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Follow the innovation - participatory testing and adaptation of agricultural innovations in Uzbekistan: guidelines for researchers and practitioners

Ul Hassan, Mehmood; Hornidge, Anna-Katharina; Akramkhanov, Akmal; Rudenko, Inna; Djanibekov, Nodir; Veldhuizen, Laurens van

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Follow the Innovation:

Participatory Testing and Adaptation of Agricultural Innovations in Uzbekistan

Guidelines for Researchers and Practitioners

Mehmood Ul-Hassan, Anna-Katharina Hornidge, Laurens van Veldhuizen,
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Zentrum für Entwicklungsforschung
Center for Development Research
University of Bonn

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United Nations Educational, Scientific and Cultural Organization

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LIST OF ACRONYMS

AF	Afforestation
CA	Conservation Agriculture
EM	Electromagnetic induction Meter
FTI	Follow the Innovation
FTT	Follow the Technology
KRASS	Khorezm Rural Advisory Support Service
M&E	Monitoring and Evaluation
MTP	Machine Tractor Park
PhD	Philosophiae Doctor (Doctor of Philosophy)
PRA	Participatory Rural Appraisal
PIA	Participatory Impact Assessment
PM&E	Participatory Monitoring and Evaluation
SA	Salinity Assessment
SANIIRI	Central Asia Irrigation Research Institute (Russian acronym)
SMID	Social Mobilisation and Institutional Development
SWOT	Strengths, Weaknesses, Opportunities, Threats
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WUA	Water Users Association
WMO	Water Management Organisation
ZEF	Zentrum für Entwicklungsforschung (Center for Development Research) of the University of Bonn

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1. INTRODUCTION

Background

Agricultural research generates findings that offer the potential for improving the existing situation of farmers. Yet, many innovative ideas and technologies generated through research are not implemented or adopted, because most of such innovations do not address the real-life complexities faced by farmers. Scientific research carried out in agricultural projects often takes place in isolation from the intended users of the innovations. To overcome the lack of fit between scientifically generated innovations and the local reality, participatory innovation development approaches in which local and scientific knowledge interacts systematically offer much potential.

Innovations produced by research projects without interaction with and adaptation to real-life situations are difficult to feed into local and national systems of policymaking as well as into development projects. In order to overcome this challenge, the "Economic and Ecological Restructuring of Land and Water in the Khorezm Region of Uzbekistan" project of the Center for Development Research (ZEF) at the University of Bonn, in collaboration with United Nations Educational Scientific and Cultural Organisation (UNESCO) and Urgench State University, Uzbekistan, devised in 2008 a participatory and transdisciplinary approach to innovation development. The project called it the "Follow-the-Innovation" (FTI) approach. The process had the twofold objective of: 1) testing, adapting and thus validating four selected scientific innovations in real-life settings of rural Khorezm; and 2) drawing lessons for the use of this approach in future innovation development projects and outscaling in Uzbekistan and in other parts of Central Asia. For three years, four teams used and developed this approach in their work on four different innovation "packages".

Central Asia is a region currently undergoing immense agricultural transformation processes, from the former system of central planning to increasingly market-oriented liberalisation. In Uzbekistan particularly, farmers under the state plan continue to receive detailed instructions from the state on what and how to plant, when and how to irrigate and how to carry out agricultural operations to fulfil the plan. The farmers are thus not the sole decision-makers regarding land and water use. This fact has to be considered in the choice of innovations as well as in the style of participatory interactions with relevant stakeholders.

About these guidelines

The FTI guidelines presented here are based on this experience and draw out the collected lessons learnt with regard to the design and implementation of FTI in the post-Soviet setting of rural Uzbekistan. As such, this builds on and expands existing guidelines and documentation for participatory approaches to innovation development. It adds the perspective of being based on a well-documented experience of participatory innovation testing and adaptation in this setting. A list of key practice-oriented resources on participatory innovation development to complement this guide is included at the end of it.

The main readership targeted by this publication consists of researchers involved in finding appropriate innovations for agricultural development in and around Uzbekistan, donor-sponsored agricultural research and/or development projects, centres of the Consultative Group on International Agricultural Research (CGIAR) working in Central Asia, international and local non-governmental organisations involved in promoting innovative agricultural practices within the region, the national and international scientific research and extension community interested in "discovering", and development practitioners in and around Uzbekistan who are interested in diffusing agricultural innovations.

Chapter 2 describes the context of the experiences on which the guidelines are based, with a brief overview of agricultural development in Uzbekistan as well as the history and design of the ZEF–UNESCO project. Both have influenced considerably the way FTI could be introduced and implemented. Chapter 3 reviews the basic concepts underlying the FTI approach and their rationale, while Chapter 4 explains the overall flow of the FTI approach. Chapter 5 is the heart of this guide, as it describes in more detail activities under each of the FTI "steps" while adding lessons from implementation in Uzbekistan. Chapter 6 summarises several general lessons and concerns to be taken into account in designing future FTI programmes in the region.

2. THE CONTEXT

Agriculture in Uzbekistan

Agriculture in Uzbekistan is as old as the country's history, but has experienced several transitions. While the pre-Soviet irrigated agriculture in Uzbekistan was largely confined to the vicinity of river systems and a few oases like Bukhara, vast tracts of former deserts were brought under irrigation during the period of the Soviet Union, when major infrastructure projects were launched. Soviet-designed infrastructure and management systems aimed at service provision to large-scale collective (Kolkhozes) and state (Sovkhozes) farms, each covering several thousand hectares. These large farms generally specialised in cropping systems, such as cotton–wheat, and were resource intensive, employing specialised experts of various disciplines such as agronomy, entomology, mechanisation, irrigation, accounting and management, as well as farm technicians and workers. As such, nobody or everybody working on a farm was a "farmer". This specialisation and intensive resource use over the years led to severe environmental degradation in terms of increasing levels of soil salinity, rising groundwater and declining soil fertility in many parts of the country.

Since the collapse of the Soviet Union in the early 1990s, the Government of Uzbekistan has adopted a cautious path of slow and step-by-step reforms in various sectors, including agriculture, in a gradual transition from a centrally planned system to a more market-oriented economy. The transition in property rights to agricultural land between 1992 and 2005 led to a thousand-fold increase in the number of farming units, which was not compatible with the infrastructure and institutions designed to serve much fewer and larger farms. The agricultural land-tenure system in Uzbekistan is such that land is still regarded as the property of the state, which gives it to farmers for growing state-determined crops under a state plan. Most of Uzbekistan's farms, as a part of their contractual obligations to the state, are therefore required to grow cotton and wheat crops on 70–85% of the farmland and to sell the produce to the government at state-determined prices. The farmer's freedom in production decisions is limited to 10–15% of the farm area, where the farmer can grow any legitimate crop and has exclusive rights to the outputs raised at his/her own costs.

The target yields that a farmer must get from the assigned piece of land are also pre-determined, and it is the farmer's obligation to achieve or exceed that target. To help the farmers achieve the prescribed targets, the government provides a proportion of production costs in advance through

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Large-scale irrigation in the Khorezm Region and associated salt accumulation

the banking system. The farmers can use this advance to order only prescribed inputs from prescribed governmental input-supply companies. The advances are settled at the end of each crop season against the value of products provided by the farmer to the state procurement system. To foster the achievement of targets, there is an elaborate system of sanctions and rewards, which includes severe sanctions for underperformance or defying the state order. For key crops, there are also norms and recommendations for the production technologies, inputs and agronomic practices that the farmers need to adhere to under the state plan. Agricultural inspectors, as well as various arms of the rural governmental system, monitor the adherence of farmers to the state plan.

The continuous changes in farm sizes, tenure systems, and the mandates and designs of organisations around agriculture have created perpetual uncertainties. Farmers have to update their information about governmental policies regularly and adjust their management accordingly. As such and due to farm resizing in 2008/09 and again in 2010/11, many farmers had to hand over their farms to the state, which re-merged several smaller farms and re-allocated those merged farms to "new" farmers. The farmers whose farms were taken over either completely abandoned farming or became informal tenants of the new farmers. These insecurities impinge seriously upon the farmers' willingness to make capital investments in restoring or improving land fertility. It is widely believed that such uncertainties challenge the sustainability of agriculture in Uzbekistan.

This context obviously has serious implications for innovation development and diffusion and the possibilities for a stronger role of farmers through participatory innovation development:

- The room for own decision-making by farmers is limited: main crops are prescribed and production practices determined by and large by input schemes linked to the main credit source.
- The window of opportunity within which farmers can innovate to make their farms more productive, profitable and sustainable is thus quite narrow. A farmer in Uzbekistan, for example, would have to convince the state agricultural and irrigation inspectors about his/her reasons for not following state recommendations on production technology, e.g. using reduced tillage. Many may be "scared" to go that way.
- However, there are documented experiences that many farmers do innovate within these restrictions and exceed the suggested target levels of outputs by adopting innovative ideas, e.g. intercropping, despite all the uncertainties mentioned above. This does create some room for participatory innovation.
- More than in many other regions of the world, agricultural innovation down to the lowest level in Uzbekistan needs to consider strict government policy and regulation implications. There is therefore almost always a need to involve relevant policymakers (often at the regional and national level) and policy implementers at the district level *(Hakim)*, as early as possible in the process.
- Present "new" farmers appointed by the government may not have been farmers before, may lack in-depth agricultural expertise and may not be effective partners for researchers or other outsiders.
- Finally, almost all agricultural professionals in Uzbekistan (farmers, farm managers, managers of the water users associations, agricultural scientists and local authorities) have learned and worked under the previous state-planned system and have next to no exposure to alternative, participatory approaches. They need time and opportunity to learn the strengths and weaknesses

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Project office at the compound of Urgench State University, Uzbekistan

of these approaches and to internalise participatory ways of doing things in their daily work.

The ZEF–UNESCO project and its FTI initiative

The project "Economic and Ecological Restructuring of Land and Water in the Khorezm Region of Uzbekistan" is financed by the German Ministry of Science and Education and implemented by ZEF in partnership with UNESCO, Urgench State University of Uzbekistan, and many more national and international partners. The project aims at finding ways through in-depth inter- and transdisciplinary research to alleviate environmental and socio-economic problems in Khorezm Region, which is located within the environmentally disastrous areas of the Aral Sea basin. The project intends to increase the economic efficiency of agriculture, while improving the natural ecosystem and its services. Solutions to regional problems are being investigated at three levels: i) decision support for improved agricultural policies on national and regional level; ii) institutional restructuring aimed at sustainable natural resource use; and iii) integrated "technology mix for improving the management of land and water use.

Since its inception in 2001, the project explored institutional and biophysical alternatives to current practices. The various research subprojects yielded numerous innovation packages that were believed to offer potential for outscaling. It was only in the design of the third and final phase that the project realised the urgent need for the developed innovations to be tested and refined in practice in a transdisciplinary manner, meaning jointly with farmers and other relevant stakeholders. To this end, it designed a separate component "Implementing, improving and adapting with target groups: 'Follow the Innovation' (FTI)" aimed at linking research with knowledge of stakeholders through joint testing, validating and finalising of the developed innovations. In this regard, it tried to build on lessons from elsewhere in designing more interactive innovation approaches.

