Strategic Outcome Monitoring Concept for the RIICE Programme

Concept Paper

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1 Introduction

The *Remote sensing-based Information and Insurance for Crops in Emerging Economies* (RIICE) project's goal is to reduce the vulnerability of smallholder farmers engaged in rice production in two ways by:

(1) Increasing the information on rice growth areas and expected yields to help governments, agricultural intermediaries, and relief organizations in better managing domestic rice production and distribution during the normal growing cycle as well as after natural catastrophes (Component 1: Enhanced Risk Management).
(2) Providing access to insurance solutions for governments, agricultural intermediaries (such as cooperatives or rural banks) and individual rural farmers to cushion the financial effects on farmers caused by natural catastrophes such as floods and droughts – the major causes for crop destruction in Asia (Component 2: Insurance Solutions).

In order to enhance strategic and result-oriented steering of the complex RIICE project and to provide information on relevant outcomes for stakeholders and the interested public, RIICE is setting up a Strategic Outcome Monitoring Concept (OMC).

2 Main Features of the Outcome Monitoring Concept

The suggested Outcome Monitoring Concept (OMC) deepens and sharpens the logframe-based monitoring system, which is currently an activity-based monitoring system.

In order to verify how the key outcomes of RIICE will be attained, the OMC builds on the detailed results chain introduced in Section 3. Important results of the results chain will be monitored with relevant indicators. It also provides orientation on how the collection and analysis of the data and information process can be organized.

The OMC will be applied in seven partner countries, cover the two main RIICE components and will make practical recommendations for its implementation. The challenge is that the concept, despite the complexity of the RIICE project, must be well focused on the most strategic issues without losing itself in too many outcomes and indicators.

In particular the OMC:

- gives strategic orientation,
- strengthens the development focus in this public-private development partnership,
- consolidates the formulated outcomes and indicators among the RIICE partners,
- gives practical suggestions on the necessary steps to establish the monitoring system,
- clarifies on who does what for producing the outcome information (roles and responsibilities),
- enhances the use of monitoring results for strategic steering and evidence-based decision making of the overall programme and the work of the overall steering committee,
- defines resources needed for applying the Monitoring Concept for data collection and data synthesis.

The OMC enables actors at country level to collect and analyse monitoring information. Furthermore, as the concept will be applied in different countries, it should enhance inter-country and inter-stakeholder exchange as well as mutual learning, which will further contribute to improving the effectiveness of the programme.

3 The RIICE Results Chain

The strategic OMC builds on the detailed results chain, which is presented in Annex 1. The results chain has been developed on the basis of the logical framework matrix (RIICE 2011, ProDoc Version 1.0 for the main Phase) and sharpened by consulting all RIICE stakeholders.

The results chain reflects the two core components of RIICE[1]. As stipulated in the Terms of Reference (ToR) for the OMC, we also evaluated the existing logical framework and results chain of RIICE for possible weaknesses that might affect the proposed OMC. Therefore, the draft concept at hand also includes some suggestions of how to improve the logical framework and the results chain.

[1] There is indeed a “Component 3: Knowledge Management”. However, due to the fact that this component will only be specified in the mid-term review, the OMC does not cover the knowledge management aspects of RIICE.

3.1 Component 1: Enhanced Risk Management

The outputs of this component have been defined as follows. Based on the remote sensing-based (radar-based satellite) imagery, RIICE will map the relevant rice area and estimate the growth of biomass and rice production (output 1). The findings from this mapping phase allow for the development of a rice crop growth model to forecast rice yields at the end of the crop cycle. The biomass and derived estimated rice yield monitoring information will be updated in real time as satellites pass over the mapped area and measure the growth of biomass (output 2). This information is to be gathered, organized, and made accessible through a dedicated web-based rice yield monitoring system (a web-based GIS) for which access rights will be given to partners and stakeholders of RIICE (e.g., governments, scientific partners, distributors) (output 4).

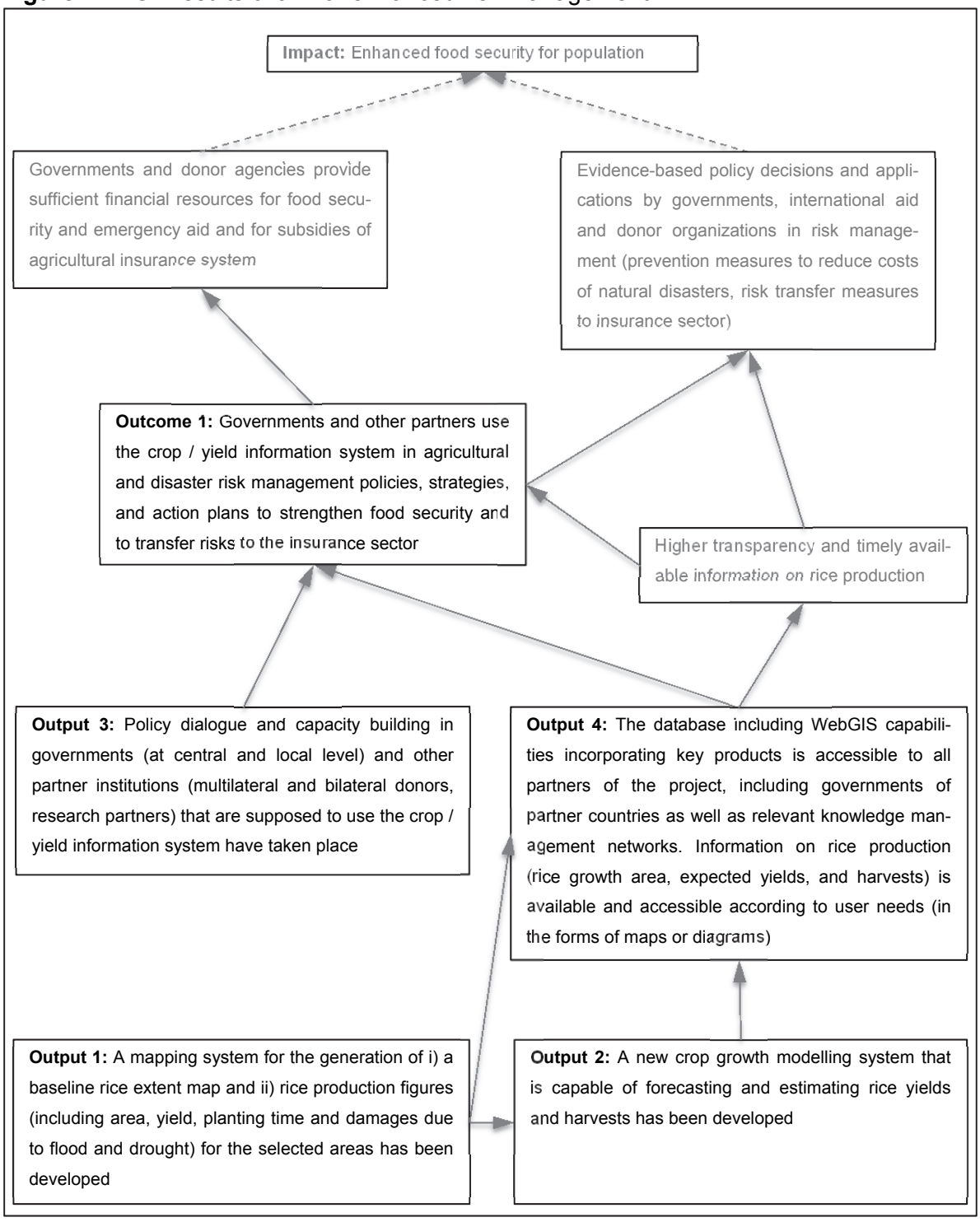
The capacities of the partner institutions in the target countries must be developed to be able to maintain the rice crop / yield information system and to use it for policy decisions with regard to disaster risk management policies (output 3). We would like to emphasize particularly the need to strengthen the capacities of governments in the crucial role they have in adopting RIICE solutions for disaster risk management.

The outcome of this RIICE component (outcome 1) is thus the use of the crop / yield information system in agricultural and disaster risk management policies, strategies, and action plans that strengthen food security and provide a basis to manage risks effectively by using a wide range of risk management solutions (including risk transfer to the insurance sector).

As a consequence, the project stipulates that governments and donor agencies provide sufficient financial resources and emergency aid and for subsidies of agriculture insurance system. In addition, governments are expected to make policy decisions with regard to agricultural risk management based on the evidence resulting from the RIICE project. These policy decisions should include measures for risk mitigation, risk transfer, such as the envisioned insurance solutions of component 2, and financing disaster relief with the aim to achieve more cost-effective and timely management of natural disasters.

However, the causal linkages between the use of the crop / yield information system (Outcome 1) and the provision of financial resources on food security and emergency aid needs still to be defined more precisely. While it is evident that the improved crop / yield information system provides crucial information for the design of new crop insurance schemes, it is less evident that (and how) the new information system can meet public action to strengthen food security.

Figure 1 RIICE results chain for enhanced risk management



Also, it is not yet fully clear what kind of institutions other than governments should use the crop / yield information system, even though first applications and potential users have been identified in Annex 5. Therefore we suggest to conducting a comprehensive baseline study in 2013 in all RIICE partner countries to get better information on current practices in support to food security and provision of emergency aid (see Indicator OC 11).

