SIAC Program Progress Report
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This progress report provides a brief background and update on the Strengthening Impact Assessment in the CGIAR (SIAC) program activities up to the end of February 2016, and planned next steps for 2016 and beyond. This report is organized around the Objectives spelled out in the SIAC program of work.

Objective 1: Develop, pilot and verify innovative methods for collection and assembly of diffusion data (METHODS)

Underpinning this objective is the development of a robust set of methods for routinely tracking adoption of CGIAR-related technologies in a cost-effective manner. Such information is a prerequisite for achieving the highest quality assessment of outcomes and impacts. A set of activities are designed to test innovative ways of assessing the adoption of improved varieties of crops, livestock and fish technologies, agronomic and natural resource management interventions, with the goal of eventually embedding protocols derived on these tests into large-scale surveys carried out by others.

Activity 1.1. Advance methodologies for tracking the uptake and adoption of improved varieties

The objective of this Activity is to pilot test and validate alternate approaches to collect variety-specific adoption data against a reliable benchmark to determine which method/approach is the most cost-effective (i.e., which method provides a given level of accuracy at the least cost). The idea is to come up with 'lessons learned' and recommendations on methods / approaches that can be used in scaling up the collection and assembly of diffusion data on improved varieties. The following crop-by-country combinations were targeted:

1. Cassava in Ghana;
2. Maize in Uganda
3. Beans in Zambia

Two further crop-by-country combinations were added to the SIAC portfolio by SPIA at the start of 2015, as part of the collaboration with LSMS-ISA:

4. Cassava in Malawi
5. Sweet potato in Ethiopia

1. Cassava in Ghana:

This study tests the effectiveness of the following four household-based methods of tracking varietal adoption for cassava against the benchmark of DNA analysis of cassava leaf samples.

A. Elicitation from farmers by asking him/her the names of varieties planted and some basic questions for each variety planted
B. Farmer elicitation on varietal characteristics by showing a series of photographs (or actual plants). This information will be later used by the analyst to identify varieties based on morphological characteristic data.
C. A trained enumerator recording observations on varietal characteristics by visiting the field and sharing their opinion on what the variety is (based on observations). The information collected will be also used by the analyst to identify varieties based on morphological characteristic data.
D. Enumerator taking photos of the plant in the field for latter identification by experts (i.e., breeders)

The field work for this study is jointly supported by SIAC and the RTB CRP and conducted in partnership with IITA, Crops Research Institute (CRI)-Ghana, and Agriculture Innovation Consulting (AIC) Ghana. Field work was completed in late fall 2013. All the samples collected from the farmers' fields and the 40 genotypes included in the reference library were sent to IITA by the Ghanaian partners in January 2014. DNA extraction

work for almost 1000 samples was completed by IITA and all the samples were shipped to Cornell for Genotyping by Sequencing (GBS). Data from the GBS analysis were submitted by Cornell to IITA in July 2014.

A presentation summarizing the main results of this case study along with the results of the bean study (case study 3, below) were presented at ICRISAT in June 2015 (upon their invitation during a visit by M. Maredia), at the AAEA meetings in July 2015, and at the International Conference of Agricultural Economists (ICAE) in August 2015. A research paper summarizing the DNA fingerprinting methodology and results of this study was published in BMC Genetics (v. 16:115 DOI 10.1186/s12863-015-0273-1).

2. Maize in Uganda:

As part of the planned DTMA (Drought Tolerant Maize in Africa) adoption survey by CIMMYT in three districts in Eastern Province of Uganda, MSU had designed and implemented modules and protocols to test the effectiveness of the following three household-based methods of tracking varietal adoption for maize.

A. Elicitation from farmers by asking him/her the names of varieties planted and some basic questions for each variety planted
B. Asking farmers to show the bag in which maize seeds were obtained and enumerator recording the name of the variety.
C. Enumerator recording observations on phenotypic characteristics by visiting the field. The analyst will later use this information to identify varieties based on the varietal characteristics data.

Field data were collected in June 2014 and leaf tissues from 416 maize fields across 34 villages were collected for DNA analysis. The National Crops Research and Resource Institute (NaCRRI) of NARO served as the 'technical' partner for DNA analysis through their ongoing project with the University of Ghana (under a Gates funded project). Due to delays in transferring the leaf tissues from the field to the lab, about 50% of samples were lost due to mold development. The remaining samples were put in production line for analysis by LGC Genomics in December and we were informed that as they began the process of DNA extraction, they found that almost all the remaining sample plates contained mold. Although, the desiccants had been changed in order to stabilize the leaf material, due to the large amount of compacted leaf material in the tubes the samples continued to degrade, and due to their health and safety guidelines they were not able to continue with these samples. Thus unfortunately, all the samples collected in June 2014 were lost. Due to the delays and difficulties experienced during this project, LGC offered to repeat the work for this project for free of charge before June 2015 (for 34 sample plates x 146 assays).

The alternative was explored with SPIA to piggy back on a planned LSMS experiment on maize in Uganda in 2015, and management of the study was thereupon transferred over from MSU to SPIA in March 2015.

Regarding the survey data received from CIMMYT, the survey results indicate that in the case of maize, 13% farmers reported not knowing the name of the variety they had planted. Among the 87% farmers that did identify a variety they had planted by name, 73% reported a variety name that matched one of the varieties in the official release list. Longe 5, an OPV, was the most cited variety planted by the sampled farmers (28%), distantly followed by Longe 10H, a hybrid variety (13%). Overall the knowledge about what type of maize variety was planted by farmers, the farmer elicitation method (method A) gave a wide range of responses. For example, among the 119 farmers that reported growing Longe 5 (an OPV), only 48% correctly identified that variety as either an improved variety or an OPV. Forty two percent of farmers growing this variety misclassified it as either 'local' (22%), 'hybrid' (18%), or other/don't know category (14%). Among the 54 farmers that reported planting Longe 10H (a hybrid variety), only 44% correctly identified it as a hybrid and 35% identified it as an 'improved' variety. The other 20% of farmers identified this variety as either local (7%), recycled (6%), OPV (4%) or don't know (4%).

Not surprisingly, only 6% of farmers were able to show the bags in which the seed planted was obtained. The other 94% of farmers that could not show the bag had either no bag to show (which is not unexpected) (58%), or had obtained seed that did not come in a bag (31%), or refused to show the bag (5%). These results thus indicate that method B may not be a practical or a reliable method to use for varietal identification in developing country settings where the culture of sharing seeds (even purchased seeds) among farmers is common or the bag is not something a farmer saves for a long period of time. Perhaps, this method can be

used as one of the additional name verification step if the data on varietal adoption is collected soon after the planting season (and the chances of farmers still holding on to the bag are higher).

The data on method C (enumerators collecting phenotypic data based on observations of plants in the maize field) were collected and are available for about 390 varietal observations. These are tabulated and were shared with the maize experts at NaCRRI to see if they can use this information to identify not only the type of variety it represents (i.e., local, OPV, hybrid) but also the name of the variety. In the absence of the DNA results, it was not possible to determine the accuracy of the result of this method. But MSU will be able to check whether this can be a 'viable' method in future studies.

Since March 2015, under SPIA, the context for the study is now a large methods experiment run by the World Bank LSMS-ISA team and UBOS on estimating maize productivity. The following three methods for varietal identification have been embedded in the design of the experiment:

A. Asking the farmer to identify the variety.
B. Asking the farmer to answer questions related to 15 phenotypic characteristics (using a visual aid), checked against sets of reference responses for each variety using alternative decision rules.
C. Focus group meeting with a number of experts.

These will be benchmarked against two DNA genotyping methods:

A. DNA fingerprinting using SNP markers on samples from maize leaf tissue.
B. DNA fingerprinting using GBS on samples from maize grain.

Field work for the whole survey took place over three visits to a sample of 900 households (post-planting; crop-cutting; post-harvest) over the period April 2015 – August 2015 in 5 districts in Uganda. For budget reasons, DNA fingerprinting was possible only on a subset of 550 farms in two districts – Iganga and Mayuge. Enumerators from UBOS were recruited and trained intensively for one month, and survey data collection was facilitated by the use of networked tablets for real-time data management and processing. Leaf samples were collected at the post-planting visit in April and May 2015, from within the quadrant laid down by enumerators for subsequent crop-cutting, using leaf collection kits from LGC ltd. Grain samples subsequently collected from these quadrants in the follow-up crop-cut visit in June and July 2015. SNP-based genotyping data was received from LGC in September 2015 following analysis of the leaf samples. Grain samples were processed (dried, ground to flour, labelled) by NACCRI in August and September 2015, and shipped to Diversity Arrays in Australia at the end of October 2015. Analysis of the matches for method B (between sets of 15 responses from each farmer, and possible combinations of 15 characteristics for varieties in the reference library) is currently being carried out.

