



SCIENCE COUNCIL

CGIAR

**Report of the
First External Review of
the Generation
Challenge Program**

October 2008



SCIENCE COUNCIL

CGIAR

Report of the
First External Review
of the Generation Challenge
Program (GCP)

Review Panel: Wallace D. Beversdorf (Chair)
Markus A. Palenberg
Jennifer A. Thomson

OCTOBER 2008

The Science Council of the CGIAR encourages fair use of this material provided proper citation is made.

CGIAR Science Council (2008) *Report of the First External Review of the Generation (GCP)*. Rome, Italy: CGIAR Science Council Secretariat.

THIS DOCUMENT CONTAINS:

- Extracts from the Summary Record of Proceedings of the Fourteenth Meeting of the Executive Council 2008 (ExCo14)
- Science Council Commentary
- GCP Response to the First External Review
- Report of the Panel on the First GCP External Review



Consultative Group on International Agricultural Research (CGIAR)

Fourteenth Meeting of the Executive Council (ExCo14)¹

Agenda Item 3.a. Challenge Program External Reviews

...

Generation CPER

Conclusion and ExCo Decision:

- *ExCo congratulated Generation CP for a very favorable external review report, and endorsed the Generation CPER recommendations including those from SC and CGIAR Secretariat.*
- *In accordance with the decision at AGM07 regarding the handling of the external review reports— i.e., CGIAR delegated to ExCo decision making authority on external reviews—ExCo will report back to the CGIAR along with an overview of lessons learned from the external reviews of both Centers and CPs.*

¹ Extract from the Summary record of Proceedings of the Fourteenth Meeting of the Executive Council, 13-14 May 2008

SCIENCE COUNCIL OF THE CGIAR

Commentary on the 1st External Review of the Generation Challenge Program

April 2008

The results of the 1st Generation Challenge Program (GCP) Review were presented to the SC at its 9th meeting on March 31st 2008 in Nairobi, Kenya, by Dr. Wallace Beversdorf, the Chair of the Review Panel. The Program's response was presented by the GCP Director, Dr. Jean-Marcel Ribaut. The Council thanks Dr. Beversdorf and the review panel for a very analytical, succinct and constructively critical report. The Panel covered adequately all essential elements in the Terms of Reference and provided a useful assessment of the specific issues included in the review of the GCP. The SC wishes to commend the Program for the overall favorable evaluation given by the Panel. **The SC endorses all the nine recommendations of the review and is pleased to note that the Program management has found the Panel's assessment accurate and helpful and is therefore committed to implement the recommendations.** The recommendations, five of which are of a programmatic nature and four about governance and management, are all both feasible and essential for the Program to implement to ensure that there will be a high probability of success when the program ends in 2013.

Achievements to-date

The most important achievement from the GCP has been the creation of well characterized reference collections for a number of crops; 21 in total when the work is fully completed. The Panel convincingly rates these collections as extremely relevant for research to follow years after the GCP has been completed. The SC shares the Panel's feeling that the management and handling of these collections needs to be carefully planned. The SC supports the development of an agreement among the GCP, the CGIAR curator community that holds the sets and the donors. In the SC's opinion the responsibility for securing their appropriate handling in the future cannot be left for the CP alone to carry, but the CGIAR System needs to take ownership and responsibility of this potentially highly significant and useful product immediately. Thus *the SC recommends that a task force including the GCP and the curators of the CGIAR genebanks be set up by the Alliance of CGIAR Centers to develop a plan for the long-term stewardship of the reference collections.* The same consideration should be made for all other genetic stocks and characterized populations generated by the GCP.

The report has only briefly evaluated the Program's scientific merits. Despite the limited attention on the GCP's scientific content in the report, the SC is satisfied that the Program is capturing and using the best science and has been productive in publishing the results, which are appearing in high quality journals. Setting up the technical, information and capacity platforms also represents important progress in the early years of the GCP, and the integration of these platforms is a task for the second phase. The SC notes the Panel's assessment that outputs and outcomes have already been achieved, particularly in Subprogram 4 linking integrating information components and analytical tools that could not have been accomplished without the GCP. The Council believes that a Program of this size and composition, to justify the large investment, should be able to deliver highly innovative research results leading to novel solutions to hitherto intractable

problems, such as the proof of concept case on drought. In the SC's view, the products from this Program must reflect a high quality and innovativeness of the science.

Added value

The CP begun its activities in the beginning of 2004 and the Program can be congratulated on its achievements during the first four years. The CPs were designed to bring a programmatic approach to CGIAR research and to add value to Center research by engaging new kinds of partnerships. The SC is particularly pleased to learn that this program has been successful in, to quote the Panel, "establishing a broad network of R&D participants with extensive capability and capacity to support GCP objectives". In the Panel's assessment the CP has made very considerable progress that probably would not have been achieved without the GCP. In the Panel's view, the capabilities that the GCP has developed are beyond those available to any individual Consortium partner. The SC agrees with this view and believes that **this CP has been effective in mobilizing science from outside the CGIAR, engaging the best expertise and in adding value through that process. Yet, as the Panel has emphatically expressed, what the GCP is going to be judged for, are the products that it can deliver to the national plant breeding institutes and others that can contribute to the developmental goals relevant for smallholder farmers. It is here that the SC believes as does the Panel that the GCP will need to focus in the second phase.**

Program coherence and focus

The GCP has set itself a strict 10-year timeline, which the Panel considers realistic and appropriate and the SC endorses as a suitable approach for any CP. However, in order to achieve success at the end of the ten-year period, the GCP needs to increase the focus of its research considerably. While it may not be realistic to expect the GCP to build grand industry-scale platforms, it is essential to lead the leveraged effort towards a more focused program with a proof of concept model that can be shared with the larger research community in the CGIAR as well as NARS. The Panel has recommended that the GCP select around seven crop-trait priorities and a) ensure that they will be fully resourced and b) put in place management teams that will be directly responsible for each of the products. In other words, the imperative of the second phase of the GCP is to demonstrate proof of concept based on the most likely products and neither resources nor management should restrict that progress. **The SC strongly endorses the Panel's recommendations for greater focus** while understanding that some other projects will continue in order to maintain the enthusiasm and scientific capacity of the Consortium. The SC is pleased to note that the Program's *ex ante* impact analyses on drought tolerance in crop farming systems were considered very appropriate by the Panel and the SC encourages the results to be used for prioritizing the GCP research agenda and goals.

Likelihood of impact

The GCP's remit is clearly on upstream research. However, the Panel has acknowledged the projection the Program has of its responsibilities that includes testing and validating breeding solutions to specific problems smallholder farmers face, drought in particular. Where the CP will rightly not move is breeding of varieties. The SC appreciates the Panel's strong notion of the Program needing to plan how its research results are delivered along the impact channel and also needing to develop success indicators to monitor that progress. It would also like to be assured that the IPR regimes that are in place will facilitate and not hinder this process; the Panel report did not elaborate on this

important component, although in discussion it appears it felt adequate IPR arrangements are in effect. The SC was concerned to learn for example that publication imperatives have caused some delays in making GCP information readily available to partners in the program. The SC endorses the Panel's suggestions that an explicit monitoring and evaluation process should be built into the CPs from the start. This should include a clear definition of what is expected to be achieved; a definition of the objectives and criteria for success.

The SC strongly endorses the concept and recommendation by the Panel on Product portfolio management. The SC supports the request to create "demand pull" by the intermediary clients of the Program that are the national level breeding programs. The notion of crop leaders and the reinvigoration of the Stakeholder Committee may be ways of achieving this. The SC observes that despite the impact orientation of the CPs in general and the commendable fact that the GCP has a delivery strategy, there doesn't seem to have been a deliberate consideration of end-product development and that the GCP has, in its own words, been more opportunity driven than end product demand driven. In general, the SC finds it important for the CP to define clearly how its exit strategy will be implemented. Many of the products from the CP require that their sustainability be ensured after the GCP's lifetime. As was mentioned with relation to the genetic resources reference sets, also the information and other platforms need to be sustained. Furthermore, there is a capacity issue so that those NARS who are the GCP's main intended user group can receive support even after the GCP's conclusion for utilizing the validated products and methods. Most NARS may be able to undertake basic breeding activities such as selection and back-crossing but moving towards a more integrated molecular marker assisted breeding program will need a deliberate capacity building effort that the GCP may need to invest in now. The SC emphasizes that the current needs of those NARS that are expected to take up the new technologies should be addressed. While the Consortium involves mainly large NARS with good capacity, it is encouraging that there are many other NARS heavily involved in the research. It is a concern to the SC that the NARS support base be maintained also after the GCP ends, particularly in SSA to sustain the adoption of the products from the Program.

Research Management

The SC notes with some concern that not only the competitive grants projects but also the commissioned projects have been dispersed and not all aligned with the Program's main objectives. It is however understandable that a broad approach may have been needed initially to create an extensive partner platform. But it also reflects the history of the Program and the influence of its initial governance structure where inclusiveness has been more important than a sharper focus. The Panel has concluded that many of the crop targets and trait targets will not be achieved within the GCP's timeline. In the Panel's analysis, the management orientation is currently too much Subprogram centered and a much more Program oriented and focused approach is needed. The task will be to integrate the closely related components of the research done in the Subprograms through realigned management with a coherent Program orientation. The Panel suggests that a way to enhance this integration could be inclusion of crop leaders that would think across the Subprograms.

The SC notes that these significant changes essential for enforcing the GCP's focus cannot be achieved without the changes in Program governance already initiated and

endorsed in the Panel's recommendations. The governance mechanism, whereby the Consortium members making decision that affect focus are also involved in research implementation, has not served the GCP well. The SC therefore welcomes delegation of governance responsibilities to a new Executive Board consisting of members that do not have any linkages to the GCP research. The SC agrees with the Panel that there is need to better align the thinking of the governance and management with the mission.

Response from the Program Steering Committee and the Management Team of the Generation Challenge Program to the External Review report

The Program Steering Committee (PSC) and the Management Team (MT) of the Generation Challenge Program (GCP) would like to commend the Review Panel of this first GCP External Program and Management Review (EPMR) for their clear and concise report. GCP recognizes the relevance and perspicacity of most of the comments and all of the recommendations. This review was conducted in a very objective, transparent and professional manner, thus providing a welcome opportunity and firm basis for positive and necessary changes and reprioritization, as GCP transits into Phase II. Implementing the recommendations presented in the report will enable GCP to improve its *modus operandi* and better organize its research portfolio, thus paving the way for the Program's success in achieving its set objectives by 2013.

The overall message presented in the report of the Review Panel is fairly straightforward and succinct. Salient features include:

- better focus for the science,
- clearer definition of indicators of success to facilitate monitoring the progress of the Program,
- a refinement of the management structure to ensure that GCP is not Subprogram but Program end-products driven,
- ensure the sustainability of GCP products after GCP's lifetime,
- proceed with reforming the governance structure, and
- monitor and carefully manage indirect costs.

Our short and bold response to the overall message and report is: "GCP is pleased by the overall positive tone of the report, it endorses all the recommendations and is committed to implementing them broadly along the timeline suggested in the report".

Our detailed response is presented below.

General Comments:

The specific purpose of GCP is to explore plant genetic diversity and apply advanced genomics and comparative biology to improve plant breeding for CGIAR mandate crops in drought-prone environments.

As indicated in our recent [Strategic Framework](#), by 2013 GCP is expected to have contributed to the following objectives:

1. Provide access to, and promote the use of, genetic diversity in plant improvement programs.
2. Develop a public platform of genetic and genomic resources and tools, and support a global community that can use them.
3. Generate and apply knowledge across crops, and demonstrate the potential of comparative genomics to improve plant breeding programs.

4. Use genetic diversity and advanced science to develop products for plant breeding programs to improve the livelihoods of resource-poor farmers in drought-prone environments.

From the report, GCP appears to be on track for objective 1. The report summary states: *“Analyses of diversity in several germplasm collections are nearly complete; and its assembly of Reference sets for these species represents a significant outcome from Phase I of this CP. These Reference sets will help focus gene discovery and trait improvement research for the foreseeable future. The GCP has contributed considerable scientific information on genetic diversity and genetic underpinnings of some important traits.”* GCP reference sets are a subset of large germplasm bank collections that contain accessions (chosen using information about origin and pedigree and molecular markers) representing as far as possible the genetic diversity of the entire gene-bank collection.

Also with regard to objective 2, GCP appears to be on track. The report summary reads: *“GCP has developed genotyping-, informatics- and some genomics-platforms. GCP has arranged access to other genomics platforms and has developed processes to permit staff at many locations to participate actively in GCP research projects.”* The Review Panel also recognizes GCP’s efforts in developing a vibrant scientific community all along the pipeline of GCP activities: *“GCP has developed an extensive consortium partnership and leveraged its resources to establish a broad network of R&D participants with extensive capability and capacity to support GCP objectives.”* And in the conclusion: *“Perhaps the most important value of GCP thus far, is the opportunities it has provided for people of diverse backgrounds to think collectively about solutions to complex problems and in the process to learn from one another.”*

Objective 3 is not considered directly in the report as it is fairly specific and in fact relates to a subset of GCP research activities.

However, the Panel is much more critical when analyzing progresses achieved thus far to accomplish objective 4, the most crucial one for impact on crop improvement in GCP target environments.

It is important to underscore that the Review Panel does not question the quality of the science conducted in GCP: *“It is clear from the high quality of the journals in which most of the articles appear that the science being conducted under the auspices of the GCP is of a high quality and the outputs are recognized by peers”* (section 3.5: publications).

The major concern raised by the Panel is that the current research portfolio lacks adequate focus and the Program appears to be rather opportunity-driven, without a clear end-product orientation and vision at Program level. A main reason for that situation is the Program’s current management structure: *“It is important to note that the current management structure is oriented along sub-programs, favoring prioritization of activities within Sub Programs but not across Sub Programs. While being a structure that supports excellence in scientific research by providing the possibility of selecting the highest-quality projects within each Sub Program, it does however not structurally support any integrated and harmonized approach across the different Sub-Programs with end products of the whole program in mind”*(Section 5.3.1). Finally, there are currently no indicators of success to evaluate performance at Program level by 2013.

GCP recognizes and is aware of these weaknesses, and the criticism is well taken. The Science Council in their comments on GCP's Medium-Term Plan (MTP) had previously pointed out this weakness in focus and questioned connectivity across Subprograms. The Management Team has been trying over the last two years or so to better focus the research portfolio and implement the Program vision to improve continuity across Subprograms. To this end, a strategic framework has been developed that includes mechanisms for determining GCP's priority farming systems, based on the coincidence of high poverty and drought. The GCP-commissioned 'reference studies' provide data on GCP's impact targets. These data are taken into account by the Management Team to make informed decisions when implementing the GCP strategy. One of them—the [Targeting Impacts paper](#) by Glenn Hyman et al—identified 12 crops and 15 farming systems based on the number of stunted children and seasons of crop failure. This complementary targeting combining crops and farming system will be further refined based on the seven crop-traits to be selected (see response to recommendation 9). The inclusion of Crop Leaders (detailed in response to recommendation 9) will help to operationalize and seamlessly integrate this complementary crop-farming system approach.

Since 2007, all new commissioned projects on genetic gain for specific crops have focused on the crops and the farming systems identified by Hyman et al. This effort to sharpen the focus of our research portfolio is also reflected by the evolution in our calls for competitive grants. The first call was rather generic while the second call was an 'oriented call' with clear research themes. Finally, our ongoing third call closing in mid-March 2008 also defines clear research themes and focuses entirely on drought tolerance.

All the above notwithstanding, GCP wholly agrees that there is still a long way to go; that we do not as yet have completely clear end-products in mind, with related indicators of success; and that it is important for the Program to allocate significant resources to a few flagship projects if we want to ensure impact in key crops. GCP must go beyond identifying success cases at Subprogram level and demonstrate the value of going through the entire GCP chain of activities to impact on plant breeding; from discovering germplasm diversity to identifying genomic regions of interest; to the development of markers related to the expression of traits of interest; and finally to the use of those markers in national and local breeding programs to improve local adapted germplasm.