The FTI component envisaged the creation of inter- and transdisciplinary research teams around innovation "packages" developed by the project and regarded as "plausible promises" to resolve some of the problems in the Khorezm agricultural system. Four such teams of scientists were formed. In a workshop series involving international resource persons, these teams were trained, supported in work planning, and provided with relevant tools, methods and skills for stakeholder interaction and joint experimentation. Between the workshops, all FTI teams were supported and accompanied by a fulltime FTI facilitator. Some stakeholders who became involved in FTI implementation joined all or some of the subsequent workshops, allowing the learning process to become very focused and lead directly to planning of next steps. The FTI process was continuously monitored, documented, critically discussed and adjusted accordingly by all partners.

The implementation of the FTI component was influenced by the overall structure and functioning of the project, which had two legs: one in the field office in Urgench and one at the Center for Development Research at the University in Bonn. The project was managed by a professor in Bonn – the project leader and head of the Natural Science Department of the research centre – assisted by two project coordinators in his department, one each in Bonn and in Urgench, as well as one coordinator of the social science and one of the economic research component in the project. Research staff comprised senior researchers and PhD students recruited from Uzbekistan, Germany and a few other countries, as well as locally recruited research assistants. Some of the senior research staff members were located at the project's field office in Urgench, and others in Bonn. This puts limitations on interaction, communication and coordination within the teams. The senior researchers in the FTI teams also led the project components in their respective disciplines, with responsibilities of recruiting and supervising students and research assistants; analysing data; writing, presenting and publishing papers in their respective scientific fields; maintaining and nurturing partnerships; and teaching and lecturing at the universities in Urgench and/or Bonn. Junior scientists, such as PhD and Masters students and research assistants, focused on their own research designs and were guided by their respective supervisors. Apart from the staff in the social science component, other staff had no prior exposure to participatory processes or methods. As typical in a project context, the researchers had little job security beyond the project duration, which led to high turnover rates of key staff during the implementation of FTI.

3. KEY CONCEPTS

Inventions and innovations

Before presenting the FTI approach in more detail, it is important to clarify its basic concepts, starting with innovation as compared to invention. Simply put, an **invention** is a new composition, device or process, an improvement to an existing one or a radical breakthrough. Inventions often extend the boundaries of human knowledge, experience or performance. All new discoveries are thus inventions.

In contrast to this, an **innovation** is a new method or device put into practice in a particular context. Once the potential users start using an invention, it becomes an innovation. Innovations can originate from science as well as from the experience of farmers, resource managers or policymakers (Wettasinha & Bayer 2008).

The ZEF–UNESCO project regarded an "innovation" as any kind of novelty that was to be introduced in the target region, be it a technology, behaviour, technique and/or approach to innovation diffusion, addressing different stakeholders, e.g. farmers, water managers, policymakers (Mollinga *et al* 2006).

Follow-the-Innovation vs. Follow-the-Technology approach

The **Follow-the-Innovation** (FTI) approach used by the project builds on the **Follow-the-Technology** (FTT) approach described by Douthwaite (2002). Douthwaite presents a stepwise process through which an agricultural technology, such as a new variety or a seeder, developed by formal research programmes is given to potential users for testing and possible adaptation, while monitoring carefully this process and its outcome.

The project extended this concept/approach to include also non-material types of innovation, such as institutional, organisational or process-related innovations, thus creating the FTI approach. FTI is a process of interaction between the project scientists and the selected potential users, through which they test and adapt an innovation to suit the local reality, while studying the outcome carefully.

Joint experimentation vs. laissez-faire

The project realised early on that, while the original FTT approach included just monitoring of how users applied or adapted the given technology, the complex character of the innovations developed by the project probably still required more structured joint testing with users in real-life situations. It therefore distinguished two strategies within FTI known as "joint experimentation" and "laissez-faire".

"Joint experimentation" refers to an approach whereby the scientists and partnering stakeholders jointly design and implement experiments under real-life conditions to test and adapt selected innovations. Experimental design, inputs needed, implementation mechanisms, monitoring and analytical methods are chosen jointly, and the criteria and indicators for assessing results are devised jointly. The innovation itself is reviewed in the beginning to assess whether it should be tested as it is or experimented with in a revised form, considering local realities. Once the results are available, these are analysed together to make a decision whether or not the innovation is found suitable. This analysis may generate ideas about what elements of the innovation can be modified and further tested in a joint experimental mode.

Under **"laissez-faire"** ("let-it-go"), the innovation with potential is offered to the intended users and stakeholders for their own use, and the researchers focus on monitoring this use, the modifications made by the users and the impact of the innovation. Adoption and adaptation practices by various categories of users are recorded and analysed, as are the reasons for adoption, modification or rejection by the users. In practice, the "joint experimentation" strategy was much more dominant in FTI implementation by the project, as the innovations selected for FTI – e.g. zero tillage as part of conservation agriculture, and afforestation of degraded land – are relatively complex and require considerable finetuning under real-life conditions (as compared to e.g. a new variety with requirements similar to an existing one).

Disciplinary, interdisciplinary and transdisciplinary innovation development

As the project innovations largely originated from the scientific work of its PhD students, these were naturally limited because of the dominance of their single **disciplinary** knowledge. Interaction with other disciplines and with users or the stakeholders is often limited in such cases.

Given the complexities around innovation in the context of Uzbekistan, the project stressed the importance of interaction between disciplines to assess potential innovations. FTI thus encouraged the formation of **interdisciplinary** teams of scientists, so that scientists from various disciplines contributed their specific knowledge and expertise.

But, by definition, FTI needs to hinge on the interaction between the project's scientific knowledge and the local knowledge of all relevant actors for innovations to be adapted and locally embedded. Once the stakeholders and the interdisciplinary teams work together on a problem jointly, the exercise becomes a **transdisciplinary** process. When stakeholders join scientists in "Innovation Teams", these teams become transdisciplinary.

Stakeholders, product champions and partners

Stakeholders are those who literally have a stake in the matter at hand, meaning those whose interests are affected by the innovation at hand or those whose activities strongly affect the innovation. Apart from actual potential users of the innovation, stakeholders thus also include those with information, resources and expertise needed for strategy formulation and implementation or those controlling relevant implementation instruments. Stakeholders might be supportive, neutral or against the innovation in question, depending upon their interests.

In Uzbekistan, the stakeholders for agricultural innovations include always farmers and their farm managers, but also farmer' associations, water users associations, staff of water management agencies, rural authorities, organisations dealing with various aspects of agriculture at district, provincial and national levels (research, education and implementation organisations), and the policymaking structures, such as the Ministry of Agriculture and Water Resources.

The FTI approach hinges on identifying, finding and mobilising stakeholders who are keenly interested in the innovation and would be ready to try it out and use it. Such people or organisations are called **product champions.** They become main movers of the FTI process and fill critical knowledge gaps.

All stakeholders – champions and others – who actually agree to jointly experiment with the FTI teams of the project become **FTI partners.**

Box 1: Stakeholders and product champion: the case of afforestation

1) Stakeholders: Farmers and farmer associations in Khorezm; provincial, district and local governments; Provincial Forestry Service; Forestry Research Institute; Ministry of Agriculture and Water Resources; National Committee on Nature Protection
2) Most important stakeholders: Farmers and farmer associations; local / provincial government; Forestry Research Institute (FRI)
3) Product champion: Head of FRI
4) Partners in FTI team: Project staff and FRI staff

4. The FTI approach: the main flow

The involvement of stakeholders in innovation development right from the onset is often essential, but this does not always match the reality of a scientific project. FTI is an effort to overcome this shortcoming, when potential innovations have already been conceived through scientific research. From this starting point, the FTI approach consists of a series of logical steps to bring stakeholders into the innovation process. Broadly, these steps can be categorised into three phases:

I. **The initiation phase** in which the project organises itself internally for FTI, reviews innovations that are part of the project's portfolio (or from elsewhere, if the project has a limited research component of its own), selects those with potential for FTI, forms teams, ensures that relevant staff has the knowledge and skills required, and encourages the teams to develop innovation-specific strategies and plans. The importance of this phase should not be underestimated. It is essential that enough time and resources are set aside to make sure that the research teams and the individual staff members are well prepared when they start interacting with stakeholders. This is particularly true in situations such as in Uzbekistan, where stakeholders can be expected to be relatively unaccustomed to working in a participatory mode and initial hesitation may need to be overcome;

II. **The experimentation and learning phase** in which the teams interact with relevant stakeholders, find those that want to join the FTI process and undertake a series

Table 1: Summary of FTI approach

Main phase	"Steps"
I. Initiation	
The project organises and prepares itself before starting to engage with other stakeholders	1. Choosing promising innovations 2. Forming and building teams 3. Team planning
II. Joint experimentation and learning	
Stakeholder engagement and mobilisation	4. Stakeholder analysis and initial selection 5. Systematic stakeholder engagement towards agreement to collaborate
Planning, implementation and M&E of joint experimentation and learning activities	6. Participatory planning and design 7. Implementing joint experimentation and learning 8. M&E and impact assessment
III. Follow-up	
Sharing the results of FTI widely and strategically	9. Strategic documentation and communication of key findings on innovations and the FTI process 10. Creating favourable conditions for continued use of the innovation and FTI

of joint experimentation and learning activities around the selected innovation or innovations in order to test and adapt it. The first part of this phase should not be rushed: finding stakeholders genuinely interested in the innovation and in becoming partners in the FTI process is critical for the further success. Clarifying expectations and responsibilities on both sides will help build a strong foundation for the process. At this point, stakeholders who have become partners may join the innovation teams, fully or partially, depending on what is most practical. In the second part of this phase – joint experimentation and monitoring and evaluation (M&E) – the challenges are to fully maintain the participatory dynamics and to ensure that partners are given full opportunity to bring in their own knowledge, experience and capacities;

III. **The follow-up phase** in which the project, involving stakeholders as much as possible, ensures that findings are compiled and packaged to be shared for specific audiences, targeting also policymakers to help create a favourable policy environment.

Table 1 summarises these three phases and their respective sub-activities.

In Table 1, each of the steps builds on the results of the previous step and provides input for the design and implementation of the next steps. Of course, this is an oversimplification of the process. In many cases, because of experiences in practice in later steps, the teams will revisit assumptions and choices made during earlier steps. This may lead, e.g. to identifying new critical stakeholders, redefining terms of collaboration or redesigning the experimentation. It is actually quite common that the first year, given the relative limited experience of the team members, is not very productive in terms of results of experimentation, but is very productive in terms of team learning, thus building a basis for much more focused implementation in the second year.

In the following chapter, each of the above-mentioned ten steps is explained in more detail, with experiences from the ZEF–UNESCO project added where appropriate. Box 2 gives an example of the FTI process in the WUA case.

Box 2: Example of flow of the FTI process: the WUA case

1. **Selection of an innovation** took place during the FTI workshop in May 2008: the approach of Social Mobilisation and Institutional Development (SMID) of Water User Associations (WUAs).