In the first instance, we will explore the two methods for DNA fingerprinting to see how they compare. Once we decide which of the two approaches is preferred (and there are strengths and weaknesses to both) we will use this as a reference to compare the other methods for varietal identification. We will also have first-rate data on agricultural productivity, soil quality, varietal identification, and household characteristics. We can estimate some simple models for the determinants of productivity: once using the data that are typically collected in surveys, based on farmer testimony; and once using objective methods for varietal identification (DNA fingerprinting), yields (crop-cuts), soil quality (soil samples taken and analysed in laboratory). These results will help us understand more about the importance of data quality in context – does improved data quality substantially impact on our understanding of some fundamental issues in impact assessment? The leaf-based genotyping has been completed, and the grain-based genotyping results are expected in February 2016. All analysis is expected to be completed by end of June 2016.

3. Beans in Zambia:

This study tests the effectiveness of the following four household-based methods of tracking varietal adoption for common beans.

A. Elicitation from farmers by asking him/her some basic questions for each variety planted.
B. Showing the farmer seed samples representing different varieties and asking him/her to identify the sample that matches each of the variety grown on their farms.

C. Collecting seed samples representing each variety planted by farmers for latter identification by experts (i.e., breeders).
D. Enumerator taking photos of the seeds during the survey for latter identification by experts (i.e., breeders).

The accuracy of adoption estimates derived from the above four methods will be evaluated against the varietal identification established through DNA fingerprinting of seed samples collected from the farmers.

The context for this study was a bean adoption study conducted by PABRA (Pan-African Bean Research Alliance), in collaboration with CIAT and the Zambian Agricultural Research Institute (ZARI). Seed samples and data corresponding to four methods, similar but not identical to the cassava in Ghana study, have been collected from 402 households that were surveyed under a PABRA study, thus allowing to leverage survey costs.

During a visit to Zambia, the MSU team visited the local market (in Kasama) and collected some bean seed samples from local vendors. These seeds were added to the pool of seeds for DNA analysis to check if the seeds of varieties sold in the market as named by the 'vendors' match the actual variety as named and identified by farmers. The total seed sample (both collected from the farmers and from the vendors) was about 900.

As a next step the seeds collected from the farmers' fields and from the market were germinated by the ZARI breeder in June 2014. A technician from CIAT-Uganda traveled in July to Zambia to help with the DNA extraction and samples were shipped to LGC Genomics.

To establish the library, ZARI included all the released varieties plus 15 other local materials in the samples shipped to LGC.

Comparing the two methods based on farmer elicitation, results indicate that there was only 25% agreement on the name of the variety planted between methods A and B. In the case of the two methods based on experts' opinion (i.e., methods C and D), there was close to 80% agreement on identifying the varieties either by name or by type. The raw data from the SNP analysis were received from LGC Genomics Lab in May 2015. These data were shared with CIAT researchers for interpretation and a report of the data analysis was submitted by CIAT soon after. Based on these data and report from CIAT, MSU has completed the data analysis to test the effectiveness of different methods of varietal identification and results are being written up as a paper expected in February 2016.

Preliminary results show DNA fingerprinting benchmark of 16% adoption, with farmer elicitation method A returning estimates of 4% adoption of improved varieties when asked for by name, and 13% when asked for as the aggregate class (local vs improved). Method B of showing farmer seed samples resulted in an estimate of 71% improved variety adoption, whereas showing seeds or photos to breeders resulted in adoption estimates rather close in aggregate (though with many possible mis-matches at level of individual varieties – to be confirmed in the paper), at 18% for showing photos and 15% for showing seeds.

4. Cassava in Malawi

The context for this study is a methods experiment led by Talip Kilic of the World Bank LSMS-ISA based around alternative approaches to estimating cassava production from households using diaries and different lengths of recall data. SPIA, through Research Associate John Ilukor, have embedded the following varietal identification approaches into the design of the experiment:

A. Asking the farmer to identify the variety.
B. Asking the farmer to answer questions related to phenotypic characteristics (using a visual aid), checked against sets of reference responses for each variety using alternative decision rules.
C. Focus group meeting with a number of experts.

These will be benchmarked against:

D. DNA fingerprinting using GBS on samples from cassava leaf.

Cassava leaf collection was integrated in the survey, along with a phenotypic protocol of traits, which was implemented starting June 2015 and is ongoing through a full calendar year. However, the leaf collection for fingerprinting and phenotypic data for subjective identification, are complete. The reference library of varieties, and their corresponding phenotypic attributes, was compiled by the Malawian NARS. DNA has been extracted in-country by the Chitedze laboratory for samples from 1200 farms and shipped to Diversity Arrays in Australia for sequencing. An output from this work is expected by end of June 2016.

5. Sweet potato in Ethiopia

This experiment was the initiative of SPIA Research Associate Frederic Kosmowski, working in Ethiopia with locally recruited enumerators and contacts through the NARS system in Ethiopia.

A. Asking the farmer to identify the variety.
B. Asking the farmer to answer questions related to phenotypic characteristics (using a visual aid), checked against sets of reference responses for each variety using alternative decision rules.

These will be benchmarked against:

C. DNA fingerprinting using GBS on samples from sweet potato leaves.

Data were collected in early 2015 from 259 plots in Ethiopia. Leaf samples were taken, DNA was extracted by ILRI in Addis, and plates for sequencing shipped to Diversity Arrays in November 2015. We are not expecting to find method B to be able to uniquely identify varieties as there are likely not enough clearly visible phenotypic characteristics that account for all varietal diversity in the library. The reference library was collected by Frederic Kosmowski and have been complemented by sequencing accessions from the CIP genebank. Analysis to match the subjective identification responses against the DNA identification of varieties is currently being carried out.

A summary of all the SIAC projects comparing alternative methods for estimating the adoption of improved varieties against a DNA reference (from across activities 1.1, 2.1, 2.4 and 3.1) is presented in table 1.

Table 1 - Comparison of methods for estimating % adoption of improved varieties in SIAC program (DATA COLLECTED – SUMMARY BY SEPT 2016)

Focus (Study team – SIAC activity)	**Sample size**	**Corresponding expert opinion estimate**	**Farmer**: Asking for variety name	**Farmer**: Asking "Improved or local"?	**Farmer**: Showing range of reference seeds	**Farmer**: Series of questions on phenotypic attributes	**Experts**: Visit field and identify by specific variety name	**Experts**: Visit field and identify "Improved or local"	**Experts**: Enumerator takes photo and experts identify	**Experts**: Seeds collected from farms and shown to experts	**DNA Reference**
Cassava, Ghana (MSU / IITA – Activity 1.1)	914 (all methods)	36% (DIIVA, 2009)	1%	6%			2%	5%	15%		4% – 31%
Beans, Zambia (MSU / CIAT – Activity 1.1)	Between 736 and 855 (varies)	9.5% (DIIVA, 2009)	4%	13%	71%				18%	15%	16%
Maize, Uganda – Leaf (SPIA / Diversity Arrays – Activity 1.1)	550										
Maize, Uganda – Grain (SPIA / LGC – Activity 1.1)	550										
Sweet potato, Ethiopia (SPIA / Diversity Arrays – Activity 1.1)	259										
Cassava, Malawi (SPIA / Diversity Arrays – Activity 1.1)	1,200	61% (DIIVA, 2009)									
Wheat, Bihar (MSU / CIMMYT / ICRISAT – Activity 2.1)	3,400										
Lentil, Bihar (MSU / CIMMYT / ICRISAT – Activity 2.1)	3,400										
Cassava, Vietnam (MSU / CIAT – Activity 2.1)	1,000										
Rice, Indonesia (MSU / IRRI – Activity 2.1)	810										
Cassava, Nigeria (IITA – Activity 3.1)											
GIFT Tilapia, Philippines (World Fish – Activity 3.1)											

Activity 1.2. Develop protocols for tracking diffusion of natural resource management technologies

