RICE Flagship project 1:
Accelerating impact and equity

Rationale and scope

The ongoing structural transformations in many countries require donors and governments to develop investment plans based on future development scenarios. This means that high-quality information is needed on such issues as changing consumer preferences, farmers' technology needs, drivers of change in rice ecosystems, yields, input use, rice markets, and prices. Such information is also needed to guide and prioritize research within RICE. Further, data are needed for effective monitoring and evaluation, and to draw lessons to feed back into the research cycle. In addition, in the absence of market feedback, publicly funded rice research requires systematic analysis of expected impacts so as to justify, prioritize, and target future investments.

To support decision making by these donors and governments, RICE as a research in development program requires a strong framework for adaptive management of its research agenda in response to changes in the rice sector, emerging needs and opportunities among beneficiaries, and feedback and learning loops based on documented results. Continuous foresight is needed to identify and monitor current and emerging drivers of change in a rapidly evolving rice sector, and to make the case for further investment.

Women make significant contributions to rice farming, processing, and marketing, but still face many barriers and inequality in access to and control over resources such as land, capital, and credit as well as access to agricultural inputs, improved technologies, and marketing services. Youth unemployment has recently emerged as a crisis in agriculture-based economies of low-income countries; the creation of job opportunities for young people in agriculture is important to reduce poverty and unemployment. Enhancing gender equity and inclusion of youth in the rice sector requires systematic situation analyses and crafting of policies and programs that will strengthen women's access to resources and services and create meaningful employment opportunities for youth. Moreover, understanding gender-related issues is prerequisite to developing and disseminating new technologies by RICE that specifically target the reduction of gender inequities. This requires good-quality information on gender-disaggregated socioeconomic and biophysical characteristics of rice production and consumption.

To realize the intended benefits of RICE among the tens of millions of targeted beneficiaries, the results of its research and development activities need to be brought to scale and answer the needs of various actors in the rice sector. This requires the development and support of collective innovation mechanisms and strategic partnerships for scaling-out, strengthening the capacity of R&D partners, and management and communication of existing and new knowledge. The design and conduct of research at the action sites of RICE will need to be informed by the perceptions of rice value-chain actors and gender and youth needs in a farming systems context, in order to deliver impact and equity at scale. The capacity of rice R&D organizations needs to be strengthened so that they fully involve value-chain and farming systems stakeholders in the research process, build on local knowledge and expertise, and empower women and employ

youth. Effective and efficient knowledge exchange mechanisms and partnerships for large-scale outreach and dissemination will need to be identified and implemented early to accelerate the adoption of innovative research products and services.

Most of the intended benefits from RICE derive from millions of farmers adopting improved rice technologies, especially new rice varieties. Hence, the existence of well-functioning seed delivery systems is a specific and critical enabling factor for the success of RICE. However, in most countries in Africa and the hinterlands of Asia and Latin America and the Caribbean, seed distribution systems are poorly developed or nonexistent. It is crucially important to improve seed delivery systems and catalyze their formation where nonexistent, to ensure timely delivery of sufficient quantities of quality seed of improved varieties to millions of farmers.

Finally, to complete the R&D loop, research managers within RICE need accurate information on the impact of their research, so that their efforts can be targeted at the most promising options.

Objectives and targets

Flagship Project (FP) 1 provides an overarching framework for guidance and feedback to all the RICE FPs, to promote and accelerate large-scale delivery and intended outcomes and impacts. FP1 undertakes foresight, policy analyses, gender and youth studies, technology targeting, fostering innovative mechanisms and partnerships for scaling-out, monitoring, and evaluation of progress, and ex-ante and ex-post impact assessments across the CRP. It helps all other FPs develop well-targeted and demand-driven products and delivery approaches.

FP1 research outcome	Sub-IDO	IDO	SLO or cross-cutting issue
Foresight analyses and priority setting used by RICE and partner scientists to develop and target technology options	Increased capacity for innovation in partner research organizations	National partners and beneficiaries enabled	Capacity development
Improved role in decision making by women and youth in rice value chains as evidenced by empowerment measures at key action sites	Improved capacity of women and young people to participate in decision-making	Equity and inclusion achieved	Gender and youth
Well functioning multistakeholder platforms for innovation at six action sites (Bangladesh, India, Nepal; Nigeria, Senegal, Tanzania)	Increased capacity for innovation in partner development organizations and in poor and vulnerable communities	National partners and beneficiaries enabled	Capacity development
New cadre of young, well-trained scientists (30% women) engaged in rice research	Enhanced individual capacity in partner research organizations through training and exchange	National partners and beneficiaries enabled	Capacity development
Effective public and private delivery systems for seeds of improved rice varieties in six countries (Bangladesh, India, Nepal; Nigeria, Senegal, Tanzania)	Increased capacity of beneficiaries to adopt research outputs	Enabling environment improved	Policies and institutions
Impacts and adoption of RICE technologies assessed	Increased capacity of beneficiaries to adopt research outputs	Enabling environment improved	Policies and institutions
Functional and effective results-based management system for RICE and its partners	Increased capacity for innovation in partner research organizations	National partners and beneficiaries enabled	Capacity development