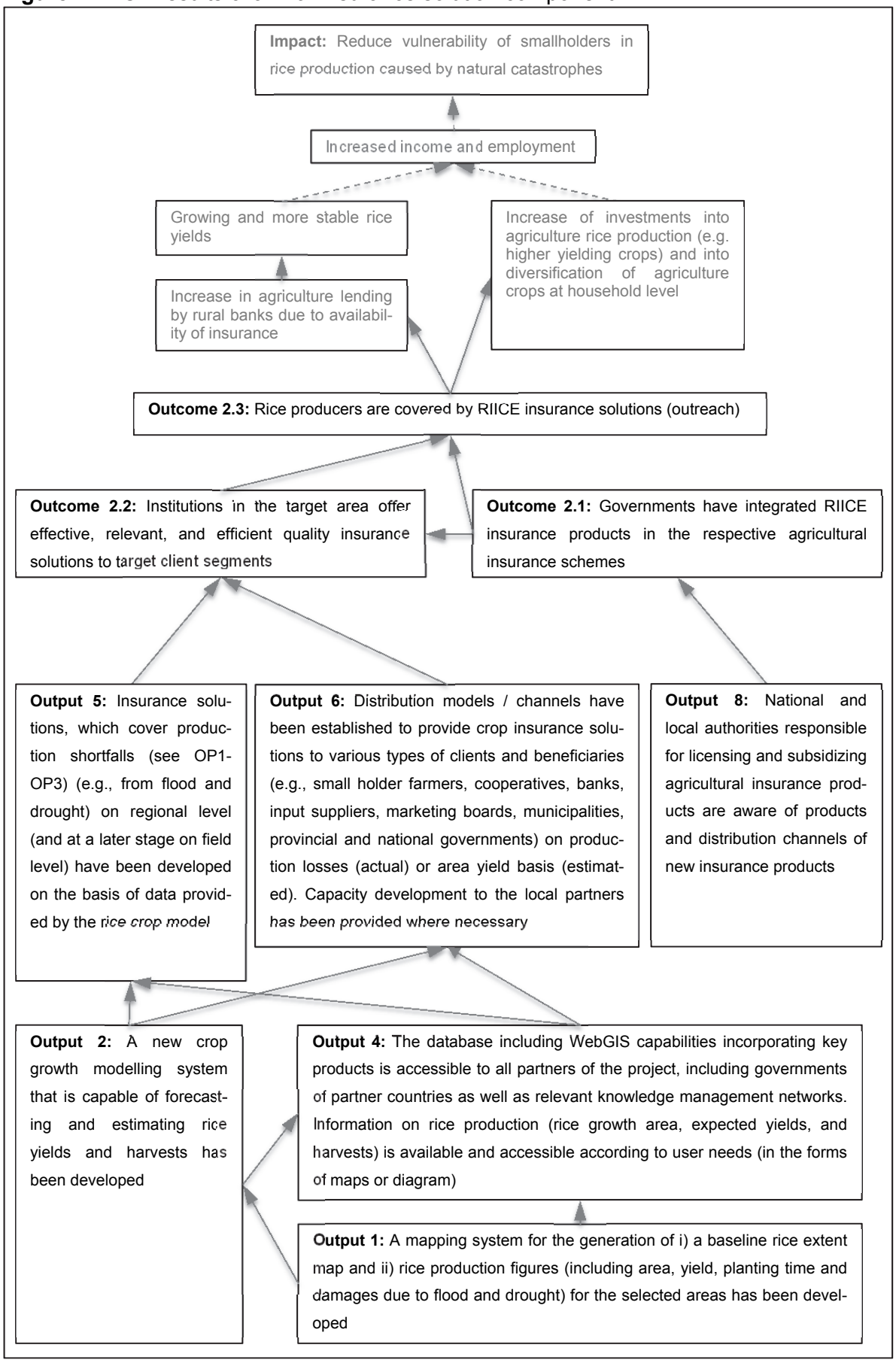
3.2 Component 2: Insurance Solutions

The results chain for the insurance component is presented in Figure 2 and serves as an overview of the monitoring concept for the insurance component, incorporating all elements with regard to the insurance outputs 5, 6, an additional output 8 that will be introduced in this section, and outcome 2. Starting with the RIICE project outputs, we measure the success with regard to outcome 2 (insurance solutions) at three different levels of aggregation. We separate these levels on the basis of the outcome 2, as defined in the logical framework and discussions with the RIICE steering committee. The discussions especially pointed out the importance of the integration of the RIICE project output in public agricultural insurance solutions as opposed to private market stand-alone products. Thus, we aligned the results chain accordingly and now separate three main levels of outcomes:

- Outcome 2.1: Governments have integrated RIICE insurance products in the respective agricultural insurance schemes
- Outcome 2.2: Institutions in the target area offer effective, relevant, and efficient quality insurance solutions to target client segments
- Outcome 2.3: Rice producers are covered by RIICE insurance solutions

By focusing on public insurance solutions rather than stand-alone private market solutions, awareness and acceptance of RIICE insurance solutions within governmental institutions play a significant role for achieving the project's goals. This is why we suggest adding the additional output 8 supporting the licensing and implementation of RIICE-related insurance solutions at national level (outcome 2.1) to the existing results chain. To assist in the implementation of this new output we explicitly suggest a set of activities that address the goals envisioned in output 8.

Figure 2 RIICE results chain for insurance solution component



We would like to further explain why we suggest a stronger role for policy dialogue and capacity building with regards to governments. A recently published study of the World Bank's "Insurance for the Poor Program" (see Mahul et al., 2010) highlights that the ownership of governments is important for the successful and sustainable development, implementation and expansion of agriculture insurance schemes. In our opinion, if possible, this crucial aspect should be more explicitly considered in the project document and complemented by specific activities for output 8 as suggested. The World Bank program identifies a number of fundamental private sector constraints on the implementation of agricultural insurance schemes that justify and call for improved government support: above all the existence of market failures, which, among others, include insurance industry capacity constraints, the high costs of agricultural insurance provision, and farmers' affordability issues. The World Bank Program also identifies weaknesses of existing public policies in this area and proposes then the following potential government roles in providing support to agriculture insurance:

- Provide legal and regulatory framework
- Enhance data and information systems
- Education and capacity building
- Public premium subsidies
- Catastrophe risk sharing / risk financing.

Along these lines, we want to suggest that RIICE should more clearly explain to what extent and how the project can contribute to enhance the capacities of governments in assuming their role in support of agriculture insurance systems. In the project document the ownership and participation of governments is formulated more as an assumption than as an outcome. However, given the critical role of this aspect and the potential of the RIICE project, we suggest that RIICE should explicitly state its capacity building interventions (output 8) to support governments in assuming their role in the implementation of agriculture insurance systems[2]. In our opinion, this is crucial to create national ownership of the RIICE initiative and to secure and strengthen the sustainability of RIICE investments.

[2] E.g., Mahul et al. (2010, p. 149) suggest that, with the financial support of the government, insurers and reinsurers are able to "create a center of expertise able to support the development and scaling up of agriculture insurance". Additionally, they propose to "establish a core team of agriculture insurance experts to provide technical support to agricultural insurers in underwriting, product development, product delivery, loss adjustment, catastrophe risk financing, and other facets of insurance provision."

Outcomes 2.2 and 2.3 previously summarized under outcome 2 were separated for the following reasons. Each of the two outcomes is affected by different factors and there is a timely interrelation, i.e., the availability and quality of insurance products and distribution channels (outcome 2.2) is necessary to achieve product outreach in the market (outcome 2.3). The performance areas reflect how well the product and its distribution reach the target farming households. We also assume an interrelation between programme ownership of governments and subsequent availability of subsidies on insurance premiums (outcome 2.1) and the outreach (outcome 2.3) due to its effect on affordability.

4 Outcome Monitoring Concept

In order to make strategic steering decisions, the provision of outcome information and the verification of observed outcome trends due to the project intervention, the monitoring concept consists of two main parts:

(1) Monitoring of outputs and outcomes,
(2) Verification of outcome trends for the component 2.

It means that we combine (1) trend analysis to measure changes over the project period at the outcome level for the different components of the RIICE project, and (2) verification of observed outcome-level trends to identify the proportion of the observed changes which can be attributed to the implemented project. The third part will only become relevant when insurance solutions are actually introduced in selected markets. It is necessary, however, to make provisions before a widespread introduction of products in order to gather baseline data. To provide guidance with regard to the points in time, data for the specific indicators need to be collected, we develop a monitoring and evaluation timeline in Section 4.2.

A central element of the project steering is the operational implementation of activities leading to envisioned project outputs. An overview with regard to this aspect including the definition of respective activities that have partly been revised in the OMC is presented in Annex 2.

4.1 Monitoring of Outputs and Outcomes

The monitoring of outputs and outcomes corresponds to a trend analysis which observes changes over the project phase, from the initial situation to the end of phase. Changes are measured with selected key indicators for designated result areas at the output and outcome level, and assessed with regard to target values defined at the end of the phase.

The results to be monitored were identified in consultation with all RIICE partners. This part of the monitoring concept should cover the priority information needs of the RIICE stakeholders so that strategic and operational steering is possible.

The identified indicators of the logical framework matrix are the basis for definition of the indicators at output and outcome levels. For each indicator, the complementary information such as the baseline values (or reference values), the target values at the end of the first phase of RIICE, the source of information (data collection method), and human and financial resources and responsibilities need to be specified by RIICE in the implementation stage of the OMC; however, suggestions are made here.

Due to the fact that the logical framework does not cover the complete results chain, the set of the logical framework indicators is complemented by indicators for other important results areas, which are essential for strategic and operational steering (e.g., for the “use of outputs”, other immediate and intermediate outcomes). In the final document, Annex 3 will summarize the indicators with the corresponding complementary information. The main responsibility for this part of the output and outcome indicators is with the seven RIICE country teams. All indicators will be defined as in Table 1, whereas baseline and target values need to be specified by RIICE.

Table 1 Exemplary illustration of indicators in Annex 3

<table>
<tr><td colspan="4">Outcome Distribution models / channels have been established</td></tr>
<tr><td colspan="2">Indicator
The number of farming households that is reached by contracted distribution partners</td><td colspan="2">Rationale for its use
Provides information on the depth of the penetration of the potential market by contracted distribution partners</td></tr>
<tr><td>Source and method
Collect data from national partners involved in the distribution of RIICE-related products (the survey can be combined with Indicator OC 223)</td><td>Resources
Time of RIICE country staff (tbd)</td><td>Timing
▪ Continuous
▪ Report: November (before operational planning for the upcoming year)</td><td>Responsibility
Country manager</td></tr>
</table>

The quality of each indicator is assessed with regard to the criteria displayed in Table 2 and discussed with the key stakeholder of the RIICE project institutions. The RRR (relevant, reliable, and realistic) approach is an improved version of SMART (specific, meaningful, attainable, relevant, and timely) that takes into account the difference between single indicators and the complete set of indicators.