2. A group of researchers working in hydrology, soil science, agronomy, economics and social sciences **formed a team** at this May workshop. It decided to divide itself into a "core group" of senior project researchers and a "support group" of junior researchers/ PhD students, men and women. A senior researcher with experience in SMID elsewhere in Uzbekistan was elected as "team leader". Most of the team members attended **two or more FTI training** events. The team suffered from staff changes and team size varied between three and six.

3. **The team planned** its work through three rounds of meetings, discussing how to proceed in testing whether or not the SMID approach led by local community members would improve the members' feeling of ownership and the management of WUAs.

4. **Stakeholder analysis and initial selection** started with a listing, by the team, of potential WUAs and mapping other stakeholders, using Venn diagrams. The team drafted criteria for selecting an appropriate WUA and chose Ashirmat WUA as a potential cooperating partner, because it is located at the farthest end of the irrigation system, has less water per unit of irrigated land than other WUAs, the socio-economic conditions of the water users are relatively poor, and there was no previous history of external support from an international organisation. Informal interaction with the WUA Chair confirmed interest.

5. **Systematic stakeholder engagement towards agreement to collaborate:** After three further informal meetings with the WUA Chair, a joint problem-analysis workshop was organised to discuss water-related issues raised by the WUA members and possible ways forward. The discussions were visualised on charts and a printed summary of proceedings was shared in the Uzbek language. The central issue appeared to be a lack of cooperation that the WUA water distribution and accounting staff received from the members, who believed that the WUA was a state body mandated to provide water for growing state-prescribed crops. The FTI team suggested that social mobilisation by knowledgeable community members might create awareness and a feeling of ownership among members and increase their willingness to cooperate.

   WUA staff visited WUAs in the Ferghana Valley of Uzbekistan, where such an approach had worked. In a follow-up meeting, the Ashirmat WUA management and the FTI team signed an agreement according to which the team would build capacity of WUA staff on social mobilisation and related issues and the WUA management would contribute local resources for carrying out SMID. The WUA chair and the head of the local rural council requested also some support in terms of hardware: a computer and printer, a few bicycles to facilitate staff travel, and some tools and equipment for refurbishing the WUA office. This was all included in the 12-point action plan that was part of the agreement.

6. **Participatory design of the joint experiment** – in this case, the joint testing of the SMID approach – took place already as part of the above process and meetings. The WUA management agreed to appoint staff and community members to conduct social mobilisation for six months and to help form water-user groups along tertiary canals. It would provide labour for construction. The project would organise technical monitoring of water supply and distribution and would undertake perception surveys to measure changes in feeling of ownership by WUA members. The WUA management would provide access to its water data and financial data. It was agreed to discuss and analyse results jointly in WUA general meetings held annually.

7. **Conducting the experiment** took the form of following the agreed process and implementing the plan. The WUA management established a "Core Contact and Partnership Group" for mobilising water users; this group comprised the

chairman of the village council, an informed and influential farmer and former head of the kolkhoz, and the six staff members of the WUA. The project conducted a four-day training programme for this group on 15–18 December 2008. In January 2009, WUA Ashirmat organised its first ever general assembly as the first step in the SMID process. The 12-point plan was approved and a series of proposals from the WUA management were raised and approved by the farmers present. A second general assembly was organised in 2010, followed by two water-users meetings in that same year.

The appointed social mobilisers visited all water users and local leaders to raise awareness about the WUA and its role, and their group leader delivered speeches on this during local ceremonies. The WUA obtained an office from the local rural council and undertook the planned refurbishing, using the agreed materials and equipment provided by the project. WUA staff managed to obtain access to an excavator for cleaning canals from higher canal-managing authorities and established small water-user groups around tertiary canals and pumping stations. Members of the WUA Core Contact and Partnership Group participated in all major FTI capacity-building activities from the end of 2008 onwards. The WUA prepared a proposal supported by FTI project staff to access Japanese funding for obtaining canal-cleaning equipment.

8. **Monitor and evaluate results:** During the fourth FTI training, the core group and the FTI team jointly decided on monitoring indicators. The WUA shared monthly progress reports with the project staff for the initial six months, as agreed. The perception survey was carried out in September 2009 and the results were jointly discussed during a meeting between the project, the WUA management and farmers. It showed that the majority of the respondents had become more aware of the WUA, its staff, the location of its office and the responsibilities of the WUA as irrigation service provider. They did not yet consider the WUA as the key actor in terms of maintenance of canals, or as people to turn to during water scarcity. They viewed WUA meetings as events to sign contracts, discuss payments and share information on WUA plans, rather than a place to have a voice in the planning and implementation of activities.

   On 15 July 2010, a participatory impact assessment (PIA) was carried out in a workshop with four WUA staff members, three commercial farmers and three other households in the irrigation perimeter. The WUA core group and the FTI project designed the PIA jointly. Participants responded on cards anonymously to 12 questions for assessing the WUA's performance. Responses were summarised on the board for all workshop participants to see. It showed that the WUA's performance improved in almost all areas since the start of the SMID. The improvements were more pronounced from 2008 to 2009 and less from 2009 to 2010.

9. **Strategic documentation and communication of key findings** has taken shape through preparation of a paper submitted to the *Journal of Agricultural Extension and Rural Development*, through inputs into these guidelines and through internal ZEF Working and Research Papers.

10. It remains a major challenge to **create favourable conditions for wider use of SMID and FTI approaches** in Uzbekistan. The newly formed NGO KRASS (Khorem Rural Advisory Support Service) hopes to work closely with the Ashirmat WUA in various activities towards this end.

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Members of the WUA core group joined all FTI training events

5. Implementing FTI

Choosing promising innovations

In the case of FTI, working with innovations in the development of which stakeholders were involved only to provide information and data, if at all, the process hinges on the initial selection of innovations that seem to offer highest potential for use in practice, so-called "plausible promises". Towards this end, a staff member reviews the project's research results, discusses with researchers and prepares a long list of potential innovations for FTI. Innovations not directly developed by the project itself can be included in the list. This list should be as exhaustive as possible, and should include a brief description of the innovation, the potential benefits it could provide and the scale for which it is relevant. Once the preliminary list is ready, it can be circulated to project staff and management for review and improvements.

As a next step, the project management and research staff develop a list of criteria for choosing the innovations to be taken into the FTI process. The criteria can be developed through brainstorming. It is important within the Uzbek context that the criteria are not only based on the nature of the innovation for practical use and skill requirements of the stakeholders, but also encompass cultural, institutional and sociopolitical aspects that are decisive for the degree of acceptance of the innovation in question. Box 3 shows the eight key criteria that the project staff used for selecting innovations under consideration for FTI.

Once the criteria are identified, project staff – if possible, involving well-known stakeholder representatives – can rank the listed innovations in a participatory session using a suitable scoring method. Box 4 shows the scoring and ranking method used by the project staff.

When the ranking procedure involves a wide range of staff, it implies a first round of very serious interdisciplinary interaction and argumentation. For example, the soil scientist may feel his innovation is ready for FTI, while the economist still has serious concerns. This interaction needs to be facilitated well so that the scientists from all relevant disciplines support the choices made from the start.

Once innovations have been ranked, the project management needs to decide – based on an estimate of the financial and human resources demanded by the respective FTI processes – how many of the top-ranked innovations can enter the FTI testing and validation process.

Box 5 describes briefly the four innovations that were included in the FTI work of the ZEF–UNESCO project on which these guidelines are based. It serves as reference for the various examples given in the next sections.

Box 3: Project criteria for innovation ranking

1. Relative readiness and potential match with socio-economic reality: Low priority given to innovations that still needed to prove themselves under research conditions or were found less suitable for local socio-economic conditions
2. Demand from concerned stakeholders: High priority if stakeholders had already shown interest in an innovation
3. Strong expertise and knowledge available within the project team: Low priority if people involved in developing the innovation had left the project or were otherwise not available
4. No major opposition from authorities and other stakeholders: Low priority if innovation was expected to be highly controversial
5. Relative resource demand (staff, equipment, finance etc): High priority when implementation could be done without major investments in time or equipment
6. Potential impact, considering impact on agricultural productivity, number of cases where this would apply, and the environment
7. Potential for synergy between various innovations being tested
8. Possibility to address multiple "levels" (field, farm, regional, national), given the importance in Uzbekistan of working not just at farmer level

Box 4: The ranking procedure used by the project

During the second workshop in the FTI capacity-building process, after the participants had already been involved in conceptual discussions around innovation and diffusion theories and soft- and hard-system concepts and detailed discussions on the FTI approach and the logic behind it, each team member was allocated ten votes, which s/he could use for "electing" innovations for FTI. Based on their knowledge and experience regarding the situation in the area and the characteristics and complexities of various innovations being discussed, the team members allocated votes according to the extent they thought the innovations met the criteria. The votes given to each innovation were added up, and the project management selected the four innovations that scored highest for inclusion in the FTI process.

Forming and building innovation teams

The transdisciplinary FTI approach necessarily considers interaction of knowledge in the most relevant disciplines as well as the local knowledge and experience of the stakeholders. This demands a team effort to exchange knowledge and agree on experimental design to test and validate the innovation. Assembling the teams for the respective innovations and equipping them with relevant skills and knowledge is therefore central to the entire process.

The best approach is that scientists interested in specific innovations volunteer to be part of one or more teams. Staff may invite colleagues to join their teams when, e.g. natural scientists stick to technological innovations, and social scientists to institutional ones. As a last resort, project management can encourage scientists from missing disciplines to be associated with relevant teams. The project aimed at creating teams in such a way that all would have researchers from natural sciences, economics and social sciences, to be complemented later with actual stakeholders to become truly transdisciplinary teams.

In practice, one staff member always operated as the main mover of the team. With the usual tendencies amongst project staff to switch jobs (resignations, promotions, long leave of absence, departure for study reasons), care should be taken to have a second line of team leadership for each team.

A critical point is the creation of enough time for the lead staff members to spend on FTI. If not, scientists might see FTI as an additional task to their regular research and capacity-development tasks. If possible, the FTI work should be declared the main responsibility for scientists whose innovations are considered for testing under this process.

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The results of a ranking to compare four innovation options

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Building the conservation agriculture team

Box 5: Innovations chosen for the FTI process in the ZEF–UNESCO project

Strengthening Water Users Associations (WUAs) through an adapted Social Mobilisation and Institutional Development (SMID) approach. SMID approaches have been successfully applied to create bottom-up WUAs elsewhere in the world, as well as within Central Asia's Ferghana Valley. Since WUAs were established in Uzbekistan using top-down approaches, most WUAs in Uzbekistan remain "paper organisations" and the water users develop little ownership of them. Donor-funded projects using SMID approaches within Uzbekistan were able to establish bottom-up WUAs that performed better. SMID appeared to offer the promise of improving the water users' feeling of owning the WUA. The premise of the chosen approach was that an initial joint experimentation with the approach with the WUA staff and local elite to build their own capacity in social mobilisation would automatically lead to continuous institutional development of the WUA when the project team gradually withdraws its support.