GCP is pleased that the Review Panel devoted considerable attention to the potential impact of the Program and on how to evaluate this impact in an objective manner. GCP welcomes the orientation towards a more private-sector approach where workplans are defined and adjusted to ensure delivery of specific end-products. However, as we redefine and implement our scientific strategy based on the Panel recommendations, we will keep in mind that GCP is a public-good international Program that should—and indeed must—preserve and accelerate gains from the good momentum of the research community it has nurtured since the Program's inception.

Issues related to governance and finances will be addressed in the next section.

Specific responses to the EPMR recommendations:

- 1. The review panel recommends that GCP establish simple program-level success criteria to provide GCP Management Team the means to focus, measure and monitor GCP program effectiveness.**

GCP endorses this recommendation, and establishing pragmatic but robust Program-level success criteria will be a top priority for the rest of the year.

Broadly speaking, GCP activities can be divided into four categories aiming to:

- characterize crop diversity and develop genetic resources,
- develop technology platforms and informatic tools,
- support and enable capacity-building and GCP product delivery, and
- achieve genetic gain to improve crop productivity for GCP target crops and environments.

These categories are of course tightly interconnected, generating products for different users along the entire pipeline of GCP activities, but also outside GCP. The first three kinds of activities described above are mostly platform-oriented, focusing on resources and services. Therefore, complementary indicators of success related to frequency of use and access to these platforms over time should be considered, recognizing that platforms are only effective when they are actually used, and that their value and relevance are indicated by both ease as well as frequency of use. The fourth kind of activity is more crop- and environment-specific. In this case, indicators of success can be defined per crop, and should take into consideration both frequency and intensity of use, as well as geographic distribution of GCP products in breeding programs in the South (e.g. markers, improved germplasm).

- 2. The review panel recommends that GCP management establish and apply a prioritization process to identify its highest impact opportunities that GCP (program-level) can actually achieve and deliver to appropriate impact channels during its remaining 6-years.**

GCP agrees with the recommendation that prioritization is an absolute requirement to implement recommendations 1 and 3.

This prioritization will build on existing GCP reference studies (e.g. the Hyman et al study mentioned above), new information to be generated based on needs plus feedback from GCP stakeholders. Different internal and external factors will also be taken into account in the prioritization of GCP program-level end-products.

Factors that GCP will consider include:

- a. The achievements and perspectives of GCP projects to date.
- b. The 'landscape' of our different partners and their individual expertise.
- c. For GCP target crops and environments, the existing breeding capacity and actual links with the breeding community.
- d. Harmonization with the efforts and objectives of other international and national partners in crop R&D (e.g., initiatives supported by the Bill &

Melinda Gates Foundation) for value-adding and also to ensure there is no duplication of efforts.

The prioritization process *per se* will be determined later on as the MT needs to critically reflect on the best possible approach to identify the elements to take into account.

- 3. The review panel recommends that GCP deploy the majority (at least 50 %) of its resources in pursuit of the seven highest impact program-level trait-in-crop products that it can achieve over the next 5-years.**

GCP supports this recommendation in principle. As indicated above, GCP is committed to sharpen the focus of its research objectives to ensure impact through selected case studies. This recommendation therefore aligns well with our own projections.

Turning to the timeline, implementing this recommendation will however require some flexibility for smooth readjustment. We consider summarily terminating ongoing activities mid-contract highly undesirable. This would erode our credibility and the team spirit, engagement and support of the GCP community. Discussing our concern with Review Panel members, the Panel confirms they do not expect us to stop ongoing projects.

However, GCP commits to identifying 7 highest impact program-level trait-in-crop products and related activities by the end of 2008, with clear indicators of success (see answer to recommendations 1 and 2). Building on existing successful projects, we further commit to assign all future uncommitted resources allocated to research to attain as soon as possible the recommended threshold.

A final point on this recommendation. The end of section 4 of the report states:

“Among these, in the view of the Panel, a minimum of two products should also serve as case studies to define, refine, and assess performance and efficiency of the full range of GCP integration processes (minimally, gene discovery, functional genomics characterization, trait validation, and marker assisted introgression and trait or component pyramiding). These seven products (collectively) should involve no more than 5 crop species.”

If we endorse the two case studies as described here, and while not questioning the number of trait-in-crop projects, we might have to revisit the restriction of 5 crops, based on the output of our prioritization exercise. Certainly, we would only advocate having more than 5 crops where there is a strong rationale in the context of the 7 flagship projects.

- 4. The review panel recommends that GCP management in consultation of the curators of the source collections establish the protocols by which each GCP Reference Sets will be maintained and distributed; and the means by which the current genotypic data and passport (catalogued) information on these Reference Sets will be maintained and augmented by current and future (non-GCP) discovery efforts that employ these collections.**

GCP fully endorses this recommendation and significant resources will be allocated in 2008 to start implementing it.

Most, if not all, GCP activities aim at generating usable products—in both the short and long term—in the form of knowledge, materials and tools for plant breeders. We are committed to promoting and disseminating these products among users that are ready to apply them, thus helping to further GCP’s mission. GCP is a time-bound Program that should ensure continued and sustainable use of its products after its lifespan. Therefore, our commitment to establishing protocols by which GCP products can be maintained and distributed extends beyond the Reference Sets.

One of the projects commissioned in 2008 is a workshop where all the research steps that led to the Reference Sets will be described and discussed, as well as the perspectives and the steps necessary for taking full advantage of these products. This will be a scientific and capacity-building workshop, with the purpose of sensitizing germplasm curators and breeders. It will be organized in concert with various players in international programs related to germplasm management and will thus promote global coordination and co-operation. The players involved include the System-wide Genetic Resources Program (SGRP) of the CGIAR, the Global Crop Diversity Trust and the Global Partnership Initiative for Plant Breeding Capacity Building (GIPB).

The Management Team is currently exploring ways and means to promote and ensure the sustainability of GCP products through supply and support services. Over the coming months, the Management Team plans to present (to the governance body) options and related workplans for a proposed a Plant Breeding Supply and Support Service (PB3S). The objective of this initiative is to create sustainable breeding support as an international public good to facilitate access by plant breeders in the South to new alleles and cost-effective modern plant science technologies, focusing on GCP products. The objective is that the majority of the services become self-sustaining from a financial point of view (user will pay for the services) by the end of GCP’s lifetime (2013).

As indicated in the recommendation, it will be critical to consider the input of the different GCP partners—especially genebank curators for the distribution of germplasm—when defining PB3S functions and *modus operandi*. The service (PB3S) should ensure quality, timely distribution and easy access to GCP products through standardized procedures. It should play the role of an honest broker to facilitate the exchange of products among partners, and reduce transaction costs by complementing existing lines of distribution without however competing with services offered by our partners.

- 5. The review panel recommends that GCP management revisit the skills training aspect of SP5 and focus skills training on the specific needs of the case studies and highest priority trait improvement projects.**

GCP agrees with this recommendation, and is already moving in the direction of the recommendation as indicated below.

Skill training was the focus of SP5 at the beginning of the GCP for several reasons: 1) at the time, there were insufficient and/or inappropriate links between the upstream research of Subprograms 1–4 and the national programs, and 2) there was a need to establish SP5 to attract, prepare and retain a core of national program scientists to become partners of our research by equipping them with the skills and expertise GCP would soon require. In 2006,

training changed to cover the specific requirements of our national program partners, as was expressed in that year's Annual Research Meeting (e.g. discussions in the phenotyping session). Moreover, the training program adapted to the new environment, i.e., more national programs became active partners in GCP research projects, and a [Delivery Strategy](#) had been developed and adopted at the Program level. The implementation of the Delivery Strategy calls for the prioritization of capacity-building for GCP products users.

To complement this re-orientation, SP5 initiated in 2007 the [Capacity Building Support \(à la Carte\) Program](#). This Program is for tailor-made capacity-building covering training, technical backstopping and basic infrastructure, to fill gaps in GCP projects that could hinder full participation and adoption of research results for individual national program teams. In addition, in its role of supporting the technical Subprograms, SP5's capacity-building initiatives will naturally also emphasize and priorities the 7 crop-traits activities that will refine GCP's focus in the years to come. In Phase II, SP5 activities will be increasingly oriented to product-push or customer-pull.

6. **The review panel recommends that during setup of the Executive Board a strong emphasis is placed on creating sufficient capacity and expertise for the Board to fulfill its duties, especially in**
 - **Setting strategic direction for the GCP;**
 - **Overseeing GCP finances and managing risks, also those relating to the host center.**

GCP appreciates the support of the Review Panel in endorsing the governance reform already initiated, leading to the current point where a decision has been taken to establish an Executive Board composed of experts without any institutional affiliation to GCP Consortium Members. The [Terms of Reference](#) of this proposed Board are embedded in the resolution adopted by the current governance body, the Program Steering Committee, during its last annual meeting in December 2007. GCP is seeking a focused and interactive Board of no more than 7 members, and, as indicated in the resolution: *"At least one member shall be selected from each of the following professional fields: science, finance, and corporate governance"*. It is our expectation that Board members will have the capacity to fulfill the roles as recommended by the Panel to provide good leadership and oversight on GCP's strategic direction and the management of its finances and risks. Therefore, we fully agree with recommendation 6 and we will ensure that the Board members selected will match the expectations.

Once the new Board is in place, it will be critical to define the legal and fiduciary parameters and responsibilities of the GCP Board and the CIMMYT Board of Trustees, as well as how the two Boards will relate to each other, given that GCP has no legal persona. The output of that discussion could result in adjusting the current CIMMYT-GCP host agreement.

The shortlist of the potential candidates for the new Executive Board should be finalized by early April, and we hope to have a functioning Board before summer 2008.

7. **The review panel recommends that an attempt is made to further simplify and clarify the GCP governance by adapting the consortium agreement to the de facto status quo and to clearly define the role and responsibilities of additional GCP governance bodies (the PSC, the PAC, the Stakeholder Committee).**

GCP agrees with this recommendation.

More than ever, it is now imperative to clearly define the roles and responsibilities of the Stakeholder Committee (SHC) and the Program Advisory Committee (PAC), given the ongoing governance reforms. The GCP Management Team is currently working in collaboration with the newly appointed GFAR Executive Secretary, on revising the SHC's terms of reference. In addition, the GFAR Executive Secretary is a member of the Selection Committee for the new Executive Board. The Board will have discretion on whether to revitalize the PAC or look for alternatives (e.g. consultants) to tap into for particular scientific expertise as and when required.

The PSC will have to redefine its role, internal *modus operandi* and interaction with the GCP Management Team. The PSC will also have to define its mode of interaction vis-à-vis the new Executive Board. As suggested in the EPMR report the option to merge the PSC and the stakeholder committee will be considered carefully.

With the roles, responsibilities and interactions among these different bodies better defined, the provisions of the Consortium Agreement should be revised and adjusted if necessary.

- 8. The review panel recommends that GCP upgrade all Sub-Program Leader positions to full time positions for the next three years. Since SP3 and SP5 Leaders already have full-time positions, this implies to move the Leadership of SP1, SP2 and SP4 from half-time to full time positions. [in order to provide the necessary management capacity for program-level management and the fulfillment of management duties in their respective SPs; and to avoid split responsibilities between the GCP and the SP Leaders' home institutions.]**

GCP endorses this recommendation in principle.

As we increasingly move from establishment to implementation, greater 'hands-on' management (as opposed to classical leadership and visioning) at both Program and Subprogram levels is becoming more fundamental for GCP's success in meeting its objectives. GCP commits to move from half-time to full-time Subprogram Leaders but only when current half-time SP Leaders, of their own volition, leave the Management Team.

- 9. The review panel recommends GCP management adopt an end-product orientation for GCP activities, i.e. the integration, alignment and prioritization of product oriented projects across Sub Programs in-line with high priority program-level product objectives. To support this, the review panel recommends that GCP management acquire or develop a product project portfolio management system to help it plan, monitor and manage its best opportunities (achievable high priority program-level objectives).**

While we fully endorse this recommendation, we also realize that its implementation will require further reflection and careful consideration.

GCP management is paying increasing attention to product management and delivery and has recognized over the past two to three years the need to reinforce links across Subprograms. We developed a product catalogue at Subprogram level but we still do not have a completely clear picture of the end products that the Program should deliver over the coming years and we are definitely lacking related indicators of success. This weakness has been brought into sharp relief by the Review Panel and is due, to a certain extent, to our current management structure: *“Subproject structure, funding and themes (project groupings) reflect technology-push or service-push orientation rather than product-push or customer-pull orientation”* (Section 3).

Recommendation 9 is not about erasing the current Subprogram structure, as it has some value clearly recognized by the Review Panel: rather, it is to add a transversal axis across the Subprogram dimension. This component must ensure that once our end products at Program level and their corresponding indicators of success have been identified (see response to recommendations 1 and 2), there is a management function that will ensure suitable resource and activity prioritization across Subprograms to deliver those end-products.

This ‘product/crop’-specific complementary management function that would help to integrate and priorities across Subprograms (in addition to the priority farming systems) can be established through at least three facilitative options:

- 1) By ‘Crop Leaders’ that are based in NARS or similar institutions, as suggested by the Review Panel. In order to remain cost-effective, this additional function should not reflect new management positions, but rather be integrated into relevant commissioned work (section 5.2.2).
- 2) By Subprogram Leaders shouldering this new responsibility and function. Thus, in addition to their current responsibility, Subprogram Leaders will add a new crop leader responsibility, based on their scientific expertise.
- 3) By a combination of options 1 and 2: Seeking Crop Leaders from NARS when there is a gap of expertise in the MT.

The MT will evaluate these different options, and any additional ones, over the coming months so that we have this new end-product orientation by the end of 2008. The development of this ‘product/crop-specific’ management dimension must be closely connected with the identification of the 7 trait–crop flagship projects. The idea to have the crop leader identified from the stakeholders will be explored carefully.

The MT is alive to the challenges of the two-dimension matrix. But while aware of the potential pitfalls, the MT would still like to move in this direction, especially given that some of the challenges that bedevil the two-dimension matrix mostly apply to large relatively more hierarchical institutions, while GCP is a ‘flatter’ virtual network.

An early preparatory step in the pathway to realizing a product portfolio management system as recommended is a workflow system that GCP started to develop at the end of 2007. This web-based system will aggregate project information (technical reports, products and outputs, etc) and integrate it with financial and other administrative and management information related to projects. It will be part of an overall Program-wide online management information system.

Conclusion

In conclusion, this review comes at a very opportune time for GCP and largely mirrors the thinking and vision within GCP in terms of weaknesses in our structure and work, remedial and preventive measures to counter these weaknesses, and strategies and restructuring for the future if GCP is to accomplish its objectives. Having conducted foundation work, including molecular marker analysis of germplasm diversity as well as developing genomic resources for most GCP mandate crop is a distinct quantifiable output from the past four years. To demonstrate impact on breeding efficiency in the context of the priority farming systems already identified, GCP now needs to allocate more resources to support a smaller set of defined trait-crops. The management structure and approach which worked well in GCP's foundation years will also need realignment to this new direction and vision, with GCP now approaching midpoint and its second and final phase.

Both the PSC and the EPMR panel have endorsed major governance reforms and the establishment of a more focused Executive Board as GCP's apex body. We are therefore optimistic that with this facilitative mechanism to buttress our work and visioning, the EPMR goals we have committed to can indeed be successfully accomplished within a reasonable timeframe before 2013, for impact on plant breeding spanning the entire chain of GCP activities from discovering genetic diversity to ultimately improve local adapted germplasm.