Table 2 Indicator assessment criteria

Each indicator	**Relevant:**	The indicator covers a relevant aspect of the outcome. There is a plausible and valid link between the indicator and the objective.
	Reliable:	The indicator is precise and can be measured with minimal bias. If two persons use the same indicator independently from each other, they will get the same results.
	Realistic:	The target values of the indicator are achievable in the defined time frame.
Set of indicators	**Doable:**	The data can be collected reliably, timely, and at reasonable costs.
	Sufficient:	The set of indicators related to the objective is adequate to measure the intended result.

4.1.1 Monitoring of Component 1: Enhanced Risk Management

With regard to outcome monitoring of this component it is relevant to get updated information on the access to the collected crop data and yield forecasts by interested stakeholders, the effective use of the information delivered to the national and international stakeholders of the rice value chain, and to capture the policy decisions and other applications in the area of food security and disaster risk management.

Other information that needs to be covered relates to the effective involvement of the governments and their role in regulating and subsidizing agriculture insurance. The subsequent indicators are the result of an in-depth discussion with all RIICE project partners.

Table 3 Outcome 1 with its 4 outputs and indicators

Outcome 1	Governments and other partners use the crop / yield information system in agricultural and disaster risk management policies, strategies, and action plans to strengthen food security and to transfer risks to the insurance sector	
Indicator		**Rationale for its use**
OC 11	Number of direct applications (e.g., approved policies and regulations for food security and disaster management) resulting from the RIICE rice crop management system, disaggregated by user type and by type of application	The range of institutions/organizations using the crop management system indicate the intensity of the use and the acceptance of the RIICE rice crop management system. For a list of potential partners see also Annex 5
OC 12	National expenditure for the maintenance of the rice crop management system	This indicator shows to what extent a government is willing to invest in more efficient financial solutions and reduce the magnitude of losses from future disaster events (see Mahul et al. 2010, p. 4)
OC 13	Number of days between natural disasters / low harvest (e.g., occurrence of floods, recognition of droughts, hails, storms) and support provided by governmental units and aid agencies to the affected population	This indicator shows the performance of the system on the one hand and the delivery of accurate information to relevant government bodies so that they can take appropriate and timely action when major flood events occur. It is to be further specified by RIICE in which areas of performance improvements are to be expected
Output 1	A mapping system for the generation of i) a baseline rice extent map and ii) rice production figures (including area, yield, planting time and damages due to flood and drought) for the selected areas has been developed	
Indicator		**Rationale for its use**
OP 11	x ha of rice-cultivated area covered by verified mapping system, disaggregated by the 7 countries	This indicator informs on the geographical coverage of the mapping system on rice production. It allows to follow up the rice production areas over the years, planting time and the extent of damages due to flood and drought
OP 12	Accuracy of rice production information: a. x % of deviation between calculated and actual rice yields b. Average number of days of deviation between remote sensing map and actual information on planting time c. Level of precision of mapped damages due to flood and drought, compared to verified ground-truthing information	The quality of the ESA data is not yet clear. As an important input for the rice crop model in Output 2, this is of significant importance and needs to be assessed when data are available in 2013
Output 2	A new crop growth modelling system that is capable of forecasting and estimating rice yields and harvests has been developed	
Indicator		**Rationale for its use**
OP 21	Frequency of updated information on rice production delivered and made accessible via briefs and/or newspaper/website	Together with Indicator OP 22 this indicator measures the performance of the new growth model in regard to estimating potential, forecast and actual rice yield
OP 22	x % of deviation between forecasted and actual rice yield and harvest for selected regions of the partner countries	This indicator measures the performance of the new growth model in regard to estimating potential, forecast and actual rice yield

Table 3 (cont.) Outcome 1 with its 4 outputs and indicators

Output 3	Policy dialogue and capacity building in governments (at central and local level) and other partner institutions (multilateral and bilateral donors, research partners) that are supposed to use the crop / yield information system have taken place	
Indicators		**Rationale for its use**
OP 31	Level of awareness and perception of key stakeholders on the existence and potential use of the crop / yield information system and the need for identified policy changes	For creating enabling attitude in regard to policy changes, different types of influencing activities need to conducted in the field of i) evidence and advise, ii) public campaigns and advocacy, and iii) lobbying and negotiation (see ODI Background Note, 2011)
OP 32	a. Level of assessment opinions (content and didactics) on capacity development events in regard to the quality, relevance, usefulness b. Degree participants think they have learned something; and the likelihood they will use what they learned. (Open-ended level 1 questions may ask participants for concrete examples on how they plan to use what they learned to improve their work)	Following Kirkpatrick's framework for evaluating learning, the level 1 measures participant opinion on and feedback about a learning activity, generally collected immediately after the activity has ended. Level 1 measures participants' immediate reactions, usually through responses to a questionnaire. Learning and transfer of learning are unlikely to occur unless participants have positive attitudes toward the training program (see World Bank Institute, 2009)
OP 33	Percentage of successful test results / homework to assess gained knowledge or skills at the end of the capacity development event	Kirkpatrick's level 2 measures the change in participant knowledge or skills due to the learning activity. A level 2 evaluation generally involves testing participants on their knowledge or skills at the very beginning of a learning activity, testing them again in an equivalent test at the end of the learning activity, and computing the learning gain by deducting the average class pre-test score from the average class post-test score (World Bank Institute 2009)
Output 4	The database including WebGIS capabilities incorporating key products is accessible to all partners of the project, including governments of partner countries as well as relevant knowledge management networks. Information on rice production (rice growth area, expected yields and harvests) is available and accessible according to user needs (in the forms of maps and diagrams)	
Indicator		**Rationale for its use**
OP 41	Level of accessibility, user-friendliness of the data base (maps and diagrams)	In order to ensure that the WebGIS system is widely and intensively used, it needs to be user-friendly and adapted to the context of the partner countries
OP 42	Frequency of updates of the information of the data base (maps and diagrams)	It is important to make regular updates. Once the system is developed, the periodicity needs to be defined.
OP 43	Number of queries / hits to information system by staff of registered user organisations / institutions	The number of queries / hits indicates the actual level of usage of the information system

4.1.2 Monitoring of Component 2: Insurance Solutions

The focal point of the indicators for outcomes and outputs is to provide a performance evaluation of RIICE-related agricultural insurance products from a customer's perspective including major stakeholders such as farm households, governmental institutions, regulators, and distribution partners. As a precondition for the validity of the indicators, we assume that the providers of insurance solutions resulting from the RIICE project have proper management practices in force to ensure transparent and accurate measurement of the underlying indicators. Among these are accounting principles, insurance management, and operational practices which are not the focus of this report.

In this section, we provide a general overview of the indicators used and rationales for their relevance. The tables in Annex 3 provide a more detailed account of the suggested indicators. The subsequent tables include the definition of each indicator and the strategic question that can be answered using it. The indicators as described here are the result of an in-depth discussion with all RIICE project partners.

The indicators for outcomes 2.1 and 2.2 reflect important steps in the process of implementing new RIICE-related insurance solutions within the broader agricultural insurance risk management and insurance framework of the seven target countries. Outcome 2.1 traces the success in terms of cooperation and acceptance at the level of governmental institutions such as regulatory authorities and the commitment to provide subsidies. Outcome 2.2 focuses on the subsequent steps of implementing the RIICE-related solutions in the respective national agricultural insurance risk management and insurance frameworks by establishing suitable distribution channels. The indicators for outreach (outcome 2.3) reflect how well the product reaches the target farming households. The ratios for renewal, coverage, and growth indicate the actual success in reaching rice farmers and may only be satisfying if most of the other outcome indicators are good, i.e., good distributive outreach and high level of product value and service quality as defined subsequently.

Table 4 Outcome 2.1, 2.2, and 2.3 with its outputs and indicators

Outcome 2.1	Governments have integrated RIICE insurance products in the respective agricultural insurance schemes	
Indicator		**Rationale for its use**
OC 211	Number of country districts using RIICE-related insurance solutions relative to total number of country districts	In several countries, the introduction of a new system to deal with production risks in the agricultural sector may be tested in some districts first before a widespread rollout
OC 212	Premiums of RIICE-related insurance solutions are subsidized	A measure of commitment of governments to include RIICE-related insurance solutions
Output 8	National and local authorities responsible for licensing and subsidizing agricultural insurance products are aware of products and distribution channels of new insurance products	
Indicator		**Rationale for its use**
OP 81	Prospect of acceptance of RIICE-related insurance concept by government	The prospect of success that governments accept to implement RIICE-related insurance solutions in agricultural insurance schemes is not assessable objectively, thus, the perceived likelihood of this to happen of project members provides valuable information
Outcome 2.2	Institutions in the target area offer effective, relevant, and efficient quality insurance solutions to target client segments	
Indicator		**Rationale for its use**
OC 221	Service times taken to report and process a set of claims per product	It is important that insurance payouts take place relatively fast after the insured loss. One aim of using the new RIICE technology is to speed up claim settlement compared to existing area yield solutions
OC 222	Relative number of claims rejected with regard to the total number of claims in the sample	This indicator reflects how well the RIICE-related insurance product covers risk from a client's perspective. A high share of rejected claims either indicates a lack of product understanding (e.g., claims are filed for risks not covered under the policy), or high basis risk (e.g., claims are filed when the insurance policy has not been triggered), or both
OC 223	The relative number of points-of-sale in relation to the number of target farming households (per district)	This indicator evaluates the ease-of-access to RIICE related insurance solutions
OC 224	Policies sold per type of distribution partner relative to the total policies sold	This indicator measures the distributive outreach of single types of distribution partners
Output 5	Insurance solutions using the rice crop model covering production shortfalls (see OP1-OP3) (e.g., from flood and drought) on regional level (and at a later stage on field level) have been developed	
Indicator		**Rationale for its use**
OP 51	Stage of completeness of RIICE-related insurance solutions including, e.g., premium payment systems, customer databases, and claim settlement processes for target regions	The RIICE insurance solutions are based on the integration of the crop growth model (OP 2) and the WebGIS (OP 4) system into the insurance product that requires adaption of standard insurance products and processes. Refer to best-practice product development processes such as described in McCord (2012)
OP 52	Basis risk of the insurance policy in terms of the percentage deviation between the index used for RIICE related insurance policies and the actual rice yields and harvests for selected regions of the partner countries	An important success factor for the distribution of RIICE insurance solutions in the longer term will be the perception of the basis risk accompanied with the envisioned index-based structure of the RIICE related products; thus the level of basis risk will be relevant for accessing this success factor