At the same time, FP1 serves the broad community of stakeholders in the rice sector by filling a general demand for up-to-date information. The focus is primarily on synthesizing and making available accurate science-based information to policymakers, donors, scientists, agricultural professionals, farmers, and the general public. FP1 provides baseline data and information against which these actors can assess the success or impact of previous interventions and plan new ones through ex-post and ex-ante assessments of projects, technologies, and policies.

FP1 will deliver the following research outcomes to selected sub-IDOs, IDOs, SLOs, and cross-cutting issues of the SRF (see also the performance indicators matrix):

Impact pathway and theory of change

Fig. 1.1 presents the impact pathway and theory of change, with risks and associated enabling actions for the whole of FP1.

FP1 conducts many of the enabling actions that support the impact pathway and theory of change of the whole RICE CRP. Foresight and priority-setting activities are the basis of evidence-based decision making by program/project management and senior research leaders in allocating resources where they have the greatest impact potential. The gender-disaggregated findings of socioeconomic analyses of farm households on technology needs of farmers, technology performance in farmers' fields, and adoption constraints are expected to improve product development and the formulation of supportive policies for their scaling-out and adoption. Addressing social considerations with a focus on women and youth is expected to lead to policies and technological changes that promote gender equality in access to productive resources and opportunities that will contribute to household food and nutrition security.

A central element of the theory of change is the establishment or strengthening at action sites of multistakeholder

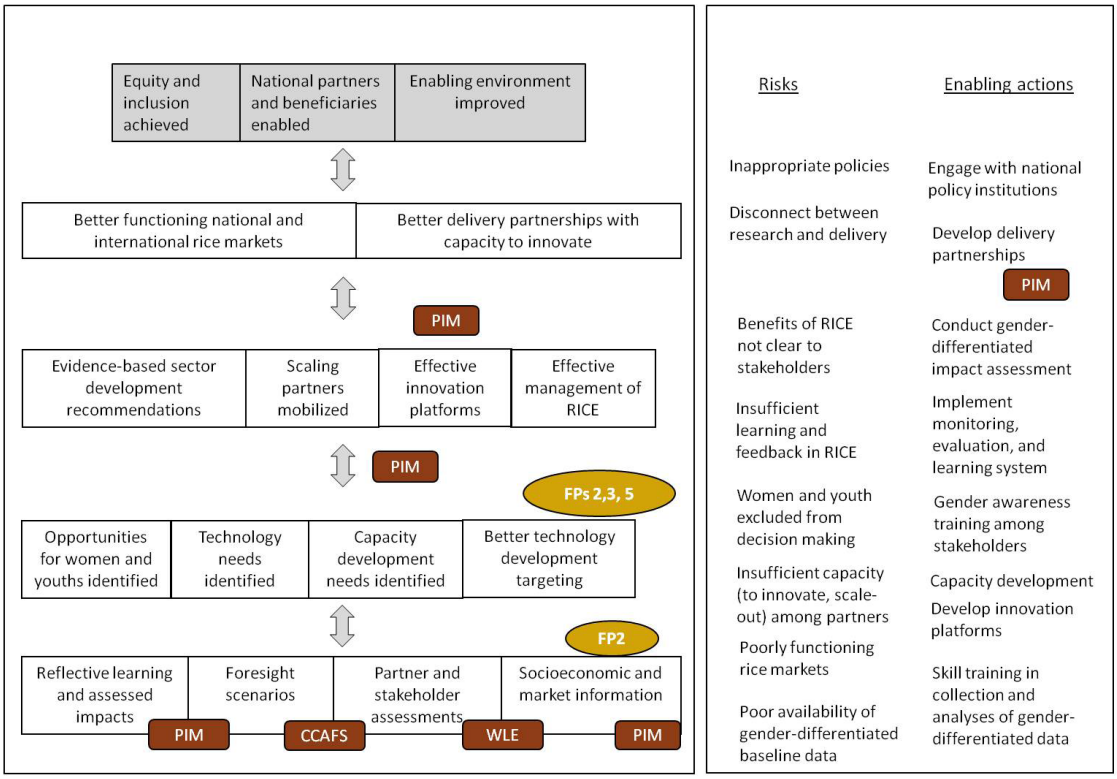

Fig. 1.1. Impact pathway (left) and theory of change (right) of FPI. Grey boxes are IDOs, ovals (with FP x) refer to links with other FPs, and the dark boxes refer to links with other CRPs (see Annex 14.2 for abbreviations).