Conservation agriculture (CA) in irrigated lowlands. The project's earlier research indicated that the main principles and components of conservation agriculture – minimum tillage, retention of crop residues and appropriate crop rotations – could be successfully applied in the irrigated areas of Uzbekistan. CA could potentially enable farmers to grow more food, feed and fibre crops in an environmentally sustainable way using less labour and fossil fuel and at a lower cost, while at the same time gradually increasing fertility and water-holding capacity of the soil.

Rapid salinity assessment (SA) using electromagnetic induction device (EM). A considerable proportion of irrigated land in Uzbekistan is salt affected. Soils are leached annually, based on regional salinity estimations, which often results in excessive use of water for leaching. Traditionally, the salinity levels are assessed by analysing soil samples from saline land, a time-consuming approach. The soil salinity maps are outdated because of the time lag between sampling, analysis and mapping. The electromagnetic induction meter (EM) is used to estimate soil salinity successfully in many parts of the world, reaching to the most relevant soil depth of 1.50m. The project's own research demonstrated that this device could accurately map spatial distribution of soil salinity in Uzbekistan in a much shorter timespan than using conventional methods. Use of the EM device does not destroy the soil, as no samples need to be taken.

Afforestation (AF) as an alternative use for marginal cropland. In a considerable area of cropland in Khorezm, soils are too marginal to be used productively for field crops. The project identified at least three species of trees, namely *Elaeagmus angustifolia, Ulmus pumila* and *Populus euphratica*, that could be grown profitably on such marginal land, offering benefits in terms of fruit, feed, fodder and fuel. A four-year-old plantation could yield up to 14 tons of oil equivalent per hectare. These findings were considered significant for the Uzbek context, as availability of fuelwood and livestock fodder remain key challenges, especially for rural areas. Thousands of hectares of land become marginal or unfit for crop production annually in Uzbekistan often because of increased salt levels.

Other incentives for involving scientists in FTI should be also considered, e.g. the prospect of publications on the participatory FTI process (this is possible!), presentation of FTI work in conferences overseas, etc. Monetary rewards for FTI work should be considered in exceptional cases only.

It is important to discuss and distribute process roles in addition to disciplinary roles in the teams. Box 6 shows how the project distinguished main roles in the teams. This is not to suggest that a team always has at least four people. Two team members can share one role, and two roles can be played by a single team member. For example, the Expert can also be a Record Keeper, or the Coordinator can also act as the Reflector.

Scientists in the Uzbekistan project face several issues in working in such teams. These include an overly strong focus on the scientific content of the innovation as well as the mental framework of being scientists who have nothing to do with extension, stakeholder interaction or implementation of innovations. A well-planned capacity-development process can help overcome some of such challenges. The ZEF–UNESCO project designed an intermittent 3-year capacity-development programme

Box 6: Process roles within the project's FTI teams

1. The "Coordinator/ Facilitator" takes responsibility for the whole process from team formation to final impact assessment with the stakeholders.
2. The "Record Keeper / Process Documenter" keeps track of team plans and activities and reminds the team members how they are moving forward.
3. The "Expert" advises the team and the stakeholders with regard to specific aspects of the innovation, either from a technical or from a socio-economic point of view.
4. The "Reflector" looks back and forward, informs the team about potential flaws in and drawbacks of the chosen approaches, and helps the team interpret the implications of the chosen path and strategies.

(Table 2) involving an international trainer in participatory innovation development. This enabled scientists to consider implementation activities related to innovation development as part of their professional and personal interests.

Timing, frequency and choice of content of capacity development are all equally important. The flow shown in Table 2 grew out of a process approach, in which the number of larger capacity-building events was according to the project plan, but content details for each developed as the process unfolded. Each subsequent workshop started with a brief summary by participants of main learning from the previous event, followed by a presentation and discussion of progress made since then.

Training events held in Urgench, the field location where the innovations were actually tested and adapted, proved to be more effective than those in Bonn, as they specifically benefited staff involved in implementation in the field. Holding training events in Bonn meant that many active implementers could not take part and there was no possibility for exposure to the local field- and farm-level conditions.

The first workshop in Bonn focused on reviewing and discussing literature related to the successes and failures of adoption of innovations, in order to help staff understand that – for successful adoption – factors external to the innovation (e.g. policy environment, sociocultural system) are as important as factors internal to the innovation (cost of the innovation, relative ease of use by the end user etc). However, we found that, when presenting and analysing the literature, parallels or lack thereof between the generic lessons and their applicability in the local context should be explicitly highlighted and participants should be encouraged to analyse them. Just opening the discussion succeeded only to a limited degree in stimulating such reflection among many Uzbek researchers.

Exposure and sufficient opportunity to practise the most relevant participatory tools are important for the staff

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FTI training workshops

Table 2: FTI capacity-development activities

Training title/ location	Timing	Focus	Number of participants
FTI Workshop I (Bonn)	February 2008 (4 days)	Concepts and approaches to innovation development and diffusion Multi-, inter- and transdisciplinary research; hard- and soft-systems thinking Working in teams	20 staff from both Bonn and Urgench
Research discussions (Bonn, Urgench)	9 literature presentations, discussions 2008–09	Presentation and discussion of key conceptual papers on innovation, adaptation, adoption, policy development etc	Variable depending on availability
FTI Workshop II (Urgench)	May 2008 (4 days)	Stages and activities of the FTI approach Participatory research methods & tools Selecting innovations for FTI Formation of transdisciplinary teams around innovations	22 staff from both Bonn and Urgench
Communication and facilitation training (Urgench)	August 2008 (0.5 day)	Skills for effective communication and facilitation of teams	14 Urgench-based staff
Teambuilding (Urgench)	August 2008 (0.25 day)	Activity-based teambuilding exercises	21 Urgench-based staff
FTI Workshop III (Urgench)	November 2008 (4 days)	Review and reflect on initial FTI implementation, lessons learnt Additional participatory research methods and tools for use in FTI (PM&E) and skills in using them, also through field study Re-assess FTI team organisation and develop measures to improve/re-strategise	21 staff from both Bonn and Urgench including 3 stakeholder representatives
Interim Review- I (Urgench)	May 2009 (2 days)	Critically review the FTI progress and its constraints Plan further steps	22 staff, mostly Urgench-based, 3 stakeholder representatives
FTI Workshop IV (Urgench)	November 2009 (4 days)	Critically review FTI implementation Participatory impact assessment methods and tools; practice through field study Process documentation Review of FTI teams and their functioning Discussion of additional innovation areas for inclusion in FTI programme	15 staff from both Bonn and Urgench, 7 stakeholder representatives
Interim Review II (Urgench)	April 2010 (2 days)	Critical review of progress Plan further steps	11 Urgench-based staff
FTI Workshop 5: Writeshop (Bonn)	January 2011 (4 days)	Present and review first draft of papers for each of the FTI processes Lead authors improve drafts based on comments to be ready by end of training Discussion of main content of FTI guidelines	4 staff lead authors, one per group 3 FTI process facilitators

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Teambuilding exercises

to learn how to engage with stakeholders, facilitate joint situation and problem analyses, and undertake participatory planning, monitoring, evaluation and impact assessment. Since the brief training sessions offered limited opportunities to practise the tools, the teams did not use most of them in the actual interaction with stakeholders. Adequate time needs to be planned in the training events to understand and practise the participatory tools and/or additional focused short training or practice sessions need to be organised focused on the use of tools. This was the role of the fulltime FTI coordinator in the project, who also reminded and encouraged teams to use the tools, helped choose the most appropriate ones, and sometimes joined teams in the field to give initial support in using the tools.

A specific training area identified early in the process included soft skills of team management, facilitation and effective communication. Many researchers and other professionals in Uzbekistan are excellent experts in their own field but lack these soft skills and thus find it difficult to entertain and accept ideas from other fields of knowledge. Communicating scientific ideas in non-scientific language to non-scientist stakeholders poses another challenge. In the ZEF–UNESCO project, the researchers still often tended to trust their own data more than those of their peers, and thus sometimes appeared to their peers and stakeholders as too sceptical, too critical or unable to compromise.

The project's training sessions in effective communication helped team members understand the importance of communication to prevent misunderstanding. They also assisted in identifying strategies that the team members need to follow to communicate within the research teams as well as with stakeholders. Training in facilitation skills helped staff identify the attitudes and characteristics of a team leader as compared to a team facilitator. They also assisted in discerning content and process roles. Team-building exercises complemented this and helped in identifying each other's strengths and weaknesses and team members' personalities and styles, and contributed to building trust amongst the team members and stakeholders.

Timing of the training events is crucial:

- Do not plan to have FTI training events at the peak of the growing or harvesting season, when non-FTI research activities keep many of the participants busy;
- Consult participants, including stakeholders, on most convenient timing;
- Avoid lengthy periods without any training or review activity, so as to maintain the enthusiasm that peaks immediately after training and to prevent loss of knowledge. Six-month intervals are too long. Short events can be organised between larger training events to bridge such periods;
- More informal discussion and feedback sessions can be held monthly within the project; here, practical assignments and activity-based learning designed around the challenges the teams face can garner interest and facilitate learning.

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Brainstorming on the roadmap in the salinity assessment team

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Visualising main issues raised

Team planning

It is important that, very early on, each innovation team having members of different disciplinary backgrounds develops a joint understanding of the innovation and its present status. This enables them to define jointly the purpose of testing and adaptation with the stakeholders and to develop appropriate strategies towards this end. A number of team sessions will be needed for this, rather than the lead researcher writing his/her usual research proposal.

Box 7: Intervention logic of the AF innovation

If: Marginal cropland identified is available for planting
Farmers agree to plant recommended trees species (design and responsibilities), and
State authorities grant permission for the proposed land use

Then: Trees will be planted
Leading to productive growth of trees
Increased financial benefits for farmers
Ecological benefits
Farmers motivated
And an opportunity for cropping system change

IMPACT: Environment–land use changed
Farmers have higher income
Livelihood and system benefits (long-term)
Positive changes in regional landscape
Appreciation and credit for project increased

Two tools were suggested and used to help the teams in this. First of all, the teams were encouraged to jointly formulate the so-called **main intervention logic** of the innovation at hand: what the innovation entails, what is expected to be the immediate outcome of using the innovation, and what the longer-term impact might be. The "If – Then – Impact" framework is helpful to formulate this. Box 7 shows the intervention logic formulated by the team working on the afforestation (AF) of marginal cropland.

The teams then formulated a **"roadmap"** as a joint planning tool: a brief document outlining the main strategy of the team, leading to main activities foreseen, people involved and timelines. Figure 1 shows, for example, a summary of the roadmap of the team working on salinity assessment. Given the complexities of the project and the FTI team structure, coming up with a feasible roadmap with sufficient inputs from all colleagues and stakeholders proved time-consuming. The direct feedback and comments from the FTI coordinator based in Urgench proved very important in this context.