Table 4 (cont.) Outcome 2.1, 2.2, and 2.3 with its outputs and indicators

Output 6	Distribution models / channels have been established to provide crop insurance solutions to various types of clients and beneficiaries (e.g., small holder farmers, cooperatives, banks, input suppliers, marketing boards, municipalities, provincial and national governments) on production losses (actual) or area yield basis (estimated). Capacity development to the local partners has been provided where necessary	
Indicator		**Rationale for its use**
OP 61	Number of contracted distribution partners available for reaching out to the target farming households	The distribution of agricultural insurance requires a variety of approaches to reach the target farming households. This indicator provides an assessment of the diversity of the distribution system related to RIICE related insurance solutions
OP 62	The number of farming households that is reached by contracted distribution partners	Provides information on the depth of the penetration of the potential market by contracted distribution partners
Outcome 2.3	Rice producers are covered by RIICE insurance solutions (outreach)	
Indicator		**Rationale for its use**
OC 231	Governments assure eligibility of RIICE insurance solutions under their agricultural insurance schemes	Insurance coverage depends mainly on government commitment that may only indirectly be influenced by the satisfaction of rice farmers
OC 232	The number of active insured farming households relative to the total number target farming households	The coverage ratio provides indication of how well developed the insurance awareness and product uptake is
OC 233	Average farmland size of active insured farming households	This number provides insight into the target farming households reached by the insurance products. Size of the farming land is expected to be highly correlated with income; thus it provides an indication of which levels of income are reached

In addition to the above performance indicators, a complete account on product features and related distribution channels is necessary for each RIICE related product that is registered in the monitoring system. This includes information on the perils covered under the policy, the distribution channels used, potential exclusions of the policy, conditions for valid claims (pay-out trigger), and others. The information on products and clients need to be clearly related to a unique identifier to ensure that all relevant interrelations can be analysed.

4.2 Monitoring and Evaluation Timeline

Based on the broad project timeline of the RIICE project documentation, Table 5 provides an assignment of the measurement of indicators of the various levels of outputs and outcomes to the respective project phase. The aim is to give guidance with regard to the timely planning when implementing the monitoring and evaluation indicators. In addition to the stated phases, we particularly suggest a discussion on post-project proceedings. Several of the RIICE project goals are likely to be out of range to be achieved within the project's timeframe of 3 years and are only viable if potential efforts are made to reach the envisioned goals after the project's' time horizon of three years. However, to allow for a continuous monitoring and evaluation of the project's goals in a post-project phase it is necessary to prepare the foundations in this stage of the project already.

Table 5 Monitoring and evaluation timeline

	Preparatory Phase	Main Phase	Scale-up Phase	Post-project Phase
Output 1				
Output 2				
Output 3				
Output 4				
Output 5				
Output 6				
Output 8				
Outcome 1				
Outcome 2.1				
Outcome 2.2				
Outcome 2.3				

5 Appraisal of the Suggested OMC with Reference to the DCED Standards

The following appraisal is based on the control and compliance criteria of the DCED Standards for Measuring Achievements in Private Sector Development.

5.1 Articulating the Results Chain

The OMC is based on results chains which are articulated explicitly for each of the two intervention areas of:

(1) Component 1: Enhanced Risk Management,
(2) Component 2: Insurance Solutions.

The result chains are sufficiently detailed so that changes at all key levels up to intermediate outcome level can be assessed quantitatively and/or qualitatively. It is the responsibility of the RIICE management that mid and senior level programme staff is familiar with these results chains and use them to guide their activities. It is recommended that the steering committee together with the RIICE partners review the results chains at least once a year. It is good practice to include adequate consultation with programme stakeholders into the review process (e.g., important partner government units) in order to create ownership.

5.2 Defining Indicators of Change

There is at least one relevant indicator associated with each key change described in the results chains. It is foreseen that the universal impact indicators (i.e., income, employment, food security) are included in the relevant results chains. However, these impact indicators are relevant for the component 2 only. They will need to be defined and detailed in the suggested impact study (see Annex 4) for measuring impact on beneficiaries of the insurance solutions for rice smallholders.

It is the responsibility of the RIICE management that mid and senior level programme staff understands the indicators and realises how they illustrate programme progress. It is therefore necessary to organize capacity building events at the level of each of the partner country.

5.3 Measuring Changes in Indicators

First baseline information on key indicators will need to be collected from 2013 onwards, depending on the different indicators. The RIICE management together with the staff in

charge of the OMC will elaborate a detailed time schedule when the baseline data will be collected.

The suggested impact study should be designed in line with established good practices (in terms of research design, sampling, quality control). Therefore professional advice should be provided by experienced university institutes.

5.4 Estimating Attributable Changes

Outcome level

The estimation of attributable changes at the level of component 1 concerns the direct applications resulting from the RIICE's rice crop / yield information system. At this level the attributable changes can be identified with sufficient certainty. Regarding component 2, reasonable attribution can be claimed for the three outcomes concerning the RIICE insurance solutions.

Impact level

It is not foreseen to measure impacts at the level of component 1 (enhanced food security). At the level of component 2, an impact study is suggested in two of the RIICE partner countries. First reflections on this topic are given in Annex 4. In June 2013, the decision on conducting impact studies will be taken by the RIICE steering committee meeting.

5.5 Capturing Wider Changes in the System or Market

This DCED control point is less relevant for the RIICE programme.

5.6 Tracking Programme Costs

Following the SDC requirements, costs need to be tracked annually and cumulatively. An accounting system should be in place to track costs and produce annual and cumulative totals of all programme-related costs spent in programme countries. The accounting system will also seize all costs relating to the OMC implementation.

5.7 Reporting Results

All projects and programmes are obliged to prepare annual progress reports following SDC's "Guidance for Progress Reporting by Partners". The OMC enhances reporting on outcomes and recommends that the document is based on key indicators and includes the costs reporting. Whenever possible, reported changes in key indicators should be disaggregated by gender. It is in the interest of RIICE that its results are regularly published. A specific component on knowledge management will be launched at a later stage.

5.8 Managing the System for Results Measurement

A clear and reliable system for measuring key indicators at appropriate intervals is established. This system provides information for each of the key indicators, the measure, the rationale, the method of data collection, the timing, resources and responsibilities. Once the baseline data are available, the target values need to be be fixed. Annual data records with actual values can be produced based on the corresponding Excel worksheet. To ensure quality performance of the OMC, all indicators need to be critically and periodically reviewed with the “indicator assessment criteria” (see Table 2).

However, this information needs to be detailed by the RIICE staff in charge of monitoring together with the country teams. Specialists need to elaborate the design and implementation of the impact study. Specific capacity building support (training and coaching), should enable the country staff responsible for monitoring to accurately assess their responsibilities in the results measurement.

Due to the innovative character of the RIICE programme, it is important to invest in an appropriate system for results measurement. Therefore the system should be supported by sufficient human and financial resources to manage and implement the results measurement. It is important that RIICE is allocating sufficient budget for on-going monitoring and impact studies. A professional RIICE staff should take charge of the overall responsibility in monitoring. The job description will include the specific responsibilities with regard to monitoring at the programme level and at the country level.

The monitoring system will provide outcome focused information which will increase the performance of programme management and decision-making.

6 Outlook and Conclusions

The suggested Outcome Monitoring Concept for the RIICE Project aims at deepening and sharpening the logframe-based monitoring system, which is currently applied. In the process of assessing the various goals including output and outcome levels envisioned by RIICE, we define important areas to monitor on the basis of a set of indicators. The assessment process included an in-depth exchange with the RIICE Steering Committee and discussions with all major stakeholders.

A particular result from those discussions was the insight that several goals at outcome and especially at impact level are far beyond the project's' time horizon of three years, thus demanding a focus on outputs and early stage outcomes. As a result of the discussions in the project team and with the members of the RIICE Steering Committee, we reached the conclusion that a detailed assessment of the project's impact and the causal influence of specific factors on outcome level results will not be at the centre of this monitoring concept. However, for further stages of the process started by the RIICE project, we strongly recommend the use of impact assessment approaches and causal models to identify important drivers of success as we outline in the Annex 3.