platforms[1]—mechanisms that allow interactions along the rice value chain and/or within a particular farming systems environment among stakeholders who share a common goal to improve mutual understanding, create trust, define roles, and engage in joint action within a value chain (FP2 [Upgrading rice value chains]) and/or farming systems (FP3 [Sustainable rice farming systems]) context. A learning alliance is a multistakeholder platform that places special emphasis on capturing learnings from joint development and implementation of solutions and interventions in repetitive, progressive learning cycles (Lundy et al 2005). Another form of multistakeholder platform is the innovation platform, which provides a space for learning and change (Homann-Kee Tui et al 2013). It comprises a group of individuals (who often represent organizations) with different backgrounds and interests: farmers, traders, food processors, researchers, government officials etc. The members come together to diagnose problems, identify opportunities, and find ways to achieve their goals. They may design and implement activities or coordinate activities by individual members.

To reach millions of beneficiaries, partnerships will be forged for capacity development and scaling-out beyond the action sites.

Real-time data on rice production, the medium-term outlook, and quantitative assessment of domestic and trade policies will help national policymakers to effectively forecast and mitigate problems in the sector. In particular, policy measures such as export bans, import restrictions/quotas, and input subsidies are often subject to controversial debate on national food security. FP1 research will help to mitigate situations like the 2008 global rice price spike by engaging rice traders and government agencies in more appropriate market and policy responses. However, much relies on the presence and quality of data. Engagement of national partners will be sought to collect, verify, and take ownership of national and subnational data.

Science quality

FP1 will collect and analyze vast amounts of cross-sectional and panel data and GIS/remote-sensing data across the rice sector in different countries and along whole rice value chains using state-of-the-art tools and methodologies. The information will be used to provide critical feedback to all other RICE FPs, allowing them to develop well-targeted, demand-driven products and delivery approaches for varieties, management systems, and other information that actors along the rice value chain really need. For farm households, such data include information on farm characteristics, resource base, labor use, income levels, farmers' perceptions on technology needs, technology adoption patterns and constraints, and farm-level effects of technologies. The farm household data will be geo-referenced and disaggregated by gender to identify any changing roles of women and youth. All household data will be collected using computer-assisted personal interviewing, in which completed questionnaires are immediately sent to the main server to allow continuous checking of data collection and quality.

Spatial analysis will involve mapping and monitoring the biophysical and socioeconomic characteristics of rice-producing areas using remote-sensing technology and GIS for effective technology targeting. The use of remote sensing to track technology adoption and real-time monitoring of rice production (including crop losses due to extreme weather such as flood and drought), will be supplemented with survey data to improve accuracy, timeliness, and cost-effectiveness of the estimates.

The in-house foresight and policy simulation integrated platform, using the rice growth model ORYZA2000 and

[1]According to ISPC (2015), multistakeholder platforms 'concern structured alliances of stakeholders from public, private and civil society sectors. These include companies, policy makers, researchers, a variety of forms of NGOs, development agencies, interest groups and stakeholders from local, national, regional and international governance regimes. The key feature is the dissimilarity of partners'.

the IRRI Global Rice Econometric Model, will be linked to IFPRI's IMPACT modeling framework to measure the impacts of potential technologies and policies nationally, regionally, and globally. On-the-ground economic, environmental, and social impacts of technology adoption will be assessed when research products are near their peak level of adoption, while more immediate feedback to scientists and policymakers will be provided through qualitative evaluation during early adoption. The adoption survey data will be combined with DNA fingerprinting of collected rice seed samples to cross-validate survey results. To enhance the scientific quality and rigor of impact assessment, advanced methods will be used, including randomized control trials, conditional and marginal treatment effects, experimental auctions, and other experimental methods to elicit information from farmers and other value-chain actors. FP1 will combine quantitative and participatory impact-evaluation methods. The quantitative part focuses on the new marginal treatment effect (MTE) framework that accounts for selection of both observables and unobservables and creates a unified framework to generate various parameters of interest.

The leader of FP1 is an experienced economist in the rice sector and has leadership skills in research-for-development projects and programs obtained in GRiSP. The FP1 core team consists of a well-balanced mix of senior scientists and young professionals

The Independent Evaluation Arrangement (IEA) review of GRiSP noted that, although the GRiSP social sciences produced some outstanding work with some excellent examples of high-quality science, quality overall was variable. Too much of the work was too descriptive, too disciplinary, or published in working papers, reports, and mediocre journals rather than in first-call journals. In line with their recommendations, FP1 management will foster more interdisciplinary research with biophysical scientists (especially in FP3 and FP5 [New rice varieties], through joint situation analyses, need and opportunity assessments, and technology evaluations). It will also foster strong partnerships with both public and private ARIs to bring in fresh and novel social science tools, such as through collaboration with the University of California-Berkeley on randomized control trials; Purdue University, University of Mississippi, and North Carolina State University for joint analysis of farm household survey data in gaining insight into poverty dynamics, food security, technology adoption, and impact; the University of Arkansas on the development and application of the multicountry econometric model; and Sarmap for remote sensing technology and software (see also section Partnerships).