It can be expected that the team members who were most closely involved in developing the innovation will tend to dominate some of the discussions. They need to be challenged to listen to other perspectives and integrate experiences and knowledge from other team members and their respective fields of expertise. In the project, attention also had to be given to clarifying and strengthening the role of junior team members, PhD students and research assistants. This points to the need for the team leader or

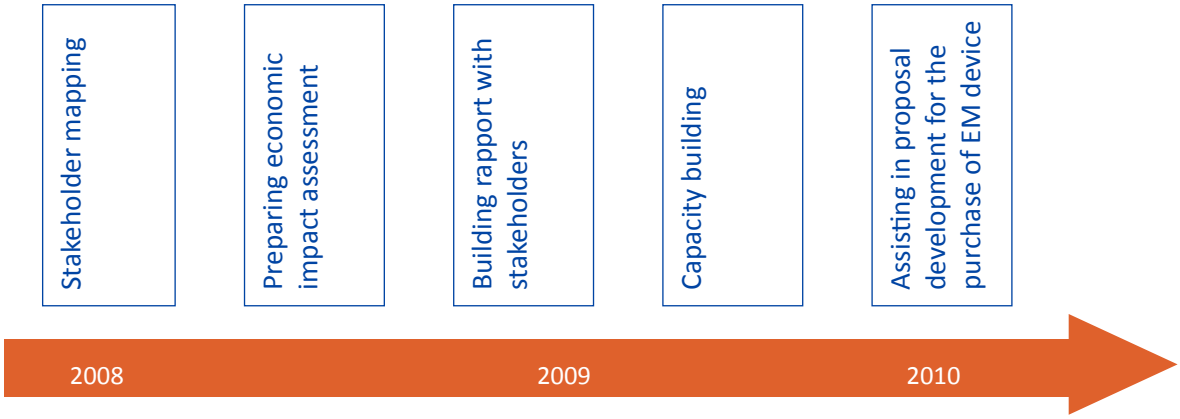

Figure 1: Roadmap of the salinity assessment team

another team member to facilitate team discussions and create an open, motivating and encouraging environment. In cases where the team leader found this difficult, it proved helpful to request one of the team members or the FTI coordinator to moderate certain team discussions.

During such planning meetings, it is useful to visualise the main discussion points and conclusions for all to see. This helps to bring all members on board and to develop a similar understanding of the situation at hand. This can take very simple forms, as illustrated in the photograph below, showing a visualisation of the main issues to be included in the process documentation on the salinity assessment FTI process.

Stakeholder analysis and initial selection

In FTI, identifying relevant and appropriate stakeholders for the innovation concerned is a critical step. The teams need to ask themselves two sets of questions: 1) "Whose problem does the innovation aim to resolve?" "Who would be interested in collaborating with the team in jointly testing it"? and 2) "Who could have a major influence on acceptance and use of the innovation?" – who would therefore need to be involved/linked to the FTI process at some stage. The seven steps in selecting key stakeholders are shown in Box 8.

In Steps 2 and 3, the project teams used the Venn diagram. This is a tool for visualising on, e.g., a sheet of paper the most

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Venn diagram analysis of stakeholders

Box 8: Seven steps in selecting key stakeholders

1. Prepare a list of stakeholders who might be interested in the innovation, taking into account those at field, farm, system and national level (see example given in Box 1).
2. Review and analyse in the teams the potential interests and mandates of these stakeholders. Practical issues such as their location and availability for engaging in FTI may also have to be considered. A Venn diagram helps to organise such an analysis (see above).
3. Choose the most relevant stakeholders who would be potentially interested in joining the experiments and the FTI process.
4. Contact potentially interested stakeholders and seek an appointment.
5. Present the innovation and convey desire for cooperation.
6. Explore stakeholders' interest, resources, constraints and willingness to cooperate.
7. Process and analyse this information in order to make a final selection of stakeholders. Central in the analysis is formulation of coherent criteria for ranking potential stakeholders, but do not eliminate too soon; keep a few options open in case the preferred stakeholders do not agree.

relevant stakeholders and indicating their direct relevance to the innovation (shown through distance of the circles from the innovation) and their power (shown through size of the circles). The photographs below illustrate an example from the WUA team. Detailed instructions about the logic and use of this and other tools mentioned here can be found in manuals on Participatory Rural Appraisal (PRA) or other resource publications such as those listed in the references.

Another simple tool in a stakeholder review is the SWOT analysis, which encourages teams to discuss the Strengths and Weaknesses of each stakeholder as well as the Opportunities and Threats related to it.

Finally, matrix ranking is a very useful tool to help make the final choice, as it enables comparing multiple stakeholder options along a set of agreed criteria. The PRA resource guides listed in the references give further details on using this tool.

Systematic stakeholder engagement

Depending on the stakeholders chosen – a farmer, WUA, technical service organisation or local government – each team needs to decide how to engage with them so as to reach a clear agreement to collaborate in testing and adapting the relevant innovation. In this, they will build and follow up on the initial links made as part of the stakeholder selection process.

The process of engagement starts with an initial contact between the team and the stakeholder through a formal or informal meeting. Since stakeholders are usually busy, it is prudent to seek an appointment with them at their convenience. The first contact should be made at the stakeholder's workplace, as they might feel more comfortable to listen to new ideas there. In Uzbekistan, a one-time encounter or meeting is usually not considered enough. The necessity for a series of encounters for confidence building is presented in a local phrase: "the first encounter acquaints us with each other, the next encounter we become comrades, the next encounter we become friends, and then we become family".

Therefore, teams need to plan enough time for exchanging ideas in a series of such encounters, with conscious efforts to build confidence and trust. These encounters can be used to introduce the work the team has done on the relevant innovation and to present the team's findings and ideas on how the innovation might ease or improve the stakeholder's work performance. The teams will indicate that, before such findings can be recommended for a wider scale, they need to be verified and validated under the real-life situation of the stakeholder and that adaptations may need to be made as part of the process.

In almost all cases, the discussion will zoom in at some point of time on the problems that the innovation is supposed to solve and their main causes. At this point, a more systematic joint problem/situation analysis will help both the stakeholder as well as the research team to understand each other's views and perceptions of the key issues. The meetings for problem and situation analysis need thorough preparation.

Visualisation of key issues raised or agreed upon during a problem discussion will make the analysis more systematic and transparent. This is generally a new practice in Uzbekistan and therefore needs to be done carefully

Table 3: Joint problem analysis with farmers and WUA members

Problems		Responsible organisations to solve the problem	Ways to solve problem / improve situation
Water scarcity	The area receives insufficient water to irrigate it; the tail ends and peripheries of the WUA did not receive water since mid March	*Hakim* (mayor) of the district, Water Management Organisation (WMO), WUA	*Mirabs* (officers for water distribution) should prepare more equitable water-distribution schedule and implement/ enforce it
Water turns are not followed	Even if water reaches the WUA, only a few commercial farmers and kitchen gardeners (*tomarka*) irrigate their land; water is very unequally distributed throughout the WUA	District *Hakim*, Rural Council Chairman, WUA staff, farmers	Clearer and stricter water turns must be established. *Hakim*, Rural Council and WUA staff should check this. Farmers should follow the agreed or approved water-distribution rules
Problems with inputs (diesel, electricity) for pumps	There are few diesel pumps for irrigation; no diesel quotas are allocated; electricity is not reliable	Head of the local filling station, Ministry of Agriculture and Water Resources Management	Limits for use of diesel and electricity must be allocated and released according to the number, type and capacity of the pumps
High cost of pumping for irrigation	The cost of pumping water is high compared to farm incomes; most farmers and other water users cannot afford to pay for the electricity and pump maintenance	Cabinet of Ministries of Uzbekistan, Ministry of Agriculture and Water Resources Management	Funds to cover cost of the pumps must be allocated; irrigation system must be turned into gravity irrigation
Inadequate land preparation for water delivery	Most farmers report that they prepared land for irrigation under administrative pressure. But when water arrives, not all fields are prepared for irrigation and the water flows into the drainage	*Hakim* and WUA leadership, farmers	Better coordination of water releases/turns and readiness of land for irrigation; extension of the irrigation time allocated for the WUA
Mismanagement of drainage water	Water in the drainage system, e.g. Ozerniy, cannot be managed; as a result, during drought/water shortage, the groundwater levels drop, leaving no water in the wells	Ministry of Agriculture and Water Resources Management	Infrastructure to control water levels should be constructed and, when water is scarce, the drainage canal can be blocked so as to raise groundwater levels

and well explained. In Uzbekistan, stakeholders can be distracted because of hospitality considerations. However, the project experience suggests that, when it is introduced carefully, people do quickly accept this new way of working in meetings and appreciate the benefits.

During such joint analysis, a conscious effort needs to be made to link the research findings to the specific situation of the stakeholders and to deliberate how the chosen innovation could resolve some of the problems mentioned. The team members should encourage stakeholders to give their ideas, be open to hear these, and solicit views on how the innovation could be made to work in the field, with or without adjustments. When views of the stakeholders differ from those of the team, joint testing could be suggested to find answers in practice. Adjustments proposed by the stakeholders become a topic for discussion, as in the case of the WUA innovation team (Box 9).

A main objective of these discussions is gauging whether the stakeholder is genuinely interested in and enthusiastic about becoming involved in FTI. There is always a danger that teams bring across the view that the joint experimentation is primarily a research interest of the project. Stakeholders may be quick to assume that the project will provide all inputs and resources, and interest in these resources may become their main motivation to become involved in FTI. Given the main purpose of FTI – to find out whether the innovation makes sense in real life – the decision of stakeholders to join FTI is already a first critical test. Teams would emphasise that joint experimentation in FTI is and should be in the interest of the stakeholder as well as the project. This would imply owning and sharing the risks and results as well as the resources. Reluctance of stakeholders to engage in FTI on the proposed innovation should be carefully probed, as this in itself may reveal important factors influencing the usefulness of the innovation.

Box 9: Adapting a proposed innovation: the case of WUA

The WUA team proposed to improve farmers' ownership of the WUA through social mobilisation and training. However, WUA stakeholders perceived having an own office and means of transport as prerequisites for "having a face" and recognition by the community. The WUA team, after a series of discussions about the potential benefits and other modalities, agreed to contribute some funds for refurbishing the office of the WUA to increase its visibility within the community. The WUA requested materials from the project and decided to cover the labour costs itself.

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Bicycles improve the visibility and outreach of WUA staff

If stakeholders show initial interest, an agreement has to be reached on the nature and operationalisation of the collaboration in FTI. Box 10 provides a checklist of key areas of attention, from the Uzbekistan experience.

In Uzbekistan, verbal agreements are preferred and honoured; formally signed agreements are not necessarily needed to consolidate the collaboration. Even if written agreements are signed, these are rarely fully adhered or referred to. Nevertheless, the problems with verbal agreements are that not all details might be remembered over a longer time and that there is no transparency on what has been agreed. It is therefore especially worthwhile to write and sign partnership agreements in situations where financial resources are required for the joint experimentation. In such cases, a draft agreement in the local language needs to be prepared and shared to allow possible changes and amendments. It is possible that stakeholders in Uzbekistan are not skilled in writing partnership agreements, and the team may need to provide assistance. Inputs, suggestions and changes from the stakeholders need to be actively and politely requested, as the stakeholders might be hesitant or consider it impolite to disagree. Once agreement has been reached on the draft,

Box 10: Framing stakeholder collaboration

1. Discuss how they see their benefit of involvement in FTI
2. Discuss what the project expects
3. Discuss what can be achieved through joint experimentation
4. Discuss what the team needs from stakeholders
5. Discuss what the project can provide for stakeholders
6. Agree what to expect from each other
7. Clarify roles, responsibilities and timelines
8. Summarise jointly your common understanding
9. Discuss next steps
10. Prepare and exchange minutes, revise and/or translate, if necessary.

it can be translated into other languages, if necessary, and should preferably be signed by the project first.

After collaboration has been agreed, representatives of stakeholders can be asked to join the innovation team. The stakeholders thus become full partners in the processes of testing and validating the innovation and may join team meetings and even training events, if convenient. In the ZEF–UNESCO project, for example, representatives of the WUA involved in FTI joined the innovation team and attended key training workshops. Although this increased complexity of translation during training, it very much helped in not only building team spirit but also clarifying the FTI aim and process. The regular involvement of a representative of the National Forestry Research Institute in the afforestation team worked likewise and contributed to the institute's acceptance of both the innovation and FTI.

Participatory planning and design

Participatory planning of the joint experimentation or learning activity goes much beyond informing the partners about how these will be carried out. It is a conscious effort to bring science and local partner's reality together. Both parties need to put their wishes, desires, knowledge and experience on the table and negotiate to identify a way forward through which the objectives and interests of both parties are largely met.

The planning includes at least the following:

- Further detailed analysis of the strengths and weaknesses of the innovation, all its relevant features as well as potential barriers and constraints.
- The objective of the joint activities, referred to here as joint experimentation and/or learning. The heart of FTI is the joint effort to explore whether and how the innovation could work for the stakeholders; thus the term "experimentation". The addition "and/or learning" indicates that the activity can take other forms than an organised experiment, though the overall objective remains the same.
- The design of the experimentation: First of all, the question whether it is left to the stakeholders to try and use the innovation themselves with only monitoring by the project (the laissez-faire form of FTI) or a joint experiment would be the way to go.
- In the case of joint experimentation, discussion and agreement on the layout of the experiment in the field and the various "treatments" are critical issues on the agenda. Finding a good compromise between demands from science and practicalities in the field is essential. The agenda also includes the inputs and timing of the various operations.
- At this stage, ways to verify the expected outcomes through joint M&E need to be agreed on, including M&E criteria and processes. This will be discussed in more detail in a later chapter.

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WUA farmers reviewing the WUA's irrigation design

An important challenge in countries like Uzbekistan is that the local norms of respect for and politeness to visitors and guests dictate that the hosts listen and do not express any disagreement. Special efforts therefore need to be made to encourage partners, as much as possible, to speak up and not to sit as passive listeners. This can be achieved by planning enough time and using also informal visits to build trust.

In moderating and facilitating these discussions, teams need to capture the main outcomes and designs so that all team members develop the same understanding of the experimentation. Tools from the PRA approach such as timelines; SWOT analyses; seasonal calendars indicating activities, responsibilities and resource requirements for various steps; and ranking exercises to compare alternatives can be helpful during the planning process. PRA resource materials listed in the references provide further guidelines on using these.

A compilation of the outcomes and conclusions of the planning sessions forms the action plan for the team. This should be prepared in the local language and shared as swiftly as possible with partners. Their comments and suggestions have to be considered, and the plan and experimental designs improved accordingly.

Implementing joint experimentation and learning

Implementation means putting the planned steps and strategies into action following agreed roles and responsibilities. Here, the partnership will be put to the test. Challenges and complications are to be expected. Box 11 summarises the form the experimentation took in the ZEF–UNESCO project.

During this phase, the project FTI teams needed to be patient. While project teams work with strict project-given timeframes, stakeholders work at their own pace, giving the FTI work the priority it has in their own context.

It is quite likely that several unforeseen circumstances emerge during the implementation, especially in Uzbekistan, as the government rules, regulations and procedures keep changing. Several conditions that were presumed to exist might have changed or might not exist anymore, thus requiring adjustments in the plan. For example, while experimenting with field-level techniques related to crop growth, input availability, weather conditions, soil conditions etc. might change.

The attitude of the non-participating actors, e.g. the village administration, might also require adjustments to the experimental approach. For example, when the WUA received bicycles from the project as part of the joint experimentation strategy, the Machine Tractor Park chair turned against the WUA chair. The latter, an extremely enthusiastic stakeholder and product champion for the WUA FTI, finally had to resign from his position.

All such situations and the resultant adjustments should be discussed and agreed between partners, and the partners should adjust their roles and responsibilities accordingly. A flexible approach to implementation with continuous reflection on the implications of refinement on the original objectives of the collaboration helps in concluding the collaborative efforts successfully.

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Farmers planting trees collectively for experimenting with agroforestry

Box 11: Joint experimentation in the four FTI cases

Strengthening Water Users Associations: The planning interactions with WUA leadership led the WUA to convene its first ever general assembly that approved a 12-point WUA improvement plan which had been developed and agreed upon between WUA management and the project. This included provision of equipment; capacity building of WUA staff in social mobilisation and participatory water management; mobilisation and/or repair of machinery/tractors; interaction with defaulting farmers to pay their debts to WUA; informing water users/WUA members about rotation of irrigation turns; and construction of water-measuring devices in canals and drains. The "experimentation" thus took the form of using this agreed strategy and plan and jointly monitoring whether this indeed significantly improved WUA functioning in all aspects.

Conservation agriculture in irrigated lowlands: In this case, three farmers agreed and allocated plots for testing CA practices, including land levelling using new laser equipment. These trials were subdivided into two parts: an experimental plot and a conventional plot. While the farmer grew crops on the conventional plot using his/her usual agronomic practices, the experimental plot was cultivated according to the advice of the CA expert. Farmers' suggestions taken into account in the design included an increased seed rate for winter wheat and use of herbicides during the second crop-growing period to suppress the weeds. In some cases, fertilizer doses and residue amounts were also adjusted by mutual agreement. These discussions were, however, neither structurally recorded nor reported back to the entire team.

Rapid salinity assessment using electromagnetic induction device: The team, having had limited response from a number of other organisations, came to an agreement with the Central Asia Irrigation Research Institute (Russian acronym: SANIIRI), a key organisation as far as soil salinity testing is concerned. SANIIRI tested the equipment on its research station in the Khonka District, where it had salinity assessment data through its own soil sampling techniques. The ZEF–UNESCO project's field assistants assisted with calibration of the equipment, with further EM and GPS measurements where needed, and with soil sampling to compare the results. Altogether, 20 locations were sampled and measured using the conventional methods as well as the EM. SANIIRI took responsibility for further analysis and reporting. SANIIRI concluded that the equipment needed to be further tested and proposed to undertake similar measurements at their own cost in the Syr Darya Region, to which the project agreed.

Afforestation as an alternative land for marginal lands: FTI implementation hinged on field trials by three farmers who planted trees at marginal sites, including new varieties proposed by the project. More farmers were planned to be involved, but a delay in identification activities influenced final selection of the farmers. During planning, farmers' suggestions about species to be included and planting methods were taken into account. Water availability for post-planting irrigation, however, became a concern because of water administration regulations, adding to the stressful conditions (in addition to poor soils) on the saplings. One farmer was able to get water on time to his site (his agreed responsibility), but the project also approached the authorities to ensure a timely first irrigation. Late planting resulted in poor survival rates in the first year, but the enthusiasm of stakeholders was such that the team agreed to re-plant trees during the next season at two of the three sites and this on even larger areas than during the first year.

Monitoring, evaluation, review and impact assessment

Regular monitoring and periodic review and evaluation aim at taking stock of what is happening in the FTI activity and to what extent the main questions are being answered. Monitoring refers to the continuous and systematic collection and processing of information on the joint experimentation as well as on the process of collaboration in FTI. During the review (less systematic) and evaluation (more systematic), the information collected is analysed to summarise findings, draw conclusions and identify lessons learnt. Impact assessment looks specifically at the longer-term effects of the work.

Participatory Monitoring and Evaluation (PM&E) is part of FTI. In this, a key role is given to stakeholders in designing and implementing M&E activities and learning from it. PM&E goes beyond using participatory techniques to gather information. Actively involving stakeholders in the process will:

- Widen the analysis and make it more relevant to real life by integrating criteria and perspectives from practice;
- Increase relevance of findings to the stakeholders so that they can take informed decisions;
- Enable the discovery of the unexpected;
- Make the exercise less demanding in terms of time and funds;
- Build capacity of stakeholders to undertake M&E of own activities.

To be able to gradually improve and strengthen the FTI collaboration, it is important to include M&E of the collaboration. The teams and stakeholders agree on indicators to assess whether or not the collaboration is proceeding in the desired way, and whether or not course corrections are required. Such indicators could be, e.g., related to performance of roles and responsibilities and provision of agreed inputs and other resources, and/or following the agreed schedule.

Having prepared itself for the main design steps and possible M&E components, the FTI team plays a double role in: i) helping stakeholders define their M&E needs and related activities by asking systematic questions step by step; and ii) defining, if needed, its own (further) learning needs and related M&E activities complementary to those of the stakeholders.

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Canal mapping by WUA members

Designing PM&E includes answering the following questions:

1. What is the objective of the experimentation? What do we, you, the project want to learn from the joint experimentation? The teams help stakeholders define this by themselves. The interest is in finding common ground but accepting specific interests.
2. For each objective, what are the specific criteria that need to be considered in answering the question? Best indicators are generally those which are valid and reliable, sensitive, specific, cost-effective, and available when needed.
3. For each main criterion, what indicators can be measured or monitored relatively simply?
4. For the given indicators, which methods/tools can/need to be used for measuring and recording?

Box 12 illustrates how the WUA team, jointly with WUA leadership, made an initial analysis to design PM&E.

In the Uzbekistan experience, we noted that stakeholders often suggested too broad or too simplified monitoring indicators, creating problems with respect to attribution. Researchers, on the other hand, tended to suggest indicators that required too much and too detailed data collection. In FTI, the researchers can help stakeholders choose appropriate indicators and in organising and using suitable methods of collecting data. The stakeholders can help minimise data collection and suggest alternate ways and indicators more relevant and more practical from their

Box 12: Main PM&E design parameters in the WUA process

Objective: Has WUA performance improved through the WUA strengthening effort?

Criteria	***Indicators***
Profit from crops	Improved economic efficiency of farmers through the number of weddings, houses and cars etc
Water users' support to WUA	Number of WUA members Participation of people in water distribution Approval rates of WUAs
Transparency between WUA and members	WUA reports Distribution of WUA reports
Irrigated crops and area	Farmer yield and area reports WUA staff reports

perspective. For example, a researcher may want to actually record and measure water flow to an experimental field, whereas the farmer would assess the water performance of an innovation by looking at the labour/time requirement to complete one round of irrigation.

Two types of PM&E tools can be distinguished:

1. **Tools that are needed to interact with and acquire feedback from the stakeholders** about the innovation and the collaboration. These can include SWOT analysis, pairwise and matrix ranking, most-significant-change methodology, focus-group discussions, opinion surveys carried out through questionnaires etc; and
2. **Tools that are required to record, process and manage information** obtained through the methods listed above. These can include paper files and folders, wall calendars, charts, computers and software programmes, cameras etc.

The choice of an appropriate tool should take into account the accessibility of the data and information to everyone concerned. Teams will need to ensure regular feedback, sharing and joint analysis of data amongst all team members and stakeholders. In the case of Uzbekistan, the feedback tools such as SWOT, ranking and scoring seemed to be most suitable for use by field-level stakeholders (e.g. farmers, WUAs), and formal recording tools such as tables, graphs and electronic files for organisational stakeholders (administrative and scientific organisations).

Finding a proper balance between stakeholder interest and own M&E needs proved to be a challenge for the researchers in our Uzbekistan experience. Common pitfalls are listed in Box 13.

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Joint monitoring of conservation agriculture experiments

Box 13: Pitfalls in PM&E as experienced by the FTI teams

1. Researchers tended to devise detailed scientific M&E indicators and data-collection needs without and before adequate discussions with stakeholders (CA).
2. Researchers tended to impose indicators and methods despite participatory intentions (CA).
3. Inadequate attention and time devoted to M&E resulted in inappropriate frequency of data collection (WUA, AF and SA).
4. Lack of clarity about the end-use(r) led to the collection of excessive amounts of overly detailed data (CA, WUA).
5. Analysis done by researchers was not made available to stakeholders or other team members (CA).

While the PM&E as described above looks at the performance of the innovation as compared to present practices and at the FTI collaboration, the ultimate objective is that the innovation will improve the situation of those involved and/or the wider ecological and sociopolitical system in a significant and sustainable way. "Impact" refers to longer-term change and can be tangible or intangible, intended as well as non-intended. **Impact assessment** is used to find out whether the stakeholders' situation has been improved or not. In the spirit of FTI, the project opted for *participatory* impact assessment (PIA) rather than relying on extractive surveys only.

Most PIA methods and tools focus on mobilising and systematising concrete experiences of stakeholders through ranking and scoring of alternatives, combining semistructured interviews with small focus-group discussions and then visualising the outcomes for joint analysis with the stakeholders. Structured surveys may be needed only, if at all, to collect systematic data on specific issues. Project baseline data or existing information from other sources can be used for comparison and triangulation. The teams should be aware of the danger of collecting too many detailed scientific data.

Table 4: Timeline analysis prepared with AF farmer

Event	Time	Remarks
1. First contact with the project through Laser Levelling Workshop	November 2008	
2. PhD researcher visited Machine Tractor Park (MTP) for discussion on AF and the MTP Chair sent her to the farmer	December 2008	MTP Chair was somewhat interested in AF
3. PhD researcher visited 2–3 times per month		
4. Species selection and establishment of nursery (PhD researcher)	Spring 2009	
5. Preparation of saplings (PhD researcher / project)		
6. Preparation of land (farmer)		
7. Planting of saplings (farmer) and monitoring (researcher)	March 2009	Monitoring by PhD researcher & project leader
8. Weeding (farmer)	Summer 2009	
9. Irrigation (farmer)	Summer 2009	
10. Fertilizer application (farmer)	Summer 2009	Expand area, more crop species, more training, division of responsibilities
11. Intercropping sorghum, melons and pumpkins (farmer)	Summer 2009	
12. Making future plans	2010	

Though the project realised that a full-fledged PIA could not be fitted into the relatively short (3-year) timeframe for FTI, it developed and tested the following way for doing PIA in order to: i) underline the importance of impact issues; and ii) build the capacities of staff involved to be able to use PIA tools successfully in the future:

1. Define the key 2–3 questions to be answered in the assessment, e.g. did CA help to reduce the use of the scarce water resource, thus enabling farmers to irrigate more land? Did CA improve the income of farmers?
2. Define clearly the limits of the innovation /activity to be assessed: its content, geographical and time boundaries, e.g. how did the WUA in Ashirmat involved in FTI perform compared to the non-involved WUA in Nurobod in 2008?
3. Identify and prioritise impact criteria: What do stakeholders consider important as impact of conservation agriculture? Income? Labour use? Social status and recognition? Increased capacity to innovate?
4. Discuss and select indicators and methods to use with stakeholders, and pre-test them.
5. Discuss and decide on sampling method and sample size with stakeholders, if a sampling technique is to be used.
6. Critically analyse with stakeholders how much of the impact can be attributed to the innovation. Help stakeholders list possible other factors that contributed positively or negatively to the impact. This could then be assessed using ranking/scoring of respective factors to estimate the relative contribution of each.
7. Triangulate / crosscheck using other sources of information.
8. Provide feedback (downward accountability) to stakeholders on the results and verify results with them.

Though PIA was thus done on a trial basis only, most teams – after initial hesitation – successfully used key PIA tools (Box 14).

Although PM&E and PIA are presented separately here, they are intricately related to each other. Impact information will often emerge already as part of PM&E, and can even be asked for intentionally. On the other hand, PIA outcomes might determine what additional elements of the innovation need to be included in PM&E exercises.

All PM&E and PIA activities help answer the question whether or not the innovation makes sense under the

Box 14: PM&E/PIA tools used by the FTI teams

- Timeline of FTI implementation activities with the AF team, including important agricultural events (see Table 4)
- Pairwise ranking and matrix ranking to compare three tree species for afforestation, based on farmers' criteria
- Pairwise ranking of conventional and rapid methods of salinity assessment
- Pre- and post analysis for institutional innovations, such as improving equity in water distribution by the WUA
- "With-and-without" analysis for afforestation of marginal lands
- Radar diagram to measure participation in meetings over the years (Figure 2)

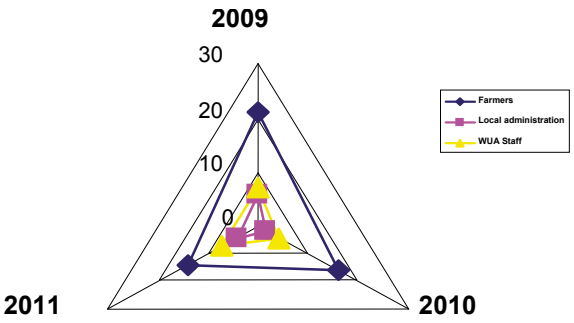

Figure 2: Analysis of participation over time in WUA assemblies

given circumstances – as it is or in an adapted form – and can be outscaled. In case this proves not to be the case, the constraints that are faced and the reasons for mismatch with the local situation need to be not only identified and analysed but also documented.

Our experience in Uzbekistan shows that each PM&E and PIA tool needs to be tailored to the specific stakeholders concerned. The need for consistency in choice and use of tools over a period of time might not be realised by the teams until very late in the FTI cycle, but is very important. Therefore, impact assessment should be introduced early during staff training.

Strategic documentation and communication of key findings on innovations and FTI

While research projects often limit their documentation and communication component to sharing results with the scientific community, the emphasis on stakeholder interaction and real-life learning in FTI requires a more encompassing set of documentation and communication activities. In the case of the ZEF–UNESCO project, these included:

- Detailed reports of all FTI capacity-building activities, such as the FTI workshops I–V and the training events on facilitation, effective communication and teambuilding. These reports offer: i) detailed knowledge about various participatory tools that were learned by the FTI teams for interaction with stakeholders and for systematic and participatory collection and analysis of information; and ii) useful insights into and analysis of the training experience itself;
- Annual process documentation of FTI implementation: Notes on the FTI processes as actually realised, with reflections by the process facilitators and team members, were compiled annually. These were analysed later in more detail in ZEF Working Papers made available online on the ZEF website (http://www.zef.de/workingpapers.html), as well as published in the form of two journal articles in *Rural Development News* and *Development in Practice;*
- Experiences were also analysed from a social-science perspective and led to papers on FTI processes, sometimes including findings on technical components of the innovations and published in peer-reviewed scientific journals. The 2011 FTI writeshop played an important role in this;
- Two 2-page research briefs in the ZEF–UNESCO Rivojlanishlari (ZUR) series were prepared in English and Uzbek and were circulated amongst policymakers, resource managers, development workers and scientists in Uzbekistan. They are downloadable from the ZEF–UNESCO project website (http://www.khorezm.zef.de/zur_khorezm.0.html);
- These guidelines were prepared to share the FTI approach and the lessons learnt when applied in Uzbekistan, in an accessible way to practitioners: people who can use and apply the approach in their regular work.

Most of this documentation together with all empirical data (process notes, field data, photographs, minutes of meetings etc) has been placed on ZEF's webservers, both

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FTI writeshop in January 2011

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in Urgench and in Bonn. The project coordinators can grant access upon request.

Creating favourable conditions for continued use of innovations and FTI

Success in outscaling promising innovations that were found to work in real-life conditions of stakeholders, as well as success in outscaling the FTI approach, depends on whether the wider environment of government policies, regulations and other factors support them. An FTI process takes this into consideration and considers where it can and should undertake steps to change these conditions when they are important limiting factors. Even though the timeframe for the FTI work on which these guidelines are based did not allow major time investments in this, the project took a number of steps to create favourable conditions for continued use of selected innovations and the FTI approach:

- A symposium was organised for development donors in Uzbekistan to brief them about the research and findings of the project regarding various innovations, so as to encourage the donors to accept these innovations when they are included in proposals for funding;

- A short research consultancy was undertaken to explore the policy environment in Uzbekistan, particularly on how innovations are recommended for use by policymakers. It studied the ways of feeding agricultural innovations into the Uzbekistan policymaking process, with particular reference to the four innovation areas of FTI;

- At a policy-level awareness seminar held for Uzbekistan's Parliamentary Committee on Agriculture, the results of FTI-tested innovations were presented together with other findings of the project. Based on its deliberations, the Committee recommended to the state scientific institutes to validate the results and, if found suitable, to forward the innovations to the relevant state apparatus for further diffusion and outscaling;

- Following this up, three of the four innovations – namely afforestation, conservation agriculture and the salinity assessment tool EM 38, together with the documented evidence of their functionality and potential suitability – were submitted to the Ministry of Agriculture and Water Resources for further checking;

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Symposium for the Uzbek Parliamentary Committee on Agriculture

- Involving key government bodies in the FTI process itself proved effective, as shown in the FTI salinity assessment case. EM has already been taken up by the key formal institute SANIIRI in its regular training of field staff responsible for salinity measurements, after having been convinced of its usefulness through involvement in the FTI process;

- The Uzbek nationals in the project, including the senior researchers who were major drivers in the FTI work, have formed their own organisation, a not-for-profit research consultancy called Khorezm Rural Advisory Support Service (KRASS; www.krass.uz). KRASS includes relevant innovations in its field programmes and will undertake further refinement of them in an FTI mode where possible. The team now acts as a major resource organisation for FTI and for participatory approaches in general.