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH
SCIENCE COUNCIL AND CGIAR SECRETARIAT

**Report of the
First External Review of the Generation Challenge Program**

Review Panel: Wallace D. Beversdorf (Chair)
Markus A. Palenberg
Jennifer A. Thomson

SCIENCE COUNCIL SECRETARIAT
MARCH 2008

CONTENTS

Summary	1
LIST OF RECOMMENDATIONS	2
1 INTRODUCTION AND BACKGROUND TO THE REVIEW	5
1.1 Relevance of genomics in the context of Challenge Programs	5
2 THE GENERATION CHALLENGE PROGRAM (GCP)	7
2.1 GCP emergence, mission and strategy	7
2.2 GCP strategic objectives, delivery pathway and phases	10
2.3 Program set-up and function.....	15
3 GCP THEMES.....	23
3.1 Assessment of subprogram effectiveness	23
3.2 General comments on GCP themes	27
3.3 Program-level outcomes (view of 90 projects across themes).....	28
3.4 Ethical and legal issues.....	31
3.5 Publications.....	32
4 GCP EFFECTIVENESS: CONCLUSIONS AND RECOMMENDATIONS	33
5 GOVERNANCE AND MANAGEMENT OF GCP.....	37
5.1 Overall governance and management setup.....	37
5.2 GCP governance	38
5.3 Management of the GCP	50
6 RESOURCE MOBILIZATION AND FINANCIAL HEALTH	55
6.1 Fund raising performance and outlook	55
6.2 Performance vs. budget.....	57
6.3 Financial management and financial health.....	58

TABLES

2.1 Professional focus of survey respondents.....	10
3.1 GCP-derived publications.....	32
5.1 Consortium Partners.....	37
5.2 Provisional Consortium Partners.....	38
5.3 PSC attendance	41
5.4 Stakeholder Committee members.....	46
5.5 GCP management capacity	52
6.1 Suggested GCP cash contributions for phase 1 in original proposal (in 000 US\$).....	57
6.2 Suggested GCP in-kind contributions for phase 1 in original proposal (in 000 US\$).....	57
6.3 GCP cash balance	59
6.4 GCP cost structure.....	60
6.5 GCP transaction cost ratios	60

FIGURES

2.1 Survey Respondent Composition: Institutional affiliation(s)	9
2.2 General product develop scheme including those components in GCP	11
2.3 Responses to stakeholder survey question 19.....	12
2.4 Resource flows in the GCP	14
2.5 Organization of GCP R&D.....	16

2.6 Responses to stakeholder survey question 11	18
2.7 Responses to stakeholder survey question 12	20
5.1 Responses to governance and management survey question 1.....	43
5.2 Responses to governance and management survey question 7.....	51
6.1 GCP total donor contributions from 2003 to 2007	55
6.2 GCP annual funding from 2003-2006 (actual), 2007 (expectation) and 2008-2010 (extrapolation) in US\$ Million.....	56

ANNEXES

1	Generation Challenge Program External Review (2008) Panel Membership	A-1
2	CGIAR Challenge Program External Reviews (CPER) Guidelines.....	A-3
3	CGIAR External Review of the Generation Challenge Program – Terms of Reference	A-7
4	Reviewed Document List	A-9
5	People Consulted by the Panel.....	A-14
6	Stakeholder Survey Results	A-15
7	Governance and Management Survey Results	A-27
8	Acronyms	A-37

SUMMARY

The Generation Challenge Program (GCP), now in its fifth year, has achieved much. It has developed an extensive consortium partnership and leveraged its resources to establish a broad network of R&D participants with extensive capability and capacity to support the GCP objectives. Funding of the program has slightly exceeded projections and the outlook going forward is satisfactory (details are provided in Chapter 6). The GCP has developed genotyping-, informatics- and some genomics-platforms. The GCP has arranged access to other genomics platforms and has developed processes to permit staff at many locations to participate actively in GCP research projects. Analyses of diversity in several germplasm collections are nearly complete; and the assembly of the Reference Sets for these species represents a significant outcome from Phase I of this CP. These Reference Sets will help focus gene discovery and trait improvement research for the foreseeable future. The GCP has contributed considerable scientific information on genetic diversity and genetic underpinnings of some important traits.

In reviewing the programmatic aspects of the GCP, the Panel arrived at the view that the GCP needs to give more attention to prioritization of program-level trait-in-crop opportunities. The GCP needs to evaluate what it can achieve, and more actively manage its achievable high priority product opportunities in Phase II of the program. These perspectives reflect a belief by the Panel that the GCP funding mechanisms, project initiation and project management are too closely aligned with subprograms and associated subprogram themes, and not closely enough with mission-oriented program-level objectives. This orientation has been useful to insure good science quality and efficiency, but has not provided sufficient focus on mission oriented program objectives relevant to smallholder farmers. Stated briefly, the Panel believes that the GCP needs to focus resources in Phase II on a limited number of high priority achievable objectives. These have been addressed in the analyses and recommendations particularly in Chapters 4 and 5.

The Panel is concerned by the turnover frequency among the management team and the part-time appointments of half of the leadership team during Phase I of the GCP. The Panel believes these may in part be responsible for the limited prioritization and alignment of projects with program-level objectives; and the limited use of program-level management processes and tools normally associated with R&D programs of this scale and complexity.

The Program Steering Committee has not provided adequate strategic direction and may have hindered the GCP management from focusing resources. The GCP has not benefited from an active Program Advisory Committee but has had useful but limited input from the Stakeholder Committee. Recommendations of the Governance Task Force are being implemented (issues addressed in Chapter 5).

The GCP needs to develop a clear and executable exit strategy over the next few years. Many of the platforms, developed or improved by GCP, are embedded in CGIAR centers or key partners. The full impact of GCP products will require that these platforms are durable beyond GCP and are accessible by CGIAR centers, NARS and some ARIs, and down-stream breeding programs and seed distribution networks.

LIST OF RECOMMENDATIONS

10. The review Panel recommends that the GCP management in consultation with the curators of the source collections establish the protocols by which each GCP Reference Sets will be maintained and distributed; and the means by which the current genotypic data and passport (catalogued) information on these Reference Sets will be maintained and augmented by current and future (non-GCP) discovery efforts that employ these collections.
11. The review Panel recommends that the GCP management revisit the skills training aspect of SP5 and focus skills training on the specific needs of the case studies and highest priority trait improvement projects.
12. The review Panel recommends that the GCP establish simple Program-level success criteria to provide the GCP Management Team the means to focus, measure and monitor GCP Program effectiveness.
13. The review Panel recommends that the GPC management establish and apply a prioritization process to identify the highest impact opportunities that the GCP (Program-level) can actually achieve and deliver to appropriate impact channels during its remaining six years.
14. The review Panel recommends that the GCP deploy the majority (at least 50 %) of its resources in pursuit of the seven highest impact Program-level trait-in-crop products that it can achieve over the next five years.
15. The review Panel recommends that during setup of the Executive Board a strong emphasis be placed on creating sufficient capacity and expertise for the Board to fulfill its duties, especially in
 - Setting strategic direction for the GCP;
 - Overseeing GCP finances and managing risks, also those relating to the host center.
16. The review Panel recommends that an attempt be made to further simplify and clarify the GCP governance by adapting the consortium agreement to the de facto status quo and to clearly define the role and responsibilities of additional GCP governance bodies (the PSC, the PAC, the SHC).
17. The review Panel recommends that the GCP upgrade all subprogram leader positions to full-time positions for the next three years. Since SP3 and SP5 leaders already have full-time positions, this implies to move the leadership of SP1, SP2 and SP4 from half-time to full-time positions. This is needed in order to provide the necessary management capacity for Program-level management and the fulfillment of management duties in their respective SPs; and to avoid splitting responsibilities between the GCP and the SP leaders' home institutions.
18. The review Panel recommends that the GCP management adopt an end-product orientation for the GCP activities, i.e. the integration, alignment and prioritization of product oriented projects across subprograms in line with high priority Program-level product objectives. To support this, the review Panel recommends that the GCP

management acquire or develop a product project portfolio management system to help it plan, monitor and manage the Program's best opportunities (achievable high priority Program-level objectives).

1 INTRODUCTION AND BACKGROUND TO THE REVIEW

The Science Council of the CGIAR commissioned an external review of the CGIAR Generation Challenge Program (GCP). It was conducted by Dr. Wallace D. Beversdorf, International Service for the Acquisition of Agri-biotech Applications, (Chair), Dr. Markus Palenberg, Global Public Policy Institute, Berlin, Germany, (Governance and Management), and Professor Jennifer Thomson, Molecular and Cell Biology Department, University of Cape Town, South Africa (Technologies). The Panel biodata are provided in Annex 1. Review guidelines and terms of reference documents for this Challenge Program External Review are provided in Annexes 2 and 3.

For this review, the Panel has reviewed a broad range of documents (see Annex 4) and consulted a total of 35 individuals, either during on-site visits or through telephone- or video-conferencing (refer to Annex 5 for a comprehensive list of interviewees). In addition, the Panel has conducted two surveys, targeting a total of more than 250 individuals and receiving more than 190 responses. Please refer to Annex 6 for results of the stakeholder survey and to Annex 7 for those of the governance & management survey.

1.1 Relevance of genomics in the context of Challenge Programs

The rapid emergence of genomic sciences (the study of genes and their functions) and associated technologies over the past dozen years has provided new insight into genetic systems that govern diversity of life and regulate biological (life) processes. Recent advances in many fields of biology are based on genomics, and resulting in both fundamental understanding of life and practical applications (including human and plant health practices, and microbial, plant and animal production and protection). Genomics are being applied to genetic improvements in many crops and livestock species in the industrial world and indirectly (mostly limited scale or trickle-down) benefit smallholder farmers in the developing world (e.g. drought tolerant corn hybrids, Bt-cotton, -vegetables and -corn, and marker-assisted introgression of synthetic or recently discovered genes into locally adapted varieties).

Genomics understanding and enrichment of crop germplasm is already assisting plant breeders in variety improvements particularly for multi-gene traits or traits with complex inheritance due to large genotype X environment interactions such as drought tolerance, disease resistance, and yield. The diversity and complexity of germplasm and variety improvement prior to genomics often required multidisciplinary efforts. The laboratory orientation and data intensity of many genomics processes applied to crop improvement extends the dimensions of technological skills, terminology and interactions for crop improvement even further, and as such requires even greater intensity of focus on objectives and management of interfaces along the progression.

Some elements of genomics have also been applied to an understanding of plant germplasm collections through the application of a progression of structural marker assessments of germplasm collections over the past decade, many of these in CGIAR centers. These have provided some insights into the preservation of diversity as germplasm underpinning crop product migrated geographically and underwent intensive recombination and selection during the modern era of plant breeding (past 100 yrs.). The applications of (structural) genomic technologies to germplasm collections have been variable in intensity due in part to available resources, skills and interests.

A Challenge Program is a time-bound program of high-impact research that falls within the scope of the CGIAR mission, seeks to resolve complex issues of overwhelming global and/or regional significance (and, if the latter, with global impact), and requires partnerships among a wide range of institutions to develop and deliver its products. (The Charter of the CGIAR System, March 2007)

The Panel believes a program that integrates genomics, germplasm and plant breeding to enhance crop genetic diversity and to deliver improved crop varieties for smallholder farmers is worthy of a Challenge Program. Such a program may assist in the delivery of enduring socio-economic impact (improved economic and food security for smallholder farmers) and would for efficiency have to involve a range of institutional partners with divergent skills.

The Panel further believes that to operate such a program meaningfully under the 10-year time limitation anticipated by the CGIAR mission, the program must be highly focused and ensure that tools, platforms, germplasm and associated information are preserved by more durable institutions associated with and accessible by downstream (local) plant breeders and seed distribution channels. These issues will be discussed more fully below.

2 THE GENERATION CHALLENGE PROGRAM (GCP)

2.1 GCP emergence, mission and strategy

2.1.1 Emergence of GCP

The GCP apparently had a complicated birth. Although the first version of the GCP proposal (a version that was subsequently adapted into the present original proposal) was not provided to the review Panel, interviewee feedback suggested that this first draft proposed a narrowly focused program to develop and implement tools, including comparative genomics and marker assisted breeding (MAB) tools, to modernize breeding particularly in cereals at a limited number of CGIAR centers and NARS. This early concept apparently was not well received by several CGIAR center Director Generals and advisors who perceived the proposal as exclusionary. The ensuing discussions ultimately lead to a much more inclusive (but less focused) GCP Proposal in February of 2003.

The GCP is legally a Partnership Consortium which functions to receive funds from donors, establish, manage, and finance projects of an integrated Research & Development (R&D) program to improve traits available to crops grown by smallholder farmers in the developing world. The GCP oversight including legal and strategic guidance (collectively governance) has been provided by a Program Steering Committee (PSC) essentially representing the institutional consortium partners.

The GCP operates under a legal consortium agreement that addresses rights and obligations of the host institution (CIMMYT) and institutional partners; and a framework of contractual agreements covering obligations of all (non consortium) research partners funded at least in part through the GCP. The GCP is hosted by CIMMYT; since 2007 this hosting relationship has been formalized by establishing a host agent agreement between CIMMYT and the consortium.

Management of the GCP R&D program includes a Program Director plus two full-time and three part-time subprogram leaders seconded from consortium partners. The GCP R&D program is supported administratively by both a small group of GCP staff and also by CIMMYT (host institution) staff.

The current Governance and Management setup has impacted the GCP R&D program in several ways. While most Governance and Management issues will be discussed in detail in Chapter 5 of this Review, relevant observations of program-related impacts and recommended adjustments within the R&D program will be addressed Chapter 4.

2.1.2 GCP mission

The GCP Mission (*GCP proposal, Feb. 3, 2003*):

Unlocking Genetic Diversity in Crops for the Resource-Poor will realize the potential of plant genetic resources to improve livelihoods and increase food security in developing countries. It will do so by enhancing the use of genetic resources in breeding programs through a concerted effort to generate, manage and apply genomic information derived from comparative studies. It will enhance the public domain as the best means to ensure fair access and benefit sharing for resource-poor farmers.

The GCP Mission has evolved slightly over the past 4 years. Program-level objectives (related to enhancing or protecting crop genetic diversity and assisting in the development of improved germplasm for smallholder farmers) have been stable.

This mission has evolved slightly and was in 2007 restated as follows:

To use advanced genomics science and plant genetic diversity to overcome complex agricultural bottlenecks that condemn millions of the world's neediest people to a future of poverty and hunger. (*GCP presentation to CP External Review, Oct. 30, 2007*).

and

The GCP is at the heart of a research and capacity building network that uses plant genetic diversity, advanced genomic science, and comparative biology to develop tools and technologies that help plant breeders in the developing world produce better crop varieties for resource-poor farmers. (*GCP Strategic Framework, Feb. 6, 2007*)

2.1.3 Partnerships

Currently, the R&D program of the GCP (defined as any R&D projects that receives funding through the GCP) involves a vast group of research partners (currently more than 70 participating institutions including both consortium and non-consortium partners). The GCP R&D projects (currently more than 90) are employing a broad range of technologies that may be relevant to trait enhancement in food crops (with the exception of transgenic technologies). The GCP projects involve (to a greater or lesser extent) more than 20 crop species.

A key component of the GCP strategy and design involves leveraging skills and capacities of a broad network of consortium partners (currently 18) and additional R&D partners (currently more than 70) to address its mission. This component of the GCP strategy is characteristic of Challenge Programs (leverage skills and capabilities from many institutions to develop and deliver its products). The GCP leveraging strategy involves funding processes to extend R&D partnerships inside and beyond the consortium as well as to support specific R&D projects. The funding mechanisms are rather complex, evolving and different for each of three categories of projects (Competitive Grant Projects, Commissioned Projects and Special Projects). Funding mechanisms and associated project categories will be discussed in greater detail in Section 2.3.2, as collectively these help to define and orient the GCP R&D program(s).