Finally, FP1 management will encourage jointly authored (among CRP centers and ARIs), high-quality publications similar to a recently published article (Yamano et al 2016) on the adoption and impact of international rice research technologies, co-authored by social scientists from IRRI, AfricaRice, and CIAT. Already in recent years, the FP1 core team has published in top tier disciplinary and interdisciplinary journals, including the American Economic Review, Food Security Report, Proceedings of the National Academy of Sciences, Agricultural Economics, World Development, Food Policy, Applied Economic Perspective and Policy, Plos One, Australian Journal of Agricultural Economics, Agricultural Systems, Field Crop Research, Remote Sensing, Land Use Policy, Global Food Security, Food Security, Global Environmental Change, and Mitigation and Adaptation Strategies for Global Change. One paper was the best journal paper in Agricultural Economics in 2014 (Balagtas et al 2014).

Lessons learnt and unintended consequences

FP1 builds on Theme 5 (Technology evaluations, targeting, and policy options for enhanced impact) and Theme 6 (Supporting the role of the global rice sector) of GRiSP. A major lesson learned was that a strong conceptual and analytical framework should

be developed to underpin this work, and that this work should play a stronger role in CRP internal guidance and monitoring, evaluation, and learning (MEL). Hence, this role has been strengthened and two new Cluster of Activities (CoAs) have been added to strengthen the MEL (CoA1.6) and impact assessment (CoA1.5) activities. In particular, capturing learning on progress toward development outcomes and feeding this back into the research progress of the other FPs are major improvements over GRiSP. Also new are the analyses of youth mobilization in the rice sector; CoA1.2 includes the development of a youth strategy for the whole of RICE. It summarizes some of the specific GRiSP lessons learned on gender and how FP1 will improve on them in RICE.

Through its activities on program monitoring and evaluation and impact assessments, FP1 aims to address unintended consequences of RICE on any development outcome or SLO. Repeated household surveys and analyses of national survey data will reveal impacts on such issues as household food security, poverty, gender equity, youth employment, and natural resources. Such information will be fed back into the research planning cycle of the RICE FPs through CoA1.6. A particular potential unintended consequence is that RICE technologies do not respond to the needs of women or socially disadvantaged groups in society, or do not bring them benefits. Hence, FP1 will disaggregate (by gender, age, and social groups) and monitor technology adoption data, conduct gender studies to develop technologies that address women's needs, and engage in technology dissemination approaches that target women and socially disadvantaged groups. Another risk of unintended consequences arising from these actions is that traditional power structures become threatened to the extent that development objectives are obstructed. Through close collaboration with project partners and monitoring the success of multistakeholder platforms, especially learning alliances, FP1 will signal such risks and develop mitigation strategies such as additional awareness raising and developing and demonstrating win-win situations. Under special conditions, partners with special skills such as conflict resolution may be needed.

Clusters of activity (CoA)

1.1 Foresight and targeting

Foresight analyses combine qualitative methods such as national and regional policy dialogues and stakeholder consultations, and quantitative methods. In CoA1.1, qualitative assessments will be carried out in strong collaboration with national planning activities such as through policy dialogues and contributions to the development of national rice sector development strategies, especially in sub-Saharan Africa and Asia. For example, in collaboration with REPAD (Réseau de Recherche pour l'Appui au Développement de l'Afrique), CoA1.1 has begun to assess the impact of the common external tariff on the development of the rice sector in West African countries.

Quantitative modeling approaches will be used to conduct dynamic supply-and-demand analyses under different socioeconomic and environmental scenarios. An integrated model, combining a global rice supply-and-demand econometric model with a crop growth simulation model (developed in collaboration with PIM/IFPRI) will be used to assess the changes in technology and policy development that are needed to meet the challenges to global food security, poverty, climate change, and natural resource degradation. The econometric model describes the behavior of the world rice market and how it is linked with other agricultural and nonagricultural inputs and products. It includes 33 major rice-producing, rice-consuming, and rice-trading countries/regions. Its linkage with the crop growth simulation model allows yield estimation to be endogenized in the system. The integrated model will further be linked to a satellite-based rice monitoring system to provide seasonal forecasts of rice area, yield, production, price, and predictions of crop loss caused by extreme weather events such as floods, droughts, and tropical cyclones.