6. Organising FTI effectively

In order to ensure highest possible quality of work in implementing the FTI steps and activities described in the previous chapters, the process needs to be organised taking into account the following:

Arrange for effective process facilitation

In the FTI activities, methods and tools described in previous chapters – including the functioning of the FTI teams themselves – effective process facilitation is key. A facilitator is someone who helps manage the process of information exchange and discussion towards reaching agreements. This role is very different from that of an expert or a team leader. An expert's role is to contribute his/her expertise, and a team leader's role is to ensure that the team members accomplish the task assigned to or assumed by the team. In contrast, a facilitator's role is to help with how the debate, discussion or performance proceeds.

FTI was implemented with two levels of facilitation: the overall FTI process facilitation and team-specific facilitation. The overall facilitator ensures that the teams proceed as planned, keeps an oversight, and provides advice and assistance to teams or individuals whenever requested, including support in facilitating critical events. S/he looks at capacity and knowledge needed versus those available, and finds ways to address the gaps.

Within an FTI team, facilitation is critical both within teams in conducting its meetings and discussions and when the team is holding meetings, workshops, training sessions and discussions with stakeholders. Even in relatively simple activities such as informing farmers or other stakeholder groups on the progress against the workplan, a more facilitative role rather than being a simple "carrier of information" is preferable, since one purpose would be to motivate partners to reflect on the progress and to decide whether to further follow the agreed process or to adapt it.

A facilitator's role is also to make sure that everyone, including those with lower formal status, is encouraged to present views in meetings, and that the decisions are taken based on consensus after discussion of various viewpoints (nobody forces their opinion as "the right choice)". Within the hierarchical and authoritarian context in Uzbekistan, the facilitator needs to do this tactfully. The expression of honest views will be encouraged when letting participants understand that everybody's knowledge, experience and views are equally important for addressing the topic at hand. At the same time, people in Uzbekistan will expect from a facilitator a degree of informal coaching (how to do), coordination (among teams as well as sometimes within teams) and even sometimes direct supervision and control (reiteration of objectives, frequent reminders, assertions and re-assertions).

Introduce FTI early in project and research cycle

In a project aimed at innovation development, a participatory and transdisciplinary approach to this should be introduced soon after the start of the project. This would allow some linkage with stakeholder knowledge and realities from the start, so that even more basic research activities can benefit from and incorporate this. FTI would then go beyond participatory innovation validation after having developed an innovation and move towards more comprehensive forms of participatory research. A proper participatory transdisciplinary research process also requires a longer timeframe (at least 5–6 years).

Allow adequate time for getting started

Generally it does take time and training efforts to build multidisciplinary teams. In the context of Uzbekistan, this is even more important, given the limited prior exposure of staff to FTI approaches and the need to adapt those used in other countries to the local realities. Time is needed for staff to understand the essence of the attempted process and to operationalise it from their perspective. A rushed start into action might risk the quality of inter- and transdisciplinary interaction and any outcomes achieved. The ZEF–UNESCO project carried out two intensive training workshops within the first six months and experienced one season of initial FTI interaction on a trial basis, followed by a third intensive training workshop to review and build capacities. It was only after a year that staff started to gain basic confidence in using and developing further the FTI approach.

In the cases presented here, none of the teams was able to conclude the FTI process fully within a period of three years, i.e. to be able to conclude with full confidence whether or not the innovation they worked with was suitable or not for outscaling. Given the complexity of the innovations at hand and the project context, the process needed more than three years, exceeding the time and money available.

Plan for enough resources

Besides time, a participatory, transdisciplinary process to innovation development in Uzbekistan requires adequate financial resources as well as good resource people and well-trained local staff. These are also critical in bridging the gap between foreigner researchers and local authorities, researchers and stakeholders.

While training can be given relatively quickly, it requires a lot of time, practice and reflection by the trainee before the contents of the training become part of the mindset as well as part of the common-day practice. Two of the four FTI teams could have particularly benefited if more social science staff would have been able to assist them right from the start.

Exercise caution in promoting multi-tasking

As indicated for the ZEF–UNESCO project in Chapter 2, research projects have a tendency to assign numerous tasks to scientists, e.g. teaching, supervising research, analysing data, attending conferences and publishing research. But organising an FTI process is not something that can be done in a few free hours; it needs focused attention of at least one or two team members. FTI team members should be clear about their responsibilities and tasks in the entire process from the start, and newer responsibilities should either be avoided or older workload should be taken off them.

Allow for process flexibility

While manuals such as this can be useful, they should be regarded as offering guidance and not blueprints. FTI teams need to have enough space to adjust and adapt the process based on the demands of the stakeholders, the innovation, the context and the team members themselves.

In the case of the WUA, for example, where the innovation – the SMID approach – did not provide hardware support, the team realised and adjusted itself to the facts that: i) without an office, the WUA would not have a face amongst its members; and ii) regardless of the amount of training received on social mobilisation and system management, a WUA staff member without transport facilities would not be able to perform effectively.

The pace of the four FTI teams in the project also showed considerable differences. The WUA team quickly came together, while the SA team took a year to find its final form and purpose. However, it gathered speed quickly after this. Some teams operated as coherent teams, while others were a group of experts responsible for distinct parts of the process.

7. Epilogue

In the end, none of the four teams could follow the FTI process to the full extent as described in these guidelines. Project-related factors, stakeholder constraints and wider policy developments such as the land reconsolidation continued to interfere, forcing teams to improvise and/or look for shortcuts. For example, several key stakeholders could not make the step to join the FTI team in experimenting with the new salinity measurement approach. However, one key stakeholder finally did join and is now convinced to have found a way to put the approach into practice in Uzbekistan. The trees that are part of the AF work are still too small to allow final conclusions to be drawn; the design of the experiments with farmers had to be adapted and the number of farmers involved is still limited. But the work is progressing and farmers' interest in AF is growing, as evident from the number of requests for work in this area received by the project.

Results of the process in moving the innovations forward towards adaptation and acceptance by stakeholders have thus been mixed so far. Some FTI teams have made considerable progress; others have a longer way to go. This depended, among other things, on the complexity of the innovation chosen and the strength and dynamics of the FTI teams.

In all cases, though, the FTI activities have increased the understanding among staff involved of a wide variety of the real-life factors that confront local stakeholders and affect the potential and effectiveness of the relevant innovations. This will certainly influence the staff members' future work in their respective fields.

The core group of staff involved, who had little or no experience in participatory interaction a few years ago, has become convinced of the relevance of this approach for research and development in Uzbekistan and is interested to seek ways to make it work in the country. It is hoped that KRASS, the organisation that is meant to ensure sustainability of the project's efforts and whose senior members were part of one or more of the FTI innovation teams (see Chapter 4), will actively incorporate the essence of FTI into its work routine.

As far as ZEF is concerned, the lessons learned through FTI are forming a source of inspiration and will most certainly influence future projects, enhancing its preparedness for inter- and transdisciplinary research as well as research implementation.

Reading and resources

On the origin of the Follow-the-Technology approach

Douthwaite MB, Langewald J & Harris J. 2001. Development and commercialization of the Green Muscle biopesticide. Ibadan: International Institute of Tropical Agriculture (IITA). ISBN 978 131 193 2. Available at http://old.iita.org/cms/details/impact/Greenmuscle.pdf

Douthwaite MB. 2002. *Enabling innovation: a practical guide to understanding and fostering technological change.* London: Zed Books.

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Selected resource books on participatory innovation development

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Veldhuizen L van, Waters-Bayer A & de Zeeuw H. 1997. *Developing technology with farmers: a trainer's guide for participatory learning.* London: Zed Books. Available now from International Institute of Rural Reconstruction (IIRR), Silang, Cavite, Philippines.

Further readings on the ZEF–UNESCO project and its FTI implementation

Abdullayev I, Oberkircher L, Hornidge A-K, Ul-Hassan M & Manschadi AM. 2008. Strengthening water management institutions in Uzbekistan. Science Brief from the ZEF–UNESCO project on Sustainable Management of Land and Water Resources in Khorezm, Uzbekistan, ZUR No. 7, December 2008. Downloadable under: http://www.khorezm.zef.de/zur_khorezm.0.html

Hornidge A-K, Ul-Hassan M. & Mollinga PP. 2009. 'Follow the innovation': a joint experimentation and learning approach to transdisciplinary innovation research. Working Paper No. 39. Bonn: Center for Development Research, University of Bonn. Downloadable under: http://www.zef.de/workingpapers.html

Hornidge A-K & Ul-Hassan M 2010. From 'plausible promises' to transdisciplinary innovation research in Uzbekistan: process outline and lessons learnt. *Rural Development News* 2010/2: 53–63.

Hornidge A-K, Ul-Hassan M & Mollinga PP. 2011. Transdisciplinary innovation research in Uzbekistan – 1 year of 'Following The Innovation'. *Development in Practice 21 (6): 834–847.*

Mollinga P, Martius C & Lamers J. 2006. Work Package 710: Implementing, improving and adapting with target groups: "Follow the Innovation" (FTI). In: Martius C,

Lamers J, Khamzina A, Mollinga P, Müller M, Ruecker G, Sommer R, Tischbein B, Conrad C & Vlek LG (eds), Economic and ecological restructuring of land and water use in the region Khorezm (Uzbekistan). Project Phase II: Change-Oriented Research for Sustainable Innovation in Land and Water Use (2007–2010). Bonn: Center for Development Research, University of Bonn.

Ul-Hassan M & Hornidge A-K. 2009. 'Following the Innovation': the development of a participatory approach for innovation validation and outscaling in Uzbekistan. Science Brief from the ZEF–UNESCO project on Sustainable Management of Land and Water Resources in Khorezm, Uzbekistan, ZUR No. 10, November 2009. Downloadable under: http://www.khorezm.zef.de/zur_khorezm.0.html

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FTI training reports

Veldhuizen L van. 2008a. Operationalising the Follow-the-Innovation approach: report on the ZEF Uzbekistan Training Workshop II, 1–4 June 2008, Urgench. Leusden: ETC EcoCulture.

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It is still very common that innovative ideas and technologies generated through research are not implemented or adopted in practice because they do not address and/or match the real-life complexities faced by farmers. This is the case in Central Asia as well as in many other parts of the world. To overcome the lack of fit between scientifically generated innovations and local realities, participatory approaches to innovation development in which local and scientific knowledge interact systematically offer much potential.

The interdisciplinary research project "Economic and Ecological Restructuring of Land and Water in the Region Khorezm (Uzbekistan): A Pilot Project in Development Research", funded by the German Federal Ministry of Education and Research (BMBF) and implemented by the Center for Development Research (ZEF), University of Bonn, Germany, in collaboration with the United Nations Educational Scientific and Cultural Organisation (UNESCO), undertook to develop and put into practice a participatory approach to innovation development adapted to the realities of Uzbekistan. As this approach consists of a series of logical steps to systematically bring relevant stakeholders and end-users into the innovation process and to further develop the innovation at hand in a collaborative way, the research team coined it the "Follow-the-Innovation (FTI)" approach.

These guidelines bring together the main lessons learnt with regard to the design and implementation of FTI in the post-Soviet setting of rural Uzbekistan. They are meant to inspire researchers involved in finding appropriate innovations for agricultural development in and around Uzbekistan as well as other governmental and non-governmental organisations involved in promoting innovative agricultural practices within the region.

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