A call for pilot projects under this activity was issued by MSU in July 2013 and two studies were commissioned:

1. Innovative use of mobile phone based applications in tracking adoption of Natural Resource Management Technologies in India (CIMMYT)
   and
2. Hyperspectral signature analysis: a proof of concept for tracking adoption of crop management practices in Gazipur, Bangladesh (IRRI)

The final technical reports for the two competively selected pilot studies funded under this Activity were received by MSU in April 2015 (from CIMMYT) and June 2015 (from IRRI). The reports were reviewed by SPIA and MSU, and comments of this review were shared with the authors. SPIA is publishing an impact brief on the CIMMYT study to highlight the results and lessons learned on the application of an Integrated Voice Response System to track the adoption of resource management technologies and farming practices. For the IRRI study, in addition to the fact that the research team was unable to obtain hyperspectral imagery (as initially proposed) for the test site and resorted to using alternates (Landsat 8 and MODIS), SPIA has a number of concerns regarding the study, in particular whether this is the right type of remote sensing imagery that should be used. The lessons from these two pilots have significantly informed our strategy for activity 2.2 implementation, which was the intention when the SIAC program was designed. Regarding cell-phone surveys, we have understood more about the biases from phone surveys and constraints regarding assembling a sample frame, and regarding remote sensing, through having this work externally reviewed, we have understood more about the heterogeneity of remote sensing approaches and the strengths and limitations of different methods.

A further pilot study was added in 2015:

3. Measuring adoption of conservation agriculture: A study in Ethiopia (SPIA, World Bank LSMS-ISA)

Frederic Kosmowski (SPIA Research Associate based in Addis Ababa) has designed a study to test the following methods for collecting data on soil cover from crop residues – one of the pillars of conservation agriculture, and a source of significant controversy in Sub-Saharan Africa owing to poor data quality.

A. Enumerator asks the farmer to estimate the % soil cover in their plot
B. Enumerator uses photo aids to help the farmer estimate the % soil cover in their plot
C. Enumerator uses a drone to take an aerial photo of the plot which is then digitized and a % cover estimated
D. High-resolution satellite imagery
E. Enumerator lays a transect rope with knots which is used to estimate for the field (assumed reference)

Fieldwork in 5 enumeration areas in Ethiopia began in November 2015 and will be completed in February 2016, with data collection covering 200 households (350 plots). Satellite imagery is being obtained from a commercial provider following a tendering process. This study will help us understand the extent to which survey-based data on soil cover is accurate relative to an objective reference, and also whether using drones or satellite imagery are viable alternatives. SPIA is also currently exploring the capability of the new generation of micro-satellites (e.g. Skybox) and how they are changing the outlook for using satellite imagery for these problems in future.

Activity 1.3. New institutional approaches to collecting technology diffusion data

Most diffusion surveys in the past have depended on CGIAR research teams, either working on their own or working in collaboration with national programs and statistical services to generate the data. In many countries, there are private market research firms as well as private survey firms engaged in carrying out household surveys for academic purposes. A call for proposals was issued by MSU with a focus on doing a

case study in India. The call was issued in February 2015, and applied to either for-profit or non-profit entities with the relevant capacity.

A total of six proposals were received and after review carried by MSU, proposals received from two private sector firms based in New Delhi (Synergy Technofin and Creative Agri-Solutions Private Limited-CASPL) and one firm based in Chennai (Nathan Economic Consulting India Private Limited) were recommended to SPIA for funding. After receiving an approval from SPIA, MSU established Letters of Agreement with the three firms to undertake the pilot studies to test the innovative approaches. The scope of these pilots is outlined below:

1. Led by Synergy; Haryana (Karnal) and Bihar (Vaishali); Technologies: Zero till, direct seeded rice, LLL; Wheat-rice based farming systems
2. Led by CASPL; Haryana (Karnal) and Punjab (Ludhiana); Technologies: Zero till, direct seeded rice, LLL; Wheat-rice based farming systems
3. Led by Nathan; AP (Anantapur and Kurnool); Technologies: 15 soil conservation measures promoted by ICRISAT; Groundnut farming system

To validate the estimates of technology adoption to be obtained from the three pilot studies, MSU is conducting representative surveys in the 5 study districts by using a more 'traditional' approach. This approach consists of working with a survey firm in India (identified from a process of issuing expressions of interest) to help with the logistics of doing data collection. The questionnaire and sampling design was developed by MSU with little involvement of the contract survey firm. But the survey firm provides enumerators (hired specifically for this survey), organizes training for the enumerators (with one MSU PhD student actively participating in the training of enumerators and making sure all the field activities are planned as per the survey design), takes charge of programming the survey questionnaire as a CAPI survey, provide logistical support to the field staff, and receives data, does data quality checks, data verification, and submits the clean data to MSU. All data collection for the validation surveys has been completed and currently the data are being reviewed, cleaned and organized for analysis. All the three contracted firms have completed the field work and submitted their deliverables. MSU will review the outputs and summarize the findings of this pilot project in a report format by end of April 2016.

Activity 1.4. Develop and disseminate best practices for collecting diffusion data

The idea with this activity is to take stock of activities, results and lessons learned from activities 1.1, 1.2 and 1.3, in order to generate guidance for the CGIAR system more broadly. This activity will be organized in the form of a workshop, foreseen in 2016. The Policies, Institutions and Markets (PIM) CRP has agreed to partner with SPIA and MSU in organizing and participating in this workshop. The dates of 3rd and 4th August 2016 in Boston (immediately after the AAEA meetings) have been provisionally reserved for this workshop and invitations will be circulated to a wide group of researchers with relevant expertise inside and outside the CGIAR system.

Objective 2: Institutionalize the collection of the diffusion data needed to conduct critical CGIAR impact evaluations (OUTCOMES)

The objective here is to compile and make available the best information on outcomes that are at least plausibly attributable to CGIAR research outputs, and on a large-scale. This is where a key bench-marking function for the CRPs is most obviously fulfilled by this program. Large gaps in existing adoption databases for genetic improvement technologies (activity 2.1), natural resource management technologies (activity 2.2) and policy-oriented research (activity 2.3) will be filled for priority regions. In addition, under activity 2.4, the World Bank Living Standards Measurement Study-Integrated Surveys of Agriculture (LSMS-ISA) team and SPIA and Centers are working together with NARS partners and statistical agencies to see how some of these processes can best be integrated into existing surveys to reduce cost and increase frequency of data collection. MSU is exploring similar objectives in Zambia and Mozambique and in dialogue with Indian counterparts for a similar objective.

Activity 2.1. Organize the collection of crop germplasm improvement research related direct outcomes

Under the SIAC project objective 2, this Activity (2.1) has expanded on the DIIVA and TRIVSA projects that have come to a closure, and focus on the collection of varietal diffusion data in South and Southeast Asia.

MSU is leading a process for which varietal release and varietal adoption data are collected for 62 crop x country combinations (CCCs) (which increases to 130 if we count individual states within India and regions within China as equivalent to countries – they all have their own data collection efforts) using expert opinion elicitation methods. Towards the planning of Activity 2.1, a two day inception meeting with Center and NARS partners was held in Bangkok on January 15-16, 2014 for a total of 35 participants. Based on the discussion and input from resource persons and participants, a guideline document on the methodology for collecting varietal release and varietal adoption data using expert elicitation methodology was finalized by MSU and shared with all the Centers and NARS partners. Subsequent to the inception meeting, each participating Center prepared a budget and workplan, upon which MSU established sub-contracts with the centers to collect varietal release and adoption data for the CCCs.

Table 1 below provides a summary progress report on work accomplished and still pending towards completing data collection for the two databases (varietal release and varietal adoption). Overall, data collection to compile the two databases has been completed for 107 out of 130 CCCs to be covered by this Activity. This represents an overall achievement of 82% of the targeted numbers of CCCs. Three CGIAR centers have completed the data collection for 100% of their CCCs, and have also submitted the technical reports and the two databases. The LOA for ICRISAT was extended till end of February 2016 and they plan to organize the elicitation workshops in the remaining CCCs in January and February 2016. CIP will have completed all expert elicitation workshops by March 2016, except for the 6 potato CCCs in India. For potatoes in India, CIP has been exploring to work with Dr. Rajesh Rana from ICAR-NIAP as a consultant. However, the process of signing an agreement with ICAR-NIAP is now seriously delayed due to a legal review process. It is likely that CIP will request another no cost extension to complete the potato work in India (but as of now their contract end date is April 15, 2016).