Together with survey data and tools such as GIS, the above models will be used to characterize and map market segments and target environments for technologies that other RICE FPs will develop—such as new varieties, crop management technologies, farming systems, and postharvest technologies. Information obtained from participatory, structured, and quantitative priority-setting exercises will be fed into the model to obtain estimates of economic, health, and environmental benefits per dollar of investment in potential research areas. Components of this analysis include mapping of rice agroecosystems, assessment of current and projected yield gaps under future climatic conditions, and disaggregation of yield gaps into efficiency gaps, gender gaps, abiotic yield limitations, and biotic yield reductions for particular agroecosystems and countries.

1.2 Gender and youth for inclusive development

CoA1.2 identifies the constraints and gender- and age-specific needs and opportunities for women and youth in rice-based systems and rice value chains. The findings from gender and youth research will provide important feedback to RICE FPs 2–5 for the design of gender- and youth-sensitive technologies and for the implementation of gender- and youth-inclusive actions to accelerate impacts of these technologies.

CoA1.2 focuses on developing strategies for the equitable inclusion of men, women, and youth in the rice sector and identifying income-generating opportunities for women and youth in rice-based agricultural systems. The major activities of this cluster are identifying opportunities, needs, and constraints of women and youth to contribute to and benefit from the development and dissemination of improved rice technologies, diversified farming systems, and sustainable natural resource management practices. This cluster also identifies gender- and age-differentiated impacts of rice-related technologies and the changing role of women and youth in rice farming. Capacity development programs will be designed for women and youth. Innovative business models (e.g., agricultural service provider and seed entrepreneur) for women and youth will be developed and tested in selected countries of Asia and Africa. Opportunities are described in more detail in the other FPs. Finally, CoA1.2 will assess the impacts of new technologies, training, and business models on youth and women's empowerment by evaluating their decision-making power and access to and control over assets comparing pre- and post-intervention scenarios. Findings will be provided as feedback to project leaders, national partners, and donors for gender- and age-inclusive agricultural policy decisions.

1.3 Collective innovation and scaling-out

Fig. 1.2 presents a detailed impact pathway and theory of change for CoA 1.3. Accelerating the adoption of rice products and services resulting from research depends first on full and equitable participation of key stakeholders in research activities at the action sites to ensure that products and services that are developed are inclusive and demand driven. CoA1.3 will bring the voice of poor and vulnerable communities to the development partners that directly interface with them. It will strengthen the capacity of RICE research and development partners for innovation at action sites by developing innovation platforms and building on local knowledge and iterative cycles of collective planning, action, and learning. The capacity of rice value-chain actors at the action sites to generate innovations will be strengthened. CoA1.3 will develop a proactive and inclusive approach to opportunities for youth employment and women's empowerment during technology development, and prioritize innovations that help more marginal farmers, ethnic groups, and women to capture a significant (if not disproportional) fraction of the benefits.

CoA1.3 will also establish, maintain, and expand partnerships with major scaling partners from the public and private sector to scale-out RICE technologies and services (developed in FPs 2–5) to reach millions of

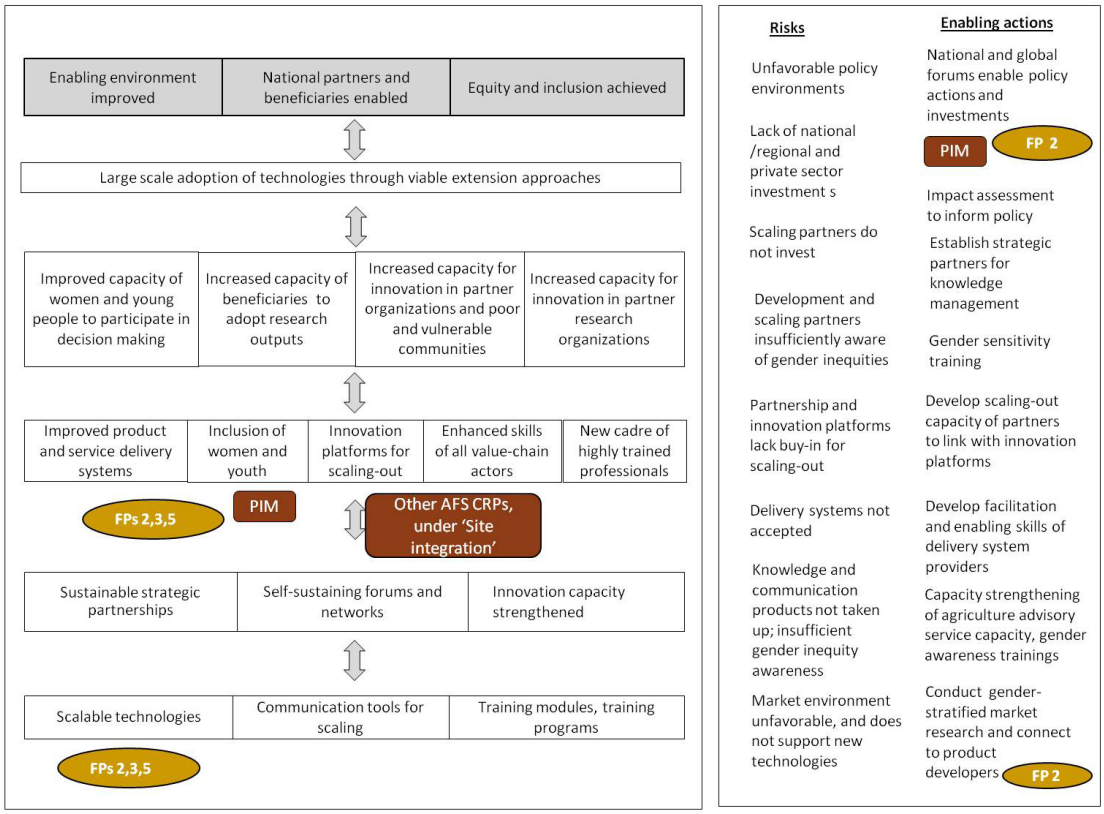

Fig. 1.2. Impact pathway (left) and theory of change (right) of CoA 1.3 of FP1. Grey boxes are IDOs, ovals (with FP x) refer to links with other FPs, and the dark boxes refer to links with other CRPs (see Annex 12 for abbreviations).

beneficiaries beyond the action sites. Scaling partners include national extension services; national research, technology, agricultural, and rural development ministries; the private sector (e.g., seed industry and machinery providers); international development and donor agencies (e.g., international development banks); and NGOs such as Catholic Relief Services, Bangladesh Rural Advancement Committee, and Digital Green. Such partnerships will build on the lessons learned and the principles and technologies derived from research at the action sites. Hence, CoA1.3 promotes linkages between multistakeholder platforms at action sites and scaling partners. In return, the scaling partners will provide RICE with information on the performance of these innovations and gender-disaggregated data on their uptake by target beneficiaries. Successful scaling-out of RICE technologies and services also requires that policymakers and decision makers create and maintain a favorable policy environment. Hence, CoA1.3 links with the policy activities of CoA1.1.

CoA1.3 will conduct research to rigorously assess the cost-efficiency, effectiveness, and inclusiveness of the various scaling models used by RICE and its development partners. Case studies will include seed systems for effective delivery of new varieties (link with CoA1.4), agricultural machinery systems (link with FP2 and FP3), rice management decision support (link with FP3), and business models and capacity strengthening approaches. The outcome of this research will be the enhanced ability to select best-fit scaling approaches for impact at scale, in particular targeting women and youth.

1. 4 Seed delivery systems

This CoA will strengthen seed delivery systems, and catalyze their formation where nonexistent, to ensure timely delivery of sufficient quantities of quality seed of improved varieties to millions of farmers. Enabling actions will include developing good understanding of the gaps in seed delivery, strengthening the

capacity of partners along the seed chain, and strengthening linkages with national seed systems, community seed growers, input dealers, and private seed companies. Effective communication strategies will be employed along the demand-supply chain to provide adequate seed of different categories to relevant partners. The role of the private sector, NGOs, and other seed producers will be emphasized and strengthened to sustain seed multiplication and delivery. New entrepreneurships will be sought, particularly among youth and women's groups, to engage in good-quality seed multiplication and marketing, especially in remote or inaccessible areas. Special attention will be paid to including women farmers among the beneficiaries of the seed of improved rice varieties.

1.5 Adoption and impact assessment

Ex-post impact assessment will be conducted when RICE research products are close to their peak of adoption. Results will be fed back into technology development, targeting, and scaling-out in CoA 1.3 and CoA1.4, and other FPs. These studies will focus on estimating the realized economic, social, and environmental benefits of adoption of RICE products. The studies will be designed to allow the disaggregation of impact results for men, women, and youth so as to assess how RICE outcomes have led to changes in the CGIAR SLOs such as food security, poverty, and environmental footprints for each actor. Most ex-post impact studies in the CGIAR so far have focused on results of adoption of improved varieties; impacts from the adoption of improved natural resource management (NRM) and postharvest technologies have been less documented. Difficulties in defining NRM technologies and practices, measuring noneconomic returns, and measuring long-term benefits have inclined social scientists to focus on genetic contributions.

Therefore, in addition to impact assessments of novel genetic resources, CoA1.5 will focus on evaluating NRM and postharvest technologies and practices. The proposed studies include resources conservation technologies (e.g., smart-valley, alternate wetting and drying, and One-Must Do and Five Reduction), improved farming equipment (mechanical weeder), institutional innovations (contractual arrangements), decision support innovation (RiceAdvice and Crop Manager) and postharvest innovations (parboiling system and ASI thresher). Impact surveys will take into account estimation of household (both male and female led) and aggregate (country-wide and mega-growing environment) parameters.

To obtain reliable impact estimates, evaluation studies need to employ rigorous evaluation methods. Often, it is useful to have baseline data to identify changes over time with and without new technology. In CoA1.5, the ex-post impact assessment methodology will combine both quantitative and qualitative participatory impact-evaluation methods. The quantitative component uses a design that integrates both randomized control trials and observational study methods, based on the potential outcomes framework, but the focus will be on the new marginal treatment effect (MTE) framework. Unlike traditional approaches such as propensity score matching, the MTE framework accounts for selection on both observables and unobservables and creates a unified framework to generate parameters of interest. Surplus analyses will be used to estimate the total benefits of RICE varieties at the aggregated level. Impact evaluation specialists will work closely with scientists who are familiar with new technologies and practices to establish baselines and control treatments for later impact evaluations. Data will be collected and analyzed using an automated web-based application (Mlax) developed by AfricaRice (www.mlax.org) and other computer-assisted personal interview systems (e.g., Surveybe).

1.6 Monitoring, evaluation, and learning

A results-based management system prototyped under GRiSP will be further developed and used to track progress of RICE toward its development outcomes. This

system will be interoperable with center-specific MEL systems that are already in place. Special emphasis will be placed on tracking gender-disaggregated process indicators and providing feedback on gender-specific RICE targets. A functional and well-articulated MEL system is essential to manage for results. CoA1.6 will be responsible for leading the RICE results framework and developing and implementing tools to measure IDOs and sub-IDOs. The MEL system of RICE will track, monitor, and evaluate progress and provide reflective learning across the FPs. The system will help design impact pathways and theories of change, guide the FPs through analysis of critical feedback loops, and use the results to adapt the impact pathways and theories of change in a continuous learning cycle. It will also derive key lessons for program/project management and decision making. The results of the MEL system generate knowledge for scaling-out RICE products and services. Finally, the MEL system will be used for reporting and to show accountability to donors and stakeholders. The backbone of the system consists of repeated household surveys at RICE key action sites, supplemented with focus group discussions and spatial analyses.

Partnerships

Partnership building and strengthening are at the heart of CoAs 1.3 and 1.4, which will also improve the capacity of the other RICE FPs to collaborate with farmer organizations, private-sector and civil society partners, and national and regional rice development projects. It will build on local knowledge and expertise, thereby empowering women and mobilizing youth. Specifically for value-chain analysis and upgrading, FP1 will partner with PIM to adopt a common framework, which will be applied jointly at specific action sites in target countries.

Collection and analysis of the data needed to achieve the goals of FP1 require partnerships across a wide spectrum of advanced institutions within and outside the CGIAR. Special emphasis will be placed on strengthening capacity in national partner institutes to carry out policy work related to the seed sector, input supply and availability, and the labor market. Such capacity will be mobilized to support technology development, adoption, and dissemination. A consultative framework and mechanism of information sharing will be adopted with various stakeholders (NARES and NGO staff, national agricultural statistical service staff, rice stakeholder organizations, policy analysts, and donors). To enhance the quality of its science, FP2 will expand its partnerships, particularly with other CGIAR centers, ARIs, and universities.

FP1 has a comparative advantage for rice sector research because its research portfolio naturally connects through many entry points to rice agri-food value chains. Although the private sector increasingly addresses mechanization and postharvest problems, it usually engages only in areas that have short- to medium-term market potential. The comparative advantage of FP1 further rests in its international mandate, which facilitates exchange among countries and can thus improve rice sector efficiency at regional and global scale.

Climate change

The long-term data collected in this FP will be used to assess the effects of climate change on yield and provide insight into the coping mechanisms adopted by farmers to adapt to its effects. Foresight and ex-ante assessment of potential technologies will be conducted under different climate scenarios, using the integrated economic and crop modeling framework to measure potential impacts. CoA1.6 describes the MEL process that uses climate change impact and other assessments in a continuous learning cycle for program/project management.

Gender

Rice farming and value chains everywhere are changing rapidly, with major implications for the role of women in decision making, labor specialization, and postharvest management. With appropriate

Some major partners and their roles are:	
Discovery	Proof of concept/Scaling-out
IFPRI, International Crops Research Institute for the Semi-Arid Tropics, University of California-Berkeley, Purdue University, University of Mississippi, North Carolina State University, University of Arkansas, London School of Economics, Alliance of the International Center for development-oriented Research in Agriculture (ICRA), Center for Development Innovation (CDI) of the Wageningen University research group, the Royal Tropical Institute (KIT), and Sarmap.	Numerous NARES partner institutes in Africa, Asia, and Latin America. NARES researchers are normally given the responsibility of data collection, analysis, report writing, and publication at the national/state level for all studies in their respective countries. NARES institutes also disseminate results in national scientific and policy forums. Scaling partners include national extension services; national research, technology, agricultural, and rural development ministries; private sector (e.g., seed industry and machinery providers); international development and donor agencies (e.g., international development banks); and NGOs such as Catholic Relief Services and the Bangladesh Rural Advancement Committee.

technological and institutional support, rice farming could offer equal opportunity employment for women and men. The IEA evaluators of GRiSP concluded that GRiSP, specifically through its W1/W2 funding, played a central role in sensitizing and training its participating centers' staff and partners in gender analysis. GRiSP successfully involved women as target beneficiaries in its activities for scaling-out technologies despite cultural barriers imposed in some societies. However, the evaluators also noted that GRiSP was less successful in incorporating gender as an integral part of research planning and technology design, and recommended that GRiSP should do more in-depth analysis to understand opportunities and constraints of women in rice farming and value chains in order to better address the effectiveness and equity impacts of its research and technology delivery (Recommendation #9, p xvii). Hence, gender research has been embedded as a specific CoA in FP1 to pay particular attention to gender issues upstream in the research-delivery pipeline, to conduct in-depth research on the role of women in rice farming and value chains, and to guide planning of research that explicitly incorporates gender dimensions in the early stage of technology design in the other FPs of RICE. It also contributes to gender aspects of ex-ante and ex-post impact assessments. Further details are provided in the description of CoA1.2.

Capacity development

Capacity development in FP1 incorporates most of the nine elements of the CGIAR Capacity Development Framework. Lessons from GRiSP have shown that the element "Needs assessments and promising interventions" requires expert facilitation of innovation processes for successful technology development and dissemination. In turn, successful facilitation requires interdisciplinary and gender competences, as well as business development skills. Hence, CoA1.3 supports the development of skilled facilitators in RICE institutions and in partner R&D organizations. These facilitators will also be trained in gender-sensitive approaches so that they will be able to recognize gender gaps in access to improved technologies and technical knowledge, and to identify gender-disaggregated constraints and opportunities. CoA1.3 will also develop capacity enhancement programs to address gender concerns in the whole R&D process; to train women on all aspects of production, processing, and farm management; and to train grassroots women farmers and other actors in the rice value chain. Concrete outputs will include training material, people trained on women and youth aspects in value-chain development and products, and advisory services that work for women and youth.

In ex-ante and ex-post impact assessment (CoA1.5), emphasis will be on institutional capacity development

in advanced tools and methods through close interaction with national partners. Specifically, training is to be provided on analytical forecasting and modeling tools, remote sensing, GIS, and the conduct of surveys and other data collection techniques. Capacity to apply these tools at the institutional level will be prioritized.

Intellectual asset and open access management

FP1 follows the RICE policies and strategies on intellectual asset management, open access, and data management, which are in line with the CGIAR Principles on the Management of Intellectual Assets and their Implementation Guidelines, and with the CGIAR Open Access and Data Management Policy and its Implementation Guidelines. FP1 intellectual assets relate to statistical data, survey data, models, tools, methodologies, training and information dissemination products in various forms (digital, written video, audio, manuals, pamphlets, posters, and PowerPoint presentations: Rice Knowledge Bank, RiceHub, Rice videos Africa, and Rice videos Asia), and policy briefs, reports, and publications. Data on national rice sector statistics are made available through the World Rice Statistics. Gender-disaggregated household and other survey data are made open access and are distributed through the online sites Farm Household Survey data and AfricaRice Research data. As a policy, these data are made available within 12 months after curation and quality control or 6 months after publication. Surveys are conducted in accordance with the highest ethical standards; the RICE CGIAR centers are committed to protecting the rights, dignity, health, safety, and privacy of research subjects when collecting data. Informed consent from study participants shall be obtained at the outset of any survey or interview. Personal data collected with respect to farmers or other stakeholders will be processed fairly and lawfully and, in particular, will not be made public. The structural econometric model of the global rice sector developed at IRRI is publicly available (Jamora et al 2010, IRRI 2012, Hoang 2014). The rice model ORYZA2000 is fully documented, maintained, and downloadable with tutorials. CoA1.6 will maintain a web-based performance management system that catalogues RICE outputs, outcomes, IDO indicators and underlying data, and reports and other knowledge products.

Flagship Project management

FP1 is led by Dr. Sam Mohanty, head of social science division of IRRI. Each CoA is co-led by a team of senior scientists (focal persons) consisting of one or more representatives from each center.

CoA 1.2 is led by a RICE expert who coordinates the RICE gender team and participates in the CGIAR gender network. CoA 1.6 is led by RICE's M&E expert, who coordinates the RICE MEL team and participates in the CGIAR Monitoring, Evaluation & Learning community of practice (MELCOP), and IEA's evaluation community of practice. Both the gender and M&E expert participate in the extended RICE management team.