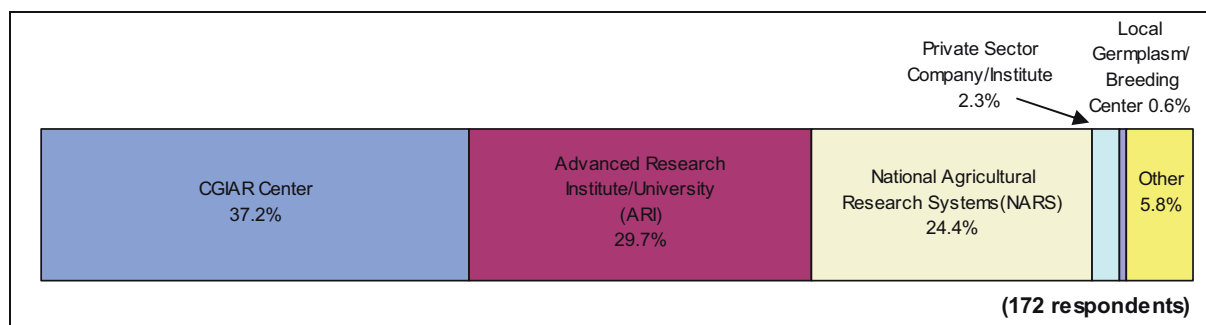
From the perspective of this Review, three elements of program design were assessed:

- The dimension, purpose (roles) and appropriateness of the R&D partners;
- The duration, boundaries, phases and focus of GCP activities; and
- Groupings of scientific projects into subprograms and subprogram themes (clusters of projects with similar types of objectives).

The Panel observed that R&D partners collectively bring to CGP a very broad set of genomic technical platforms, and crop or trait evaluation platforms (diverse environments), knowledge and skills. Collectively, these capabilities are of industrial scale and well beyond those available in any individual GCP Consortium Partner in regard to GCP defined area of integrated processes (germplasm diversity-gene discovery-functional genomics – trait-in-crop evaluation-plant breeding).

R&D partner survey results indicate GCP research participant are institutionally broad-based and most are active in the germplasm, genomics and trait improvement continuum.

Figure 2.1 Survey Respondent Composition: Institutional affiliation(s)



The rights of consortium partners include direct inputs (discussion and votes) on issues of strategic direction, and content including approvals of competitive grant projects, and evaluation the R&D program and future consortium partners; their responsibilities consist of providing support [delivered as in-kind knowledge, skills and platform capacities and related intellectual properties (IP)].

Specific roles of both consortium and non-consortium staff participating in GCP research are defined more specifically in research projects. These are quite divergent and reflect their skills and capacities of each participant. In what follows, we briefly assess the main contributions provided by the different GCP partnership groups:

- ARI R&D-partners within and beyond Consortium Partners have provided some key opportunities through established tools, highly advanced skills and in some cases recently discovered genes with the potential to improve some crop traits that could have considerable impact on smallholder farmers. Currently ARI staff represents nearly 30 per cent of all GCP research participants.
- NARS have provided considerable capacity, particularly in breeding (including MAB) and trait evaluations, but just as importantly, knowledge of local farming systems and locally adapted varieties. As such, their collective knowledge and capacity is essential to define (and refine) the GCP's anticipated or planned outputs as well as evaluate these for appropriateness into the product delivery stream (NARS partners are a significant part of the seed product delivery streams). In the GCP, some of the NARS R&D participants have initiated or advanced bilateral relationships in both skills training and support of specific projects. Staff members of NARS currently represent nearly a quarter of all GCP research participants.
- CGIAR centers provide upstream breeding capacity, access to and understanding of germplasm resources in many crops as well as supporting technology and information technology, and a broad base of supporting knowledge in many crops and traits in crops. CGIAR centers have specific (crop) mandates regarding crop germplasm collections and plant breeding. The contribution of skills, information platforms, some technology platforms and knowledge of germplasm is essential for the GCP. CGIAR center pre-GCP efforts in both diversity of germplasm and genetic underpinning of specific traits are well represented among the GCP projects. Staff members of the CGIAR centers currently represent nearly 40 per cent of all GCP research participants.

Collectively, the partners cover a broad range of appropriate skills. Self-indications of the GCP R&D participant respondents' professional focus are provided in the Table 2.1. These responses indicate GCP participants provide the full range of skills in the germplasm-variety improvement continuum.

Table 2.1 Professional focus of survey respondents

Answer Options (multiple answers possible)	% of Respondents	Response Count
Variety Development (Variety Breeding, Evaluation / Multiplication / Distribution)	35.1%	59
Germplasm enhancement (upgrading collections, populations and/or lines for any purposes other than direct use by farmers)	20.8%	35
Germplasm characterization (genotyping, phenotyping germplasm)	57.1%	96
Germplasm maintenance (storage and/or rejuvenation of germplasm collections)	11.9%	20
Germplasm collection (adding genotypes to germplasm collections designated for maintenance)	9.5%	16
Gene discovery / characterization	35.7%	60
Marker / QTL discovery	41.7%	70
Marker / MAS platforms	29.2%	49
IS / IT support	14.3%	24
Other	13.7%	23
Total respondents: 168, average of 2.7 responses per respondent		452

The Panel commends GCP in establishing an extensive network scientists participating in GCP projects. The Panel recognized as appropriate the dimensions and roles of the research partners. At the same time, we recognize that the R&D participants should remain dynamic and reflect the priority opportunities that emerge during Phase I.

2.2 GCP strategic objectives, delivery pathway and phases

The original GCP proposal (2003) established a number of anticipated outcomes at the Program level that were believed to be achievable during the 10 years the GCP would operate. These outcomes were consistent with the mission of the GCP and will in the context of this Review be referred to as GCP Strategic Objectives. They provide some focus on drought tolerance but do not contain any crop focus.

2.2.1 Strategic objectives

The Program level objectives are aligned with the original GCP Mission. These include:

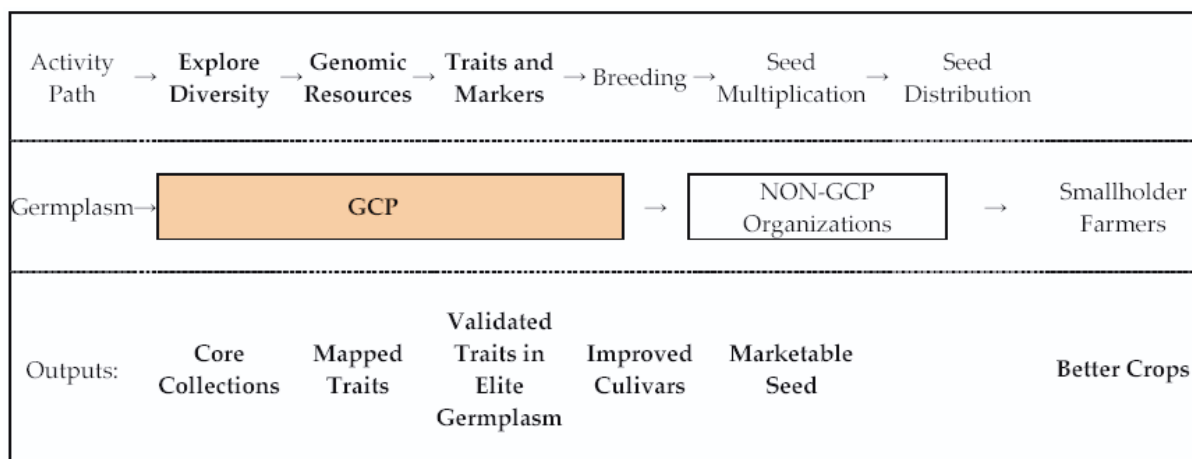
- Structural and function characterization of Genetic Diversity as a resource for gene discovery;
- Gene discovery for trait improvement based on Comparative Genomics
- Gene transfer (introgression) for trait improvement into relevant lines (elite or regionally adapted lines);
- A Repository for information and publicly available tools for discovery and analyses
- Education and skills training for potential users of GCP-associated tools and technical processes;
- Validation of GCP processes via A Case Study involving Drought Tolerance.

These Strategic Objectives reflect a sequence of technical activities to identify new genes and improve crop traits; and the means [technical and information technology (IT) platforms, and improved skills through training) to achieve and support the GCP outputs. This sequence of

activities includes the exploration of genetic diversity in germplasm collections, the attempts to discover genes and genomic regions responsible for (improved) traits, identification and functional genomics characterizations of potentially beneficial genes or genomic regions, their transfer into improved lines for trait characterization (or validation) and finally to hand-off improved traits in relevant germplasm lines to local breeders (and into the impact channel).

The sequence of the GCP processes parallels the sequence of many large scale (industrial) breeding programs although industrial programs are usually organized on a crop or market basis. With the final Strategic Objective GCP intends to validate the GCP integrated processes via a “Drought Case Study”. This objective is planned to validate and presumably help the GCP to refine the application of its processes. As such it could also lead to enhanced traits-in-crop products and associated tools to be transferred into appropriate impact delivery streams beyond the GCP.

Figure 2.2 General product develop scheme including those components in GCP

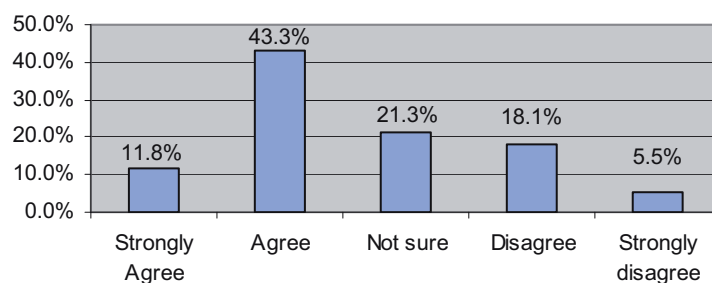


Neither the GCP Strategy nor its Strategic Objectives anticipate direct delivery of its outputs in locally-adapted varieties to smallholder farmers. Both assume that its intermediate trait outputs will be handed-off to other (non-GCP) Plant Breeding Institutions for down-stream development. That is, the GCP outputs will rely on external breeding, seed multiplication and seed distribution to reach smallholder farmers (see Figure 2.2, adapted from multiple GCP sources). How to do it is described in the GCP delivery strategy.

The R&D partner survey responses indicate some concerns among the GCP program R&D participants that the GCP has not adequately considered the limits or linkages between the GCP projects and down-stream delivery to smallholder farmers. About half of respondents agree that limits to the GCP projects (upstream genomics and breeding) and linkages to the delivery stream were adequate, while more than 20 % of respondents believe they were not adequate.

Figure 2.3 Responses to stakeholder survey question 19

*The GCP in defining the limits of its projects has sufficiently considered and linked to the down-stream delivery chain to ensure timely access to GCP achievements by priority beneficiaries (smallholder farmers).
(127 responses)*



In consideration of the time limited nature of the GCP, the Panel agrees that the GCP should focus on the upstream R&D. The Panel believes however, that the GCP should prioritize its activities according to the prioritized deliverables for downstream breeding. The GCP tools and training will need to support these downstream activities to ensure uptake of GCP products and delivery of impact.

2.2.2 GCP phases

GCP R&D anticipates operation through two phases, each consisting of 5 years.

Phase I (2004-8) activities provide understanding and structural characterization of diversity in germplasm collections, build capabilities for trait improvement and provide “Case Study” validation that those GCP capabilities, when integrated, could deliver improved traits.

Phase II (2009-13) is planned to be more open-ended but anticipates much better understanding of genetic diversity, relevant genes and validated traits relevant to smallholder farmers.

Phase I (2004-2008) has the following anticipated outcomes:

- A platform for accessing, identifying and utilizing genetic resources for crop improvement;
- Accessions in genetic resource collection with genomic regions or alleles having favorable impact on priority traits (for subsequent transfer to germplasm for resource-poor farmers);
- Understanding of the genetic structure of genebank collections to enhance the value of germplasm resources;
- Candidate genes (or genomic regions) underlying important crop traits including their accelerated functional characterization;
- An information network for genomic and phenotypic data integrating advanced genetic resources, genomic and crop information systems to increase efficacy of plant breeding programs;
- Greatly expanded capacity among research centers through collaboration and advanced capacity building of scientists;
- An extended global network of CGIAR Centers, NARS, public ARIS and private institutes for the effective utilization of advanced technologies for crop enhancement for developing countries; and
- The GCP integrated approach validated by the case study on drought.

(from GCP Proposal, 2003)

These program level outputs are intended to provide the understanding of germplasm diversity and explore genes underlying traits, provide capacity to improve traits generally, and to assess the GCP processes through a Case Study on Drought Tolerance. The case study would provide at least one set of genes or genomic regions for a complex trait and associated markers and tools necessary to validate resulting drought tolerance in appropriate germplasm.

A case study in the Panel's view is appropriate, and necessary to provide an opportunity for GCP to refine its processes prior to Phase II.

The case study should also provide the GCP a trait-in-crop product(s) for hand-off to the local breeding and product distribution stream. If successful, this could provide an opportunity for early assessment of the GCP assumptions regarding its linkages to and appropriate support of the impact channel.

Phase II (2009-2013) is intended to provide the following additional outcomes:

- Additional information and genetic resources for use in research and crop improvement programs;
 - Greatly enhanced understanding of the genetic control of priority traits for release to the general research and breeding communities;
 - Breeding materials containing new alleles that will directly improve productivity or quality and with further breeding, will enhance productivity and quality of food crops for resource-limited farmers globally.
- (from GCP Proposal, 2003)*

Evolution of anticipated outcomes

The GCP's anticipated outcomes (which reflect the collective anticipated generalized outputs of the GCP subprograms) have evolved somewhat since the original proposal. Expanded outcomes have been added as opportunities emerged. The most significant among these include emergence of the "Reference Sets" for several crop species.

From Genebank Core Collections the identification of the Reference Sets of representative germplasm were made possible through rapid structural genotyping of several germplasm composites with random genomic markers during Phase I and a suggestion that reassembly of specific accessions from these core collection could provide "reference samples" (of the source composites or collection) with well defined structural diversity and potential enhanced allelic diversity. These Reference Sets will emerge from the GCP in 2007-08 and extend the phase I outcome: "Understanding of the genetic structure of genebank collections to enhance the value of germplasm resources".

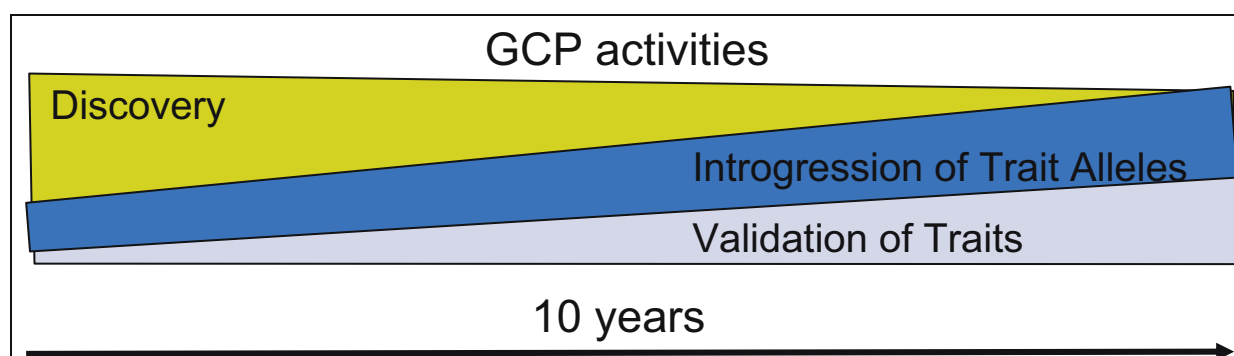
Understanding of traits and trait improvements in advanced breeding materials (representative of the second and third outcomes of Phase II) have been expanded in part through "competitive grant calls" early in Phase I (effectively "buying-in" some available and potentially valuable trait alleles and associated skills from external discovery efforts).

There has also been some evolution of an original GCP outcome based on unanticipated complexity and slower than expected progress associated with major genes for drought tolerance. Case Study(ies) will benefit from better definition(s) going forward, including designation of crop(s) and traits or trait components, as alleles for significant drought tolerance

(per se) have not been identified and validated to date. (Drought tolerance is complex and most probably involves the responses of many alleles to stress.)

The Panel anticipates (based on the Management Team perspectives provided to the Panel) considerable additional definition or refinement of Phase II outcomes as the GCP approaches the end of Phase I next year. The GCP Management has indicated that the proportion of activities and the connected flow of resources in discovery will decline while activities and resources to prepare improved traits (novel genes/markers) in appropriate germplasm for validation and hand-off to local breeding and product delivery streams (impact channels) will increase. These refinements will reflect in large measure the successes in Phase I projects to identify candidate genes for desired traits.

Figure 2.4 Resource flows in the GCP



adapted from GCP Overview (Ribaut, 2007)

The Panel agrees that the duration of the GCP (10 years) is appropriate to establish, evaluate and refine an integrated set of platforms and processes to efficiently discover, characterize genes and evaluate corresponding traits in appropriate germplasm.

However, the Panel believes that the GCP will not complete evaluation of many of its traits-in-crop opportunities in all relevant regions/farming systems; and the GCP will not achieve delivery of all traits improvement opportunities in regionally adapted germplasm of all crops to the appropriate delivery channels during phase II. The GCP must begin to prioritize its opportunities.

The current boundaries of the GCP's research activities do not include large-scale breeding and seed multiplication of improved locally adapted varieties or distribution to smallholder farmers (at least according to the mission or program level objectives). This gap is in part addressed through the participants who are part of the down-stream delivery chain and in part through the Capacity Building/Training components the GCP which are intended to connect and support components of the delivery chain beyond the GCP. During Panel discussions with representatives of donor to the GCP (see Annex 5), development impact (benefits for smallholder or resource-poor farmers) was the most common reason given for donor support of the GCP. The Panel believes that the gap between donor expectation and the GCP activity-boundaries needs special attention in Phase II.

The Panel believes that the GCP will have to expend considerable effort during Phase II to:

- Ensure that the GCP tools and platforms, and integrated processes are both efficient and durable beyond the GCP; and

- Ensure that the GCP improved trait outputs enter the product development and delivery stream with appropriate support (tools, skills and information) necessary to ensure products are available to benefit of smallholder farmers in locally adapted varieties.

2.3 Program set-up and function

2.3.1 Program structure

The GCP structure includes five subprograms (SPs), each with a subprogram leader, and follows the technology orientation and essential supporting functions of the GCP Strategic Objectives discussed in the previous Chapter. This operating organizational structure is also reflected in the Program Research Management Team chart (Figure 2.5).

The first three subprograms are sequential activities leading to novel or improved traits.

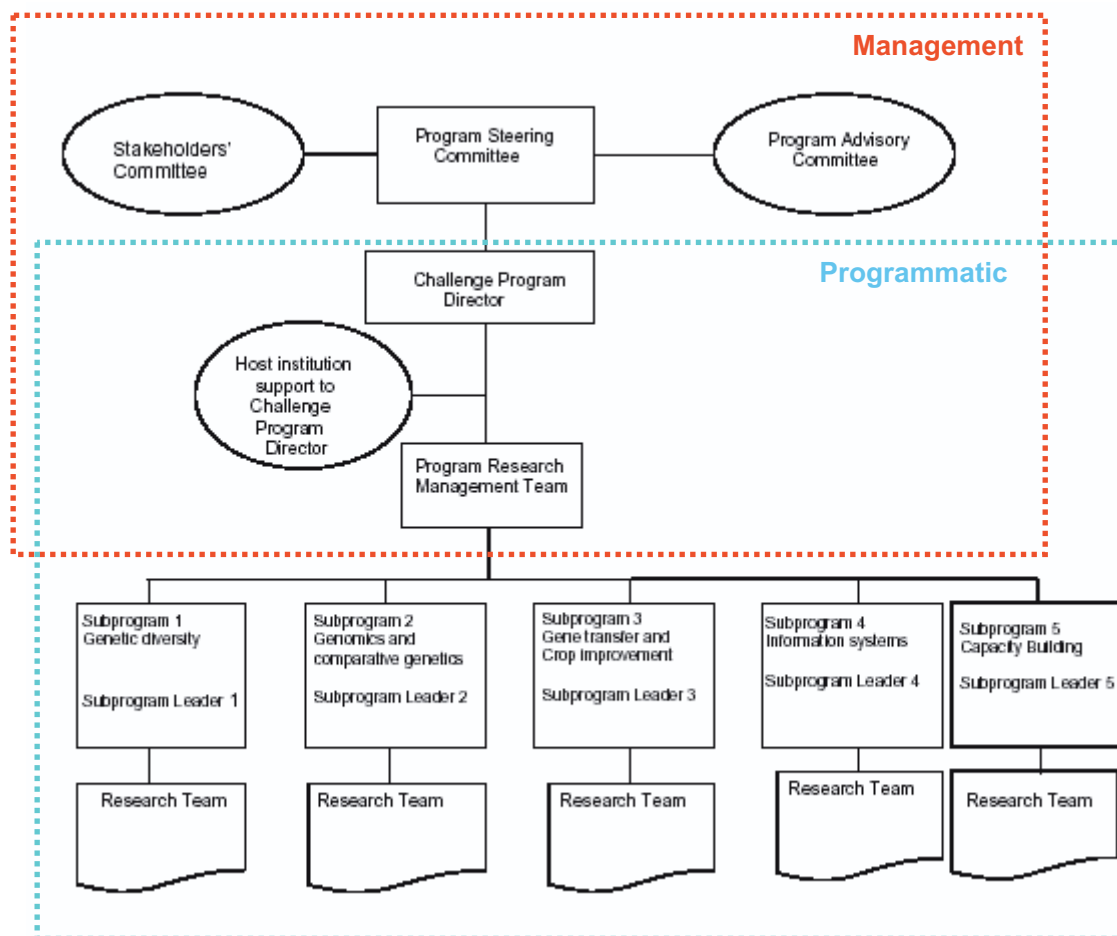
- SP1 conducts exploration of genetic diversity;
- SP2 employs functional genomics to identify and characterize alleles or genomic regions in the context of gene functions and pathways that influence traits or could provide novel traits for crops; and
- SP3 transfers genes or genome regions to relevant germplasm (trait capture) and characterizes the associated traits in agricultural environments of interest (trait validation). SP3 employs trait-associated markers (markers linked to the genes usually identified in SP1 or SP2) to assist the transfer of alleles or genomic regions into relevant germplasm for validation and to assist down-stream breeder transfer validated traits to locally adapted varieties (via MAB tools and markers).

SP4 and SP5 provide support and build capacity and capabilities.

- SP4 develops, adapts and provides a repository of analytical tools, for data and for resulting or related information and provides more general IT platform support for communications, training and project monitoring; and
- SP5 provides support for Human Resources and some infrastructure capabilities and skills development through educational and skills training programs and by developing training materials and help-desk systems. Additionally, SP5 is responsible for developing systems to ensure delivery of products beyond GCP, offers help-desks and develops some support services, and conducts socio-economic studies (including the GCP Strategy Frame and *ex ante* impact analyses and impact assessments).

The Panel is concerned with the focus and continuity of leadership along the gene discovery/trait improvement continuum. Management turn-over and part-time focus of half of the subprogram leadership have not provided an environment of focus, continuity, rigorous oversight, project or portfolio management appropriate for a promising, complex but time-limited CP. This issue will be addressed further in Chapter 5.

Figure 2.5 Organization of GCP R&D



GCP subprogram leaders each have an external advisor who supports the subprogram on technical issues. The Review and Advisory Panel (RAP), which was established in 2005 by GCP management, is made up of these advisors. In addition to individual support of subprogram leaders, the RAP provides a consolidated report annually to the Challenge Program Director. RAP members devote considerable time (10+ days annually) in support of GCP including participation in the Programs Annual Research Meeting.

In the assessment of the Panel, RAP is providing meaningful and useful support for the management and R&D in GCP at the project and program levels.

Both the limited capacity and high turn-over rate of the management team and the performance of the RAP will be further discussed in Chapter 5 (below).

2.3.2 Project initiation and funding

The GCP mode of operations for R&D reflects the GCP's means of accessing partnership resources, establishing projects, managing projects in concert with the corresponding Principal Investigators to deliver project objectives (outcomes). Projects in GCP fall into three categories based on purpose funding provisions by which projects are initiated which include:

- Competitive Grants,
- Commissioned Grants and
- Special Project Grants.

Collectively, these mechanisms of project funding provide the primary tools available to the GCP to encourage and leverage partnerships, initiate and align projects and explore opportunities or breakthroughs that emerge outside current projects. In what follows we will assess each project funding mechanism individually.

Competitive projects

Competitive Grants, which represent close to 30% of GCP project funding to date, are intended to extend partnerships and access new ideas, opportunities and/or breakthroughs beyond the current GCP projects. The Competitive Projects are initiated through a 'call' process leading to pre-proposals and from these, a selected group of full proposals some of which are chosen for funding. The GCP as of this review is processing its third round 'call' for Competitive Grants. Competitive Grant processes have been evolving:

The 'first call' for Competitive Grant Proposals went out in April 2004. The review Panel was composed of 7 *ad hoc* reviewers from universities or research institutes in 6 countries who are widely recognized as experts in the fields involved. Based on the recommendations of this review team, a selection of applicants was invited to develop and submit full proposals. These were evaluated and ranked by the same reviewers, and a subset of projects was finally recommended for funding. The PSC was then responsible for the final determination of awards.

Two categories of grants were awarded: a) start-up grants for 1-2 years for up to \$100,000 total; and b) standard grants of up to \$300,000/year for up to 3 years. From the original 78 eligible pre-proposals submitted, 28 were selected for submission of full proposals. Of these 16 were recommended for full funding and 1 for 50% funding. The time between submissions of pre-proposals to awards being made was 5 months.

The chair of the PAC participated in both Independent Review Panels that evaluated the proposals. In his report on the first call the chair comments that in his view the process adopted for evaluation of proposals was scientifically rigorous, open, and transparent.

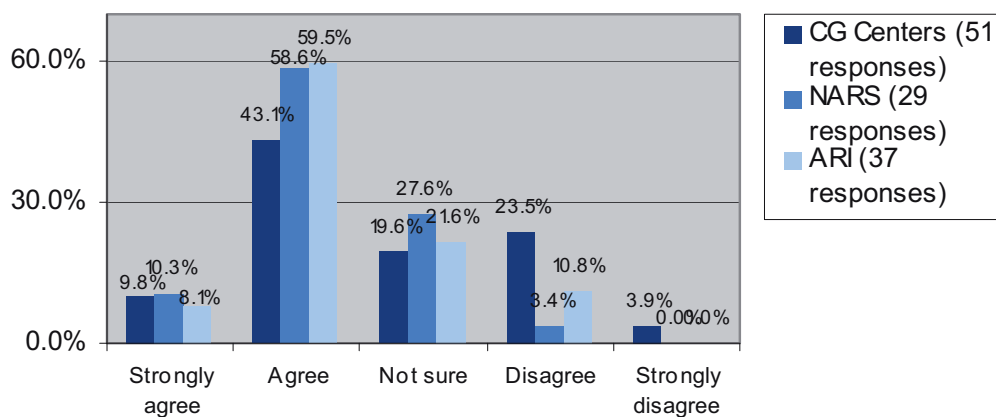
The second call went out in February 2006. Among 45 pre-proposals received, 20 were selected to submit full proposals and 6 of the 19 received, were selected. The process for the second call had evolved with respect to the first call based on the experience that project outputs of the first call had limited alignment with the GCP program objectives. In the second call, in addition to better thematic definitions, more dialogue between subprogram leaders and applicants selected to provide full proposals was established and further dialogue was provided to negotiate project outputs before funding agreements were signed.

In his report on the second call the chair of PAC commended the Management Team for the carefully constructed calls for proposals they developed. In this call the Management Team prioritized thematic areas for short-term development. The chair commented that this was a departure from the first call but in his opinion it was appropriate for the then current phase of development of the GCP. It also served to limit the number of proposals received.

The stakeholder survey results indicate that there is good support for the Competitive Grant process although a considerable portion (23 %) of CGIAR Center participants does not believe the process is optimal to align projects with highest priority needs and attract highest quality collaborators.

Figure 2.6 Responses to stakeholder survey question 11

The GCP has established optimal procedures for soliciting, negotiating and implementing competitive projects that are clearly aligned with need, attract highest quality collaborators, and ensure timely and effective delivery of necessary scientific/technical inputs for highest priority goals. (128 responses)



The Competitive Grant Projects have been successful in establishing new partners and in providing the QTLs and gene sources that the GCP would pursue to enhance a range of traits in crops including drought (rice, wheat, maize, cassava, and cowpea), salt tolerance (rice) aluminum tolerance (sorghum, maize, wheat and rice); and a number of biotic stresses in maize, wheat, rice, peanut, cowpea, and cassava. The processes involved have evolved considerably to address issues that became apparent from the first call. The initial call was very open-ended with limited input from the management team, which resulted in limited alignment of Competitive Grant Projects outputs with the GCP objectives. The process for the second and subsequent calls (third call currently underway) have evolved to include better definitions prior to the call and dialogue between the theme owners (subprogram leaders) and authors of Competitive Proposals to improve alignment of project outputs with the GCP thematic needs.

The Review Panel believes that Competitive Grant Projects have been successful in expanding partners and establishing some linkages among the three categories of research partners (ARIs, CGIAR centers and NARS), beyond what would have been achieved by conventional CGIAR-funded or even System-wide finding mechanisms.

Several competitive grants have already delivered outputs and contributed to understanding of diversity and several opportunities for trait improvements from identified QTLs and alleles as well as to improved GCP capacity to learn and deliver.

The Panel was concerned however, by the Management Team's estimates that due to the diversity of research topics, nearly a third of the outputs from the first round of Competitive Grant funded projects did not directly align with GCP major program level objectives or were delayed.

Some of the failures reflect limited opportunity for alignment of proposal outputs with the GPC needs in the first round of Competitive Grants (already discussed). Some delays reflect funds flow problems (donor funding delays as well as institutional delays). Others reflect technical risks, climatic risks, skills and equipment deficiencies for genotyping various collections (e.g. equipment issues at IRRI); differential baseline knowledge, genetic complexity and/or longer

generation times of some germplasm collections; and delays in hand-off of materials or information among projects (portfolio management issues).

The Panel believes that the GCP has employed Competitive Grants effectively to leverage partners and capabilities and that resulting projects have achieved much in spite of alignment problems in the first round, some failures and some delay.

On a process level, the GCP competitive grants process needs to comply with the CGIAR Financial Procurement Guidelines (specifically with Guideline number 6). Another Challenge Program had to call back a series of competitive grants due to non-compliance with this guideline after the program had been audited.

Since, similar to other Challenge Programs (and CGIAR Centers), compliance with the guidelines has not been formally confirmed for the GCP, the review Panel suggests that the GCP conduct such an assessment and implement corrective action of needed.

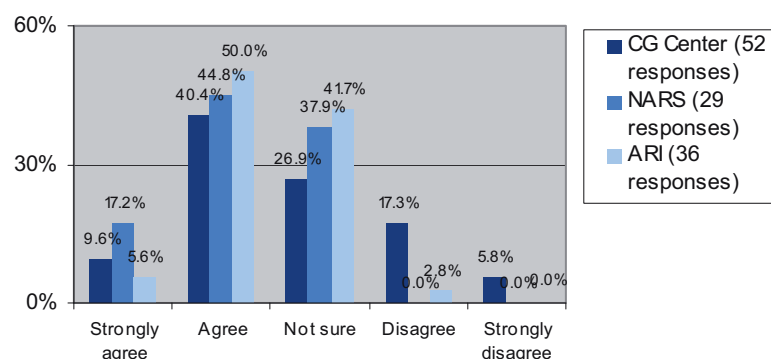
Commissioned and capacity building projects

Commissioned and Capacity Building Projects reflect nearly 50 % of the total GCP R&D expenditures. These projects are initiated, selected and funded at the subprogram level, primarily at the discretion of subprogram leaders following agreement of subprogram fund allocations by the Management Team. Currently, 86 commissioned projects are active (SP1 = 30, SP2 = 9, SP3 = 6, SP4 = 24 and SP5 = 17) and most projects in SP4 and SP5 are commissioned due to the nature of those SPs. In what follows, we provide a brief overview over the type and topics of the commissioned projects for each subprogram:

- Commissioned projects in SP1 include about 16 projects on genotyping or molecular characterization of various collections or composites of collections; a number that support formation or distribution of composites or collections; and some that support phenotyping directly or development of phenotypic models.
- SP2 commissioned projects are currently focused on formation of mutant populations in rice, legumes and potato; diversity analyses in Musa and some rice composites; and QTL-mapping in beans and developing genomic resources in less studied crop species.
- SP3 commissioned projects in addition to developing a low cost trait (DNA-based) marker assays are addressing a trait evaluation process via integrated physiology/genetic models; dealing with assimilation and training exercises in rice (backcrossing) best practices; and the initial phases of joint physiological / genetic evaluations of wheat and barley composites in field trials in Morocco.
- SP4 commissioned projects currently reflect ongoing refinements of GCP domain-models and user-interfaces; supporting efforts for several of the partners' basic IT platforms including an improved LIMS for high throughput screening platforms at ICRISAT adapted in part for additional partners; refinements in a number of genomics, genotyping, MAB and marker assisted selection (MAS) analytical tools; and support for several web-based service applications and integrated GCP platforms.
- SP5 commission projects included an array of training materials, and support for several training exercises and travel grants; support for the Interactive Resource Center & Help Desk at the Cornell University Institute for Diversity; development work on an GCP asset inventory system (GCP accessible intellectual assets); and an ex-ante analyses of MAS technologies supported by GCP.

Figure 2.7 Responses to stakeholder survey question 12

The GCP has established optimal procedures to undertake commissioned projects consistent with the highest priority goals and most appropriate collaborators (appropriate logistics/facilities and skills). (128 responses)



There is considerable support but some concern about the process for commissioning projects in GCP based on survey of R&D participants (Figure 2.7). Based on comments provided, these relate to the choice of appropriate partners and lack of focus or strategy. Some respondents believe that the process could be better aligned with the GCP mission or with achievable outcomes. A few respondents commented that too much emphasis was expended with keeping the institutional partners or affiliated colleagues happy. These issues are difficult for the Panel to assess. Interviews with several PIs brought up a number of problems but except for work overload, these were diverse in substance.

Cohesiveness of Commissioned Projects along the continuum of diversity-gene discovery-gene characterization-trait evaluation (defined in Figure 2.2) was not clear to the Panel. Commissioned Projects should provide unambiguous alignment and focus on program-level objectives but appear to be deferred to subprogram priorities. From subprogram leaders and interviews with some principal investigators, there are indications of cooperation among subprograms. A number of gaps are apparent in project progress reports, however, with out clear indications (discussion) of interventions to close them.

The Panel believes that refinement of R&D priorities for the GCP should be completed prior to the initiation of Phase II: These refinements should focus on program-level priorities; and should include consideration of crop-, trait-, farming systems-impact potential against what has been achieved during GCP Phase I, and what can reasonable be acquired or achieved in Phase II. The results should drive and align future Competitive and Commissioned Projects.

Special projects

This category groups projects supported by a few donors with some restriction on the research topics. As an example, the Bill and Melinda Gates Foundation agreed recently to fund three integrated programs to improve some tropical legume crops and make improvements available to smallholder farmers. One of these programs (Tropical Legumes I) is currently employing GCP skills and technology platforms for upstream R&D activities in groundnut, cowpea, common bean and chickpea as a Special Project. The activities include genetic diversity analyses, QTL marker identification, exploration of tolerance to biotic and abiotic tolerance and the use of MAB to help pyramid various traits for variety improvement.

Tropical Legume I activities are funded and coordinated as a component of a larger set of programs beyond the GCP. These activities have diverted some attention (skills and capabilities) from the GCP priorities but have also provided some learning opportunities including exposure to:

- A different structure and level of management and coordination among related sequential programs to address discovery element in germplasm, variety improvements and seed distribution;
- An oversight and coordination process for upstream research by designated down-stream development and distribution participants (customer oriented focus);
- Exposure to time-oriented project management, and
- Some elements of portfolio management (conditional project funding provisions based on timely delivery of outputs among the approved portfolio of projects).

Collectively, the special projects provide a conceptual approach to R&D management and oversight not yet fully employed in portfolios of Competitive or Commission Projects of the GCP. While it is too early to determine whether this approach is relevant for the GCP, some elements of project management are already being adopted recently for some new GCP projects. The Rockefeller Foundation also funded smaller projects on drought tolerance in rice and maize.

3 GCP THEMES

Project management is conducted at the subprogram level. Projects with similar objectives are managed within a subprogram and referred to as subprogram themes (e.g. projects with similar objectives or closely related activities). Subprogram themes are aligned with components of program-level Strategic Objectives. As a complication, program level objectives related to trait improvement normally depend on multiple themes across subprograms (see figure 2.2.1). Themes within a subprogram are portfolios of R&D projects (employing skills and technologies platforms associated with the subprograms) and collectively represent the project portfolio of each subprogram. Although many projects and most anticipated products of GCP are crop specific (genotyping, synthesis of reference sets, gene discovery and functional characterization, trait assessments, trait introgressions into relevant lines for hand-off to delivery streams), subprogram themes are crop neutral, reflecting process, skills and platforms. Subproject structure, funding and themes (project groupings) reflect technology-push or service-push orientation rather than product-push or customer-pull orientation). As such, it is not clear to the Panel how the theme projects in subprograms are linked and managed to provide program-level outcomes.

In what follows, we present the specific targets per subprogram and assess the degree to which these targets have been reached.

3.1 Assessment of subprogram effectiveness

SP1 Themes [Genetic Diversity of Global Genetic Resources]

- Composite sets of accessions determined by collaborators for genetic characterization and use in genomics and comparative genetics (yrs. 1-5);
- Identify and assembly of a set of structural markers for target crops (yrs. 1-5);
- Identify and assemble a set of 500 candidate functional genes (incl. drought tolerance) for diversity and gene discovery studies on the refined core subset of target crops (yrs. 1-6);
- Refine the gene sets via information from SP2 and COS (yrs. 1-7);
- Complete comparative genetic analyses and mapping of several disparate crop groups to find synteny and orthologous gene systems (yrs. 1-6);
- Apply high-throughput genotyping to refine core subset of germplasm, initially focused on drought genes identified in the case study (yrs. 2-10);
- Target phenotyping of accessions for traits based on allelic variation, initially drought traits (yrs. 2-8);
- Identify alleles at candidate gene loci or markers having positive correlations with target traits (yrs. 3-10);
- Develop methods/tools for efficient identification of useful genotypes from the composite sets of germplasm (yrs. 3-10);
- Discover new alleles of genes involved in drought tolerance in specific genotypes from the composite sets of germplasm (yrs. 4-10); and
- Implement protocols for access and benefit sharing of derivatives of accessions consistent with the Convention on Biological Diversity and the International Treaty on Plant Genetic Resources for Food and Agriculture (yrs. 2-10).

(From 2003 GCP proposal)

The Panel is of the view that SP1 is central to the program and has been quite effective and efficient in its exploration of diversity in available germplasm. The subprogram has benefited from experienced and stable leadership, considerable pre-GCP efforts to explore diversity among

some of the collections maintained in CGIAR centers, the emergence of high throughput technologies (e.g. Diversity Array Technologies), very clear objectives in its portfolio of commissioned projects and considerable financial support during Phase I. The program has experienced some problems associated with variability of both skill levels among partners and collections (quality, size, genetic complexity, and reproduction characteristics), but has dealt with these through active interventions (training and technical). Significant Program-level outputs are already emerging from SP1 and the anticipated Reference Sets should be the most enduring GCP products.

The Panel commends SP1 for progress on exploring diversity and the anticipated emergence of “Reference Sets” that could focus efforts and potentially accelerate progress in gene discovery and trait improvement in several crops with in and beyond the GCP.

The Panel recognized that considerable efforts are necessary to ensure that the progress to date translates to durable benefits both with regard to the long-term availability of the Reference Sets and the provisions to maintain and advance associated information (including genotypic and functional genomic data) beyond the life of the GCP.

SP2 [Comparative Genomics for Gene Discovery]

- Consolidate existing (and develop new) framework genetic marker systems for target crops (yrs. 1-4);
- Define universal anchor markers (COS markers) developed for monocots and dicots (yrs. 1-4);
- Develop and deploy mapping tools to Challenge Program partners linked to the CO consensus map repository and international plant databases (yrs. 1-4);
- Integrate comparative maps with available sequence and functional genomics data (yrs. 2-6);
- Assign genes and pathways to putative phenotypes via EST, gene-specific oligo arrays for model species and other crops (yrs. 1-6);
- Establish gene expression profiles for selected phenotypes and crop genotypes (yrs. 2-8);
- Identify common and unique genes (orthologs) correlated with phenotypic expression across species (yrs. 3-9);
- Define function of more than 100 genes for stress tolerance and regulatory control of stress-response pathways using over-expressing constructs or variants (natural or induced) of the garget genes (yrs. 2-10); and
- Establish a data base of gene array and proteomic analyses with SP4 (yrs. 2-10).

(From 2003 GCP proposal)

SP2 has made some progress in functional characterization of genes or chromosome regions made available to and discovered by GCP. It has assembled (through partners and technology providers) several of the platform technologies necessary to carry out efficient functional genomic characterization of genes and QTLs. The program has had several challenges including management turnover, limited or divergent skill levels among many of the partners, divergent analytical and informatic platforms and capacities and movement of biological materials internationally. SP2 is addressing these through training exercises and provisioning (and creating) higher throughput platforms for both genomics and (in concert with SP4) informatics platforms and analytical tools, which should improve capabilities and capacities.

The Panel believes that the SP2 functions could benefit from better prioritization of trait and crop objectives (program-level) as SP2 technologies are highly specialized, diverse and evolving

rapidly (some may be transitory). Prioritization may help SP2 focus projects and align its platforms with the highest priority GCP products.

SP3 [Gene Transfer and Crop Improvement]

- Identify candidate (recipient) varieties acceptable for end-users for wide testing at targeted sites (yrs. 1-10);
- Develop and test new MAS strategies (yrs. 1-5);
- Transfer genes/traits to adapted (improved) genetic backgrounds (yrs. 4-10);
- Transfer to genes/traits in acceptable germplasm to national programs for field validation of trait expression (yrs. 6-10); and
- Advance potential varieties and populations to on-farm evaluation and selection (yrs. 6-10).

(From 2003 GCP proposal)

SP3 has made progress in developing introgression and MAS tools based on genotyping data, specific test kits and training with analytical and simulation tools assimilated with help of SP4. The subprogram has been very involved in training workshops related to MAB (with help of SP5) and trait validation. It is struggling to identify appropriate physiological evaluations of drought tolerance in field environments as these are limiting progress in identifying and assessing potential drought tolerance genes and genomic regions. The program has significant interaction with the NARS breeding communities and together with SP5 is the key point of GCP contact with down-stream product delivery channels.

The Panel commends the SP3 efforts to date, but believes it could provide additional benefits to the GCP by gathering and providing greater input (prioritization and pull) from the down-stream product delivery channels. These could help the GCP to focus activities in the best interest of its delivery channel partners and the smallholder farm communities they serve.

SP4 [Genomics and Crop Information Systems]

- Establish expert network spanning bioinformatics, association genetics and genetic resources (yrs. 1-10);
- Draft acceptable information management standards and protocols based on external experts in the field (yrs. 1-3);
- Complete use-case and design requirements for information networks (yrs. 2-5);
- Integrate Genetic Resources and Crop Improvement Information Networks (yrs. 1-10);
- Define genomics tools and protocols to be used in GCP (yrs.1-3);
- Complete Use cases, design requirement and prototype comparative genetics, genomics, proteomics, metabolomics and systems biology information platforms (yrs. 1-5);
- Incorporate high-throughput genotyping and phenotyping into genetic resources and crop information systems (yrs. 1-10);
- Integrate genomics and association genetics into genetic resources information systems (yrs. 1-10);
- Design an integrated training program in bioinformatics, association genetics and genetic resources information management (yrs 1-4);
- Develop appropriate training materials for above (yrs. 1-5); and
- Deliver courses in bioinformatics, association genetics and genetic resources as appropriate (yrs. 2-10).

(From 2003 GCP proposal)

SP4 has been instrumental in improving the functions of the GCP and may represent the only GCP themes and projects that could not have been successfully implemented outside the Challenge Program environment. While the evolution and integration of the GCP informatic platforms and analytical tools have received critical comment (in R&D participant surveys) particularly from CGIAR centers, they were strongly supported by NARS participants and have provided real evidence of leveraging benefits among CGIAR centers (e.g. LIMS).

The Panel commends SP4 on very considerable progress to date. However, the Panel is concerned that GCP informatics platforms must be populated with timely data, and data and information of substantial quality (quality control and training are essential if these platforms are to provide enduring value beyond the GCP), and that these platforms (as repositories of GCP information) remain durable beyond the GCP. To this end, the Panel believes SP4 would benefit from full-time management going forward.

SP5 [Human Resource Capacity Building]

- Creation of a training platform;
- Create or support research or learning activities for GCP collaborators and partners to further GCP mission;
- Construct systems for ensuring product delivery;
- Develop and implement support services; and
- Conduct ex ante impact analysis and impact assessment(s).

(From Medium Term Plan 2008-10²)

SP5 has benefited from full-time leadership over the past two year period. The training programs of GCP have been well received (based on the R&D participant survey) and with significant inputs from the other subprograms, contributed significantly to technical skills development among partners. GCP training programs reflect the benefits from ARI partners in GCP, as ARIs and CGIAR Centers have contributed much in skills training workshops and in technical issue resolution. SP5 has provided funding for one graduate student education program and provided assistance and/or travel grants for students and several staff to visit advanced laboratories to solve specific bottlenecks in the GCP projects, and to attend Annual Research Meetings of the GCP. The training programs and associated IT tools have also permitted improved and standardized approaches to both proposals and project plans within the GCP. A new initiative of SP5 has been the Capacity Building Support Program (*à la Carte*) that accepts requests for tailored capacity building including formal and informal training, technical backstopping and basic field and laboratory infrastructure. SP5 offers a number of helpdesks (e.g. IP Helpdesk) and services (e.g. Genotyping Support Service) in close collaboration with the technical subprograms. Moreover, SP5 takes care of ensuring that research projects develop delivery plans that are meant to map a realistic path for the translation of research findings into products that benefit users.

SP5 has also provided leadership in commissioning or completing two significant undertakings. The first provided impact analyses of drought among farming systems and by crops grown in those farming systems and attempted to assess the relative potential impact of improved drought tolerance in major crops in these farming systems. The second contributed to the GCP strategic framework that could help the GCP to focus resources to maximize impact.

² Estimated by the review team due to the lack of workplan for SP5 found in the original GCP proposal.

Both undertakings are recent (2007 and 2006, respectively) and there is not much evidence yet that either of these has been effectively employed to focus GCP projects or to maximize GCP outcomes. The strategic framework in particular needs management team consideration as its orientation recognizes but does not directly attempt to align the GCP activities with the interests of smallholder farmers or the delivery streams that will receive the GCP outputs.

The Panel commends SP5 for progress to date, including very significant progress in skills development and training for GCP generally and in particular among GCP R&D participants.

3.2 General comments on GCP themes

The Panel attempted to assess progress and prospects for the GCP Program-level outcomes (Strategic Objectives) by trying to integrate project progress across subprograms. These in the Panel's view represent the GCP strategic product objectives directed at local plant breeders and seed stock delivery channels (biological prerequisites for impact delivery). These also include the biological material prerequisites for case study validation of the GCP integrated processes.

Progress in other strategic objectives directed at building skills networks or improving technical platforms (gene discovery and characterization, and trait evaluation), IT platforms and training platforms have more general applicability and could thus be assessed to some extent directly from subprogram discussion, publications and project reports. Recent SP2 and SP4 project progress reports are quite cryptic and therefore were difficult for the Panel to assess.

In the Panel's view it is unfortunate that the GCP Program-level outcomes are not explicitly defined (crop and trait-in-crop products) as these would assist the refinement and alignment and applications of the subprograms themes and subsequently the programs projects and provide a more meaningful assessment of Program-level progress towards its mission.

Most themes appear to be heavily technology (SP2) or service oriented (SP4 and SP5), except SP1 and SP3, which are product oriented. The applications of funding mechanisms and resulting projects in SP2 and SP3 are closely aligned with the subprogram structure (subprogram themes).

The Panel is concerned that the GCP projects may be more closely aligned with the program structure and less closely aligned with the GCP mission- or Program-level objectives.

The Panel recognizes that the outputs of the GCP are for the most part resources and tools for plant breeders and that the GCP has by definition decided to hand-off its trait/marker outputs to downstream breeders for development and delivery to resource-poor farmer. The GCP has limited management input from the breeder communities, even though 35 % of GCP participating staff recognized themselves as plant breeders. The Panel believes the subprogram orientation of GCP could limit adoption by the down-stream delivery chain and therefore the beneficial impact on the target beneficiaries (resource-poor farmers). In spite of the fact that the GCP adopts a value-chain approach and request the development of delivery plans for major projects, it is clear that the implementation of those delivery plans is out of the GCP's control.

3.3 Program-level outcomes (view of 90 projects across themes)

3.3.1 GCP-products

The Panel (with help from management and some PIs) recognized a number of program-level opportunities (for the GCP products) which could be directly applicable to local breeders and the seed stock delivery streams and as such could be indirectly beneficial to small holder farmers if these products were made available in appropriately adapted varieties. These include:

- Improved Germplasm resources for current and future generations of plant breeders; and
- Improved trait alleles and associated genetic markers available to breeding programs for the current generation of resource-poor (small stakeholder) farmers.

The Panel believes the near-term emergence of the Reference Sets represent strong evidence that the GCP has made good progress in understanding diversity and is developing outputs that could unlock the potential of available genetic diversity. These Reference Sets should attract considerable attention and assist gene discovery and provide a focus for trait evaluation both within and beyond the GCP.

If appropriately supported through seed maintenance and distribution processes and through collection, organization, and maintenance of accessible information (genotypic, genomic, physiological and agronomic) derived from these reference sets, the long-term impact of these GCP products should be very significant. Ultimate beneficiaries include smallholder farmers and the broader population. The benefits should include both socio-economics ones including food security, and a better informed approach to maintaining crop genetic diversity as a natural resource for future generations.

The synthesis, multiplication and distribution of these Reference Sets and associated genotypic and passport information will be among the most significant achievements of the GCP's initial phase. Yet the full value of these Reference Sets depend on the durability of the management systems available ensure appropriate maintenance and distribution, ongoing essential data collection and information synthesis. The Reference Sets are first among several GCP products that will need information platform support beyond the life of the GCP for impact to be achieved. Transfer and support of the GCP platforms will be a considerable undertaking that if miss handled will be a clear risk to long-term impact of these GCP products.

The review Panel recommends that the GCP management in consultation with the curators of the source collections establish the protocols by which each GCP Reference Set will be maintained and distributed; and the means by which the current genotypic data and passport (catalogued) information on these Reference Sets will be maintained and augmented by current and future (non-GCP) discovery efforts that employ these collections.

The Panel encourages that these protocols be developed and transferred over the next three years to ensure orderly transfer of responsibilities and adequate support by the GCP beyond the transfer of responsibilities (prior to the wind-down of the GCP).

The Panel finds that the gene discovery, functional genomics and trait validation objectives of the GCP are progressing, but only slowly. Many GCP projects have made significant progress in obtaining and defining potential genetic components of desired traits. Looking at the lifetime of the GCP it is no surprise if most of the gene-based markers identified as of today resulted from efforts initiated prior the GCP (e.g. CMD in cassava, Al-tolerance in sorghum and corn, salt

tolerance in rice). Good progress has been achieved in identifying genome regions that may include desirable alleles and many markers have been identified to help manage these genome regions in lines appropriate for trait evaluation and gene validation in the context of variety improvement. However, these somewhat sequential processes are technically complex and quite iterative (require bi-directional or multi-directional dialogue for planning and information flow) within a crop species.

Numerous factors have limited progress along this upstream research continuum. When assessing GCP progress toward specific traits improvements in several crops (based on 2007 Mid-year and Final Reports/Competitive and Commission projects), the “bottle-neck” factors are frequent (but vary widely) and include limited availability of or access to capacity (priorities), inadequacy of supply or quality of biological materials (seed stock, environmental or planning issues), difficulty in moving germplasm internationally (regulatory or legal issues), inadequate field evaluation protocols (technical skills and testing environments), delays in information flow (data and information standards or institutional priorities). Collectively nearly every project in the trait improvement continuum has experienced at least one (many have experience several) of these bottle-neck factors. Because of these, progress has been slow and some trait objectives (including drought tolerance) in one or more crops may not achieve adequate progress to warrant product hand-off during the life of the GCP. The Panel believes that case studies are essential to validate (and improve efficiency) of the GCP integrated processes.

The Panel believes that focus and alignment of (subprogram) projects with program-level objectives would help the GCP to coordinate interdependent projects and refine its integrated processes to develop and deliver “trait-in-crop” outcomes prior to the decommissioning of the GCP in 2013.

The Panel believes that the GCP could benefit from greater focus on drought tolerance in fewer crops (prioritization) and further, that the GCP requires targeting study analyses and project progress reports to prioritize and focus resources related to drought tolerance.

This would permit more management, coordination and effort to be directed at completing some case study outcomes (validation and refinement of the integrated GCP processes).

3.3.2 *Technology and service platforms (non-IT)*

The Panel recognizes and commends the GCP for its efforts to access and build capacity and associated skills in the definition, development and operation of the GCP technology platforms. Several GCP technology platforms are essential (operationally) to provide timely access and support for genotyping, gene identification and function characterization, trait validation and breeding processes and are therefore strategic in nature. Some are imbedded among the GCP partners and others are outsourced. While the current needs for these platforms are real, the specific genotyping and genomics (platform) technologies are evolving rapidly and hence specific platforms and tools maybe transitional. Some of the trait validation, and marker platforms and tools are trait and/or crop specific. The Panel believes that the GCP management understands the platform issues relative to the GCP Program-level product objectives. The Panel believes that some of these platforms will most probably need to support several GCP outcomes beyond the duration of the GCP itself (e.g. those which will support the transfer of traits to locally adapted varieties and permit quality control for complex traits during seed multiplication and distribution).

Panel encourages the GCP to carefully plan future evolution of its technology platforms to provide essential support to the highest priority GCP trait-in-crop products; and the devolution or transfer of its platforms to ensure essential technologies are both accessible by and supportive of the down-stream breeding and distribution channels beyond the GCP. The Panel recognized and commends the development of genotyping support serves (GSS) as an example of supportive access to the GCP technology platforms.

3.3.3 *IT platforms*

The Panel commends SP4 for outstanding performance in accessing, developing, integrating and building capacity of the GCP IT platforms. These platforms handle information, communication and data analysis. Functional genomics and genotyping platforms are quite data intensive and these IT platforms provide data capture/retrieval and analyses. These also provide simulation and modeling tools for MAB and crop physiological responses (e.g. to stress). Many of the tools and some of the analytical platforms have been adapted from pre-existing applications for the use of the GCP. While some of these platforms and tools are transient in nature, data and information associated with the Reference Sets and “trait-in-crops” objectives must be durable and secure to safeguard the long-term potential impact of these GCP outputs. The GCP must continue to make provision for durable warehousing for both GCP data and information. The GCP has attempted to augment some of the more useful tools and platforms available in CGIAR centers with some of the technical and analytical platforms available to partners or the public generally and has developed informatics interfaces to permit data management among some partner IT platforms and publicly accessible internet based analyses platforms.

Survey and interviews results as mentioned earlier indicate some concerns but much support for the tools and platforms developed or made assessable by the GCP (particularly among ARI and NARS participants). One significant donor raised concerns about the durability, reliability (data quality), and capacity of the GCP’s IT platforms and tools for the longer term. The concerns reflect the risks to GCP products if data and information (genotyping data, markers, passport information) are not of sufficient quality or are lost over time.

The Panel believes that the IT platforms are progressing well but need considerable additional effort in IT development or adaptation for the GCP needs (IT platforms will continue to need substantial resources and training support in Phase II). These efforts should include preparation for the orderly and secure devolution of the GCP IT platforms to appropriate partners in advance of 2013 with assurances that the platforms will be accessible for both R&D partners and for down-stream breeding and distribution channels beyond the GCP.

The Panel further believes that the issues related to data quality and availability (data repositories) require management’s attention and actions including improved quality control, better policies related to timely delivery of information, and better definition of roles and responsibilities (related to information and data deposition) among project leaders and subprogram leaders (follow-up and vigilance), as well as considerable support for project leaders in depositing data and information into these repositories.

These repositories will need to be available for many purposes beyond the GCP not least of which will be to support elements of the delivery channel (local breeders and seed distribution (quality control) and provide the informational foundation for long-term efforts with the GCP Reference Sets. For these reasons, the Panel believes that the GCP would benefit from full-time SP4 leadership, as recommended in Chapter 5 of this review.

3.3.4 Training platforms

GCP Training Platforms were discussed in some detail under the themes of SP5. From the Program perspective, the training programs have been effective in standardizing some GCP processes (proposal and project development). The Platform has also provided funding and oversight for both education programs and skills development programs among the GCP participants (through training workshops, travel grants and distribution of training materials) developed by a diverse group of GCP and external contributors.

The Panel believes these efforts have been appropriate the Phase I and are effective in assisting the GCP to fill some skills deficiencies among its partners. Training needs will persist and the training materials from Phase I (upstream skills) should be positioned as internet based tutorials to permit *à la carte* access by those who need training in future.

In Phase II, the Panel believes that the training platforms will need to refocus toward skills development that supports crop/trait evaluation and breeding to deliver traits in appropriate germplasm for regional evaluations. The training platform will also have to support GCP products uptake by the local breeding communities and the distribution channels and thus be available beyond the duration of GCP. General training tutorials for all down-stream functions should be available prior to 2012 as these will be needed well beyond GCP.

Effectiveness of these GCP training platforms will in large measure determine the impact of GCP Program-level products on smallholder farmers. In the intermediate time frame, they will have considerable influence on the adoption of GCP outputs by local breeding communities and associated distribution channels upon which small holder farmers depend for varieties.

The review Panel recommends that the GCP management revisit the skills training aspect of SP5 and focus skills training on the specific needs of the case studies and highest priority trait improvement projects.

3.4 Ethical and legal issues

3.4.1 GCP products and services as international public good

The Panel explored the GCP's efforts to contribute international public goods through its themes, policies and partnership agreements and observed examples of these efforts in the conduct of the GCP projects. The Panel did not participate in the more contentious issues of definition, purpose or merit of IPG status. Prior to the formation of the GCP, many of the genomic sequences derived from crops and model species, and corresponding functional annotations of these sequences had been placed in the public domain. The GCP efforts to achieve IGP status for its products was directed by PSC and has to a large extent, been delivered via agreement provisions among Consortium Partners and among other institutions that have been funded by the GCP.

The Panel commends the GCP for its efforts to gain or maintain IPG status for many of its informational, analytical and biological products (Reference Sets, traits, genes and markers) in most cases for all potential users, and at least for use by the GCP, CGIAR breeding programs and local breeding and distribution channel participants that use the GCP outputs to serve the needs of smallholder farmers.

The GCP has endeavored successfully to establish free and unrestricted use access to analytical tools (including copy right-protected applications developed by third parties) which and been

adapted and included in the GCP IT platforms and analytical tool repository (at least for the GCP partners and down-stream delivery channels relevant to the GCP product delivery).

Some short term issues persist including limited access to some GCP data and information (even by GCP partners) while authors await acceptance and publication of manuscripts emerging from the GCP; seed transfers involving Chinese germplasm employed in some projects (drought tolerant wheat) and some transfers involving germplasm transfers among Latin American partners in cassava. The germplasm access and transfer issues are being resolved through progress on the International Treaty on Plant Genetic Resources for Food and Agriculture, and regulatory progress in some countries (including China).

Delayed access to GCP information by GCP partners (presumably to protect information during scientific manuscript preparation, submission, acceptance and publication) deserves management attention or follow-up. Such delays should not be necessary for partners with "need-to-know" as it does not appear consistent with timely development and delivery of the GCP Program-level objectives (trait-in-crop products).

3.5 Publications

GCP has contributed a number of publications over the past five years. The trends for Journal Articles, Conference papers and posters indicate that the GCP platforms are generating novel information.

Table 3.1 GCP-derived publications

Year	Books	Book chapters	Journal articles	Conference papers	Posters	Learning materials	Other
2004				5			1
2005			5	16	23	9	5
2006		5	18	25	42	3	2
2007	2	14	38	35	48	2	15
2008		1	4	1		3	
Total	2	20	65	82	113	17	23

The Panel assessed a random sample (20) of recently published referred scientific journal articles designated as GCP supported publications. Apart from one which was descriptive, one which did not acknowledge the GCP and one which was clearly based on data obtained prior to the start of the GCP, the Panel found that the papers were generally consistent with or supportive of GCP objectives or themes. The increasing frequencies of articles indicate that the GCP is gaining some traction in discovery and trait validation efforts.

It was apparent from the reviewed publications that the diverse partners are working together and recognize their respective contributions (through co-authorships). It is clear from the high quality of the journals in which most of the articles appear that the science being conducted under the auspices of the GCP is of a high quality and the outputs are recognized by peers. The Panel expects that the GCP will contribute significantly to the literature on diversity and comparative genomics over its remaining term (six years).

4 GCP EFFECTIVENESS: CONCLUSIONS AND RECOMMENDATIONS

GCP has been diligent and effective in establishing a group of institutional partners including CGIAR centers, Advanced Research Institutions and National Research Institutions committed to understanding and utilization of genetic diversity in germplasm collections of crop species to improving the traits in crops relevant for smallholder farmers in the developing world.

Partners in this consortium have been diligent in establishing the legal framework and operational fundamentals necessary to undertake a major R&D program to improve traits for many of the food crops grown by resource-poor farmer. GCP has also been effective in leveraging its resources to attract both capabilities and commitments of many additional R&D partners (both public and private), some of which had not previously been linked to the CGIAR. Today the GCP includes 18 consortium partners and its R&D program includes committed participants of more than 70 R&D institutions around the world.

In the view of the Panel, the capabilities, knowledge and commitments available to the GCP R&D program reflect major achievement and represent a significant milestone in the evolution of the CGIAR's efforts to enhance genetic diversity, improve genetic resources for small holder farmers and improve food security for the resource-poor.

The Panel also commends the GCP Management Team for fostering and maintaining an environment of enthusiasm among its diverse group of R&D participants.

The GCP, in defining the boundaries of its R&D program, may have limited or impaired its maximum potential impact on resource-poor farmers. First, because the CPs generally are time-limited (essentially 10 years) and because local variety development and multiplication times are long for most food crops (7-15 years), the GCP decided to focus on upstream research that will not deliver varieties suitable for use by most resource-poor farmers. The GCP will rely upon local breeding programs and variety distribution channels to develop and deliver varieties with GCP enhanced traits to farmers. As many of these variety development and distribution channels are not well developed in marginal production areas, there is considerable risk that the GCP trait improvements may not reach all potential beneficiaries in suitably adapted varieties for all marginal production areas or farming systems.

Second, the GCP decided to (or in practice has) avoided deployment of transgenic crops (that permit movement of genes among species) to improve traits for resource-poor farmers. This in part is because some major donors that fund GCP R&D are governments that oppose or restrict the use of crop varieties with improved traits created by transgenic technologies. In addition the GCP does not have the resources to handle properly the deployment of transgenics considering the legal and biosafety issues. Therefore GCP has restricted its trait improvement efforts to genes already available (but not yet found) in the germplasm of each food crop it is attempting to improve for the benefit of resource-poor farmers.

In spite of the real limitations above, the Panel believes that the GCP R&D has the capacity to contribute beneficial impacts for resource-poor farmers by providing enhanced germplasm with improved traits and associated tools, information and training to the local breeding programs that serve those farmers.

The GCP has been quite successful in obtaining funds to support its activities, modestly exceeding projections of the Program Proposal. (Financial specifics including funding outlook are addressed in Chapter 5).

The Panel believes that the current level of GCP resources are sufficient to maintain interest of appropriate participants, and achieve the Program-level objectives if adequately focused and managed.

The breadth and number of the GCP consortium partners have introduced considerable complexity into the formulation of strategic direction, strategic (impact-oriented) objectives, focus and prioritization as these relate to the GCP's R&D portfolio. While drought tolerance is given a high level of priority in the GCP founding proposal, Program-level objectives are quite generic (outcomes were neither explicitly defined nor prioritized) and most are oriented toward descriptive and discovery research or development of enabling or supporting platforms. Further, the GCP R&D program does not appear to have received or has not benefited from active strategic direction, specifically defined or prioritized mission-oriented objectives, or program-level evaluations criteria (success criteria) from PSC. The Panel's assessment of the GCP governance is provided in Chapter 5.

In the Panel's view GCP activities (in terms of crops alleles/traits/farming system) are far too broad to manage for meaningful outputs or outcomes within the limited duration of the Program. The Panel applauds the principles in the GCP Strategy Framework (2007). The results of the GCP impact analyses of drought tolerance in crops in targeted farming systems (2006) could help the GCP to prioritize its opportunities. The GCP management appears to have met resistance from the PSC when it attempted to focus resources on particular farming systems, crops or traits for crops. The Panel feels strongly that to achieve its program-level objectives the GCP will need to focus on its highest priorities and when appropriate, seek approval of the emerging Executive Committee and support of the PSC.

The review Panel recommends that the GCP establish simple Program-level success criteria to provide the GCP Management Team the means to focus, measure and monitor GCP Program effectiveness.

Such a tool should help focus the GCP activities on those most likely to succeed. Minimally, the success criteria should include minimum anticipated frequencies and intensities of GCP trait products in relevant impact chain breeding programs by 2010-2013; and thereafter, minimum (anticipated) frequencies (percentage of acres with GCP traits) and (anticipated) intensities (number of GCP traits per acre) in crops grown by resource-poor farmers. Project level monitoring is discussed in Chapter 5.

Upon approval by the GCP governance group, resulting priorities, product portfolio management information and consideration of the success criteria will assist many aspects of the Program that seem a bit neglected at present for a program as important as the GCP.

The review Panel recommends that the GCP management establish and apply a prioritization process to identify the highest impact opportunities that the GCP (Program-level) can actually achieve and deliver to appropriate impact channels during its remaining six years.

The Panel applauds the progress on *ex ante* impact assessment of crops in drought prone farming systems but it did not find evidence that these factors are being considered in Program-level prioritizations.

The CP discovery and development path for its key outputs (products that can be handed-off to down-stream impact channels) is complex. The Panel found limited evidence that the GCP has mastered navigation of its complex internal discovery and development pathway through which its Program-level opportunities must navigate to become products. The Panel found considerable evidence of critical gaps along the discovery and development pathways in specific projects.

The review Panel encourages that GCP management acquire or develop a product project portfolio management system to help it plan, monitor and manage its best opportunities (achievable high priority Program-level objectives).

Product portfolio management starts with defining each product that the GCP intends to hand-off to the impact channel. Then for each product, it defines the specific project outputs that must be achieved to deliver the product. Critical project outputs are normally arranged sequentially (critical pathway) with the anticipated dates of output availability, the person responsible for the output and the person(s) who will receive the output along the critical path identified. The pathway can also be embellished with resource requirements. Collectively the critical pathways for all GCP products make up the product project portfolio.

A product portfolio management system would also provide the GCP Management team information vital to guide on-going resource allocations, support on-going prioritization of opportunities and help define what capacity building and training exercises are necessary to avoid bottle-necks and support the GCP's Program level outputs. Further, it would provide a key component for Program-level evaluation by both management and governance teams.

The Panel believes strongly that the GCP must focus resources on a limited set of impact-oriented objectives (traits including drought tolerance and crops) to achieve its goal of validating the GCP process and providing improved traits in appropriate germplasm for hand-off to down stream breeding and on-farm evaluation by the end of its second phase. The Panel also believes that case studies are necessary to define, refine or integrate the GCP's processes to efficiently deliver Program-level outcomes.

The review Panel recommends that the GCP deploy the majority (at least 50 %) of its resources in pursuit of the seven highest impact Program-level trait-in-crop products that it can achieve over the next five years.

Among these, in the view of the Panel, a minimum of two products should also serve as case studies to define, refine, and assess performance and efficiency of the full range of the GCP integration processes (minimally, gene discovery, functional genomics characterization, trait validation, and marker assisted introgression and trait or component pyramiding). These seven products (collectively) should involve no more than five crop species.

Finally regarding a question the Panel struggled most to answer: What has been achieved by GCP that could not have been achieved without it?

The capabilities and capacity of this consortium and its R&D partners probably could not have been achieved through a Systemwide Program. In terms of the mission-oriented outcomes, it is too early to make a firm judgment. In theory, everything that has been achieved could have been achieved without the GCP; but practically, much of what has been achieved would not have been achieved without the GCP. This is most apparent from the products already achieved in SP1 (exploration of genetic diversity) and SP4 (IT). The themes of both subprograms were preceded by long histories of diligent activities in several CGIAR centers. Yet both have contributed, one through understanding of diversity and creation of Reference Sets of germplasm; and the other by making analytical tools and information readily available and easy to use by plant breeders in places where such tools were seldom used before. Neither is conceptually profound, yet both will make plant breeding efforts in the developing world much more efficient.

Perhaps the most important value of the GCP thus far is the opportunities it has provided for people of diverse backgrounds to think collectively about solutions to complex problems and in the process to learn from one another.

5 GOVERNANCE AND MANAGEMENT OF GCP

All Challenge Programs (CPs) have been set up with a finite lifetime. It therefore seems reasonable to avoid heavy setup and close-down costs, e.g. related to the establishment of an independent legal entity and the build-up of administrative and back office capacity within the Challenge Program. Instead, the present CPs have opted for virtual organizations that outsource key operative functions such as human resources management (employment of program staff), accounting, handling of funds, legal services (contracting), etc. to participating centers.

The structures and the compositions of the governance bodies vary widely between the existing CPs, ranging from independent advisory boards to steering committees composed entirely of institutional representatives. In some cases, subcommittees, e.g. Executive Committees, exist. Functions and depths of involvement of the respective governance bodies range from active and detailed involvement in various program aspects to strongly relying on the host centers for governance.

The overall governance and management setup of the GCP will be discussed next, followed by a comprehensive analysis of the arrangements in place.

5.1 Overall governance and management setup

The Generation Challenge Program is organized as an unincorporated joint venture of currently 18 Consortium partners. The consortium partners are listed in Table 5.1.

Table 5.1 Consortium Partners

Name	Full Name	Type ³	Country of Headquarter
ACGT	<i>African Center for Gene Technologies</i>	ARI	South Africa
Agropolis ⁴	--	ARI	France
Bioversity	Bioversity International	CG Center	Italy
CAAS	Chinese Academy of Agricultural Science	NARS	China
CIAT	Centro Internacional de Agricultura Tropical (International Center for Tropical Agriculture)	CG Center	Colombia
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo (International Maize and Wheat Improvement Center)	CG Center	Mexico
CIP	Centro Internacional de la Papa (International Potato Center)	CG Center	Peru
Cornell University	--	ARI	USA
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária (Brazilian Agricultural Research Corporation)	NARS	Brazil
ICAR	Indian Council of Agricultural Research	NARS	India
ICARDA	International Center for Agricultural Research in the Dry Areas	CG Center	Syria
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics	CG Center	India

³ The classification of institutes was adopted from the report "CGIAR Center Collaboration: Report of a Survey", SC Secretariat 2006. The abbreviation "NARI" has been changed to "NARS".

⁴ representing CIRAD, INRA, IRD

IITA	International Institute of Tropical Agriculture	CG Center	Nigeria
IRRI	International Rice Research Institute	CG Center	Philippines
JIC	John Innes Center	ARI	UK
NIAS	National Institute of Agrobiological Sciences	ARI	Japan
WARDA	Africa Rice Center (West Africa Rice Development Association)	CG Center	Benin
WUR	Wageningen University & Research	ARI	Netherlands

The umbrella organization “Agropolis” represents the three French Advanced Research Institutes CIRAD, INRA and IRD. While the consortium partners have signed the agreement, Agropolis, CIRAD and INRA have signed it individually while the signature of IRD is still pending.

In addition, several additional institutions have expressed their interest in joining the GCP Consortium. However, since the GCP governance had already started a governance reform process (see section 5.2), the following 4 institutions have been granted a “provisional consortium member status” until a reformed governance structure will be in place.

Table 5.2 Provisional Consortium Partners

Name	Full Name	Type	Country of Headquarter
BIOTEC	National Center for Genetic Engineering and Biotechnology	NARS	Thailand
CINVESTAV	Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional (Research and Advanced Studies Center, National Polytechnic Institute)	NARS	Mexico
INRA Marokko	Institut Scientifique de Recherche Agronomique (National Institute for Agricultural Research Morocco)	ARI	Morocco
IAO	Istituto Agronomico per l'Oltremare	ARI	Italy

Under the consortium agreement, the GCP is not a separate legal entity. Consortium members are individually liable for their share in the joint venture.

Each Consortium partner has certain responsibilities for the GCP that are described in the original program proposal (February 2003) and defined in detail in the Consortium Agreement, signed between August 2004 and March 2005 by most Consortium members.⁵

CIMMYT, as the GCP host center, plays a pivotal role in the GCP. It legally represents the Challenge Program, manages the program funds and physically hosts the GCP secretariat.

5.2 GCP governance

The Consortium has established a Program Steering Committee (PSC) that acts as the main governance body of the Challenge Program. Since the GCP is a hosted program, it relies on its host center, CIMMYT, for legal representation as well as for financial management. Therefore,

⁵ WARDA has joined the Consortium later than the other members and has signed the agreement in 2007. IRD, one of the founding members, has not signed the agreement to date (January 2008).

the main governance body of CIMMYT, the CIMMYT board of trustees, plays an important role in the GCP governance as well.

In addition, a series of advisory bodies have been set up including the Program Advisory Committee (PAC), the Stakeholder Committee (SHC) and the Review and Advisory Panel (RAP). The functions and responsibilities of these governance bodies will be assessed in next sections of this chapter.

The review of the GCP's governance performance is complicated by the fact that a fundamental reform of its main governance body, the PSC has been decided during the time of this review. In what follows, we present a description and an assessment of the present (pre-reform) GCP governance structure along its main governance bodies. After that, we will summarize the ongoing governance reform process and point out in what instances it addresses issues identified by this review and in what instances additional recommendations are needed.

5.2.1 *The Program Steering Committee (PSC)*

PSC functions

The main decision-making governance body of the GCP is the PSC. According to the GCP consortium agreement, this governance body is [...] responsible for overall management and governance of the Challenge Program [...].

The specific role and responsibilities are detailed in an appendix to the consortium agreement. These responsibilities comprise of

1. *Policy*
 - (a) *determine strategic directions for the Challenge Program and approve an agreed set of specific aims to achieve the Objectives, and key milestones;*
 - (b) *establish performance criteria to determine the progress of the Challenge Program in achieving the Objectives;*
 - (c) *approve the Annual Operating Plan;*
 - (d) *approve the Annual Report;*
 - (e) *oversee the Challenge Program Director and the Committees and allocate responsibilities; and*
 - (f) *approve guidelines for the obligations and rights of Supporting Participants.*
2. *Staffing*
 - (a) *appoint:*
 - *the PSC Chairperson;*
 - *the Challenge Program Director;*
 - *members of Committees; and*
 - (b) *set up Committees.*
3. *Finances and Resources*
 - (a) *set budgetary priorities;*
 - (b) *receive and approve Annual Budgets;*
 - (c) *distribute the Challenge Program Funds and allocate other resources in accordance with Annual Budgets and Annual Operating Plans;*
 - (d) *determine the value of in kind contributions made after the Start Date;*
 - (e) *approve variations in a Consortium Member's Contributions.*
4. *Intellectual Property (IP)*
 - (a) *put in place procedures for the identification and management of Background IP, Pre-Existing IP, Challenge Program IP, and Confidential Information; and*

- (b) *consistent with the specific provisions of clause 26 [Commercializing Challenge Program IP] make recommendations about Commercializing and decisions about otherwise dealing with Challenge Program IP;*
5. *General*
- (a) *receive and consider reports from the Challenge Program Director and Committees about the Challenge Program performance;*
 - (b) *promote cooperation among the Consortium Members;*
 - (c) *approve communications and public relations strategies including guidelines for public announcements and fundraising; and*
 - (d) *admit new Consortium Members and Supporting Participants under clause 30 [New Participants and Supporting Participants]*

These specific terms of reference for the PSC comprise of a series of typical responsibilities of decision-making governance bodies, but lack others.

For example, following the standard set of functions required for global program governance⁶, “giving strategic direction” and “exercising management oversight” are mostly covered while “risk management” and “conflict management” are only included partly or indirectly and “audit and evaluation” is not addressed at all.

The lack of coverage of some important governance functions in the fundamental consortium agreement is of concern. Moreover, as well be discussed later, the critical function of “giving strategic direction” has, while covered in the above terms of reference, not been executed in a satisfactory manner by the PSC. These shortcomings in terms of governance responsibilities need to be addressed by the planned governance reform.

Division of responsibility and accountability between the GCP and the host center

For some of the governance functions discussed above, the question on whether the PSC actually has the authority for decision-making may be asked. Since legal and financial responsibility ultimately lies with the CIMMYT, the distribution of responsibilities and related liabilities between the CIMMYT board of trustees (the central governance body of CIMMYT) and the PSC is of importance. As far as the review Panel could determine, no such distribution of responsibilities is documented in CIMMYT’s board meeting minutes.

While not within the scope of this review, the CIMMYT board of trustees might consider to more clearly define which of its oversight authorities, e.g. along the key governance functions, it transfers to the main GCP governance body and how accountability can be guaranteed for these.

It is important to note however that a host agent agreement has been signed between CIMMYT and the GCP Consortium that details the responsibilities of the host center on the one hand, and those of the consortium on the other hand. This agreement will be discussed in more detail in section 6.3 of this review.

⁶ From the IEG /OECD DAC “Sourcebook for Evaluating Global and Regional Partnership Programs”. Based on the OECD Principles of Corporate Governance (2004).

PSC setup and processes

At the time when this report was written, the PSC consisted of 20 voting members:

- an independent⁷ chairperson;
- 18 representatives of the consortium institutions⁸;
- the GCP Director.

In addition to the voting members, several non-voting observers, e.g. a representative of the EC, the chair of the PAC and the chair of the SHC, take part in PSC meetings.

The PSC has met annually for a total of 5 times (attendance shown in Table 5.3), including its inaugural meeting in September 2003.

Table 5.3 PSC attendance

Function	1 Sep 2003	2 Dec 2004	3 Nov 2005	4 Nov 2006	5 Dec 2007
PSC Chair	I. Serageldin	E. Terry	E. Terry	E. Terry	E. Terry
GCP Director	(not yet member)	R. Zeigler	JM. Ribaut	JM. Ribaut	JM. Ribaut
ACGT, South-Africa	(not yet member)	(not yet member)	K. Kunert	J. Morris	Jane Morris
Agropolis, France	Y. Savidan	H. Palmier	Y. Savidan	Y. Savidan	Yves Savidan
Bioversity	E. Frison, C. Hoogendoorn	E. Frison, C. Hoogendoorn	L. Snook	L. Snook	L. Snook
CAAS, China	Z. Ye	Z. Ye	Z. Ye	(absent)	G. Xifeng
CIAT	D. Pachico	D. Pachico	D. Pachico	(absent)	(absent)
CIMMYT	P. Ninnes	M. Iwanaga	M. Iwanaga	M. Iwanaga	M. Iwanaga
CIP	H. Zandstra	H. Zandstra	P. Anderson	C. Crissman	C. Crissman
Cornell University	P. Gregory	S. Kresovich	S. