g. at the end of a planting season) to bring stakeholders together and take some time to reflect on the progress that has been made towards achieving the commonly defined objectives. The assumption is that ongoing reflection increases the likelihood that these objectives are being met, while acknowledging that the pathway is difficult to predict and requires flexibility. Having stakeholder meetings form a good moment to consciously reflect on questions such as:

- What went successfully and as expected?
- What went differently?
- What are new constraints that emerged?
- How does that affect the aspired outcome and impact of our project?
- What additional activities do we need to implement to overcome such constraints?

FIGURE 9 Participatory development of a Theory of Change (Anderson, 2005, p. 8).



- Do we need additional expertise and involvement of other stakeholder groups for that?
- Can we avoid such problems during subsequent phases of project implementation, and how?

Under Humidtropics, yearly reflection meetings were organised during which participants were asked to visualize certain elements of their functioning, like levels of satisfaction and perceived benefits and whether interventions targeted the Top 5 challenges of their stakeholder groups identified during the RAAIS Lite workshop. Subsequently, these formed the starting point for a critical discussion on past experiences and achievements; both regarding the collaboration process, as well as regarding the actually innovations being tested. In addition, this discussion informed the planning and adjusting of activities for the next year. In this way, the reflection meetings facilitated the key elements of the participatory action research cycle (act - observe - reflect - revise).

More generally, the stakeholder reflection meetings serve two main purposes:

1. Involved stakeholders and partners sit down and reflect on their past activities and achievements against the Theory of Change.
2. Based on their assessment, stakeholders can decide to elaborate certain activities that seem promising, drop others that do not seem to work and decide to embark on new activities to fill R4D gaps.

Especially the second purpose sounds easier than it actually is. In research-oriented projects, planning of work and budget often occurs on an annual basis, and diverging from such plans may have implication for the project or researcher. Also for data collection purposes, field trial data are often only publishable in peer-reviewed scientific journals after 2 or 3 seasons of data collection, which may make a decision to stop a specific experiment after 2 seasons difficult. In a similar fashion, development donors often require detailed logframes when granting development funds. It are these and other incentive mechanisms that sometimes reduce flexibility and adaptive capacity in R4D projects, even when it is clear that the tested innovation will not result in the desired development outcomes or impact.

To support RAAIS M&E&L under Humidtropics we have developed a reflection workshop protocol (www.wageningenur.nl/raais-toolkit).

5

Analytical framework

Similar to the methodological framework, RAAIS combines different analysis techniques. For the RAAIS Lite workshops different analytical dimensions have been defined, related to the workshop sessions (Table 6).

Different analysis steps can be followed and diverse analysis approaches and tools can be used. Quantitative workshop data can be analysed for constraints and opportunities across countries, study sites and stakeholder groups. Microsoft Excel®, SPSS, Gephi and other similar software packages can support (descriptive) statistical analysis guided by the analytical categories in Table 7.

Qualitative interview data can be transcribed and analysed electronically in Adobe Acrobat™ using keywords (e.g. climate change, extension, policy). The analysis can focus on identifying root causes and explanations of constraints identified in the workshops. Furthermore, the analysis of these data can provide insight into sensitive political issues that are more freely discussed in individual interviews than in the multi-stakeholder workshop setting. Secondary data can be analysed for their relevance to the problem under review, the innovation capacity in the agrifood system or the functioning of the agricultural innovation system more generally. Examples of the potential analyses are visualised in Figures 10, 11 and 12a and 12b.

TABLE 6 Example of analysis categories

Categories	Subcategories
1. Stakeholder groups	Farmers; civil society/ NGO; private sector; government; research and training
2. Constraint dimensions	Biophysical (e.g. soil types, water availability), technological (e.g. inputs and management techniques), social-cultural (e.g. cropping practices, beliefs), economic (e.g. human and finacial resources, off-farm income), institutional (e.g. policies and rules) and political (e.g. power dynamics)
3. Constraint causes	Infrastructure and assets (e.g. physical and knowledge); institutions (e.g. policies and regulatory frameworks); interaction and collaboration (e.g. between stakeholders); capabilities and resources (e.g. entrepreneurship, human and financial resources)
4. Levels	International; national; regional; provincial; district; ward; village; farm[b]
5. Time	Very short (<1 year), short (1-2 years), medium (2-4 years), long (4-6 years) or very long (>6 years)
6. Type of innovation	Technological and institutional innovation

[b] Based on administrative system across the three countries, descriptions of levels were modified.

TABLE 7 Overview of four analysis steps, analysis approach and analysis methods and tools.

Analysis step	Analysis approach	Analysis methods and tools
1. Analysis within the analysis categories	Descriptive statistics for categories 1-6	Calculation of means and relative frequencies using SPSS
2. Analysis across the analysis categories	Descriptive statistics for relations across categories 1-6	Calculation of cross frequencies and correlations between two variables using SPSS
3. Constraint linkages analysis	Constraint network mapping	Network mapping of constraints using Fruchterman Reingold algorithm and analysis using analysis sub-categories as attribute values in Gephi v.0.9.1. as well as mean degree of constraint network.
4. Analysis of entry points for innovation	Participatory prioritisation of constraints and opportunities for innovation by stakeholders	Qualitative analysis of similarities and differences in entry points for technological and institutional innovation. Descriptive statistics of groups of important constraints, using relative frequency of sub categories in a category

FIGURE 10 An example of spider web analysis of analytical dimension A (types of institutional and political constraints) across different study sites in Tanzania.

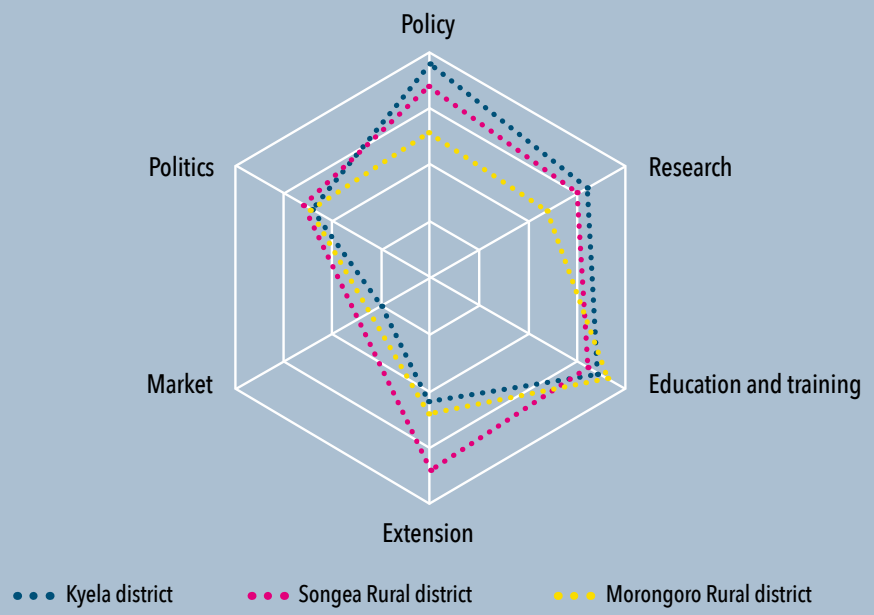


FIGURE 11 Analysis of interview data on how structural conditions provided by the agricultural innovation system that can enable or constrain innovations (see also Table 2).

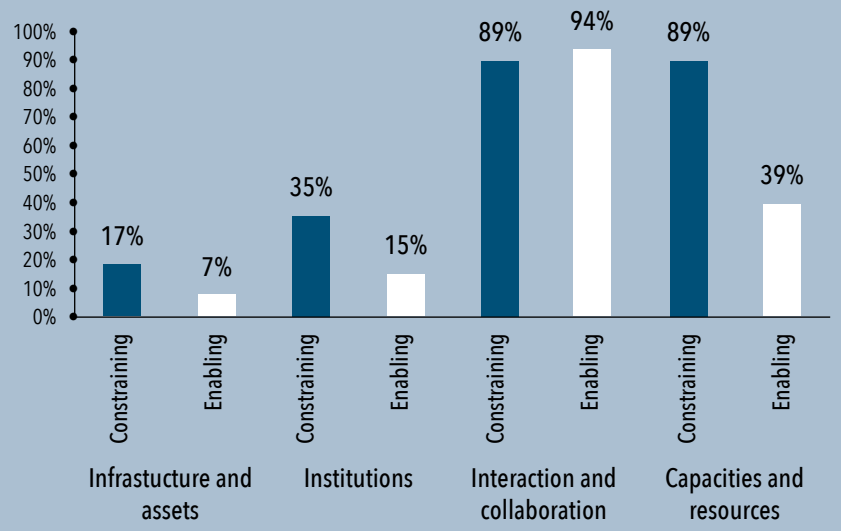


FIGURE 12A All constraints network indicating different study sites, clusters and stakeholder groups. Nod sizes indicate the relative connectivity of the constraint.

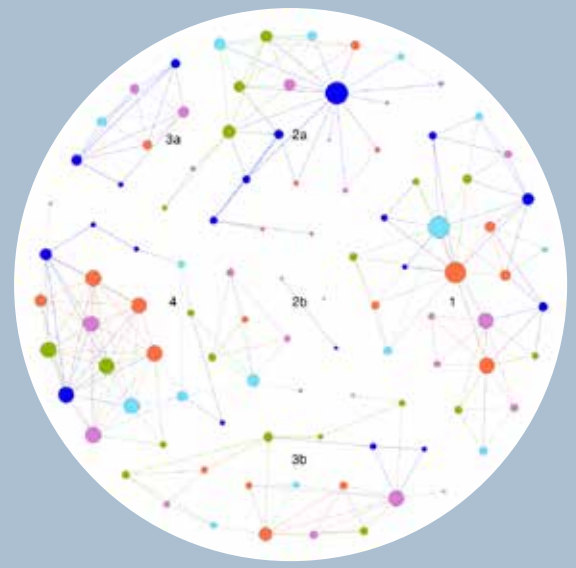
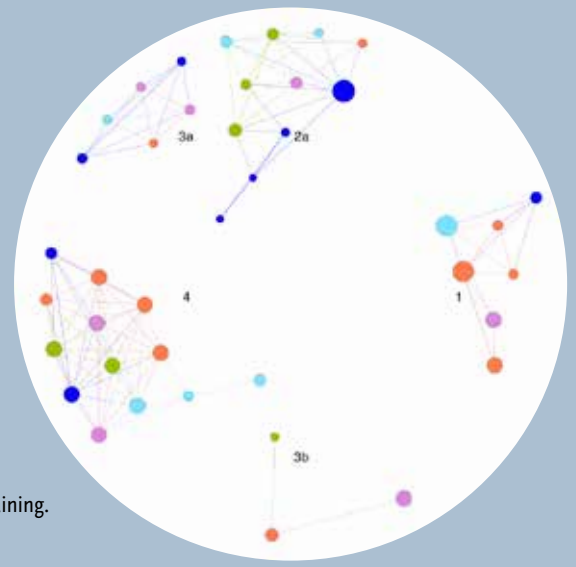


FIGURE 12B Important constraints network indicating different study sites, clusters and stakeholder groups. Nod sizes indicate the relative connectivity of the constraint.

Numbers
1. Gitega, Burundi
2. Kadahenda, Rwanda
3 . Kayonza, Rwanda
4. Ngweshe, DRC.

Colours
Purple: Farmers
Green: Civil society/ NGO
Light blue: Private sector
Orange: Government
Dark blue: Research and training.



Source: Schut et al., 2016. Agricultural Systems 145 (165-176).

6

RAAIS materials

6.1 RAAIS workshop materials and facilitation protocol

For a detailed discussion of workshop size, composition and structure, please see Section 4.2. The workshop components and the content of each session are set out below.

Length
One and a half day.

Point of departure
An Entry Theme should be formulated before the start of the workshop.

Language and facilitation
The workshops should be held in a language spoken by all participants and be facilitated by someone who is familiar with the local cultural norms, has affinity with the problem and understands the realities of the different stakeholder groups.

Note-taking
A guide for detailed note-taking has been developed (see Section 6.2).

Stakeholder representation
- Five farmer representatives (e.g. commodity-based farmer organisation based on Entry Theme, smallholder farmers, agro-industrial producers)
- Five government representatives (e.g. national level agricultural extension policy officer, crop- or livestock-related policy officer, extension liaison officer)
- Five representatives of the private sector (e.g. agri-input dealer, credit provider, processor, private extension company, seed company)
- Five representatives of research and training institutes (e.g. CGIAR centre, national agricultural research system (NARS), agricultural university, agricultural training institute)
- Five representatives of NGO/civil society (e.g. (rural) (inter) national development organisation)

Depending on the specific Entry Theme, other stakeholder groups can be included. Participants should be able to read and write. A representative gender and age sample should be taken into account.