Table 2 - Data collection status by Centers for SIAC Activity 2.1, as of the end of January 2016:

Center	Total mandated CCCs	Data collection in mandated CCCs			Report submitted	Databases submitted
		Completed	To be completed	Percentage completed		
CIMMYT	40	40	0	100%	Yes	40
CIAT	10	10	0	100%	Yes	10
IRRI	21	21	1	100%	Yes	21
ICRISAT	15	10	5	67%	No	0
CIP	41	24	17	59%	No	18
MSU	3	2	0	67%	Yes	2
Total	130	107	26	82%		91

MSU (in consultation with SPIA) had identified four CCCs for a validation of adoption estimates derived using expert elicitation method and/or secondary data sources. Two methods are being used for validation—estimating adoption using representative farmer surveys and DNA fingerprinting on all or a sub-set of seed samples. The four CCCs identified for validation of Activity 2.1 are:

1. and 2. Wheat and lentil in Bihar: The field work (data collection) for a sample of 3,400 farmers in Bihar has been completed by ICRIS/ISAP. Seed samples collected from the farmers are currently being held at the Regional office of ISAP in Bokaro, Jharkhand. During a planned visit by M. Maredia to India in the first week of February 2016, these samples will be organized and delivered to ICRISAT for DNA fingerprinting. Compilation of the reference library (of 96 wheat varieties and 15 lentil varieties) has been facilitated by CIMMYT.

3. Cassava in Vietnam: The fieldwork for the first visit survey of approximately 1000 farmers was completed by CIAT in November 2015. The cassava stalk samples collected from the field are being planted in the Green House in Vietnam at a NARS facility. CIAT has developed a protocol video for NARS researchers to follow to extract the DNA from these samples and from the 300+ accessions of cassava to be used as reference library. The extracted DNA will be shipped to Colombia in February/March 2016, where CIAT researchers will conduct the DNA analysis using SNP markers. The second round of data collection (to collect production and post-harvest information) is planned at the end of February 2016. Data entry for the survey data is planned to take place in March 2016. Survey data and results of the DNA analysis are expected by mid-April 2016.

4. Rice in Indonesia: Field validation survey (sample size 810 farmers) in Lampung province was completed in November 2015 and data set has been sent to MSU for analysis. Seed samples for more than 100 rice varieties has been collected by an ICRR researcher (the local collaborating NARS), and farmer collected seed samples are also being held by them until the export permit to ship these samples is secured. This has been another challenge in doing varietal identification using DNA fingerprinting when the seeds (or DNA samples) have to cross country borders. On the Philippine side, IRRI had to obtain an import permit (which is only valid for two months), which was then sent to Indonesia to apply for export permit. However, due to recent revisions in the export permit application process, ICRR was not able to get the export permit before the expiry of the import permit. IRRI has to now reapply for a new import permit, and ICRR will have to restart the process. This whole process has substantially delayed the project by at least 3 months - according to the last update from ICRR, they expect to ship the samples to IRRI in April 2016.

Table 2 - SIAC Expert Elicitation for Updating Adoption Data (Expert Elicitation EE; DNA fingerprinting; Data also at State S or Region R -level)

		S Asia					SE Asia									E Asia	TOTAL
		Afghan-istan	**Bang-ladesh**	**India**	**Nepal**	**Pak-istan**	**Cam-bodia**	**Indo-nesia**	**Laos**	**Malay-sia**	**Myan-mar**	**PNG**	**Philip-pines**	**Thai-land**	**Viet-nam**	**China**	
RAFS	Rice			EE – S		EE	EE	EE + DNA	EE	EE	EE		EE	EE	EE	EE – R	**11**
MAIZE	Maize		EE	EE – S	EE	EE	EE	EE					EE	EE	EE	EE – R	**10**
WHEAT	Wheat	EE	EE	EE – S + DNA	EE	EE										EE – R	**6**
RTB	Cassava			EE – S			EE	EE	EE		EE		EE	EE	EE + DNA	EE – R	**9**
	Potato		EE	EE – S	EE	EE		EE					EE		EE	EE – R	**8**
	Sw. Potato		EE	EE – S	EE			EE							EE	EE – R	**7**
DCLAS	Barley			EE - S													**1**
	Chickpea					EE					EE						**2**
	Pigeonpea										EE						**1**
	Lentil		EE	EE – S + DNA	EE												**3**
	Groundnut							EE			EE				EE	EE - R	**4**
	TOTAL	**1**	**5**	**8**	**5**	**5**	**3**	**6**	**2**	**1**	**5**	**1**	**4**	**3**	**6**	**7**	**62**

Activity 2.2. Organize the collection of natural resource management (NRM) research outcomes

This was initially part of the Michigan State University sub-grant but it was agreed in Jan 2014 that SPIA would manage this part of the program. Following a delayed start after this work was transferred back to SPIA, a call for Expressions of Interest was finally issued in October 2015, for case-studies focused on the following priorities NRM practice – country combinations:

Table 3 – Priority NRM practice-country combinations for call for EoIs issued October 2015

Priority NRM practices	**Priority countries**
Agroforestry (particularly "fertilizer trees", leguminous fodder shrubs)	Kenya, Zambia, Zimbabwe, Rwanda
Alternate wetting and drying (AWD) in rice production systems	China, Vietnam, Philippines, Indonesia, Myanmar, Bangladesh
Conservation agriculture in maize-based systems	Zambia, Zimbabwe, Mozambique, India, Pakistan, Nepal, Bangladesh, Kyrgyzstan, Uzbekistan, Tajikistan, Turkmenistan, Kazakhstan, Iraq, Mexico
Cocoa integrated crop and pest management (ICPM)	Cameroon, Cote d'Ivoire, Ghana, Liberia, Nigeria
Micro-dosing of fertilizer in maize-based systems	Kenya, Zimbabwe, Mozambique
Integrated soil fertility management	Kenya, Rwanda, Burundi, DRC

From this call, 62 expressions of interest were received, and these were scored and review by SPIA in November 2015. Proponents from 18 expressions of interest as well as a number of resource people and SPIA secretariat members were invited to participate in a workshop in Rome in December 2015 comprising: discussions of the nature of the priority practices; the existing data infrastructure in place in the relevant countries that can serve as the basis for generating adoption estimates; prospects for remote sensing; and group work clustered around the six practices. The overall objective of the workshop was to try and broker collaborations across interested parties to ensure we got a strong set of full proposals.

Following the workshop, SPIA issued an invitation to the workshop participants specifying a set of 9 work packages that full proposals should be targeted towards. Proponents were invited to outline "core" and "upgraded" budget options for their proposals, with sets of activities to match. In February 2016, the 12 full proposals received (together covering a total of 25 of our practice-country combinations) were externally reviewed by a five-member expert panel, and a recommendation for funding proposals has been put to the PSC for discussion and decision on 17th March 2016. Work by the proposal teams will then take place throughout the remainder of 2016 and run to mid-2017. Hence, this is one of the activities that has made the no-cost extension to mid-2017 necessary.

Related to the documentation of NRM outcomes, James Stevenson represented SPIA in a workshop held in Cairns, Australia in June 2015, on assessing the effectiveness of landscape level interventions. The consensus in the group was that there is too little attention paid to demonstrating whether, and under what circumstances, a landscape scale approach is beneficial and will bring about impact. A paper reflecting these ideas, led by Jeff Sayer, was submitted to Conservation Letters in November 2015.

Activity 2.3. Organize the collection of policy-oriented research outcomes

This is a part of the SIAC activities that aim at generating core data on the diffusion of CGIAR-generated technologies and policies (see 2.1 and 2.2): 2.3 focuses on outcomes of CGIAR policy-oriented research that have influenced significant policy changes related to agriculture, food and nutrition at the regional, national or global level. The goal is to compile and make available to CGIAR stakeholders the best available information on outcomes that are, at least plausibly, attributable to CGIAR policy research outputs with the

overall objective of building an inventory of CGIAR policy-oriented research outcome claims that have been externally vetted.

In the first phase completed in 2014, a consultant (Mitch Renkow) drew on earlier CGIAR PMS data files from 2006 through 2010 to compile a list of 93 outcome statements that credibly describe significant achievements of 'deriving from Center POR outputs'. For each POR outcome, information is provided on the constraint or problem that was addressed, the key research outputs underpinning the outcome, a description of the specific POR outcome itself, what supporting evidence exists, and the region or country in which the outcome took place. Sixty-one of these were deemed to be Category I "strong" cases – ones that satisfied specific criteria. In addition to the 61 strong outcomes, there were 32 other outcome statements that were deemed to have significant potential but required further documentation. Of these latter 32 outcomes, 17 were judged to require additional evidence linking the outcome to specific Center outputs. In other words, it was felt that the existing outcome statement provided insufficient information to make a compelling case that the policy outcome could be reasonably attributed to the Center. Fifteen additional statements described outcomes that look promising, but either were at an early stage (e.g., they described early outcomes emanating from pilot projects), or were simply not described well enough to make a strong case for being a POR outcome – but, again, appear to have good potential to generate meaningful policy outcomes. The categorization draws on: original external reviewers' comments and scores and the consultant's own judgement about the strength of evidence / logic.

Phase 2 was again led by Renkow with two objectives: (1) updating the POR outcomes inventory for 2010 through 2014 through a careful review of websites, annual reports and other relevant documents published by Centers and CRPs; and (2) offering Centers the opportunity to verify earlier submitted information or provide updated information to substantiate or modify earlier claims (by sharing the Phase I inventory). At the end of October 2015, Renkow submitted to SPIA the updated inventory with potentially viable outcomes that might be reasonable candidates for inclusion. In addition, Renkow authored and presented a paper on 'assessing the impact of policy-oriented research in the CGIAR: methodological challenges and reasonable expectations' at the International Conference on Impacts of Agricultural Research – Towards an Approach of Societal Values (French National Institute for Agricultural Research INRA, Paris, November 3-4, 2015). The paper offers a critical assessment of efforts by the CGIAR and kindred national agricultural research institutions to evaluate the welfare impacts of policy-oriented research conducted under their auspices.

In Phase 3 (2016), SPIA will initiate an external validation process of POR outcome claims assembled under Phases 1 and 2.

Activity 2.4. Long-term institutionalization of collection of adoption data

SPIA's long-term vision in achieving this objective is to involve a broader and more diverse set of national institutional partners in the collection of adoption data so as to systematize the collection of nationally representative data (on a regular basis) in the most cost-effective way possible. MSU is working in India, Mozambique and Zambia to explore the integration of technology adoption data into existing surveys. On a parallel track, SPIA is working with the World Bank Living Standards Measurement Study – Integrated Surveys of Agriculture (LSMS-ISA) team through two researchers – Frederic Kosmowski and John Ilukor.

1. *India (MSU):*

The initial efforts (meetings and discussions) focused on ICAR to leverage existing data or future data collection efforts (cost of cultivation data) for the purpose of tracking and monitoring the adoption of improved varietal technologies (and any other technologies, if data are available) by farmers on a regular basis. While there was some initial interest, subsequent interactions suggested that ICAR did not have

institutionalized data collection mechanism in place to integrate this data, and a better target for such efforts might be the Ministry of Agriculture or National Sample Survey Organization (NSSO) or to try and work at the state level (in 1-2 states) and see if the Department of Agriculture in a given state is open to this idea of institutionalizing the collection of technology adoption data at least on a pilot stage.

Since the SIAC update in February 2015, Mywish Maredia traveled to Odisha, India, in May 2015 for a day, and visited the Department of Economics and Statistics for the State of Odisha to find out more about the types of agricultural data being collected at a state level. From this visit and the desk review of questionnaires used to collect different types of data through surveys that are routinely conducted (such as the crop cut experimental data, input surveys, agriculture census surveys and NSSO surveys), the emerging conclusion is that India is a data rich country. There is an impressive amount of data being routinely collected (many at representative scale), and all these efforts are already institutionalized within the government system. However, despite these efforts, the fact remains that it is not easy to get an overall representative picture and trend of the adoption of different types of agricultural technologies that are generated by the Indian research system (and the collaborating CGIAR centers) due to a number of reasons, including government confidentiality laws.

Due to the characteristics of the way data are collected, processed and reported in India, there is limited utility of these data for tracking technology adoption at a representative scale. There is certainly room for improvements in this data system, but a local institution or a research center needs to champion this cause. The goal would be to make some changes in the institutionalized data collection system so that the data collected using public resources can serve the research and monitoring needs of the agricultural research communities. MSU has initiated a conversation along these lines with the National Institute of Agricultural Economics and Policy Research (NIAP/ICAR), and will continue to pursue these efforts: NIAP/ICAP Director has written to the Secretary of Agriculture to make household unit level data available to researchers, and intends to approach the Chairman of the Statistical Commission. However, to date, we have not been able to make any meaningful progress towards our objective with this work.

2. *Mozambique (MSU):*

MSU has liaised with the Directorate of Economics and Statistics (DEST) within the Ministry of Agriculture and Food Security (MINAG) that is responsible for producing official agricultural statistics. The Integrated Agricultural Survey (IAI) is a routine data collection effort – representative at the provincial level – and done every 1-3 years. MSU reviewed the IAI survey instruments and provided feedback on integrating some technology specific questions in different sections of the survey. While DEST plans to conduct a “light” round of IAI this year and is unable to incorporate these suggestions in its entirety, some were taken on board. They have also expressed interest in testing new methods of tracking adoption of varietal technology, especially using DNA fingerprinting, and MSU will continue to discuss these options with them.

3. *Zambia (MSU):*

MSU reviewed the Crop Forecast Surveys (CFS) that is conducted annually by the Ministry of Agriculture & Livestock and Central Statistical Office. This survey is representative of small and medium scale holdings at the country level. Suggestions for modifications and addition of a one page section on the adoption of conservation technology were made to the CFS coordinator – this was pilot tested in February 2015, but was not implemented in the March-April round of CFS due to time constraints (increased survey length and time). However, the team has agreed to integrate a page of questions in the second follow-up round (post-harvest season in September-October 2015). During a recent visit to Zambia (on another project), MSU (M. Maredia) visited the Ministry of Agriculture and Livestock to get an update on this activity. All data collection has been completed and currently undergoing data entry and cleaning. Once the data are cleared by the Central

Statistical Office, it will be shared with MSU and broader research community to assess the adoption of conservation technologies at the national level. This is an example of a successful outcome from this process of engagement with country statistics agencies.

4. *Ethiopia (SPIA and World Bank LSMS-ISA):*

The third wave (2015/16) of the Ethiopia Socioeconomic Survey (ESS) presents an opportunity for integrating a number of questions related to the adoption of CGIAR-related agricultural technologies. The ESS is a nationally representative survey of 4,000 households, and is managed by Central Statistics Agency (CSA) via a network of some 300 resident enumerators.

SPIA were able to incorporate additional adoption-related questions into the ESS for the following technologies: Orange-fleshed sweet potato; Awassa variety sweet potato; Crop rotation in previous three years; Treadle pump; Motorised pump; Desi / Kabuli type of chickpea; Weather index insurance; Broad-bed maker; Improved livestock feed module. Data collection is ongoing, but we can expect to have access to the data by mid-2016 – ahead of the formal release in 2017.

5. *Uganda (SPIA and World Bank LSMS-ISA):*

The Annual Agricultural Survey (AAS) is a new survey funded by the Ugandan government and implemented by the Ugandan Bureau of Statistics. The survey instruments were pre-tested in the second season of 2015 and the main survey will start in 2016. SPIA were able to incorporate questions into the AAS for the following technologies: bean varieties; cassava varieties; maize varieties; sweet potato varieties; sorghum varieties; agroforestry; livestock; conservation agriculture.

In Uganda, the fourth wave of the Integrated Household Survey (the true LSMS-ISA panel survey) is planned for 2016. The details are not yet out from the LSMS team or UBoS but the training is likely to start in March 2016 and fieldwork could start in March-April. If successful in the AAS, there is strong possibility that questions will be incorporated in the panel survey.

6. *Malawi (SPIA and World Bank LSMS-ISA):*

In Malawi, the Integrated Household Survey 4 (LSMS-ISA panel survey) is taking place in 2016. Training began in February 2016, and fieldwork starts in late March 2016. John Ilukor and James Stevenson, with input from the FAO EPIC team, have introduced questions on a number of NRM practices into the survey instrument, relating to inter-cropping, crop residue management, agroforestry, crop rotation, etc. John Ilukor is currently training enumerators with the Malawian National Statistics Office.