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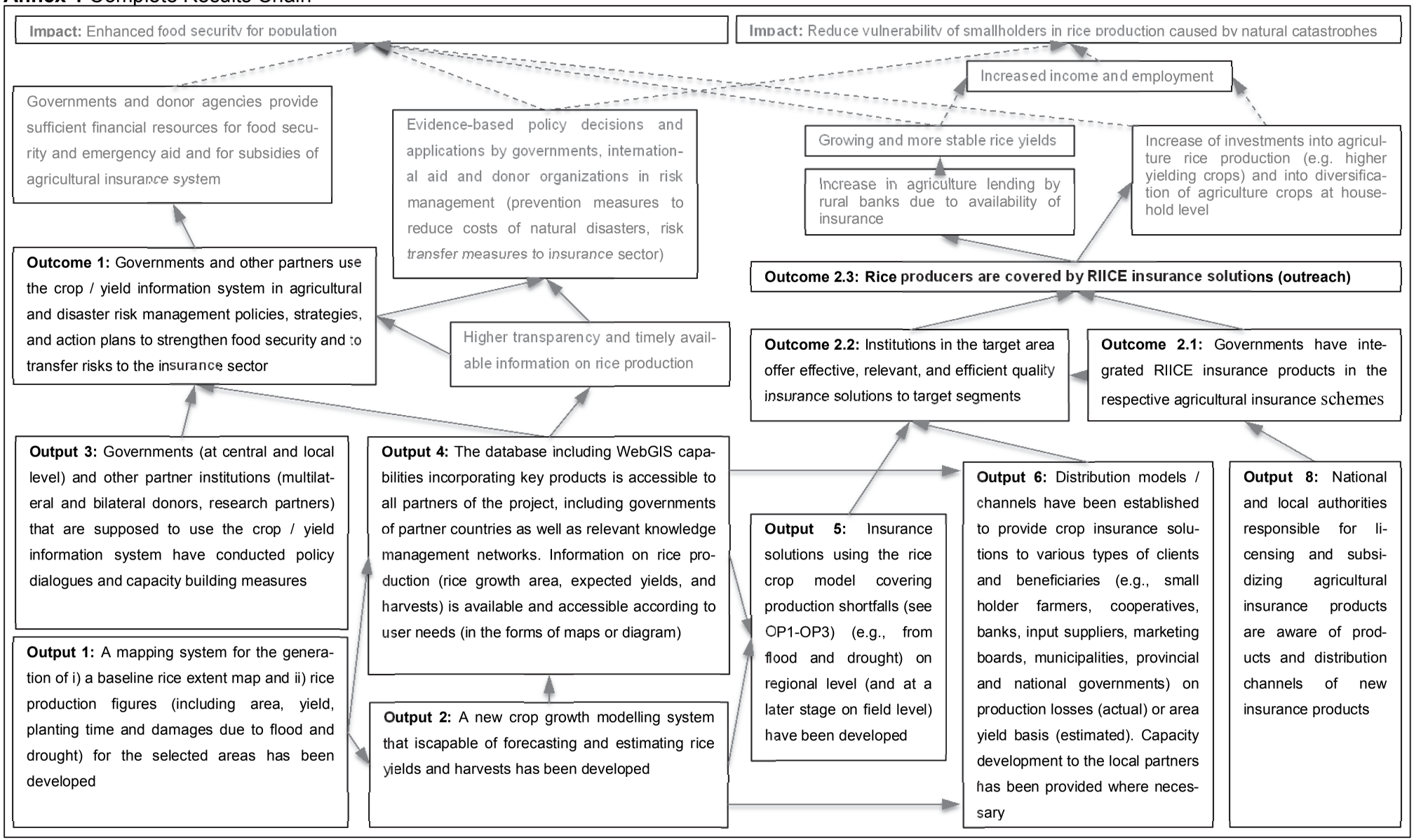
Annex

Annex 1 Complete Results Chain



Annex 2 Monitoring of Activities

The monitoring of activities is already set up for the project components 1 and 2 (as formulated in the Project Document 1.0, p.19, November 2011). Within the scope of this OMC, we also match and redefine activities to their respective outputs.

Monitoring of activity milestones is currently summarized in quarterly "Output Monitor" reports (= operational sheet) that report on the activity milestones for outcome 1 and outcome 2 for all seven countries. This activity-based monitoring mainly serves for short-term operational steering and operational planning on a semester basis. It must be adjusted / enhanced due to augmentation of specific activities for outcome 1 and 2. The list of activities with regard to each output is presented in Table A1.

Table A1 Activities

Activities related to Output 1	
A 11	Monitor price of the ESA data required for the mapping system per country. Currently, data will be available and free of charge from 2013; however, the European Commission may change position on this. To consider: a. If free of charge: project aims not at risk b. If not free of charge, purchase of data might still be viable; however, this needs to be assessed in more detail
A 12	Facilitate involvement and capacity of local partners, e.g., improve qualification and level of competence in the use of data. Local partners need to play an active role in the implementation and development stage for the solutions to be accepted and used. It takes time to build up the required resources
A 13	Assess and improve infrastructural capacity of local partners with regard to technology: a. data storage capabilities b. information processing capabilities Infrastructural capabilities of partners in target countries are often very limited. This is of concern, since Sarmap data often exceeds 1 TB
A 14	Development of a baseline extent map (including crop seasons) for selected areas based on archive data: a. Collection and consolidation of historical rice figures on area and yield available in selected countries b. Selection of remote sensing archive data and generation of products at national level for baseline extent map
A 15	Development of a map of rice-cultivated areas (planting dates, flood/drought damages) for selected areas based on real-time (actual) remote sensing data: a. Planning and transfer of remote sensing data for cultivated area product b. Generation of cultivated area product at local level c. Validation of production figures by local partners (baseline, cultivated area)
A 16	Estimation of potential yield under irrigated conditions for selected based on Oryza 2000: a. Estimation of potential yield map based on Oryza 2000 b. Validation of yield maps by local partners
Activities related to Output 2	
A 21	Compilation of crop growth model for actual yield and input data sets: a. Basic data sets (soil, weather stations, cropping calendars) updated and ready to be used b. Software development to achieve better software performance
A 22	Estimation of actual yield under irrigated conditions for selected areas based on the integration of remote sensing biomass and Oryza 2000: a. Application of spatial and remote sensing data to the yield model using new crop model b. Testing and validating the new crop yield model

Table A1 (cont.) Activities

Activities related to Output 3	
A 31	Thorough analysis of the existing information systems with regard to agricultural production, and disaster risk management in this area to define the potential use of the RIICE technology
A 32	Performing stakeholder analysis on governmental and other partner institutions (multilateral and bilateral donors, research partners) which have interest in potentially using the crop / yield information system
A 33	Establishment of a policy dialogue and capacity development plan for the identified stakeholders
A 34	Development of capacity development programmes (content, didactics, course evaluation formats) for different stakeholders
A 35	Contact and contract key institutions (local partners) for conducting capacity building programme
A 36	Performing policy dialogue activities, disaggregated by: - Meetings for providing advisory support to governmental (central and local level) - Public communications in television, newspapers, radio and other media - Public meetings, speeches and presentations - Membership and participation in boards and committees
A 37	Performing training of local partners to apply remote sensing and yield modelling (generation of rice production maps, conducting ground-truthing activities to validate production figures, …): - Number and types of training - Number of participants fully attending the training events - Number of participant days at these events (x training days x number of participants)
A 38	Performing training and information events for staff of potential users of the crop / yield information system (governments at central and local level; other partner institutions - multilateral and bilateral donors, research partners): - Number and types of training - Number and types of information events - Number of participants of training and information events - Number of participant days at these events (x training days x number of participants)
Activities related to Output 4	
A 41	Conceptional development of a WebGIS and definition of interface to GRiSP as a component of a rice information gateway (also clarification and distributing of access rights)
A 42	Production of the WebGIS platform: a. Setting up a dedicated WebGIS-infrastructure for insurance services b. Setting up a dedicated WebGIS-infrastructure for public access c. Populate the database with validated products
Activities related to Output 5	
A 51	Identification and selection of potential local partner(s)
A 52	Performing multi-stakeholder dialogues with (potential) partners on regional, national and supra-regional level relevant for the success of the project
A 53	Performing demand and need assessment for rice crop insurance solutions on smallholder farm level
A 54	Development of RIICE-related insurance solutions including terms and conditions, tariffs, premiums, premium payment systems, customer databases, and claim settlement processes for target regions
A 55	Preparation of all necessary regulatory steps for licensing RIICE-related insurance solutions
A 56	Clarification of the role of the government as provider of premium subsidies and/or nat. cat. cover (follow progress in output 8 and related activities)
A 57	Assessing re-insurance capacities for respective regions

Table A1 (cont.) Activities

Activities related to Output 6	
A 61	Conduction of demand and need assessment for rice crop insurance solutions for the level of risk aggregators (banks, cooperatives, input suppliers, marketing boards, other kind of agri businesses)
A 62	Identification and selection of the required distribution channels / partners
A 63	Assessment of the capacities of the involved distribution channels / partners
A 64	Development of capacity development programmes (content, didactics, course evaluation formats) for distribution channels / partners
A 65	Performing capacity development programmes for involved distribution partners
A 66	Establishment of contractual relationship with distribution partners
A 67	Clarification of the roles and responsibilities of involved distribution partners and (re-) insurance companies in terms of sales, claims management, reporting / monitoring, marketing and awareness raising, grievances and redressal mechanisms
Activities related to Output 8	
A 81	Thorough analysis of the existing agricultural insurance schemes and existing policies to define the potential use and advantages of the RIICE-related insurance solutions for the level of municipalities, provincial and national level governments (compile an insurance inventory)
A 82	Investigation of regulatory framework: is the regulatory framework conducive for the development and distribution of remote sensing and index-based crop insurance solutions?
A 83	Performing institutional analysis on governmental institutions and regulatory authorities which are responsible for agricultural insurance schemes
A 84	Establishment of a policy dialogue and capacity development plan for the identified governmental institutions
A 85	Development of capacity development programmes (content, didactics, course evaluation formats) for different governmental institutions
A 86	Contact and contract key governmental institutions for conducting capacity building programme
A 87	Performing policy dialogue activities, disaggregated by: - Meetings for providing advisory support to governmental institutions (central and local level) - Public communications in television, newspapers, radio and other media - Public meetings, speeches, and presentations - Membership and participation in governmental task forces and committees