Workshop materials
- Laptop and beamer
- Extension cable
- Pre-printed posters
- Printer + extra cartridge + printing paper
- Tape
- 30 Marker pens
- 30 booklets + 30 pens to take notes
- 6 x 50 coloured cards per workshop (yellow, green, blue, purple and orange)
- Camera
- Puncher and stapler + staples
- Name tags (sticky paper)
- Registration list for participants

Administrative issues preceding the workshop
- Invitations to be sent at least two weeks before the workshop
- List of confirmed participants (ensure equal representation of five stakeholder groups)
- Agreement on participant allowances
- Organise tea-break and lunch
- Workshop venue with one big room, sufficient tables, chairs and so on

PHOTO 11 **Group photo taken during the RAAIS workshop in Kumasi, Ghana in April 2015.** PHOTO: IITA GHANA

SESSION 1

Opening and participant introduction

Time	15 minutes
Activity	To become familiar with workshop objectives, program, get to know one another (see Photo 11).
Objectives	Briefly introduce project/program and its objectives. Discuss workshop agenda and objectives. Facilitate a round during which participants introduce themselves. Introduction of Entry Theme by workshop facilitator. Introduction should be kept general not to bias participants.
Role of facilitator	Into what group do you fit best? Participants are asked to raise their hand. Participants are given five coloured cards. Colour depends on the stakeholder group: • Farmer/producer: yellow cards • Civil society/NGO/farmers' association/development projects: green cards • Private sector (agri-shops/miller/trader/processor: blue cards • Government representative (extensionist, policymaker, plant health, extension liaison office): purple cards • Research and training institutes (NARS, universities, international research): orange cards
Materials needed	• Name tags • Marker pens • List of participants • 30 booklets to write notes + 30 pens • Printed workshop programme • Coloured cards (5 cards per participant) • Poster with overview of group colours
Potential challenges	Delay in the start of the workshop.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 150).

SESSION 2

Individual brainstorming about constraints and challenges

PHOTO 12 RAAIS workshop participants in Benin identifying their individual constraints and challenges relating to the Entry Theme of the workshop (parasitic weeds in rice). PHOTO: M. SCHUT

Time	15 minutes
Activity	Individual brainstorming by participants. Each individual participant writes on their coloured cards the five main challenges and constraints relating to the Entry Theme. Challenges and constraints should relate as much as possible to their direct activities on the specific Entry Theme, but more general challenges and constraints can also be included (relating to production, harvest, storage, trade, marketing, policy, research, training, or more general and so on). On the back of the coloured cards, participants write their gender (male/female) and age. The session is performed individually to avoid group pressure in defining challenges and constraints (see Photo 12).
Objectives	To identify main constraints and challenges as experienced by individual stakeholders.
Role of facilitator	Explain the session, walk around and assist participants who have questions or need support. Facilitator urges participants to identify the five main Entry Theme-related challenges and constraints that they face in their work. These can be specific, or more general. Ensure that participants write gender and age on the back of each card.
Materials needed	• 5 coloured cards per participant. Each participant group uses a different colour. • 30 marker pens (one for each participant)
Potential challenges	• Participants who cannot read or write (selection procedure should try to ensure against this). • Participants need support in formulating constraints and challenges. • Participants forget to write gender and age group on back of each of the cards.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 150).

PHOTO 13 RAAIS workshop participants representing government officials in Kazakhstan debate about their stakeholder group Top 5 constraints and challenges.
PHOTO: M. SCHUT

SESSION 3

Developing a Top 5 of constraints and challenges in homogeneous stakeholder groups

Time	45 minutes
Activity	Participants sit together in homogeneous groups (so farmer representatives together, government representatives together and so on) and explore similarities and differences between constraints identified by members of the stakeholder group (see Photo 13). Next, they rank the identified challenges and constraints from major constraints to minor constraints. Each group discusses and reaches consensus on the Top 5 constraints and challenges. If necessary, new cards can be distributed if participants want to rephrase constraints and challenges. The cards are numbered 1 to 5 based on their position in the Top 5. Workshop facilitator collects the cards that did not make the Top 5.
Objectives	To identify and rank main constraints and challenges as experienced by each stakeholder group.
Role of facilitator	Explain the session, walk around and assist stakeholder groups who have questions or need support. The facilitator urges participants to write clearly, as these cards will be used throughout the workshop. Cards will be put on poster with tape to allow for presentation. Photos will be taken of each poster.
Materials needed	• Prepared posters for each of the stakeholder groups with numbers 1-2-3-4-5 (see session materials) • Marker pens • Tape • Camera
Potential challenges	Only one or no representative of stakeholder group: if there is only one representative of a stakeholder group, his/her Top 5 are used.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 151). Video Clip: www.youtube.com/watch?v=QJtN1OFHBjg

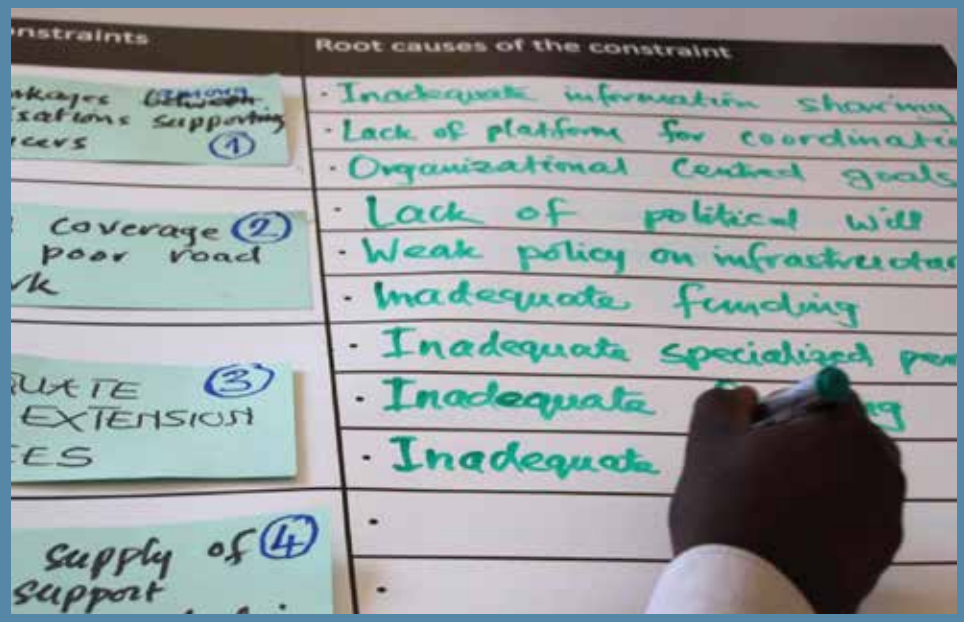


PHOTO 14 Private sector participant from Zambia identifying root causes for intensification of soybean/ groundnut systems in Zambia. PHOTO: M. SCHUT

SESSION 4

Identifying root causes of constraints and challenges

Time	45 minutes
Activity	Participants sit together in homogeneous groups (so farmer representatives together, government representatives together and so on) and identify a maximum of three root causes for each of the prioritised five constraints (Photo 14).
Objectives	To identify root causes of the identified constraints and challenges, stimulate discussions within the stakeholder group on what is causing the constraints.
Role of facilitator	Explain the session, walk around and assist stakeholder groups who have questions or need support. The facilitator urges participants to write clearly, as this outputs needs to be documented
Materials needed	• Prepared posters for each of the stakeholder groups sufficient space to identify up to a maximum of 3 root causes for each of the 5 prioritised constraints (see session materials) • Marker pens • Camera
Potential challenges	Stakeholder groups remain very generic in the type of root causes they identify (e.g. poorly functioning policies). The facilitator urges them to better specify what elements of policies design, implementation or enforcement are causing the constraints.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 151).

PHOTO 15 **Farmer participants in the GIZ-IITA banana project in Burundi identify the constraints and challenges for their Top 5.** PHOTO: M. SCHUT

SESSION 5

Identifying the type of constraints and challenges

Time	45 minutes
Activity	Stakeholders have to categorise the constraints and challenges according to different dimensions of complex agricultural problems (see Photo 15): • Biophysical (e.g. climate change, soil fertility) • Technological (e.g. machinery, improved varieties) • Socio-cultural (e.g. norms, values, perceptions) • Economic (e.g. market, access to credit) • Institutional (e.g. rules, regulations, policy, land tenure) • Political (e.g. stakeholder collaboration, politics) Two important issues: • More than one dimension may be selected • Participants circle the dimension they think is most appropriate to the constraint The different stakeholder groups can discuss and at the same time put their Top 5 cards on the pre-printed poster. When this is finalised, each group gives a short plenary presentation (max 5 minutes per group).
Objectives	To categorise the constraints and challenges according to different dimensions of complex agricultural problems.
Role of facilitator	The facilitator supports, but also challenges, the participants when they position their cards on the poster (see session materials). The facilitator supports the presentation by each of the groups, keeps time and allows different participants to pose questions.
Materials needed	• Pre-printed poster of specific dimensions (see session materials) • Cards, Tape, Marker pens, Camera
Potential challenges	• Participants find it difficult to categorise the cards: in that case, other workshop participants and the facilitator support the group during the plenary. • Stakeholder groups have not selected the most appropriate dimension.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 152).

SESSION 6

Categorising constraints and challenges along structural conditions that can enable or constrain innovation

PHOTO 16 RAAIS workshop participants in Niger categorising their constraints and challenges across the four categories of structural conditions that can enable or constrain innovation. PHOTO: L. C. HINNOU

Time	45 minutes
Activity	Stakeholders categorise their Top 5 constraints and challenges according to structural conditions that can enable or constrain innovation (see Photo 16): • Infrastructure and assets • Institutions • Interaction and collaboration • Capabilities and resources • Other
Objectives	To categorise stakeholders' constraints and challenges along categories of structural conditions that can enable or constrain innovation.
Role of facilitator	Explain the session, which is about understanding what is causing the constraints and challenges, encourage stakeholders to think critically when categorising their constraints and challenges, and facilitate discussion between different stakeholder groups.
Materials needed	• Cards • Pre-printed poster (see session materials) • Marker pens • Camera
Potential challenges	• Some constraints and challenges may relate to more than one category: participants should position the card in the category that forms the main cause of the constraint or challenge. • Some constraints/challenges may be difficult to categorise: these can be classified as other.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 153). Video clip: www.youtube.com/watch?v=Cr7qnTdN-CQ

PHOTO 17 RAAIS workshop participants in Tanzania dividing their constraints across different administrative levels. PHOTO: M. SCHUT

SESSION 7

Categorising constraints and challenges across different (administrative) levels

Time	45 minutes
Activity	Categorise constraints and challenges across different administrative levels (see Photo 17). Each group separately puts its Top 5 cards on the pre-printed poster. The session is followed by a short discussion on multi-level dynamics. Leading questions for the discussion can be: • How are dynamics at one level influenced by dynamics at other levels? • Are these dynamics constraining or enabling? Before the workshop, the poster should be adapted to the administrative levels of the country where the workshop is organised.
Objectives	To get insight into the multi-level dynamics of stakeholder constraints and challenges.
Role of facilitator	Support the stakeholder groups in positioning the constraints and challenges on the poster, encourage stakeholders to think critically when categorising their constraints and challenges, and ensure that different stakeholder groups provide equal input to the discussion.
Materials needed	• Pre-printed poster with levels (see session materials) • Cards and tape • Different coloured marker pens
Potential challenges	Constraints or challenges are applicable at more than one level: position the card at most relevant level as perceived by the stakeholder group.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 155). Video clip: www.youtube.com/watch?v=N3nrrUsMyvM

PHOTO 18 RAAIS workshop participants in Xishuangbanna, China identifying relations between constraints and challenges. PHOTO: M. SCHUT

SESSION 8

Identifying relationships between constraints and challenges, and identifying key constraints

Time	45 minutes
Activity	Building on Session 7, stakeholders jointly identify relations between constraints and challenges (see Photo 18). What is the relation between different constraints and challenges, what feedback mechanisms are at play? Arrows are drawn between the cards and can be one or two way. Once the participants have finished identifying relations between the constraints and challenges, they select the three constraints that are central (i.e. that are connected to many other constraints or challenges).
Objectives	To identify relations between constraints and challenges and 'central' constraints.
Role of facilitator	Coordinate and facilitate the discussion between stakeholders, encourage stakeholders to think critically when identifying relations between constraints and challenges, make sure that different stakeholder groups provide equal input to the discussion. If possible, indicate direction between different challenges and constraints by using arrows and identify three constraints with most arrows.
Materials needed	• Pre-printed poster with levels (see session materials) • Marker pens • Camera • Guide for note-taking
Potential challenges	Participants are not consistent in the use of arrows.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 155). Video Clip: www.youtube.com/watch?v=OWPyNdNIf30