Objective 3: Assessing the full range of impacts from CGIAR research (IMPACTS)

While work under Objectives 1 and 2 paves the way for future ex post impact assessment studies, Objective 3 activities are focused on carrying out a number of impact assessments of CGIAR research and development initiatives along the entire chain of causation - from research investments to the System-Level Outcomes. Since this causal chain is long and complex, SPIA is approaching it from a number of different perspectives: case studies that focus on measuring the impact of CGIAR research on health and nutrition (activity 3.0); long-term large-scale studies of impact for major areas of CGIAR investment (activity 3.1); sets of short-term micro-scale impact studies using experimental and quasi- experimental methods (activity 3.2) to provide evidence on the impact of CGIAR research-derived technologies to adopting households; studies of a number of under-evaluated areas of research (e.g. irrigation and water management; livestock and impact types (activity 3.3); a system-level meta-analysis of ex post IA of CGIAR research (activity 3.4).

Activity 3.0. Assessing the impacts of agricultural research on nutrition and health

A competitive call for case studies was issued in July 2013, with the intention of broadening and deepening the evidence base regarding the potential for agriculture research and development to leverage health and nutrition benefits. The intention is to complement, not to duplicate, on-going work in the A4NH and other CGIAR research programs. Led by Erwin Bulte at Wageningen University, an external review team identified an interesting portfolio of studies with different methods and focal technologies. A very successful inception workshop for the five funded studies was held in July 2014 and since late 2014, we have had the five studies running as follows:

1. Adoption of high iron bean varieties in Rwanda (CIAT, Harvest Plus, Virginia Tech, Rwanda Agricultural Board)
   A progress report received from the team in December 2015 demonstrated that the project has overcome some logistical difficulties and is progressing well. Erwin Bulte has been providing ongoing support to the team to try and ensure they identify a good instrumental variable for their analysis, and that the follow-up survey rounds in 2016 include dietary diversity and food security modules. Household and community surveys have been completed in 2015, and DNA fingerprinting will take place during 2016, with sampling from 120 communities taking place in January 2016. Survey preparation and implementation has taken a long time, including a long delay for a permit from the Rwandan government to allow blood sampling.

2. Shortening the hungry season through NERICA in Sierra Leone (IPA, MIT, Sierra Leone Agricultural Research Institute)
   This project has been granted a one-year no-cost extension owing to disruption caused by the Ebola outbreak in the country in 2014. The final report is now expected at end of December 2016. Early results show that children in households in that received NERICA seed (either for free or at 50% or 100% of market price) AND agronomic training on how to grow it, see positive effects using anthropometric measures that persist up to the beginning of the next hungry season. The coefficients for the same measures for the group that did not receive training but did have access to NERICA at the same fractions of market price are positive, but not statistically significant and much smaller than those on the treated and trained group at the end of the hungry season. Previous studies by the same authors have shown that NERICA is susceptible to crop failure when not grown under correct agronomic conditions, and these findings would suggest that farmer training may be a necessary condition for achieving certain development outcomes with NERICA.

3. Crop diversification for food and nutrition security in Malawi and Ethiopia (CIMMYT, Lilongwe University, Georg-August-University of Goettingen, Ethiopian Institute for Agricultural Research)
   The progress report received in August 2015 included a draft of a paper for Ethiopia that has evidence that the joint adoption of crop diversification and modern varieties has higher impacts on calorie, protein and iron consumption and diet diversity than adopting each practice in isolation. This result was not particularly unexpected but there was previously little empirical evidence to support claims that inter-cropping could have this range of impacts. Results from Malawi are expected in mid-2016.

4. Looking beyond income: impact of dairy hubs on nutrition in Tanzania (ILRI, Emory U., Tanzania NARS)
   A progress report received by SPIA in January 2016 showed that this study has moved in a different direction than expected. The team are now attempting to explain variation in nutritional status of household members for a sample of 373 households. The explanatory variable of interest is participation in a dairy hub, but there is a strong possibility that owing to the implementation of this project we will be statistically under-powered for the variables that we are most interested in. Erwin Bulte is working with the project team to try and ensure that we get some value from what has turned out to be a very different study than what we were expecting from the proposal.

5. Nutritional impacts of irrigated horticulture in Senegal (Columbia U., George Washington U., MDG Center)
   This project got off to a slow start but was underway in early 2015 but the progress report received by SPIA in December 2015 showed that the project is back on track now. In June-July 2015 the survey instrument was piloted in four villages in Senegal. The pilot data indicated that overall, dietary diversity was low among infants and young children as well as their mothers. All the study villages were visited in September-October 2015 to ascertain a list of all the households in order to allow the study team to randomly select households that had a woman with a child between 6-23 months at baseline. The pre-baseline survey was thus essential in order to allow efficient random sampling of the target population. During the pilot data collection, six focus groups were conducted to help inform the development of the nutrition education intervention. The topics discussed in the focus groups included food production, food procurement, infant and young child feeding practices, seasonal variation and sources of nutrition information. The findings of these focus groups were presented at the Global Food Security Conference in Ithaca, NY in October 2015. The focus groups have helped identify some potential barriers and enablers for the nutrition education intervention and will be combined with findings from the baseline data collection to identify the key infant and young child feeding messages that need to be targeted in the nutrition education intervention.

Activity 3.1. Long-term / large-scale impact assessment studies

The basic idea behind this work is to generate studies that credibly document the impacts of successful CGIAR research adopted at scale and over the long term using best available methods. Estimating the direct and indirect impacts from widely adopted technologies and policies is of special relevance to CGIAR donors and other stakeholders, particularly in a climate of high accountability and expectation of linkages between agricultural research investments and socially desirable outcomes.

While experimental and quasi-experimental approaches potentially have much to offer in terms of rigorous estimation of causal effects during early stages of adoption and at limited scales within producer populations, other methods, often less quantitative and seemingly less rigorous but more comprehensive, are needed to estimate impact over longer time periods and larger spatial scales. In addition to measuring the effects on crop yields and total farm income (or nutritional improvements) of adopters, estimating the impact of

widespread technological change requires consideration of effects on other groups. Widespread technological change often generates significant partial and general equilibrium effects on farm product prices and farm production resources, especially labor, but potentially land and other inputs that in turn have significant impacts on poverty, nutrition and other welfare measures affecting adopting farmers as well as other populations. Indeed, in many cases, it is believed these widespread indirect effects dwarf direct impacts in the adopting regions. The usual impact studies, which estimate producer and consumer surplus, take the first step of including effects on consumers of the product whose production efficiency has improved, and such studies undoubtedly have shortcomings that should be addressed. But in addition, they often do not in any way consider the indirect effects on farm input markets or on markets of production complements or substitutes. To what extent it is possible to demonstrate direct and indirect causal linkages from CGIAR-related technologies in these fairly complex pathways remains to be seen, but this is the goal of this activity.

In early September 2014, SPIA issued a call for expressions of interest to fund studies that seek to measure the impacts of widely-adopted CGIAR research related innovations.

Seven studies were funded out of the 12 full proposals received (8 impact + 4 adoption studies) in January 2015. An inception workshop for the set of studies selected was held in July 2015 at IFPRI, DC. The workshop had two objectives: (1) to provide specific feedback on technical and operational aspects of the funded studies, and (2) to provide an opportunity for participants to exchange views on the operational and data-related aspects of long-term, large-scale studies of CGIAR research impact studies – for instance, lessons from DNA fingerprinting work to estimate varietal diffusion; reflections on using micro data for macro analysis; and challenges in sampling and extrapolation for such studies.

The selected studies are as below:

1. Adoption and Diffusion of C88 Potato Variety in China: Spatial Variability of Productivity Gains and Cost Savings and Value Chain Development (CIP, Virginia Tech, and Yunnan Normal Univ)
2. Estimating Improved Tilapia Adoption Using DNA Fingerprinting: Philippines and Bangladesh (WorldFish)
3. Adoption of improved lentil varieties in Bangladesh: comparison between expert estimates, nationally representative farm household survey and DNA fingerprinting (ICARDA and Virginia Tech)
4. A Systematic and Global Assessment of the impact of CG technologies on Poverty (IFPRI and World Bank)
5. Using Global Agricultural, Health and Demographic Datasets to Identify the Impacts of CGIAR's Modern Seed Varieties Since 1960s (UC San Diego and George Washington University)
6. Influence of IFPRI's Research Results on Intra-household Decision-making and Gender Roles in the Field Programs of Large NGOs (TANGO)
7. Assessing the Impacts of Improved Cassava Varieties in Nigeria (IITA)

All these studies are underway and six out of seven will be completed by the end of 2016. The first progress reports are due in early 2016 and a workshop reviewing progress with the studies is provisionally scheduled for 30th July 2016 in Boston, immediately prior to the AAEA meetings.

Activity 3.2. Micro-scale impact studies using experimental and quasi-experimental methods

Led by Karen Macours at the Paris School of Economics, this call was launched in mid-2014 with the objective of furthering our understanding of how Randomized Control Trials (RCTs) can contribute to our understanding of specific causal pathways from technology adoption. Three studies were contracted between November 2014 and January 2015, and an inception workshop for the studies was held at MIT, Cambridge MA, in February 2015.

1. A Multiple Intervention Approach to Increasing Technology Adoption with a View Towards Scaling-up: Evidence from Mexico (QFD Mexico, UC Berkeley, ITAM, World Bank)

Work on the SPIA-funded aspects of this project began in January 2015 and a progress report was received by SPIA in October 2015 which shows that the recruitment of 1000 farmers into the experiment went as expected, and gives early results on the uptake of technologies as varying with different promotion treatments. Full results are expected by July 2016.

2. Drought resistance and water saving in rice production in Bangladesh (UC Berkeley, Tufts, IRRI)
   Work on this project began in May 2015, and the first progress report is due in January 2016.

3. Social networks to promote new agricultural technologies in Nepal (Yale, ICIMOD)
   This project experienced significant delays due to the Nepal earthquake in April 2015 (two of the ten districts were severely affected). SPIA is still working with the lead researcher to establish the implications of the earthquake for the experiment, as the SPIA component was for additional survey rounds of an existing experiment which began in 2014. We do not yet have a revised timeline for implementation, but hope this can be established by the first quarter of 2016 along with some early results from existing (two) survey rounds. It is likely that the project implementation (by ICIMOD) and related RCT (survey and data analysis) will extend by a year. That is, while the fourth survey round and related data cleaning/analysis per contract ends November 2016, the work will likely continue independently beyond the program end, with SPIA in possession of an intermediate output by SIAC program end.

In June 2016, along with FERDI, SPIA will organize a follow-up workshop for activity 3.0 and activity 3.2 projects where early results will be discussed, and SPIA will reflect on implications for a possible future phase of the SIAC program.

Activity 3.3. Under-evaluated areas of CGIAR research

Many studies over the years have sought to document the impacts of agricultural research although the vast majority of these have focused on crop germplasm improvement, i.e., adoption and impact of improved crop varieties. As such there remain serious gaps in the extent to which impact assessment of other components of the CGIAR portfolio have been conducted. To fill this gap, one of the activities of the SIAC program targets what we consider to be under-evaluated areas of CGIAR research, such as livestock management, irrigation and water management, agroforestry, policy and social sciences, biodiversity and natural research management.

There are two parts to this activity: (1) as an initial step in the SIAC work on under-evaluated areas of CGIAR research, commissioning of critical reviews of the impact assessment work-to-date on specific research areas (irrigation, livestock, agroforestry etc.); and (2) a wider call for ex-post impact assessments to document the adoption and the direct impacts of CGIAR research (e.g. reduced water usage for irrigation or improved yield), and where possible, poverty, social, and environmental impacts of these innovations.

As an initial step, SPIA, in April 2014 commissioned Doug Merrey, an independent consultant with vast experience in water management research, to conduct a critical review of the impact assessment work to-date on irrigation and water management research. This desk study includes IA work done within and outside the CGIAR, and evaluates how comprehensively and effectively these assessments cover the field of irrigation and water management research since 1990. Merrey's report analyzes the strengths and limitations of the existing IAs in irrigation and water management research - in terms of scale effects, rigor of causal relationships, or how close the impact indicators of the studies correspond to the System-Level Outcomes of the reformed CGIAR system. The review identifies the major constraints and limitations, e.g., methodological, data-related, resource-related, etc., of previous studies and offers guidance regarding some

specific candidates for IA studies of CGIAR research on irrigation and water management that have good potential for documentation.

In March 2015, two consultants (Sam Jutzi and Karl Rich) were commissioned to evaluate the extent and quality of ex-post impact assessment activity on livestock related research in the CGIAR to-date. The report was internally reviewed by SPIA, and finalized at the end of November 2015. The final report will be published in March 2016 along with a SPIA commentary. In addition to the full report, a SPIA Brief summarizing key results – similar to what was done for the Doug Merrey's review on IAs of irrigation and water management research in May 2015 (SPIA Brief #49) – will also be published. Both the irrigation and livestock reviews highlight areas where there are gaps in evidence base on impacts from CGIAR research investments.

Led by J.V. Meenakshi (SPIA member), in June 2015, a two-stage call was issued for impact assessment studies of under-evaluated areas of CGIAR research (irrigation & water management; livestock; agroforestry; biodiversity; policy and social science; and NRM). Proponents were asked to refer to the promising topics identified in the Merrey 2015 review. Of the 26 EOIs received and internally reviewed in August/September 2015, 10 were invited to submit full proposals at the end of October 2015.

Four studies were approved for funding in December 2015, and these are as below:

1. Forest Co-management in Guinea: a Multi-scale, Multi-output ex-post Impact Analysis (Virginia Tech and CIFOR)
2. Adoption and Impact of Alternate Wetting and Drying (AWD) Water Management for Irrigated Rice in the Philippines (North Carolina State University, IRRI and NIA)
3. Assessing the Adoption and Economic and Environmental Impacts of Brachiaria Grass Forage Cultivars in Latin America Focusing on the Experience in Colombia (CIAT, Michigan State University, Universidad de los Andes (Colombia), and CORPOICA)
4. Assessing the Downstream Socioeconomic and Land Health Impacts of Agroforestry in Kenya (ICRAF, Vi Agroforestry, and University of Illinois)

An inception workshop has been scheduled on 10th March 2016 in Washington D.C., immediately prior to the meeting on the future of SPIA. Contracts have now been finalized for all four studies and work is commencing. All four studies are scheduled for completion by the end of June 2017. These studies will provide high-quality evidence of the impact of some of the more important CGIAR outputs/outcomes that have remain under-evaluated, and showcase alternate approaches to IAs when traditional experimental or even the more credible of the quasi-experimental approaches are not feasible.

Objective 4: Building a community of practice (CAPACITY-BUILDING)

The CGIAR will benefit from a structured attempt to support the existing capacity and some emerging collaborations on ex post impact assessment. Information-sharing and regular interaction are important in enabling the kinds of dialogue that can raise standards of impact assessment in the CGIAR, as well as ensuring that individuals have the skills that they need to be successful in their work. Activities towards this objective include a small grants program (activity 4.1); a targeted program of capacity-building using competitive calls for collaborations with advanced research institutes / universities (activity 4.2); conferences and workshops on impact assessment (activity 4.3); support for independently reviewing and publishing quality ratings of impact assessment studies carried out by CRPs and Centers (activity 4.4); maintenance and enhancement of the impact website (http://impact.cgiar.org) (activity 4.5).

Activity 4.1. Small grants

In 2013, four projects were funded through the small grants program (a total of US$30K) that has been discontinued since 2014 owing to the heavy administrative burden for small amounts of money. We are currently evaluating the utility of this mechanism by following up with small grant recipients as an input to our decision-making for the future. The four projects were:

a) *IWMI, electricity and water pump policy in India:* evaluation to assess impact of policy change
b) *ILRI, pastoral value chains in Senegal:* MSc Fellow to develop social sustainability/environmental sustainability indicators
c) *CIMMYT, agri. technology package in Malawi and Ethiopia:* applying endogenous regression switching model to a panel dataset
d) *Bioversity, Home Gardens evaluation in Nepal:* new approaches to measurement and evaluation of gender impacts

Activity 4.2. Strengthening IA capacity in the CGIAR through new partnerships

Two collaborations were funded through this activity to build capacity in the CGIAR to conduct highly credible ex post impact assessments:

1. *Virginia Tech with CIFOR and CIP*

Virginia Tech (George W. Norton, Bradford F. Mills, Catherine Larochelle, Jeffrey Alwang) has been working with CIP (Guy Hareau, Willy Pradel) and CIFOR (Daniel Suryadarma; Herry Purnomo) since early 2014 to strengthen ex post IA activities, focusing on these objectives:

- Classify CIFOR and CIP research according to whether and how impact assessment could be done
- Suggest potential IA methods and approaches for Center research themes
- Assess CRP-specific impact pathways and theories of change, and developing means of measuring intermediate and final outcomes and impacts
- Assess current impact-related data collection and archiving methods
- Jointly develop data collection protocols and management systems to meet IA needs and applying promising potential IA approaches
- Conduct two pilot IAs in each Center, jointly with IA officers and scientists
- Conduct learning workshops for project participants and other audiences

A workshop was held at each institution (CIP in May 2014; CIFOR in July 2014) to provide an overview of the IA strengthening project, present an overview of IA methods and their use, create broad understanding of data needs for assessment of impacts of the Center portfolio, and engage in consultations about specific impact assessment needs. During the first visits to the Centers, meetings were held with senior management and scientists to gain understanding of IA needs. Findings from these activities are being used to classify research according to IA needs and methods.

Center staff were engaged in a dialogue about the most appropriate themes for the pilot IAs.

For CIP, the two pilot IAs are:

a) an evaluation of impacts of Cooperation 88, an important and highly successful germplasm variety released and widely disseminated in China;
b) an assessment of the impacts of the CIP gene bank.

For CIFOR, we identified the following:

a) an assessment of the impact of the furniture value chain (a project conducted in Jepara, Indonesia to better articulate small-scale artisanal furniture producers to higher-value markets);
b) an assessment impacts of CIFOR research on carbon sequestration in peat bogs and mangroves.

Virginia Tech has been working with CIP and CIFOR on the pilot impact assessments. While the initial plan was to hold a final synthesis workshop in November 2015 and submit a formal report by March 2016, Virginia Tech requested a 10 month no-cost extension. SPIA proposed a revised timeline for reports and payments and the contract was amended with a final report now due by November 2016.

2. ICRISAT and University of Illinois

In September 2015, a multi-center workshop on advanced methods in impact assessment was held in Nairobi (hosted by ICRAF). The objective of the workshop was to raise the standards of impact assessment approaches and promote their application by social and bio-physical scientists at the CGIAR Centers. The agenda was based around the range of econometric tools available for impact evaluation. After the workshop, University of Illinois researchers and SPIA Secretariat met briefly to reflect on the workshop, and SPIA will continue to liaise with the researchers on some of the suggestions that came up as a result (e.g. discussion board where IA questions can be raised, archive of workshop materials online for reference etc.). In general, judging by participation rates, the workshop was a success: while University of Illinois/ICRISAT were hoping to attract 25 participants, they received 52 applications (including from NARS partners), and accepted 38 applicants to attend the workshop representing 10 CGIAR Centers. Agenda, learning materials, and a formal summary will be posted on the SPIA website shortly.

Activity 4.3: Biennial conference on ex post impact assessment results and methods

On July 26th 2014, SPIA organized a workshop entitled “Measuring poverty impacts of agricultural research” as a pre-conference workshop at the American Applied Economics meetings in Minneapolis. Seventy participants, approximately one third from the CGIAR and two thirds from academia, participated in full day of presentations and extended discussion on the potential and limits of the following families of studies: micro-level econometric studies; model-based approaches; randomized-control trials; meso, macro and cross-country studies. The invited speakers were of the highest caliber (e.g. Michael Carter, Tavneet Suri, Will Martin, Marc Bellemare, John Antle, and Julian Alston). The day concluded with a panel discussion on “Reducing rural poverty as a System-Level Outcome for the CGIAR”. The workshop was very successful in fostering open discussion across these specialists within the agricultural economics discipline (Poverty impacts workshop, Minneapolis July 2014 report).

Following the workshop, SPIA (Doug Gollin, with research assistance from Lilli Probst) took on the task of summarizing these findings and reviewing the related literature in a paper for a non-specialist audience. An outline of this paper (Poverty impacts paper, Gollin Sept 2014) was presented to the meeting of the CGIAR Independent Science and Partnership Council at the University of Copenhagen in September 2014, was drafted in October 2014 and is currently being revised following feedback from colleagues before being published in early 2015.

Immediately prior to the poverty impacts workshop, on July 25th 2014 in Minneapolis, SPIA hosted a meeting of the Impact Assessment Focal Points from across the CGIAR centers / CRPs. This was a full day of presentations from each of the 15 focal points, as well as from SPIA on progress with the SIAC program. This was a valuable opportunity for center scientists to exchange information on their current impact assessment projects and to benefit from advice from a number of high-quality resource people that SPIA had arranged to attend to provide feedback (Julian Alston, Jeff Alwang, George Norton, Greg Traxler, Bob Herdt, JV Meenakshi). Proceedings and presentations from the IAFP workshop can be found on the Events page on SPIA website.

No further Impact Assessment Focal Point (IAFP) meetings have been held since then, but SPIA Chair and secretariat staff participated in the Evaluation Community of Practice (ECoP) meeting organised by IEA in Rome in November 2015 – there is a fair amount of overlap between ECoP members and IAFPs.

However, SPIA intends to hold an impact assessment focal point workshop in Boston in late July 2016 – immediately prior to the annual Agricultural and Applied Economics Association meetings. There will also be a mid-term workshop for activity 3.1 and will also be able to attend. The goal is to give focal points an opportunity to discuss their IA work, discuss common challenges, and be given an opportunity to collaborate with researchers outside the CGIAR system.

Furthermore, we are scoping options for a 4-day impact assessment conference to cover all of SIAC outputs and solicited papers from external researchers, for May or June 2017.

Activity 4.4. Enhancing quality and rigor: Introducing a Star Rating System for IA studies

SPIA intends to launch an online external review system as a key mechanism for ensuring high quality assessments of impacts by the CGIAR. The system differs from journal reviews (that focus on methodological approaches and innovative research) in that it also focuses on criteria such as scale and link to agricultural research outputs, responding to donor needs. It is not intended to replace journal publications, but is a systematic way of identifying and showcasing (thereby setting an example of) high-quality work to the CGIAR and donors. The idea was presented at the Impact Assessment Focal Point (IAFP) meeting in Minneapolis in July 2014 and received with enthusiasm. This early draft document (Criteria for quality rating) outlines the vision for this system: a significant change in the management process outlined in the draft being that the SPIA Chair will function as the Chief Editor and supported in that role by SPIA members (as Associate Editors). For each manuscript submitted for rating, the Chief Editor or one of the Associate Editors will identify external reviewers and manage the review process with support of SPIA Secretariat staff.

Since September 2014, a contract with the vendor (Allen Press) has been executed; and based on new process flow and meta-data requirement guidelines, Allen Press launched a testable version of the review system online on 1st December 2014. While the Editorial Manager (a typical journal management platform) was customized and launched by SPIA and Allen Press as of February 2015, the activity has not progressed further, even if discussions on approach to quality rating and criteria to be used have continued (criteria have been revised further). SPIA does still plan to launch the platform soon, and start the process for the quality rating exercise, inviting submission of papers for external review and rating. The format for information coming out of the quality rating system is shown in table 4 below.

Table 4 – Expected structure of the output from the SIAC quality rating system

Ex-post Impact Assessment Study	**Descriptors**	**Rating**
Study	Author(s) CGIAR technology that was assessed for impact Countries/region Methodology	3 'stars' – excellent 2 'stars' – good 1 'star' – fair Unrated (not submitted to the process or rejected) [Note: the rating is based on external reviews (at least one reviewer per paper) and the SPIA editorial decision]

Activity 4.5. CGIAR Impact Website

The CGIAR impact website was re-launched in May 2014. The entire front-end of the website has been redeveloped to enhance users' ability to find the information they need, and the visual identity has been brought up to date. New features such as an impact blog, a latest news section, a global publications map, and a dedicated section for the community of practitioners of IA, all add useful resources for helping to increase awareness of impact assessment activity in the CGIAR.

Since then, the Impact website continues to get maintained and updated with information on new calls for proposals and blog entries. In 2016, a private discussion board might be set up (based on interest expressed) to facilitate interactions between impact assessment scientists at CGIAR Centers/CRPs in relation to capacity building activity 4.2.