Annex 3 Monitoring of Outputs and Outcomes

Table A2 Component 1: Enhanced Risk Management

<table>
<tr><td colspan="2">Outcome 1</td><td colspan="3">Governments and other partners use the crop / yield information system in agricultural and disaster risk management policies, strategies, and action plans to strengthen food security and to transfer risks to the insurance sector</td></tr>
<tr><td colspan="2">Indicator</td><td colspan="3">Rationale for its use</td></tr>
<tr><td>OC 11</td><td>Number of direct applications (e.g,. approved policies and regulations for food security and disaster management) resulting from the RIICE rice crop management system, disaggregated by user type and by type of application</td><td colspan="3">The range of institutions/organizations using the crop management system indicate the intensity of the use and the acceptance of the RIICE rice crop management system. For a list of potential partners see also Annex 5</td></tr>
<tr><td colspan="2">Source and data collection
In 2013 a baseline study should be made in each of the partner countries.
This baseline study should provide detailed information on current risk prevention and mitigation practices and its influences on food security. It is important that decision-making processes and coordination between the different actors are well understood. At the same time baseline data should be collected for indicator OC 13.
Potential application (see also Annex 5) of the RIICE crop / yield information system might also be identified.
Once the rice crop / yield information system is functional, gather all observed direct applications (by user type and by type of application). For this purpose a format has to be designed, including as well information on financial gains.
Alternatively yearly workshop can be conducted with key stakeholders identifying what has changed since the baseline study</td><td>Resources
Time of RIICE country staff (tbd)
Baseline study might be contracted to study teams</td><td>Timing
▪ Baseline study to be made in 2013
▪ Continuous over the RIICE project duration
▪ Report: November (before operational planning for the upcoming year)</td><td>Responsibility
Country manager</td></tr>
</table>

Table A2 (cont.) Component 1: Enhanced Risk Management

OC 12	National expenditure for the maintenance of the rice crop management system		This indicator shows to what extent a government is willing to invest in more efficient financial solutions and reduce the magnitude of losses from future disaster events (see Mahul et al. 2010, p. 4)	
Source and method Collect data on any financial contribution made by governmental units to the RIICE rice crop management		**Resources** Time of RIICE country staff (tbd)	**Timing** ▪ Baseline after launching the rice crop / yield information system ▪ Continuous over the RIICE project duration ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
OC 13	Number of days between natural disasters / low harvest (e.g., occurrence of floods, recognition of droughts, hails, storms) and support provided by governmental units and aid agencies to the affected population		This indicator shows the performance of the system on the one hand and the delivery of accurate information to relevant government bodies so that they can take appropriate and timely action when major flood events occur. It is to be further specified by RIICE in which areas of performance improvements are to be expected	
Source and data collection Conduct a baseline study (see indicator OC 11) to get current data. Once the rice crop / yield information system is functional, data collection is regularly done in selected regions (tbd by RIICE) in all 7 partner countries. *PS: the time estimation might be different from country to country. RIICE will clarify it with Humanitarian Aid agencies.*		**Resources** Time of RIICE country staff (tbd) Remuneration of local observers	**Timing** ▪ Baseline data from 2013 onwards (as soon as natural disasters occur) ▪ Continuous ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
Output 1	A mapping system for the generation of i) a baseline rice extent map and ii) rice production figures (including area, yield, planting time and damages due to flood and drought) for the selected areas has been developed			
Indicator			**Rationale for its use**	
OP 11	x ha of rice-cultivated area covered by verified mapping system, disaggregated by the 7 countries		This indicator informs on the geographical coverage of the mapping system on rice production. It allows to follow up the rice production areas over the years, planting time and the extent of damages due to flood and drought	
Source and data collection Following data measurement method of Sarmap		**Resources** Time of Sarmap staff (tbd)	**Timing** ▪ Annually / bi-annually ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
OP 12	Accuracy of rice production information: a. x % of deviation between calculated and actual rice yields b. Average number of days of deviation between remote sensing map and actual information on planting time c. Level of precision of mapped damages due to flood and drought, compared to verified ground-truthing information		The quality of the ESA data is not yet clear. As an important input for the rice crop model in Output 2, this is of significant importance and needs to be assessed when data are available in 2013	
Source and data collection Following data measurement method of Sarmap and IRRI (ground-truthing)		**Resources** Time of staff of Sarmap and IRRI (tbd)	**Timing** ▪ Continuous ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager

Table A2 (cont.) Component 1: Enhanced Risk Management

Output 2	A new crop growth modelling system that is capable of forecasting and estimating rice yields and harvests has been developed			
Indicator			**Rationale for its use**	
OP 21	Frequency of updated information on rice production delivered and made accessible via briefs and/or newspaper/website		Together with Indicator OP 22 this indicator measures the performance of the new growth model in regard to estimating potential, forecast and actual rice yield	
Source and data collection Collect data on publication timing with updated information and on type of media used		**Resources** Time of RIICE country staff (tbd)	**Timing** ▪ Continuous ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
OP 22	x % of deviation between forecasted and actual rice yield and harvest for selected regions of the partner countries		This indicator measures the performance of the new growth model in regard to estimating potential, forecast and actual rice yield	
Source and data collection Following data measurement method of Sarmap and IRRI (ground-truthing)		**Resources** Time of staff of Sarmap and IRRI (tbd)	**Timing** ▪ Continuous ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
Output 3	Policy dialogue and capacity building in governments (at central and local level) and other partner institutions (multilateral and bilateral donors, research partners) that are supposed to use the crop / yield information system have taken place			
Indicators			**Rationale for its use**	
OP 31	Level of awareness and perception of key stakeholders on the existence and potential use of the crop / yield information system and the need for identified policy changes		For creating enabling attitude in regard to policy changes, different types of influencing activities need to conducted in the field of i) evidence and advise, ii) public campaigns and advocacy, and iii) lobbying and negotiation (see ODI Background Note, 2011)	
Source and data collection Design of a questionnaire (with "Likert scales") and identification of national key stakeholders to be interviewed. Conduct annual survey in each of the partner countries (the first survey can be combined with Indicator OC 11)		**Resources** Local consultancy for each of the partner country (tbd)	**Timing** ▪ Annual survey ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
OP 32	a. Level of assessment opinions (content and didactics) on capacity development events in regard to the quality, relevance, usefulness b. Degree participants think they have learned something; and the likelihood they will use what they learned. (Open-ended level 1 questions may ask participants for concrete examples on how they plan to use what they learned to improve their work)		Following Kirkpatrick's framework for evaluating learning, the level 1 measures participant opinion on and feedback about a learning activity, generally collected immediately after the activity has ended. Level 1 measures participants' immediate reactions, usually through responses to a questionnaire. Learning and transfer of learning are unlikely to occur unless participants have positive attitudes toward the training program (see World Bank Institute, 2009)	
Source and data collection Design of a questionnaire including statements for a. and b. (with "Likert scales"). At the end of each capacity building event, get the opinions of the participants		**Resources** Time of training staff (tbd)	**Timing** ▪ At the end of each of the capacity building events ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager

Table A2 (cont.) Component 1: Enhanced Risk Management

OP 33	Percentage of successful test results / homework to assess gained knowledge or skills at the end of the capacity development event		Kirkpatrick's level 2 measures the change in participant knowledge or skills due to the learning activity. A level 2 evaluation generally involves testing participants on their knowledge or skills at the very beginning of a learning activity, testing them again in an equivalent test at the end of the learning activity, and computing the learning gain by deducting the average class pre-test score from the average class post-test score (World Bank Institute 2009)	
Source and data collection Conduct tests for selected training events		**Resources** Time of training staff (tbd)	**Timing** ▪ At the end of selected the capacity building events ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
Output 4	The database including WebGIS capabilities incorporating key products is accessible to all partners of the project, including governments of partner countries as well as relevant knowledge management networks. Information on rice production (rice growth area, expected yields and harvests) is available and accessible according to user needs (in the forms of maps and diagrams)			
Indicator			**Rationale for its use**	
OP 41	Level of accessibility, user-friendliness of the data base (maps and diagrams)		In order to ensure that the WebGIS system is widely and intensively used, it needs to be user-friendly and adapted to the context of the partner countries	
Source and method Design of a questionnaire with statement on accessibility, user-friendliness of the data base (with "Likert scales"). Conduct annual surveys among the users		**Resources** Local consultancy for each of the partner country (tbd) Time of RIICE country staff (tbd)	**Timing** ▪ Annual survey among the users ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
OP 42	Frequency of updates of the information of the data base (maps and diagrams)		It is important to make regular updates. Once the system is developed, the periodicity needs to be defined.	
Source and method Data to be analysed with website software		**Resources** Cost of software Time of RIICE country staff (tbd)	**Timing** ▪ Continuous ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
OP 43	Number of queries / hits to information system by staff of registered user organisations / institutions		The number of queries / hits indicates the actual level of usage of the information system	
Source and method Data to be analysed with website software		**Resources** Cost of software Time of RIICE country staff (tbd)	**Timing** ▪ Continuous ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager

Table A3 Component 2: Insurance Solutions

Outcome 2.1	Governments have integrated RIICE insurance products in the respective agricultural insurance schemes			
Indicator			**Rationale for its use**	
OC 211	Number of country districts using RIICE-related insurance solutions relative to total number of country districts		In several countries, the introduction of a new system to deal with production risks in the agricultural sector may be tested in some districts first before a widespread rollout	
Source and data collection Collect data on applications of RIICE-related insurance solutions on district level		**Resources** Time of RIICE country staff (tbd)	**Timing** ▪ Continuous ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
OC 212	Premiums of RIICE-related insurance solutions are subsidized		A measure of commitment of governments to include RIICE-related insurance solutions	
Source and data collection Collect data on financial contribution made by governmental units to RIICE-related insurance solutions		**Resources** Time of RIICE country staff (tbd)	**Timing** ▪ Continuous ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
Output 8	National and local authorities responsible for licensing and subsidizing agricultural insurance products are aware of products and distribution channels of new insurance products			
Indicator			**Rationale for its use**	
OP 81	Likelihood of government to accept RIICE-related insurance concept		The likelihood that governments accept to implement RIICE-related insurance solutions in agricultural insurance schemes is not assessable objectively, thus, the perceived likelihood of this to happen of project members provides valuable information	
Source and data collection Design of a questionnaire (with "Likert scales") and identification of national key stakeholders involved in government negotiations to be interviewed. Conduct bi-annual survey in each of the partner countries (the first survey can be combined with Indicator OC 11)		**Resources** Time of RIICE country staff (tbd)	**Timing** ▪ Bi-annual surveys ▪ Report: November and June (before operational planning for the upcoming year)	**Responsibility** Country manager
Outcome 2.2	Institutions in the target area offer effective, relevant, and efficient quality insurance solutions to target client segments			
Indicator			**Rationale for its use**	
OC 221	Service times taken to report and process a set of claims per product		It is important that insurance payouts take place relatively fast after the insured loss. One aim of using the new RIICE technology is to speed up claim settlement compared to existing area yield solutions	
Source and data collection Acquire data from management information system (MIS) of national partners involved in claims settlement. Also identify potential benchmarks such as existing non-parametric and parametric agricultural insurance schemes		**Resources** Time of RIICE country staff (tbd)	**Timing** ▪ Continuous ▪ Baseline assessment of potential benchmarks in each country ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager

Table A3 (cont.) Component 2: Insurance Solutions

OC 222	Relative number of claims rejected with regard to the total number of claims in the sample		This indicator reflects how well the RIICE-related insurance product covers risk from a client's perspective. A high share of rejected claims either indicates a lack of product understanding (e.g., claims are filed for risks not covered under the policy), or high basis risk (e.g., claims are filed when the insurance policy has not been triggered), or both	
Source and data collection Acquire data from management information system (MIS) of national partners involved in claims settlement. Also identify potential benchmarks such as existing non-parametric and parametric agricultural insurance schemes		**Resources** Time of RIICE country staff (tbd)	**Timing** ▪ Continuous ▪ Baseline assessment of potential benchmarks in each country ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
OC 223	The relative number of points-of-sale in relation to the number of target farming households (per district)		This indicator evaluates the ease-of-access to RIICE related insurance solutions	
Source and data collection Collect data from national partners involved in the distribution of RIICE-related products. Also identify potential benchmarks such as existing non-parametric and parametric agricultural insurance schemes		**Resources** Time of RIICE country staff (tbd)	**Timing** ▪ Continuous ▪ Baseline assessment of potential benchmarks in each country ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
OC 224	Policies sold per type of distribution partner relative to the total policies sold		This indicator measures the distributive outreach of single types of distribution partners	
Source and data collection Collect data from national partners involved in the distribution of RIICE-related products		**Resources** Time of RIICE country staff (tbd)	**Timing** ▪ Continuous ▪ Baseline assessment of distribution partner type performance in each country ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Country manager
Output 5	Insurance solutions using the rice crop model covering production shortfalls (see OP1-OP3) (e.g., from flood and drought) on regional level (and at a later stage on field level) have been developed			
Indicator			**Rationale for its use**	
OP 51	Stage of completeness of RIICE-related insurance solutions including, e.g., premium payment systems, customer databases, and claim settlement processes for target regions		The RIICE insurance solutions are based on the integration of the crop growth model (OP 2) and the WebGIS (OP 4) system into the insurance product that requires adaption of standard insurance products and processes. Refer to best-practice product development processes such as described in McCord (2012)	
Source and data collection Acquire assessment of product development status on a country basis from RIICE product development team (e.g., Allianz) and provide answers on degree of completeness of each product development process such as described in McCord (2012)		**Resources** Time of staff of Allianz (tbd)	**Timing** ▪ Continuous over the RIICE project duration ▪ Report: November (before operational planning for the upcoming year)	**Responsibility** Product manager

Table A3 (cont.) Component 2: Insurance Solutions

<table>
<tr><td>OP 52</td><td colspan="2">Basis risk of the insurance policy in terms of the percentage deviation between the index used for RIICE related insurance policies and the actual rice yields and harvests for selected regions of the partner countries</td><td colspan="2">An important success factor for the distribution of RIICE insurance solutions in the longer term will be the perception of the basis risk accompanied with the envisioned index-based structure of the RIICE related products; thus the level of basis risk will be relevant for accessing this success factor</td></tr>
<tr><td colspan="2">Source and data collection
Following data measurement method of RIICE product development team (e.g., Allianz). Also identify potential benchmarks such as existing non-parametric and parametric agricultural insurance schemes</td><td>Resources
Time of staff of Allianz (tbd)</td><td>Timing
▪ Continuous
▪ Baseline assessment of basis risk of existing non-parametric and parametric agricultural insurance schemes in each country
▪ Report: November (before operational planning for the upcoming year)</td><td>Responsibility
Product manager</td></tr>
<tr><td>Output 6</td><td colspan="4">Distribution models / channels have been established to provide crop insurance solutions to various types of clients and beneficiaries (e.g., small holder farmers, cooperatives, banks, input suppliers, marketing boards, municipalities, provincial and national governments) on production losses (actual) or area yield basis (estimated). Capacity development to the local partners has been provided where necessary</td></tr>
<tr><td colspan="2">Indicator</td><td colspan="2">Rationale for its use</td></tr>
<tr><td>OP 61</td><td>Number of contracted distribution partners available for reaching out to the target farming households</td><td colspan="2">The distribution of agricultural insurance requires a variety of approaches to reach the target farming households. This indicator provides an assessment of the diversity of the distribution system related to RIICE related insurance solu-tions</td></tr>
<tr><td colspan="2">Source and data collection
Collect data on contracted distribution partners</td><td>Resources
Time of RIICE country staff (tbd)</td><td>Timing
▪ Continuous
▪ Report: November (before operational planning for the upcoming year)</td><td>Responsibility
Country manager</td></tr>
<tr><td>OP 62</td><td>The number of farming households that is reached by contracted distribution partners</td><td colspan="2">Provides information on the depth of the penetration of the potential market by contracted distribution partners</td></tr>
<tr><td colspan="2">Source and data collection
Collect data from national partners involved in the distribution of RIICE-related products (the survey can be combined with Indicator OC 223)</td><td>Resources
Time of RIICE country staff (tbd)</td><td>Timing
▪ Continuous
▪ Report: November (before operational planning for the upcoming year)</td><td>Responsibility
Country manager</td></tr>
</table>

Table A3 (cont.) Component 2: Insurance Solutions

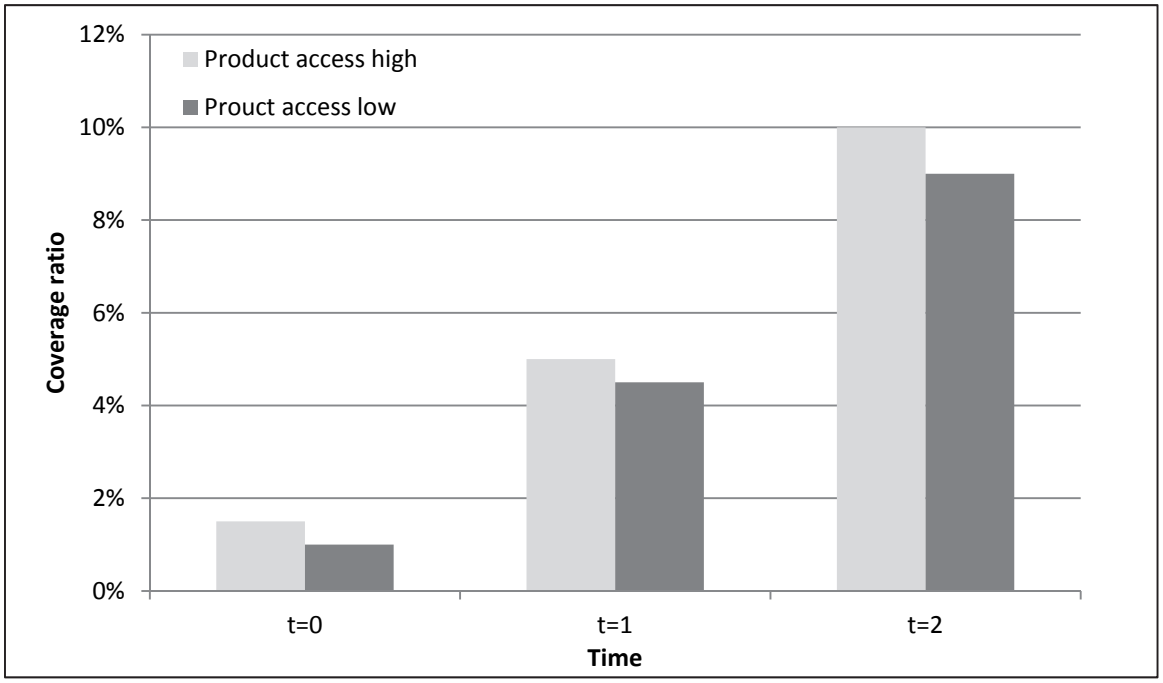
<table>
<tr><td colspan="5">Outcome 2.3 Rice producers are covered by RIICE insurance solutions (outreach)</td></tr>
<tr><td colspan="3">Indicator</td><td colspan="2">Rationale for its use</td></tr>
<tr><td>OC 231</td><td colspan="2">Governments assure eligibility of RIICE insurance solutions under their agricultural insurance schemes</td><td colspan="2">Insurance coverage depends mainly on government commitment that may only indirectly be influenced by the satisfaction of rice farmers</td></tr>
<tr><td colspan="2">Source and data collection
Acquire information on assurance of eligibility of RIICE insurance solutions under their agricultural insurance schemes</td><td>Resources
Time of RIICE country staff (tbd)</td><td>Timing
▪ Continuous
▪ Report: November (before operational planning for the upcoming year)</td><td>Responsibility
Country manager</td></tr>
<tr><td>OC 232</td><td colspan="2">The number of active insured farming households relative to the total number target farming households</td><td colspan="2">The coverage ratio provides indication of how well developed the insurance awareness and product uptake is</td></tr>
<tr><td colspan="2">Source and data collection
Collect data from national partners involved in the distribution of RIICE-related products or directly from insurers</td><td>Resources
Time of RIICE country staff (tbd)</td><td>Timing
▪ Continuous
▪ Report: November (before operational planning for the upcoming year)</td><td>Responsibility
Country manager</td></tr>
<tr><td>OC 233</td><td colspan="2">Average farmland size of active insured farming households</td><td colspan="2">This number provides insight into the target farming households reached by the insurance products. Size of the farming land is expected to be highly correlated with income; thus it provides an indication of which levels of income are reached</td></tr>
<tr><td colspan="2">Source and data collection
Collect data from national partners involved in the distribution of RIICE-related products or directly from insurers</td><td>Resources
Time of RIICE country staff (tbd)</td><td>Timing
▪ Continuous
▪ Report: November (before operational planning for the upcoming year)</td><td>Responsibility
Country manager</td></tr>
</table>

Annex 4 Estimating Attributable Changes

The suggested trend analysis for the RIICE project's outcomes in Section 4.1 is a precondition for the strategic steering of the project's progress since it provides valuable information on the success factors for achieving the goals envisioned with outcome 2. However, a simple comparison of trends in monitoring indicators may not be sufficient to take strategic decisions, unless the project management has reliable information about the economic conditions under which this trend emerged.