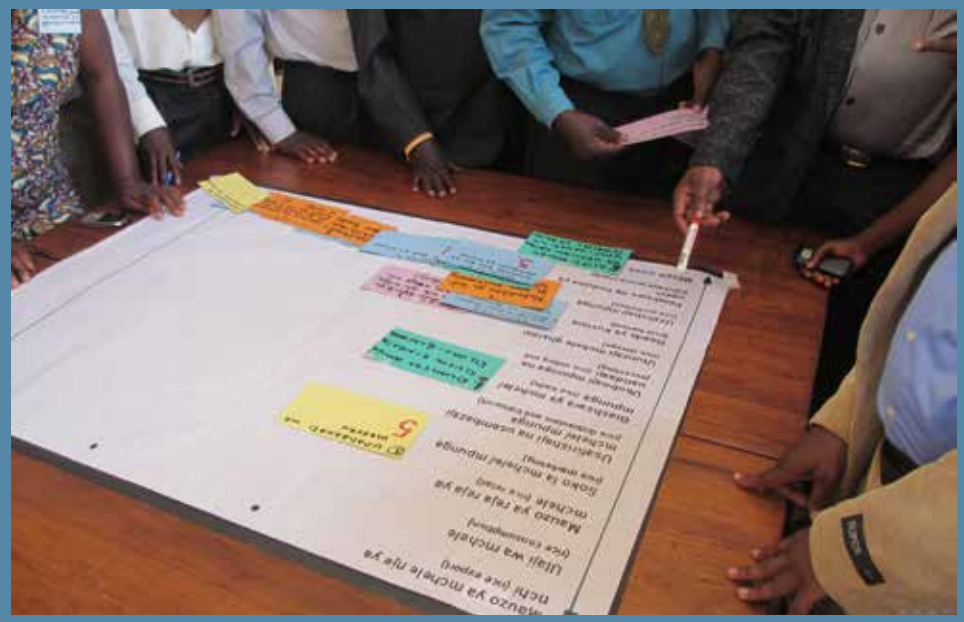


PHOTO 19 RAAIS workshop participants in Tanzania categorising their constraints and challenges across different segments of the value chain. PHOTO: M. SCHUT

SESSION 9

Categorising constraints and challenges along segments of the value chain

Time	45 minutes
Activity	Stakeholder groups position their Top 5 constraints and challenges along the segments of the (standardised) value chain (see Photo 19). The exercise is followed by a short discussion (max 20 minutes).
Objectives	To categorise constraints along segments of the value chain.
Role of facilitator	Support each of the groups to position their Top 5 cards along the value chain, encourage stakeholders to think critically when categorising their constraints and challenges, make sure that the different stakeholder groups provide equal input to the discussion.
Materials needed	• Pre-printed poster (see session materials) • Cards • Tape • Marker pens • Camera
Potential challenges	• Certain constraints cannot be categorised along the value chain: these constraints and challenges are caused by non-market constraints and challenges and are to be noted separately or in the category. • Other constraints/challenges will not specifically focus on one segment of the supply chain, but on multiple: this is to be indicated with arrows.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 156).

PHOTO 20 **Workshop participants in Benin subdivide between Entry Theme specific or more generic constraints in the agrifood system and in the agricultural innovation system.** PHOTO: M. SCHUT

SESSION 10

Categorising constraints that are Entry Theme specific or more generic in the agrifood system and in the agricultural innovation system

Time	20 minutes
Activity	Stakeholder groups (see Photo 20) categorise constraints and challenges along a gradient of: • Constraints and challenges that apply directly to the Entry Theme of the workshop. For example 'diseases in banana' or 'lack of improved fodder' when the Entry Theme is 'banana-livestock integration'. • Constraints and challenges that relate to more generic problems in the agrifood system (constraints and challenges that go beyond the specific Entry Theme). For example, 'limited agricultural extension' or 'agricultural inputs not available in a timely manner' or 'weed problems' have a broader impact than just on 'banana-livestock integration'. • Constraints and challenges that go beyond the agricultural system. For example, 'poor road infrastructure in rural areas' or 'illiteracy' have a broader impact than just on the agricultural sector.
Objectives	To distinguish between constraints that: • Are specifically related to the Entry Theme • Are more broadly related to innovation capacity in the agrifood system • Are related to the agricultural innovation system
Role of facilitator	Facilitate and animate discussion between stakeholders, encourage stakeholders to think critically when categorising their constraints and challenges, make sure that the different stakeholder groups provide equal input to the discussion.
Materials needed	• Pre-printed sheet (see session materials); Coloured cards; Camera
Potential challenges	Participants feel that constraints relate to two or three categories: need to position constraints as specifically as possible.
Session materials	Download: www.wageningenur.nl/raais-toolkit(see also page 157).

PHOTO 21 RAAIS workshop participants in Tanzania subdividing between constraints and challenges they can solve themselves versus problems that can only be solved with or by other stakeholder groups. PHOTO: M. SCHUT

SESSION 11A

Subdividing between constraints that stakeholder groups can solve themselves versus problems solved with or by other stakeholder groups

Time	20 minutes
Activity	Categorising the constraints and challenges in two categories (see Photo 21): • Problems that the participants can solve themselves. • Problems that can only be solved in collaboration with others.
Objectives	• To explore what constraints and challenges can be solved individually, and what problems can – according to the participants – only be solved in collaboration with others • To create awareness that the majority of constraints and challenges can only be addressed in collaboration with others, thereby stressing the need for a systems approach.
Role of facilitator	Facilitate and animate discussion between stakeholders, encourage stakeholders to think critically when subdividing their constraints and challenges.
Materials needed	• Pre-printed sheet (see session materials) • Coloured cards • Camera
Potential challenges	Exercise takes too much time.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 158).

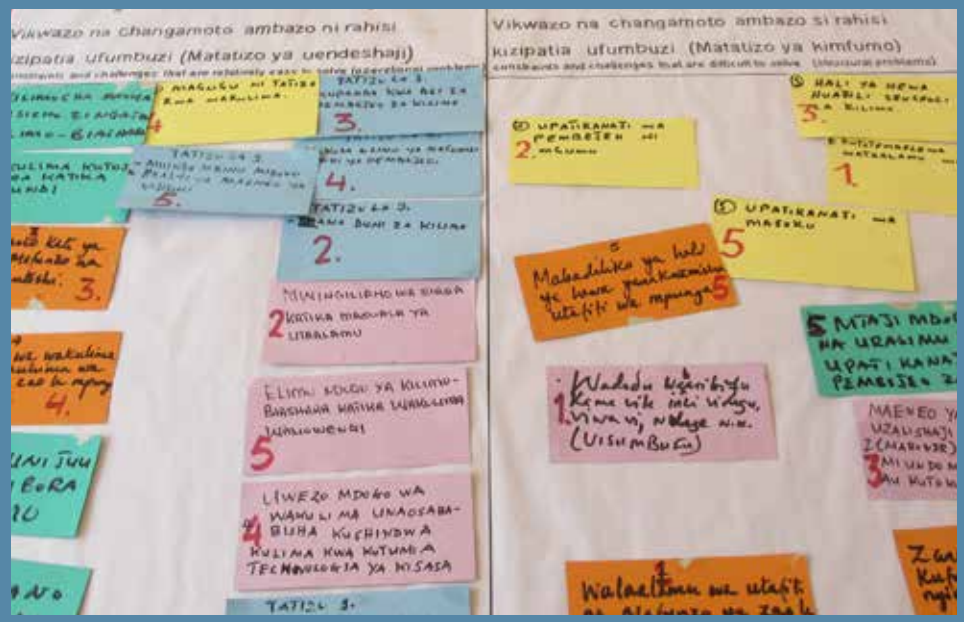


PHOTO 22 RAAIS workshop participants in Tanzania subdivide between constraints and challenges that are easy or difficult to solve. PHOTO: M. SCHUT

SESSION 11B

Subdividing between constraints and challenges that are easy/difficult to solve

Time	25 minutes
Activity	Categorising the constraints and challenges in two categories (see Photo 22): • Constraints and challenges that are relatively easy to solve (operational problems). • Constraints and challenges that are difficult to solve (structural problems).
Objectives	To subdivide between operational and more structural constraints and challenges.
Role of facilitator	Facilitate and animate discussion between stakeholders. Here, it is important to subdivide between symptoms and root causes, the why question is very important; what are the underlying issues?
Materials needed	• Pre-printed poster • Coloured cards • Guide for note-taking (see Section 6.2) • Camera
Potential challenges	• Difference between this and previous exercise is unclear for participants: facilitator explains that the previous exercise was about whether challenges and constraints can be solved by the individual stakeholder group or in collaboration with others. • The concept of subdividing between problems that are difficult or easy to solve is quite tricky. What is difficult and what is easy to solve is prone to stakeholder interpretation. Problems that are easy to solve will generally be solved in practice one would say.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 159).

SESSION 12A

Assessing the costs of the interventions to overcome the constraints and challenges

PHOTO 23 **RAAIS workshop participants in Zambia assess the feasibility of addressing their constraints and challenges.** PHOTO: M. SCHUT

Time	15 minutes
Activity	Participants work in homogeneous groups and rank the constraints according to the costliness of interventions needed to overcome them (Photo 23): • Very low costs • Low costs • Medium costs • High costs • Very high costs
Objectives	• To get an idea about the costs of the interventions required to overcome the constraints • To assess whether it is possible to address the constraints within the financial scope of the project
Role of facilitator	Facilitate and animate discussion within the groups, ensure that stakeholder groups think critically about how they rank the costs of overcoming the group's Top 5 constraints and challenges.
Materials needed	• Pre-printed poster • Coloured cards with the Top 5 stakeholder constraints • Guide for note-taking (see Section 6.2) • Camera
Potential challenges	Participants underestimate the costs of interventions to overcome complex problems (e.g. increasing number of extension officers): facilitator should explain that it is about the time that addressing the constraints and challenges will take.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 160).

SESSION 12B

Assessing the required time to address the stakeholder constraints and challenges

Time	15 minutes
Activity	Participants work in homogeneous groups and indicate how much time addressing the constraint would require (Photo 23): • Very short (<1 year) • Short (1-2 years) • Medium (2–4 years) • Long (4-6 years) • Very long (>6 years)
Objectives	• To subdivide between constraints and challenges that can be addressed within a relatively short term and those that require more medium- and long-term efforts • To assess whether it is possible to address the constraints within the timeframe of the project
Role of facilitator	Facilitate and animate discussion within the groups, ensure that stakeholder groups think critically about how much time overcoming the group's Top 5 constraints and challenges would take.
Materials needed	• Pre-printed poster • Coloured cards with the Top 5 stakeholder constraints • Guide for note-taking (see Section 6.2) • Camera
Potential challenges	Participants feel that all constraints and challenges require short-term action: facilitator should explain that it is about the time that addressing the constraints and challenges will take.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 160).

SESSION 12C

Assessing the availability of technological or institutional innovations to address the constraint?

Time	15 minutes
Activity	Participants work in homogeneous groups and assess the availability of innovations to overcome their constraints (Photo 23): • Very low • Low • Medium • High • Very high
Objectives	• To assess whether technologies or institutional innovations are readily available, or whether these need to be developed and tested • To enhance discussion on the feasibility of addressing specific constraints within the scope of the project
Role of facilitator	Facilitate and animate discussion within the groups, ensure that stakeholder groups think critically about the available innovations required to overcome the group's Top 5 constraints and challenges.
Materials needed	• Pre-printed poster • Coloured cards with the Top 5 stakeholder constraints • Guide for note-taking (see Section 6.2) • Camera
Potential challenges	Participants underestimate or overestimate the availability of innovations to address their constraints and challenges. For some of the constraints, access to technologies may not apply (participants mark an 'X')
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 160).

PHOTO 24 **Participants during a RAAIS workshop in Kazakhstan on agricultural adaptation to climate change** PHOTO: M. SCHUT

SESSION 12D

Assessing the availability of knowledge and skills to address the constraint?

Time	15 minutes
Activity	Participants work in homogeneous groups and assess the availability of knowledge and skills to overcome their constraints (Photo 23): • Very low • Low • Medium • High • Very high
Objectives	• To assess whether competencies are readily available in the project, or whether these need to be developed • To enhance discussion on the feasibility of addressing specific constraints within the scope of the project
Role of facilitator	Facilitate and animate discussion within the groups, ensure that stakeholder groups think critically about the available competencies required to overcome the group's Top 5 constraints and challenges.
Materials needed	• Pre-printed poster • Coloured cards with the Top 5 stakeholder constraints • Guide for note-taking (see Section 6.2) • Camera
Potential challenges	Participants underestimate or overestimate the availability of knowledge and skills to address their constraints and challenges. For some of the constraints, access to knowledge or skills may not apply (participants mark an 'X')
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 160).

SESSION 13

Assessing the assumed impact of addressing the stakeholder constraints

PHOTO 25 Participants during RAAIS Zambia discuss the extent to which addressing the constraints will contribute to different project objectives (in this case One World No Hunger Zambia). PHOTO: M. SCHUT

Time	30 minutes
Activity	Stakeholder groups reflect on how addressing constraints would contribute to achieving project/program objectives and impact (Photo 25): • Very low • Low • Medium • High • Very high Constraints can be scored against different project/ program objectives.
Objectives	• To categorise constraints along project/program objectives • To stimulate participants to relate constraints to project/program objectives • To get input for selecting a mix of interventions that achieve the different project/ program objectives
Role of facilitator	Support each of the groups to positioning their Top 5 cards along the objectives, encourage stakeholders to think critically when scoring their constraints and challenges against the project/ program objectives.
Materials needed	• Pre-printed poster with project/program objective (see session materials) • Cards • Marker pens • Camera
Potential challenges	• Participants find it difficult to score constraints against project/program objectives • Participants are not critical in terms of assessing how solving constraints will contribute to overall project objectives • Participants are very creative/ unrealistic in thinking of ways how addressing the constraints will contribute to overall project objectives
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 161).

PHOTO 26 RAAIS workshop participants in China categorise the constraints and challenges along different types of innovations that are required to solve them .
PHOTO: M. SCHUT

SESSION 14

Identifying different types of (R4D) domains that can support addressing the constraints

Time	30 minutes
Activity	Subdivide the constraints and challenges under R4D categories (see Photo 26): • Technological innovation • Institutional innovation • Gender innovation • Nutrition innovation • Other types of innovation
Objectives	To subdivide constraints and challenges over the R4D intervention categories.
Role of facilitator	Facilitate and animate discussion between stakeholders. In this session, cards must be subdivided over the different categories. Each of the stakeholder groups positions their own cards under the five categories. This can be followed by a short discussion among the workshop participants.
Materials needed	• Pre-printed poster • Coloured cards • Guide for note-taking (see Section 6.2) • Camera
Potential challenges	Participants feel that constraints require more than one category: they should select the most appropriate category.
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 160-161). Video Clip: https://youtu.be/75kTC-GhAhA

PHOTO 27 **Female participants discuss and prioritise constraints and challenges during a RAAIS workshop in Ghana.** PHOTO: M. SCHUT

SESSION 15A

Prioritising constraints under different R4D domains by different gender groups

Time	45 minutes
Activity	Male and female groups (see Photo 27) separately prioritise the constraints under the different research categories: • Technological innovation • Institutional innovation • Gender innovation • Nutrition innovation • Other types of innovation
Objectives	To gain insight into men's and women's priorities of constraints under the different R4D categories.
Role of facilitator	For this exercise, two sets of cards are needed as men and women will be prioritising the constraints and challenges separately. During the coffee break or lunch, the facilitator writes a second set of coloured cards (same colours, same constraints, same numbering) so that the two sets of constraints are identical. He/she facilitates and animates discussion between stakeholders. In this session, cards must be subdivided over the categories. Stakeholders collectively prioritise the cards under the categories. This can be followed by a short discussion among the workshop participants.
Materials needed	• Pre-printed poster • Coloured cards (2 sets of cards) • Guide for note-taking (see Section 6.2) • Camera
Potential challenges	Disagreement between stakeholders: facilitator animates the discussion in order to reach consensus
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 162-163).

PHOTO 28 **RAAIS workshop participants in Rwanda prioritise constraints and challenges under the different R4D domains.** PHOTO: M. SCHUT

SESSION 15B

Prioritising the Top 3 constraints under different R4D domains by women and men together

Time	45 minutes
Activity	Prioritise the constraints under the different research categories: • Technological innovation • Institutional innovation • Gender innovation • Nutrition innovation • Other types of innovation (see Photo 28)
Objectives	To prioritise constraints and challenges over the four/five research categories.
Role of facilitator	Facilitate and animate discussion between stakeholders. In this session, cards must be subdivided over the categories. Stakeholders collectively prioritise the cards under the categories. This can be followed by a short discussion among the workshop participants. Facilitator ensures that men and women groups listen to each other, provide space for discussion and treat each other with respect.
Materials needed	• Pre-printed poster • Coloured cards • Guide for note-taking (see Section 6.2) • Camera
Potential challenges	• Disagreement between stakeholders: facilitator animates the discussion in order to reach consensus • Domination of one group over the other
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 164).

6.2 RAAIS workshop guide for note-taking

To facilitate note-taking during the RAAIS workshop, a detailed guide for note-taking was developed. The guide captures quantitative data as well as stakeholder debate and discussions (see Photo 29). It is advisable for a designated person (not the workshop facilitator and not a workshop participant) to take notes. Participant presentations and discussions (e.g. during Sessions 3 and 15) can be recorded using a voice recorder. The guide for note-taking can be downloaded here: www.wageningenur.nl/raais-toolkit
Depending on the specific Entry Theme, objective and scope of the RAAIS, workshop sessions can be added or left out.

6.3 RAAIS workshop analysis tools

For each of the RAAIS workshop sessions, an analysis template has been developed (see Figure 5). This Excel spreadsheet facilitates basic quantitative analysis of the workshop results for each of the sessions. Results can be fed back to the workshop participants for validation and discussion. The Excel template spreadsheet can be downloaded here: www.wageningenur.nl/raais-toolkit

FIGURE 13 Screen shot of RAAIS workshop analysis tool.

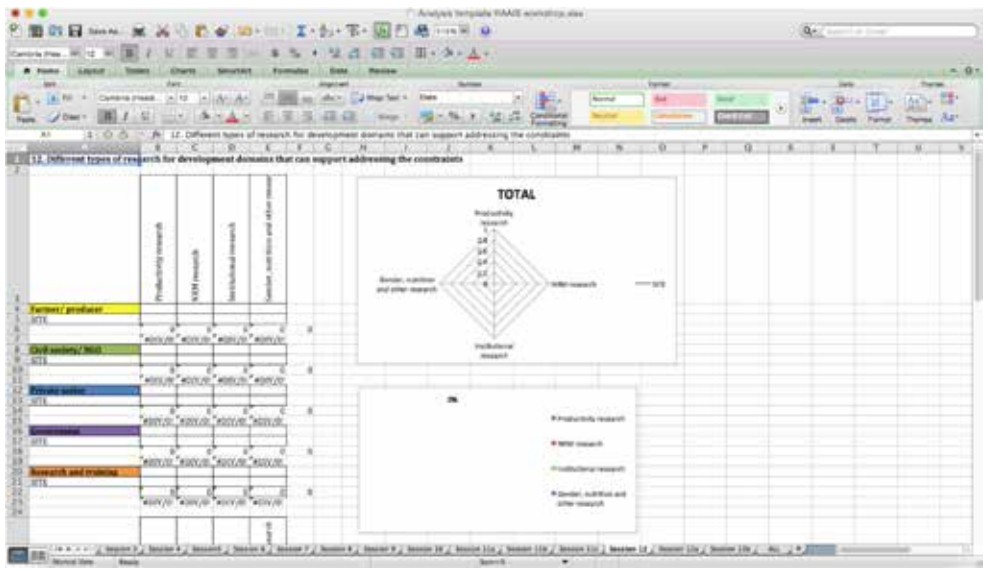
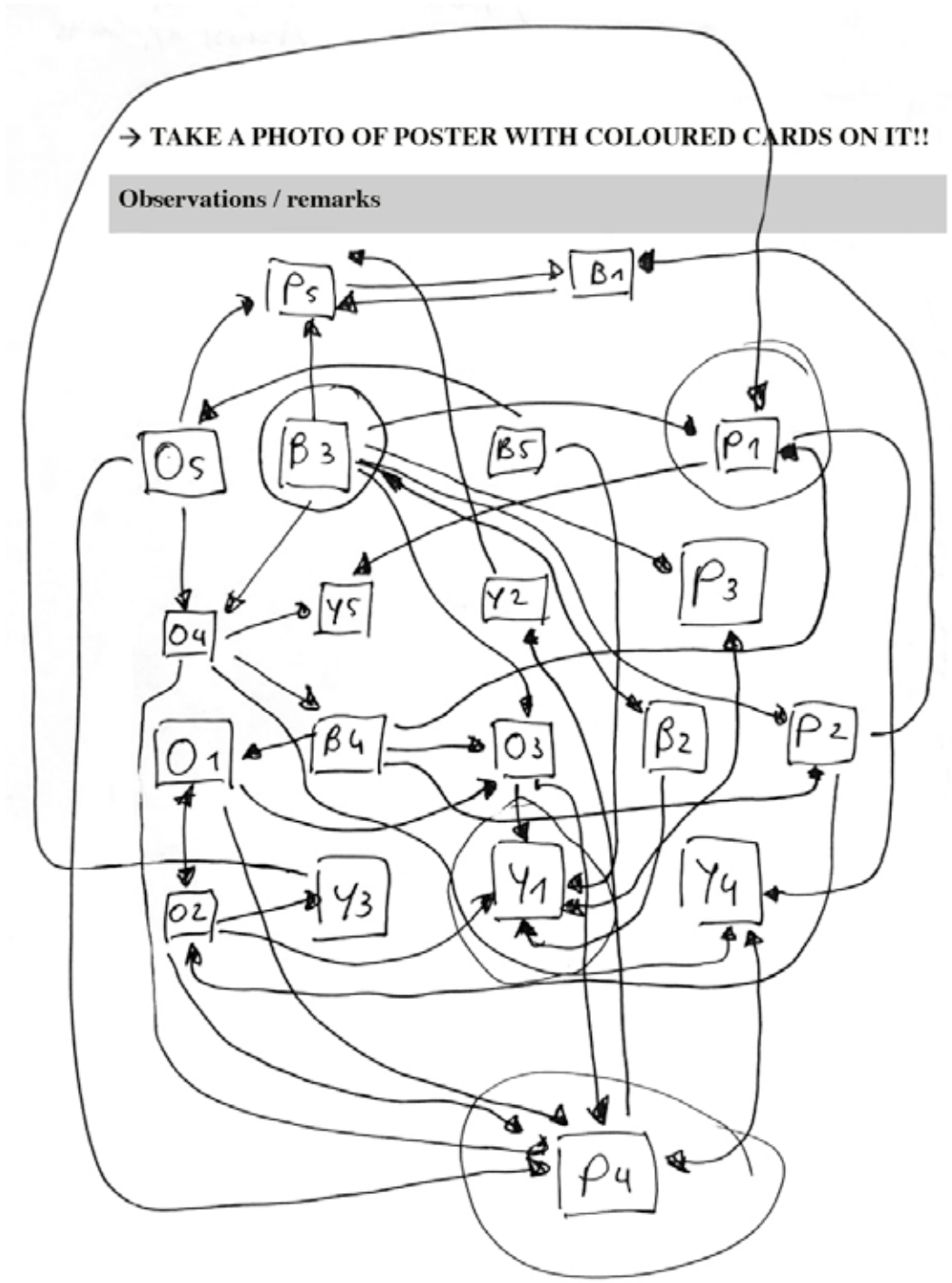


PHOTO 29 An example of how the guide for note-taking supports the capturing of workshop sessions and discussions. PHOTO: M. SCHUT



6.4 RAAIS post-workshop questionnaire

To assess RAAIS workshop participants' appreciation of the workshops implemented under Humidtropics, a post-workshop questionnaire was developed.

The questionnaire includes questions relating to:

1. General impression of the workshop?
2. What was the best element of the workshop?
3. What element(s) of the workshop need improvement?
4. Did participants feel free to express their opinion and ideas?
5. Did participants feel that different stakeholder groups were well represented in the workshop?
6. What are your main objectives for participating in the Humidtropics R4D platform?
7. What type(s) of activities should the Humidtropics R4D platform organise in order to be successful?
8. Are you willing to invest your own time and resources in participating in the Humidtropics R4D platform activities?
9. Who should lead the Humidtropics R4D platform?
10. Any other remarks/comments.

The RAAIS post-workshop questionnaire template can be downloaded here: www.wageningenur.nl/raais-toolkit

7

RAAIS Theory of Change (ToC)

For the RAAIS ToC workshop we provide less detailed sessions as for the RAAIS Lite Workshops. Reason is that excellent existing materials exist for the participatory design of Theory of Change and Impact Pathways.

Theory of Change workshops often go through the following steps (after Alvarez, et al., 2010):

1. Problem identification and analysis around a specific constraint, challenge or theme;
2. Outputs, innovations or interventions that the project will produce or embark upon;
3. Network maps that reveal relations between current constraints and challenges faced by different stakeholder groups;
4. Visioning of what the ultimate impact of the project should be;
5. Network maps that show the relations between and sequence of necessary activities and interventions to overcome stakeholders' constraints and challenges to achieve the project's impact;
6. Selecting those (clusters of) activities and interventions that can realistically be achieved within the timeframe and human and financial resources in the project;
7. Adding timeline, outputs and milestones to the interventions to firmly link intervention activities to outputs to outcomes and – eventually to – impacts.
8. Agreement on periodic reflection on Theory of Change and Impact Pathway. This can form the basis for RAAIS M&E&L.

As we explained earlier, Steps 1, 2, 3 and 4 are largely covered during the RAAIS Lite Workshops. Steps 5-8 can be covered during one-and-a-half day ToC multi-stakeholder workshops. We designed six main activities that can support the organisation of such a ToC workshop that are further elaborated below.[2]

2 Adapted from Keystone, 2009: www.mspguide.org/sites/default/files/resource/2_developing_a_theory_of_change_0.pdf

ToC ACTIVITY 1

RAAIS Lite Workshop and RAAIS Complete feedback

Time	60 minutes
Activity	Project staff and facilitators present outcomes from RAAIS Lite Workshop and from RAAIS Complete (surveys, interviews, secondary data analysis). Based on the presentation, participants validate and reconfirm the selected Entry Points for innovation.
Objectives	To triangulate the RAAIS Lite Workshop outcomes with surveys, interviews, secondary data analyses. In doing so, Entry Points are validated.
Role of facilitator	Animate discussion between participants and stakeholder groups, ensure that a designated person is taking notes of the discussions. Furthermore, the facilitator ensures that different individuals and stakeholder groups are free to express their opinion.
Materials needed	• Computer with presentation • Projector • White projection screen
Potential challenges	A whole different group of stakeholders participates in the RAAIS ToC workshop. Stakeholders reject the selected Entry Points. To overcome this challenge, the facilitator needs to clearly stress the degree to which adjusting the Entry Points is possible.

ToC ACTIVITY 2

Stakeholders develop a vision of success

Time	60 minutes
Activity	Participants collectively agree on a vision of success (when can we speak of a successful project or program). It is essential for the vision of success to be: • Plausible: It must focus on changes in and between people, groups and institutions that the organization can realistically influence. It should not point to an idealized state that is unachievable. • Dynamic: It should be a snapshot of a complex and dynamic system in which people and institutions are working effectively in relationships with each other and with outside agencies to solve problems and enhance the well-being of citizens and the environment.
Objectives	To develop a vision of success that all participants and stakeholder groups involved can relate to.
Role of facilitator	Facilitate and animate discussion between participants and stakeholder groups, ensure that a designated person is taking notes of the discussions. Furthermore, the facilitator ensures that different individuals and stakeholder groups are free to express their opinion.
Materials needed	• Posters • Marker pens
Potential challenges	• Stakeholder groups have unbridgeable differences in what the vision of success should look like. To overcome this challenge, the facilitator seeks to explore common ground. • The vision of success is not plausible and unrealistic. To overcome this challenge, the facilitator gives examples and seeks to stress complexity of overcoming certain constraints.

ToC ACTIVITY 3

Mapping the preconditions for success

Time	90 minutes
Activity	Participants work systematically backwards from the long-term strategic vision of success and identifies the changes and processes that they believe are absolutely necessary preconditions to achieving each element of their vision of success. In other words, these are changes that they believe must happen if they hope to achieve the outcomes in their vision. We are looking for changes in: Conditions; Institutions (e.g. policy environment); Relationships; Technologies, Capabilities and attitudes Subsequently, participants identify key activities and interventions that will foster these changes.
Objectives	To visualising a chain of activities and interventions and how these will contribute to achieving success. Develop scenarios depending on changing context (e.g. political or market climate).
Role of facilitator	Facilitate and animate discussion between participants and stakeholder groups, ensure that a designated person is taking notes of the discussions. Furthermore, the facilitator ensures that different individuals and stakeholder groups are free to express their opinion.
Materials needed	• Posters (enough to visualise a chain of success, e.g. Figure 7) • Marker pens
Potential challenges	• Stakeholder groups have unbridgeable differences in what the steps are required towards achieving the vision of success. To overcome this challenge, the facilitator seeks to explore common ground • Stakeholders think in too much detail with regard to the interventions. Focus should be on key interventions. Operational plans are developed in ToC Activity 4. • Timekeeping; discussion may get off-track. The facilitator ensures that discussions remain focussed.

ToC ACTIVITY 4

Developing concrete action plans and assigning tasks and responsibilities

Time	240 minutes
Activity	Participants are now starting to get more concrete about how interventions can be organised practically, and who is going to do what? This will be achieved by: • Developing action plans for interventions leading to specific outputs • Linking these outputs (e.g. research products) to outcomes (their impact) that create the preconditions of success • Identifying what has positive and what has negative influence on the successful implementation of the activities/ interventions? Anticipating potential challenges • How are collaborations are needed to implement the activities? What relationships seem promising? What problems may arise? Discussions may take place in subgroups that have expressed an interest to work on specific R4D themes or interventions. Discussion in subgroups will be more focussed. Several rounds of discussions can take place to ensure that participants get an opportunity to contribute to different groups and the interventions they are designing. Each intervention has a lead organisation and focal person for increased accountability (see Photo 29).
Objectives	To reach agreement on who is doing what, make organisations and people responsible for implementation of activities and interventions. Decide on how different stakeholder groups are going to collaborate.
Role of facilitator	Facilitate and animate discussion between participants and stakeholder groups, ensure that a designated person is taking notes of the discussions. Furthermore, the facilitator ensures that different individuals and stakeholder groups are free to express their opinion.
Materials needed	• Several tables and chairs so that participants can work in subgroups; • Posters to take notes of discussion • Marker pens
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 127-128)

Potential challenges	• Timekeeping; discussion may get off-track. The facilitator ensures that discussions remain focussed. • Groups do not reach consensus on who should lead activities and how collaboration should be organised. Here the facilitator and project team can intervene and appoint leaders. • People easily commit to many activities, which may be practically unfeasible to fulfil those commitments. Facilitator ensures that when people commit to activities, they also really invest their time and energy.

PHOTO 29 RAAIS workshop participants in China working on action plans for productivity, natural resource management and institutional innovation for more diversified rubber production. PHOTO: M. SCHUT

ToC ACTIVITY 5

Development of SMART indicators

Time

60 minutes

Activity

Now that activities, outputs and outcomes have been identified and linked to the desired impact (the vision of success), indicators and timelines can be defined. This work can best be done in small groups to enhance efficiency. Participants start reflection on questions such as:

- How long will implementing the activity take?
- When will an output be delivered (deliverables)?
- What is a verifier of success and what proof can we provide of a deliverable (e.g. a published report or research paper)?
- What is a verifier of an outcome (when can we speak of successful change in behaviour, practices, etc.)?
- What actions do we undertake when set deliverables are not being met?

Developed indicators should be SMART:

- Specific – target a specific area for improvement.
- Measurable – quantify or at least suggest an indicator of progress.
- Assignable – specify who will do it.
- Realistic – state what results can realistically be achieved, given available resources.
- Time-related – specify when the result(s) can be achieved (take into account the time constraints in the project)

Group work can be followed by short plenary presentations.

Objectives

To develop SMART indicators for activities, their outputs and outcomes. Reach consensus on what are the consequences of not meeting the indicators.

Role of facilitator

Animate discussion within groups, ensure that indicators are indeed SMART. Facilitate the plenary presentations and allow for discussion and questions.

Materials needed

- Several tables and chairs so that participants can work in subgroups
- Posters
- Marker pens

Potential challenges

- Participants have difficulties with developing SMART indicators. The facilitator should stimulate them in developing them really in a SMART way.
- Timekeeping, groups take too much time. Facilitator should ensure progress in each of the groups.

ToC ACTIVITY 6

Develop RAAIS M&E&L plan

Time	30 minutes
Activity	Participants agree on a M&E&L plan. How will information be provided and what is the interval for reflection on the expected outputs, outcomes and impacts against the Theory of Change. This can result in a M&E&L plan. The M&E&L plan should align with donor M&E&L requirements. The majority of development donors have procedures for M&E such as financial and technical evaluations during set moments in project implementation. The RAAIS M&E&L plan should align well with these donor requirements
Objectives	• The objectives of this activity are twofold: • To agree on a M&E&L plan that will be followed during project implementation. • To align the project M&E&L plan with donor requirements
Role of facilitator	Animate discussion between the different participants and stakeholder groups. Agreed M&E&L plan is agreed upon by all involved, and will be implemented accordingly.
Materials needed	• Posters for putting down dates and procedures • Market pens
Potential challenges	Stakeholder groups disagree about what would be the best M&E&L strategy. In this case, the facilitator should try to find consensus so that the M&E&L plan is acceptable for all involved.

8

RAAIS Monitoring Evaluation and Learning (M&E&L)

PHOTO 30 Reflection meeting in Gitega, Burundi in January 2015. PHOTO: M. SCHUT

RAAIS workshops, and also surveys, present a rather static picture of the complex agricultural problem under review and the innovation capacity of the agrifood system in which the problem is embedded. However, initial RAAIS workshops and surveys can function as a baseline against which to compare future workshops and surveys.

In Burundi, Rwanda and DR Congo – where RAAIS workshops were organised in 2014 to identify Entry Points for innovation for sustainable intensification of agrifood systems – reflection meetings were organised in January 2015, October 2015 and August 2016 (see Photo 30). Similar stakeholder groups as those participating in the first RAAIS workshops were involved in the reflection meetings. RAAIS baseline data were used to:

1. Reflect on the extent to which the project/program was working on demands or needs of different stakeholder groups as identified during RAAIS;
2. Assess whether current interventions align with the major on-site challenges as prioritised during RAAIS;
3. Ascertain the extent to which the implementation of RAAIS action plans had been successful in addressing project/program objectives and outcomes.

Additional information on how such reflexive M&E activities could be organised is presented below.

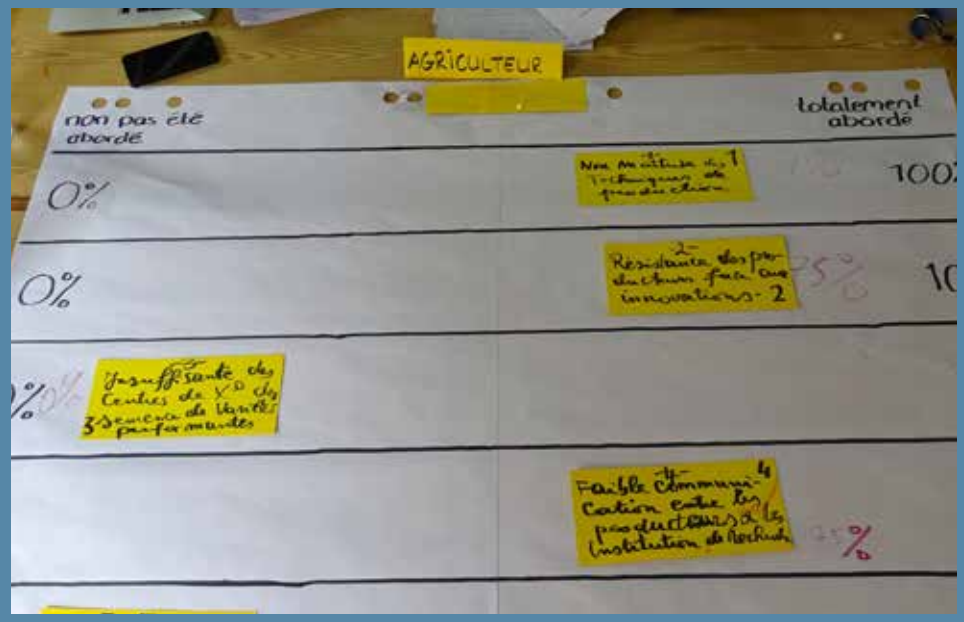


PHOTO 31 Farmer participants in an M&E reflection workshop in Burundi rank the extent to which R4D activities implemented respond to their needs and interests identified during the RAAIS workshop. PHOTO: M. SCHUT

M&E&L ACTIVITY 1

Responsiveness of R4D interventions to address the Top 5 challenges of different stakeholder groups identified during RAAIS

Time	45 minutes
Activity	Participants are in homogeneous groups (farmers, NGOs, private sector, government and researchers). Each group receives five cards listing the challenges for their stakeholder group as identified previously by the RAAIS. The groups discuss the extent to which R4D interventions are currently targeting/or planning to target these challenges and, based on this, stakeholders locate the cards on a poster with five gradients starting at 0% (not targeted at all) and ending with 100% (fully targeted). After placing each of the five challenges on one of the rows, the group indicates on the poster the percentages of their challenges being targeted by the project's interventions (see Photo 31). After completing this exercise, the whole group passes by each table, and the different posters are presented and explained. Questions to stimulate reflection may focus on why certain challenges/challenges of specific stakeholder groups are more or less targeted.
Objectives	To visualise and increase awareness and reflectivity on the responsiveness/ demand-drivenness of current interventions to the needs and challenges identified by different stakeholder groups
Role of facilitator	Explain assignment and hand out posters, marker pens and cards with challenges. Walk around answering questions and giving support when needed. Keep time: after 20 minutes of discussion in homogeneous groups, ask groups to write percentages and present posters. Facilitate plenary discussion (e.g. ask questions on how certain challenges/challenges of specific stakeholder groups are more or less targeted).
Materials needed	Posters (1 for each stakeholder group, see Photo 31); Marker pens; Cards with challenges as identified by the RAAIS; Camera ; Voice recorder (record presentations)
Potential challenges	• Lack of representation of certain stakeholder groups • Participants take very long to decide on percentages • Certain members in group dominate
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 169) Video Clip: www.youtube.com/watch?v=hunY_ZbFhoM

PHOTO 32 Participants in an M&E reflection workshop in Burundi assess the extent to which R4D activities respond to site-specific priorities identified during the RAAIS workshop. PHOTO: M. SCHUT

M&E&L ACTIVITY 2

Responsiveness of R4D interventions to site-specific challenges prioritised by stakeholders during the RAAIS workshop

Time	45 minutes
Activity	This is a plenary exercise. A big poster with a table showing all interventions against the site-specific priorities as identified during RAAIS Lite. One by one, participants should discuss the activities and evaluate whether, and if yes, how much, this activity is currently addressing or planned to address the site-specific priorities. Participants should put 0, 1, 2 or 3 crosses in each cell of the poster (see Photo 32). One of the meeting organisers enters the data in Excel and adds percentages for the relative impact of each activity on the site-specific priorities as well as the relative impact on each site-specific priority. The results can be briefly discussed.
Objectives	To assess whether current R4D interventions align with the major on-site challenges identified and prioritised by participants in the RAAIS workshops.
Role of facilitator	Explain exercise (especially explain very well that participants should indicate how much each activity is currently addressing or is planned to address each site-specific priority. Thus, what is the actual situation and what is already in the pipeline, NOT what is 'possible' but not yet happening/planned!?). Facilitate discussion and keep it moving when people elaborate too much on one example, remind participants to evaluate actual rather than potential targeting of site-specific priorities, and ask questions to check why they have decided on a certain number of crosses, engage those participants that keep silent.
Materials needed	• Poster with table with all interventions vis-à-vis the priorities • Marker pens; Camera; Computer with Excel sheet for entering data and calculating percentages
Potential challenges	• Lack of representation of participants involved in certain trials/interventions • Discussions take very long • Participants evaluate potential targeting • Participants are not aware of the activities and because of that have difficulty completing the exercise
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 170). Video Clip: www.youtube.com/watch?v=1khYW4yROdw

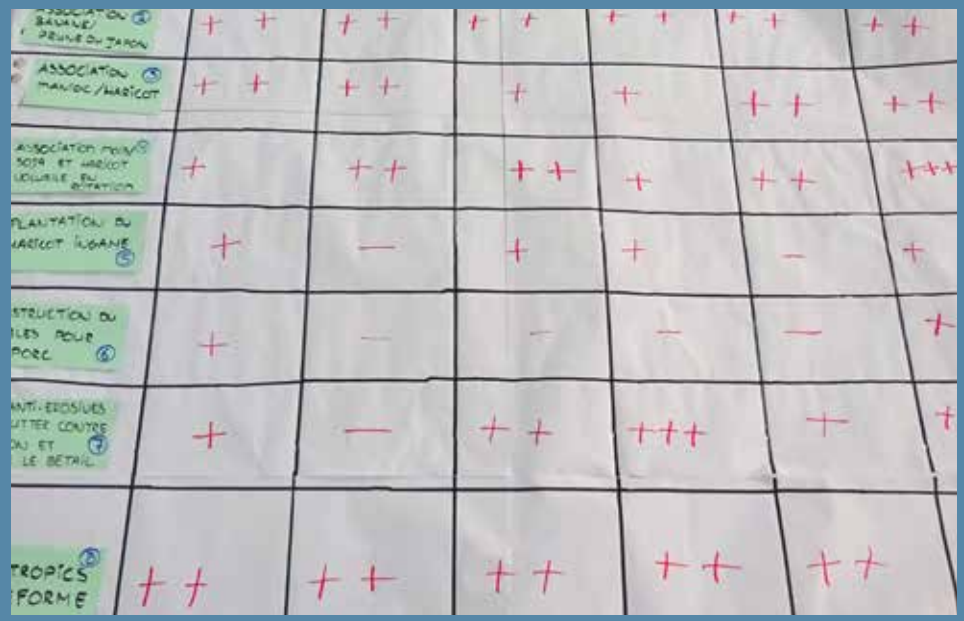


PHOTO 33 Participants in an M&E reflection workshop in Burundi assess the extent to which implemented R4D activities respond to the objectives of the research/development project or program (in this case, Humidtropics). PHOTO: M. SCHUT

M&E&L ACTIVITY 3

Expected impact of implementation of RAAIS action plans and R4D activities on the project /program's objectives

Time	45 minutes
Activity	This is a plenary exercise using a big poster with a table showing all R4D interventions vis-à-vis the project/program's objectives or outcomes. One by one, participants discuss the activities and evaluate whether, and if yes, how much, this activity currently impacts or is planned to impact the different types of objectives or outcome. They should indicate this on the poster by putting 0, 1, 2 or 3 crosses in each cell. This session is not followed by a plenary discussion/reflection.
Objectives	• To assess participants' perception of targeting the intermediate development outcomes (IDOs) with the current activities • To visualise which interventions target which IDOs, as well as to what extent, according to the participants • To visualise which IDOs are insufficiently covered
Role of facilitator	Explain exercise (especially explain very well that participants should indicate how much each activity is currently addressing or is planned to address each site-specific priority. Thus, what is the actual situation and what is already in the pipeline, NOT what is 'possible' but not yet happening/planned!?). Facilitate discussion and try to keep it moving when people are elaborating a lot on one example or activity. Remind participants to evaluate actual rather than potential targeting of site-specific priorities and ask questions to check why they have decided on a certain number of crosses. Engage those participants that keep silent.
Materials needed	• Poster with table showing all interventions vis-à-vis the project's objectives (see Photo 33) • Camera; Marker pens; Voice recording/guide for note-taking (see section 6.2)
Potential challenges	Participants are not aware of certain interventions/activities
Session materials	Download: www.wageningenur.nl/raais-toolkit (see also page 171)

9

Reflection on experiences with RAAIS

'If this is what learning is, then it is so easy'

This is how a farmer reflected on the Humidtropics RAAIS workshop held in Kumasi, Ghana, in April 2015. Although RAAIS was well received, generated energy and enthusiasm, and was picked up by different projects and organisations, we also reflected on where the toolkit could be improved. We elaborate on this in the below sections.

RAAIS was developed and tested as part of the PARASITE program to identify and analyse constraints and opportunities for innovation to effectively address parasitic weeds in rain-fed rice production systems in Tanzania (April-October 2012) and Benin (June-August 2013). The results from the RAAIS in Tanzania are elaborated in Schut et al. (2015c). Comparative analysis of RAAIS in Tanzania and Benin can be found in Schut et al. (2015b). Data were gathered across national, zonal, regional and district levels. Multi-stakeholder workshops (with 68 participants in Tanzania and 66 participants in Benin) were organised in three study sites (districts) in Tanzania and Benin where parasitic weeds are endemic. In-depth interviews were held with representatives of national, zonal, regional and district level farmer cooperatives and associations, government, the private sector, NGO/civil society, and research and training institutes (42 in Tanzania, 65 in Benin). Across the three study sites in the two countries, a socio-economic farmer survey (152 in Tanzania, 182 in Benin) was conducted to study the impact of parasitic weeds on rain-fed rice farming (see N'cho et al., 2014 for more information). In Tanzania, a farmer-extensionist survey (120 farmers, 30 agricultural extension officers) was conducted to explore the effectiveness of the national agricultural extension policy across the three study sites (see Daniel, 2013 for more information). Additionally, for both countries, secondary data including crop protection, extension and general agricultural policy, national research priorities, agricultural censuses and agricultural training curricula were analysed. Data gathering and initial analysis took around three months for each of the countries and involved two researchers. We first conducted the in-depth interviews, followed by the multi-stakeholder workshops. In Tanzania, both the socio-economic farmer survey and the farmer-extensionist survey were conducted after the interviews and workshops. In Benin, the socio-economic farmer survey was conducted preceding the in-depth interviews and workshops. Secondary data collection occurred throughout the fieldwork in Tanzania and Benin.

TABLE 8 Overview of stakeholder groups targeted during RAAIS workshops in Burundi, Rwanda and DR Congo.

Study site and country	Location	Date	Stakeholder groups targeted (sample size)					
			Farmers	NGO/civil society	Private sector	Government	Research and training	Total
Gitega, Burundi	Helena Hotel, Gitega	26-02-2014	4	5	4	5	6	24
Kadahenda and Kayonza, Rwanda	Rwanda Agricultural Board provincial headquarters, Musanze	03-03-2014	3	3	1	5	7	19
	Dereva Hotel, Rwamagana	04-03-2014	6	2	3	2	5	18
Ngweshe, DR Congo	IITA Research Station, Kalambo	28-02-2014	4	6	3	3	6	22

RAAIS workshops were held under the CGIAR Research Program Humidtropics in February and March 2014 in Burundi, Rwanda and DR Congo (Table 8), in Cameroon, Nigeria and Ghana (in May 2014 and April 2015) and in China (in November 2014).

Below, we further reflect on the main objectives of RAAIS, as well as provide recommendations for further improvements and uses of RAAIS.

9.1 RAAIS' ability to provide specific Entry Points for innovation to address complex agricultural problems

RAAIS contributed to an integrated understanding of different problem dimensions, multi-level interactions and multi-stakeholder dynamics relating to parasitic weed problems. With regard to the different problem dimensions, interviews held under the PARASITE program demonstrated a potential relation between, for example, the preference for growing local, aromatic rice varieties (socio-cultural dimension), farmers' low capacity to purchase certified seeds (economic dimension) and the spread of parasitic weed seeds through the local rice seed system (technological dimension) (Rodenburg et al., 2015). Additionally, analysis of workshop data revealed how the untimely and insufficient availability of agricultural inputs provided by the government (institutional dimension) and limited interaction and collaboration among networks of key stakeholders (political dimension) form additional bottlenecks for addressing such problems. It created awareness that describing and explaining complex agricultural problems, and exploring and designing solutions, are unlikely to be successful if the different problem dimensions are analysed and treated separately (Hall and Clark, 2010; Spielman et al., 2009).

Gathering data across different levels (national, regional and district) enabled the analysis of the interactions and (mis)matches between different levels (Cash et al., 2006). An example that emerged during the PARASITE program RAAIS workshops and the interviews is Tanzania's national export ban, which prohibits the export of agricultural produce (e.g. rice) if the country has not been declared 'food secure.' This national export ban influences local market prices, and, consequently, also farmers' willingness and ability to invest in, for example, purchasing agricultural inputs such as fertilisers and seeds (e.g. Poulton et al., 2010). This, in turn, provided an opportunity for RAAIS to find Entry Points for innovation across different levels – a procedure that has been identified as a critical factor for addressing complex agricultural problems (e.g. Giller et al., 2008; 2011). As expected, and confirming previous reports (e.g. van Mierlo et al., 2010), the participatory analysis of multi-level interactions showed that stakeholders (insiders) often frame constraints and challenges at the level they represent (Schut et al., 2015c). This was complemented by our analysis as researchers (outsiders) of the multi-level interactions regarding the parasitic weed problem.

PHOTO 34 Humidtropics' partners monitor the growth of an improved common field bean variety grown in rotation with maize-soybean intercrop in Eastern Rwanda. PHOTO: A.N. HERO

The involvement of different groups of stakeholders was essential for enhancing the credibility, validity and quality of RAAIS, as well as for delineating the boundaries of the agrifood system and the agricultural innovation system, all of which are considered key challenges when AIS approaches are being used to analyse complex agricultural problems (Klerkx et al., 2012b). Furthermore, stakeholder participation provided a better understanding of the feasibility and acceptability of solutions for stakeholder groups. Under Humidtropics, RAAIS created the starting point for the implementation of R4D activities in Burundi, Rwanda and DR Congo, aimed at improving soil fertility (see Photo 34). Working on constraints prioritised

by stakeholders, and trying to address them through jointly designed R4D activities, stimulated engagement and provided a basis for collective action.

Although we believe that the stakeholder groups included under PARASITE and Humidtropics (see e.g. Table 7) provide a good starting point for conducting RAAIS, other stakeholder groups (for instance the media, religious groups) can be relevant depending on the specific Entry Theme (e.g. Ortiz et al., 2013) and depending on the type of complex agricultural problem under review. The triangulation of data resulting from the different methods enabled us to validate stakeholders' strategic communication, for instance to verify how the extension system as described by policymakers in interviews functioned in reality according to surveyed farmers. Triangulation was also important to validate findings, such as the relation between poor road infrastructure in Morogoro and Songea and constraints relating to market access and the performance of the extension system, which were identified in RAAIS workshops and interviews under the PARASITE program.

9.2 RAAIS' ability to provide generic Entry Points for interventions to enhance innovation capacity

RAAIS reveals interactions between complex agricultural problems, the innovation capacity of the agrifood system and the agricultural innovation system. An example from the PARASITE program shows how applying fertiliser in rain-fed rice production is seen as a promising management strategy to reduce infection levels of parasitic weeds and mitigate negative effects of the parasite on rice yields (Rodenburg et al., 2011). However, as was highlighted during the RAAIS workshops in both Benin and Tanzania, fertilisers are difficult to access in rural areas. In Benin, there is no well-developed private agri-dealer network and distribution infrastructure to support the supply of agricultural inputs. Furthermore, interviews showed that the public extension and input supply systems in Benin focus on the cotton sector, rather than on cereal crops – a clear institutional constraint that applies to problems other than parasitic weeds. Another example is that, in Tanzania, a private agri-dealer network and distribution infrastructure exists, but structures controlling the quality of fertilisers are functioning sub-optimally according to interviewed government officials. In some areas, fake agri-inputs are dominating the market, resulting in a limited trust and willingness to invest in applying fertiliser, according to farmer representatives who participated in the workshops.

The example shows how the absence or poor performance of fertiliser distribution infrastructure, limited farmer-extensionist interaction and lack of functional institutions for quality control (being structural conditions for innovation) hamper the innovation capacity in the agrifood system and its technological dimension (in this case fertiliser) and rice value chain dynamics. Another example is based on secondary data analyses that demonstrated the absence of an operational policy strategy to address parasitic weeds in Tanzania and Benin. In both the interviews and the workshops, stakeholders highlighted the general lack of interaction and collaboration between stakeholders in the agricultural sector (being a structural condition for innovation) as one of the main reasons for the absence or poor implementation of parasitic weed and other agricultural policies and strategies.

The aforementioned examples demonstrate how RAAIS can support the identification of generic Entry Points for innovation. Such innovations can directly contribute to addressing the complex agricultural problem under review, but can also have a spill-over effect in terms of addressing broader constraints that hamper the innovation capacity in the agrifood system. For example, the lack of stakeholder interactions and collaboration in the agrifood system can provide an Entry Point for the adaptation of the structural conditions in the broader agricultural innovation system, for example through investments in innovation brokers or multi-stakeholder platforms (Kilelu et al., 2013; Klerkx et al., 2010). Under Humidtropics, such platforms were established in each of the action sites to tackle Entry Theme specific as well as more generic complex agricultural problems.

9.3 Lessons learnt from applying RAAIS and recommendations for further improvement

On the basis of our initial experiences with RAAIS in Tanzania and Benin, we recommend conducting RAAIS in an interdisciplinary team of researchers with expertise on different dimensions of complex agricultural problems and different data collection methods (Hulsebosch, 2001). Other suggestions include experimentation with other combinations of methods, and on different types of complex agricultural problems. The workshop methodology could be made more interactive, in the sense of directly feeding back results of the sessions to participants to stimulate reflection and validate analyses during the workshops. During the Humidtropics RAAIS workshop in Ghana in April 2015 and during the GIZ RAAIS

in Zambia we experimented with providing workshop participants direct feedback on the outcome of certain sessions (Figure 14).

As discussed in Section 7, the RAAIS multi-stakeholder workshops, but also the RAAIS surveys, present a rather static picture of complex agricultural problems and the innovation capacity of the agrifood system in which these problems are embedded. However, initial workshops and surveys can function as a baseline against which future workshops and surveys can be compared. Other methods such as secondary data analysis or in-depth interviews present a more dynamic image of how, for example, collaborations between stakeholders evolve over the years. Under Humidtropics, we started organising M&E reflection workshops to explore the extent to which stakeholder constraints and opportunities for innovation identified under RAAIS have been addressed through R4D activities (see Section 7). If such reflection workshops are repeated over time, they provide a good picture of stakeholders' assessment of whether R4D activities are responding to stakeholder needs and to prioritised site-specific constraints and challenges.

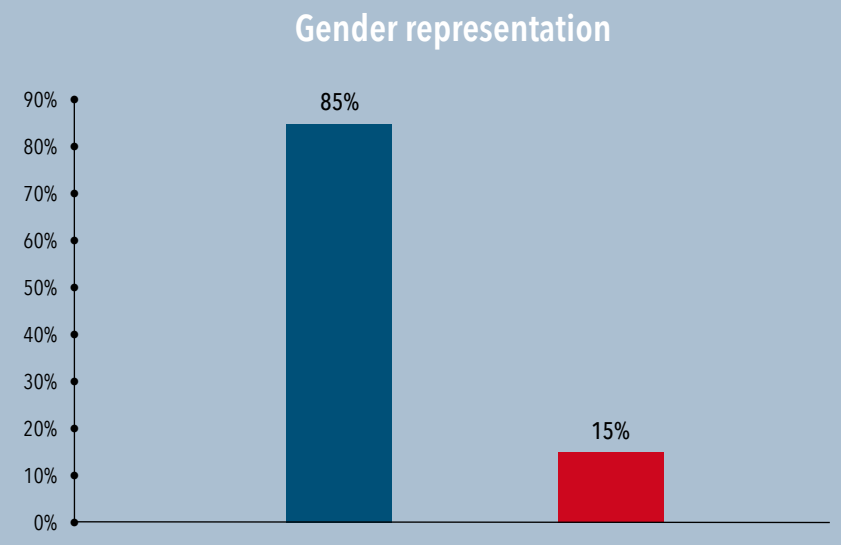
Our experiences show that ensuring social differentiation among workshop participants, interviewees and survey respondents (e.g. of different gender and age) was challenging, as, for example, the majority of workshop participants were male. Through direct feedback, the participation of gender and age groups can be discussed during the workshop (Figure 15).

The facilitation of the multi-stakeholder workshops ensured that different stakeholder groups could raise and discuss their ideas (Hulsebosch, 2001). Despite such efforts, unequal power relations and differences in ability to debate and negotiate that inherently exist between groups may have played a role. In line with our expectations, politically sensitive issues were more freely discussed in individual interviews than in a multi-stakeholder setting. Post-workshop questionnaires could provide additional insight into whether stakeholders felt that they could freely raise and discuss their ideas and needs. Such post-workshops questionnaires have been applied following RAAIS workshops held under Humidtropics. An example of the RAAIS post-workshop questionnaire can be found in Section 6.4.

The combination of different methods is essential. In terms of the sequence of data collection methods, we recommend first conducting and analysing the RAAIS multi-stakeholder workshops (RAAIS Lite) to identify constraints and challenges,

FIGURE 14 Outcome of constraint network mapping showing key constraints for sustainable food supply through innovations along the soybean value in Zambia. The objective of direct feedback is to trigger discussion on how addressing these key constraints could have a positive impact on addressing other constraints in the region.

FIGURE 15 Slide presented during the RAAIS workshop in Ghana with the objective of triggering discussion about the representation of men and women in agricultural R4D activities.



and subsequently conducting the in-depth interviews and surveys that can provide more in-depth insight into the distribution and underlying root causes of these constraints and challenges (RAAIS Complete). The workshops then provide a fast-track approach to identifying Entry Points for innovation that can subsequently be validated and explored in more detail using the in-depth interviews and the stakeholder surveys. This would furthermore increase the 'rapidness' of RAAIS as a diagnostic tool.

9.4 Lessons learnt from applying RAAIS in different governance, socio-cultural and political context

RAAIS has been applied in different parts of the world and for a broad range of topics; from scaling up of agro-ecological intensification in Nicaragua (Photo 35), to small-scale irrigation in Niger, to diversification of rubber production in China. Overall, based on feedback that we got, it served its purpose well in these different social, cultural and political contexts (see for Example Barrett et al., 2017). Key is the adaptation of the approach to local conditions; not using RAAIS as a blue-print, but rather adapt RAAIS principles and concepts to fit its purpose. The composition of stakeholder groups may be different (e.g. including religious groups or youth groups), relevant administrative or decision-making levels will different from site to site, and not in all cases it may be relevant or appropriate to conduct gender, or age group disaggregated exercises.

Multi-stakeholder processes – such as those support through RAAIS – have been defined as governance mechanism '... where actors with either a right, risk or general interest (stakeholders) are identified, and usually through representatives, invited and assisted to interact in a deliberative forum, aiming for all participants to learn, understand alternative perspectives, and possibly negotiate workable strategies and agreements' (Dore, 2007). Such processes, as well as the people and organisations involved, are embedded in broader agricultural (innovation) systems as was explained in Section 2 of this book. These systems are governed by rules, norms and values related to – amongst others – how power is distributed (e.g. the position of the state), how decisions are being made (e.g. more top-down versus more participatory decision making), what are believed to be credible innovations (e.g. the importance of technology in societies).

PHOTO 35 RAAIS workshop in Nicaragua to identify constraints and opportunities to scale up agro-ecology in mixed crop–livestock systems. PHOTO: K. SCHILLER

RAAIS provides a democratic space for joint problem identification, analysis, and prioritisation, and collective design and implementation of activities to overcome these problems. In some countries it will be seen as extremely positive that rural actors organise themselves, sit together around joint constraints and self-organise interventions to overcome these constraints. In other countries such processes may be viewed with suspicion by government or other dominant parties who may feel that these platforms are undermining their role, mandate and function. The bottom line here is that project designers and implementers need to think critically about how to organise and support RAAIS in the governance, socio-cultural or political context in which they are being implemented and supposed to contribute to achieving the desired impact. This was confirmed by Barrett et al. (2017) who applied RAAIS in a climate change adaptation project in Kazakhstan. Besides the need for embedding RAAIS in different socio-cultural and political contexts, they also emphasised that appropriate training of the RAAIS facilitators is crucial to its success.

10

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Appendices

SESSION 1 AND 2

Stakeholder group	
Farmer / producer representatives	
Civil society /NGO / Development project representatives	
Private sector representatives	
Government representatives	
Representatives from research and training institutes	

Specifications	
colour	Colour
page orientation	Portrait
size	100 x 140 cm
number of posters needed	1
downloadable version	www.wageningenur.nl/raais-toolkit

SESSION 3 AND 4

Top 5 constraints	
1.	•
	•
	•
2.	•
	•
	•
3.	•
	•
	•
4.	•
	•
	•
5.	•
	•
	•

Specifications	
colour	Black and white
page orientation	Portrait
size	100 x 140 cm
number of posters needed	5 (depending on the # of stakeholder groups)
downloadable version	www.wageningenur.nl/raais-toolkit

SESSION 5

Different dimensions of constraint

	Biophysical	Technological	Socio-cultural	Economic	Institutional	Political
1.						
2.						
3.						
4.						
5.						

Specifications	
colour	Black and white
page orientation	Portrait
size	100 x 140 cm
number of posters needed	5 (depending on the # of stakeholder groups)
downloadable version	www.wageningenur.nl/raais-toolkit

SESSION 6

What is causing the constraints and challenges?

1. Infrastructure and assets	
a. Roads, irrigation schemes, agricultural inputs distribution b. Telecommunication c. Financial infrastructure d. Assets, such as vehicles for transport workers or agricultural produce e. Agricultural machines f. Agricultural inputs/ seeds	
2. Institutions	
a. Agricultural policies b. Laws c. Regulation, incentives d. (Food) quality standards e. Agricultural subsidies f. Monitoring and Evaluation g. Organisational mandates h. Market (access) i. Trade agreements j. Social-cultural norms and values k. Informal rules of the game l. Lobby m. Resistance to change	

Specifications	
colour	Black and white
page orientation	Portrait
size	140 x 240 cm
number of posters needed	1
downloadable version	www.wageningenur.nl/raais-toolkit

What is causing the constraints and challenges?

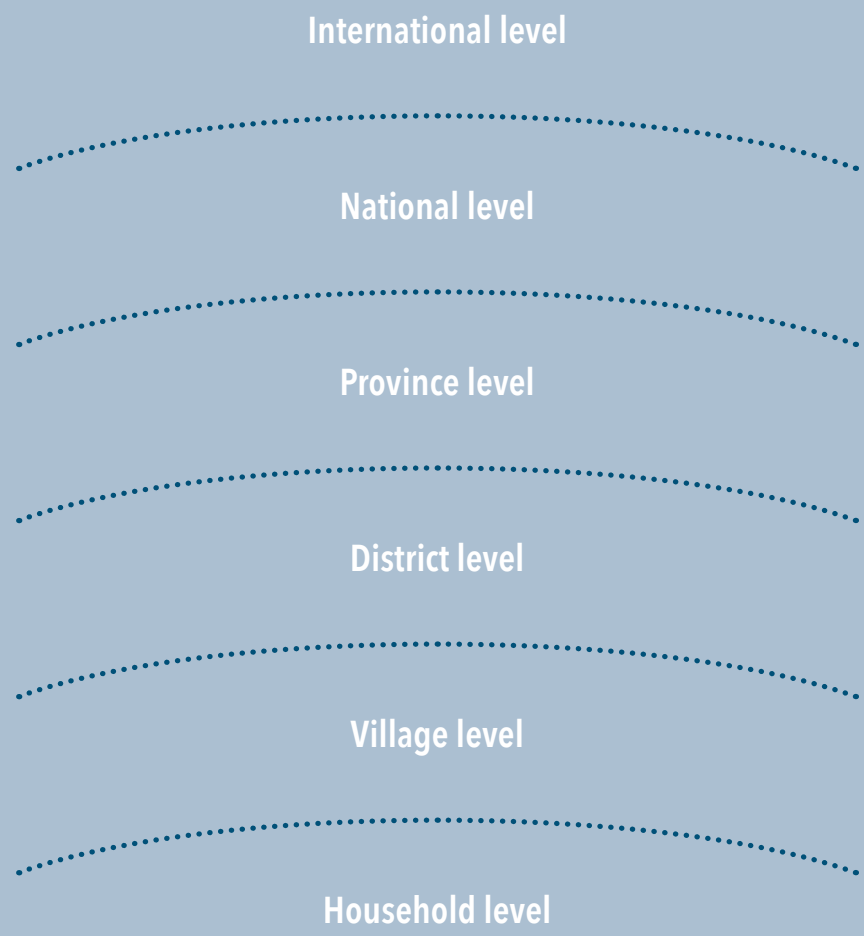
3. Interaction and collaboration

a. Multi-stakeholder interaction for learning and problem-solving
b. Systematic development and sharing of knowledge and information (strategic intelligence)
c. Public-private partnerships
d. Existence and strength of networks (too strong or too weak)
e. Existence of representative bodies (e.g. farmers association)
f. Power-dynamics and politics

4. Capabilities and resources

a. Agricultural entrepreneurship
b. Availability of labour
c. Access to knowledge and education
d. Availability of financial resources
e. Access to credit/ microfinances
f. Capacity to mobilise funds

5. Other



Specifications	
colour	Black and white
page orientation	Portrait
size	140 x 240 cm
number of posters needed	1
downloadable version	www.wageningenur.nl/raais-toolkit

SESSION 9

Specifications	
colour	Black and white
page orientation	Portrait
size	140 x 200 cm
number of posters needed	5 (depending on the # of stakeholder groups)
downloadable version	www.wageningenur.nl/raais-toolkit

SESSION 10

Constraints and challenges that only apply to the specific Entry Theme(s)	Constraints and challenges that also apply to broader issues in the agrifood system (beyond the specific Entry Theme(s))	Constraints and challenges that also apply to problems beyond the agricultural system

Specifications	
colour	Black and white
page orientation	Landscape
size	100 × 140 cm
number of posters needed	1
downloadable version	www.wageningenur.nl/raais-toolkit

SESSION 11A

Constraints and challenges that can be adressed by the stakeholder group	Constraints and challenges that can only be adressed in collaboration with other stakeholder groups

Specifications	
colour	Black and white
page orientation	Landscape
size	100 × 140 cm
number of posters needed	1
downloadable version	www.wageningenur.nl/raais-toolkit

SESSION 11B

Constraints and challenges that are relatively easy to address	Constraints and challenges that are relatively difficult to address

Specifications	
colour	Black and white
page orientation	Landscape
size	100 × 140 cm
number of posters needed	1
downloadable version	www.wageningenur.nl/raais-toolkit

SESSION 12 A,B,C,D

What is the feasibility of addressing the constraints, in terms of the...				
	Cost of the intervention	Required time for the intervention	Accessibility of appropriate technology to address the constraint	Accessibility of the knowledge and skills to address the constraint
1.				
2.				
3.				
4.				
5.				

Specifications	
colour	Black and white
page orientation	Landscape
size	100 × 140 cm
number of posters needed	
downloadable version	www.wageningenur.nl/raais-toolkit

SESSION 13

To what extent would addressing these constraints contribute to...						
	Net income increase	Employment creation	Improved food and nutrition security	Increased agricultural productivity	Innovation capacity and entrepre-neurship	Strengthened partnerships and networks
1.						
2.						
3.						
4.						
5.						

Specifications	
colour	Black and white
page orientation	Landscape
size	100 x 140cm
number of posters needed	5 (depending on # of stakeholder groups)
downloadable version	www.wageningenur.nl/raais-toolkit

SESSION 14

Technological innovation	Institutional innovation	Gender innovation	Nutrition innovation	Other types of innovation
E.g. livestock feed production, soil fertility, intercropping, weed control research, breeding fertilizer trials, etc.	E.g. research on markets / value chain dynamics, gender, policy development and implementation, land tenure, multi-stakeholder processes, etc.	E.g. research related to inclusion of and providing equal opportunities for gender and age groups, etc..	E.g. dietary needs assessment, analysis of nutrient intake	

Specifications	
colour	Black and white
page orientation	Landscape
size	120 x 200 cm
number of posters needed	1
downloadable version	www.wageningenur.nl/raais-toolkit

SESSION 15A

Women

Technological innovation	Institutional innovation	Gender innovation	Nutrition innovation	Other types of innovation
E.g. livestock feed production, soil fertility, intercropping, weed control research, breeding fertilizer trials, etc.	E.g. research on markets / value chain dynamics, gender, policy development and implementation, land tenure, multi-stakeholder processes, etc.	E.g. research related to inclusion of and providing equal opportunities for gender and age groups, etc..	E.g. dietary needs assessment, analysis of nutrient intake	
1.	1.	1.	1.	
2.	2.	2.	2.	
3.	3.	3.	3.	
4.	4.	4.	4.	
5.	5.	5.	5.	

Specifications	
colour	Black and white
page orientation	Landscape
size	120 x 200 cm
number of posters needed	2 in total: 1 (women) and 1 (men)
downloadable version	www.wageningenur.nl/raais-toolkit

Men

Technological innovation	Institutional innovation	Gender innovation	Nutrition innovation	Other types of innovation
E.g. livestock feed production, soil fertility, intercropping, weed control research, breeding fertilizer trials, etc.	E.g. research on markets / value chain dynamics, gender, policy development and implementation, land tenure, multi-stakeholder processes, etc.	E.g. research related to inclusion of and providing equal opportunities for gender and age groups, etc..	E.g. dietary needs assessment, analysis of nutrient intake	
1.	1.	1.	1.	
2.	2.	2.	2.	
3.	3.	3.	3.	
4.	4.	4.	4.	
5.	5.	5.	5.	

Overall top-3 under different research for development domains

Technological innovation	Institutional innovation	Gender innovation	Nutrition innovation	Other types of innovation
E.g. livestock feed production, soil fertility, intercropping, weed control research, breeding fertilizer trials, etc.	E.g. research on markets / value chain dynamics, gender, policy development and implementation, land tenure, multi-stakeholder processes, etc.	E.g. research related to inclusion of and providing equal opportunities for gender and age groups, etc.	E.g. dietary needs assessment, analysis of nutrient intake	
1.	1.	1.	1.	
2.	2.	2.	2.	
3.	3.	3.	3.	

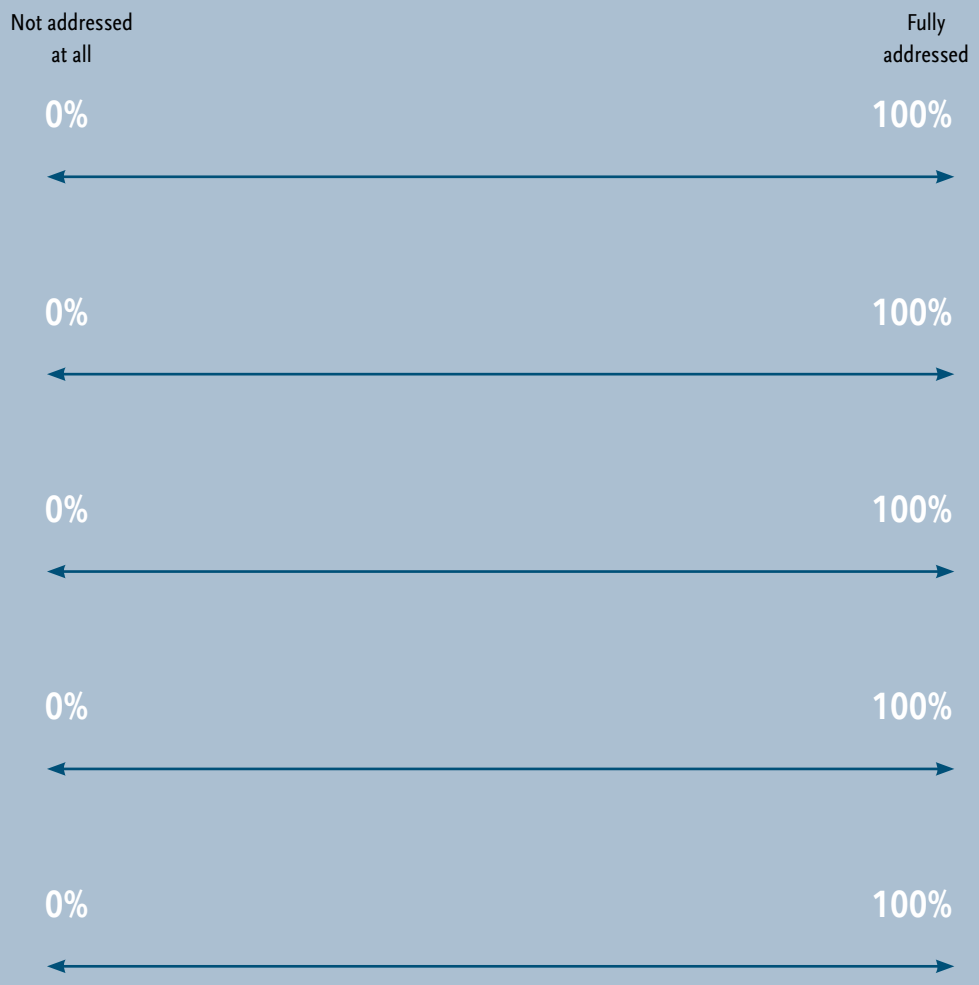
Specifications

colour	Black and white
page orientation	Landscape
size	120 x 200 cm
number of posters needed	1
downloadable version	www.wageningenur.nl/raais-toolkit

From constraints and challenges to entry points and best bets for innovation	
Theme Name the theme.	
Research for Development domain (1) technogical innovation, (2) institutional innovation, (3) gender innovation, (4) nutrition innovation or (5) other types of innovation	
Constraint Copy the constraint as is written on the card.	
Theme leader(s) Names, organisation and email.	
Key-objective(s) Formulate realistic and measurable objectives.	
Description of the activity Description of the activity (200-500 words).	
Other team members Name(s) and email.	
Partners Names of organisations and contact persons.	
Where At what location will the activities take place.	
Project duration Start and end date.	
Sub-activities Provide a list of detailed sub-activities.	
With what Innovation Platform will this activity be undertaken? Specify innovation platform.	

From constraints and challenges to entry points and best bets for innovation (continued)	
Research protocol/ methodology What research/ development approach will be used, more detailed research protocol can be attached.	
Potential limitations for project implementation What are expected to be the main challenges and how will these challenges be overcome.	
How does this R4D project relate to the project/ program's objectives Specify how this theme contributes to below objectives. Objective 1 Objective 2 Objective 3 Etc.	
How will data be collected and analysed? Indicate how monitoring and evaluation will be organised.	
How will results be reported to other stakeholders involved/ multi-stakeholder platform Indicate how collaboration with, and reporting to, the platforms will be organised.	
Estimated resources necessary to execute the activities Consider natural resources (land), human resources (labour) as well as financial resources (funding).	
Who is contributing? What can farmers, private sector, development partners, government, research – contributions can be financial or in kind (land/ labour).	

M&E&L ACTIVITY 1



Specifications	
colour	Black and white
page orientation	Landscape
size	100 x 140 cm
number of posters needed	5 (depending on # of stakeholder groups)
downloadable version	www.wageningenur.nl/raais-toolkit

M&E&L ACTIVITY 2

	Prioritised productivity constraint 1	Prioritised NSM constraint 1	Prioritised institutions and market constraint 1	Prioritised gender constraint 1	Prioritised nutrition constraint 1	Etcetera
Research for development activity 1						
Research for development activity 2						
Research for development activity 3						
Research for development activity 4						
Research for development activity 5						
Etcetera						

Specifications	
colour	Black and white
page orientation	Landscape
size	150 x 170 cm (depending on # priorities and R4D activities)
number of posters needed	1
downloadable version	www.wageningenur.nl/raais-toolkit

M&E&L ACTIVITY 3

	Project/ program objective 1	Project/ program objective 2	Project/ program objective 3	Project/ program objective 4	Project/ program objective 5	Etcetera
Research for development activity 1						
Research for development activity 2						
Research for development activity 3						
Research for development activity 4						
Research for development activity 5						
Etcetera						

Specifications

colour	Black and white
page orientation	Landscape
size	150 x 170 cm (depending on # of R4D activities and program/ project objectives)
number of posters needed	1
downloadable version	www.wageningenur.nl/raais-toolkit

Rapid Appraisal of Agricultural Innovation Systems (RAAIS) is a peer-reviewed research for development tool that has been developed, tested and used in 18 countries across 3 continents.

RAAIS supports the identification and analysis of complex agricultural problems in agrifood systems. The joint assessment of problems and identification of innovations to overcome these problems with farmers, policymakers, private sector and other stakeholders provides a starting point for collective action towards achieving development outcomes and impact.

'RAAIS is an easy way to make people do a difficult job'

This Nigerian RAAIS workshop participant nicely summarised the objective of RAAIS as a hands-on, participatory, diagnostic tool for integrated systems analysis of constraints and opportunities for agricultural innovation.

This 2nd Edition of the RAAIS Toolkit provides a background on the theoretical and conceptual underpinnings of RAAIS, updated methods to support RAAIS, a facilitation guide and materials for conducting RAAIS multi-stakeholder priority setting and Theory of Change workshops, a template for data analysis, and reference materials. The Toolkit can also be downloaded from: www.wageningenur.nl/raais-toolkit.

Readers are encouraged not to use this toolkit as a blueprint, but rather to adapt the RAAIS building blocks to the specific context at hand. We hope to learn along with you towards more meaningful and impactful agricultural innovation systems research and development.

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CGIAR RESEARCH PROGRAM ON Root, Tubers and Bananas
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