Consider, for example, the case of product access for two distinct geographical areas as illustrated in Figure A1: one area (access high) has significantly more points-of-sale relative to the number of target farming households than the other (access low). However, we observe that the area with low access to insurance products exhibits only slightly less product uptake. Relying on these results, the project management may infer that the number of points-of-sale is not relevant for product uptake and may decide to employ fewer resources in expanding retailer-networks.

Figure A1 Hypothetical influence of product access



Before making such a strategic decision, the project management should be reasonably confident that the limited difference between the low access and high access was not driven by different economic conditions: The two areas may be different from each other with regard to observable characteristics such as wealth, education, quality of infrastructure, or unobservable characteristics such as experience with insurance. Moreover, one of

the areas may be affected by factors that influence the uptake of insurance such as a publicly discussed case of insurer fraud or insolvency?

It is of utmost importance to consider factors other than the monitoring indicators that may impact strategic conclusions. In the hypothetical example of product access influence on product uptake, it is perfectly possible that a better infrastructure (e.g. road quality, cost of public transport) in the area with low product access drive the observed results. Including that information into the equation might then indeed show that the number of points-of-sale has a significant impact on the insurance product uptake leading to a completely different strategic decision.

The issue highlighted here narrows down to the problem of selection bias, i.e., not knowing whether the environment for the insurance products is comparable and similar groups of people are compared with regard to insurance product uptake. So the challenge of a robust assessment is to generate reasonable comparison groups. Comparing the behaviour of the same individual with and without being exposed to the insurance product or being exposed to a slightly different insurance product would be ideal. However, this would be unfeasible since an individual cannot have two simultaneous existences at a given point in time, i.e., an individual cannot be in the treated and the control groups at the same time (see Khandker, Koolwal, and Samad, 2010). There exist experimental and non-experimental approaches having different degrees of complexity and statistical robustness to mitigate the observed problems.

(1) Experimental approaches: randomization

The approach of randomized trials (see Angrist, 2004) that involves the application of random assignments of individuals to treatment and to a control group is considered to be one of the most robust approaches to avoid selection bias. The two groups will approximately exhibit the same characteristics in terms of important factors such as age, sex, income, and risk exposure and differ only in terms of the treatment status for appropriate sample sizes. Examples of randomized trial studies on the take up and impact of rainfall insurance are provided in Bauchet et al. (2011). The implementation of a randomized trial approach would require a randomization already at the stage of the product rollout and needs to be planned in advance. In specific, this would require to randomly select a group that receives the offer for a RIICE insurance product having specific features and distribution channels and other groups that receive the offer of a similar product whereas some product features and/or distribution channel properties are varied. It might not be required to implement randomized ex-

periments in all seven participating countries. However, it is suggested that experiments are conducted in two selected countries.

(2) *Non-experimental approaches: matching methods*

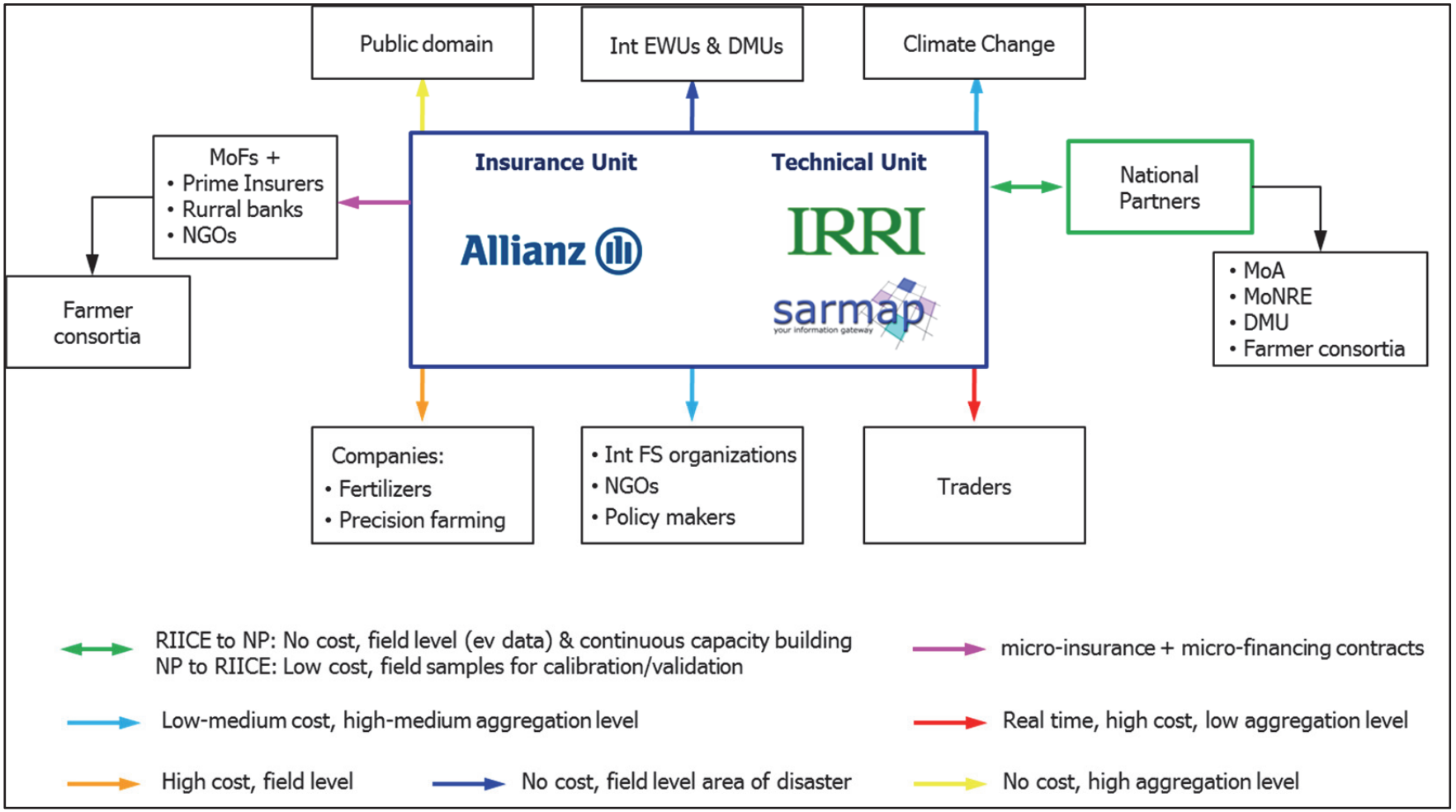
As opposed to experimental approaches, we may instead aim at identifying a "quasi-experimental setting" that mimics a randomized approach in so far as there is a group affected by a specific insurance product feature and/or distributional approach and some "control" group that is not affected. If we can argue credibly that the groups do not systematically differ, a quasi-experiment may be applied instead of a randomized experiment. However, it is often hard to justify that projects that were not ex-ante executed as randomized experiments do satisfy these criteria. Matching methods are one potential means to apply a quasi-experimental approach in the RIICE project setting. Matching methods in the case of the RIICE project objectives refer to approaches aiming at comparing areas which are similar with regard to most important environmental factors. Matching methods compare the effects of different product/distribution properties on insurance uptake across these areas to identify successful product properties. The matching is conducted on a range of observed characteristics that are deemed relevant for impacting product uptake. These approaches therefore assume that a potential selection bias may only result from observed characteristics, and thus, they cannot account for unobserved factors affecting uptake (see Khandker, Koolwal, and Samad, 2010). A drawback to this approach is that academic research is just beginning to understand the most basic drivers of rural agricultural insurance uptake. Thus, it is questionable whether comparable areas can be defined that are similar with regard to all relevant factors affecting uptake. Two potential means of implementation seem feasible: (1) only compare similar areas based on observed similarities of most important environmental factors (e.g., wealth, income, risk exposure, last harvest yield,…), (2) use of control variables to account for differences in most important environmental factors in a regression design.

Experimental and non-experimental approaches can be streamlined for specific strategic questions that have the highest priority for the RIICE project members, thus limiting complexity and effort. However, synergies for answering multiple questions within one experimental setting are usually large and additional costs limited.

To strengthen the argument for verification approaches as outlined here, we provide specific examples of strategic decisions for which experimental and non-experimental methodologies are advantageous:

- To what extent does the success of the new RIICE related products depend on the demand for agricultural credit (and thus credit-related insurance products)?
- How does the basis risk related to the new RIICE agricultural index insurance affect the demand for agricultural coverage as opposed to traditional insurance coverage?
- Which distribution channels are most successful in reaching out to the target farming households?
- What types of training and information events work best to convince potential distribution partners to take up the RIICE related insurance solutions?
- What types of training and information events work best to convince potential users to apply the RIICE rice crop information system?

Annex 5 Potential areas of application of RIICE



Source: RIICE, 2012, Remote Sensing Based Information and Insurance for Crops in Emerging Economies: On Component 1 of HGS-ETH Nadel Report.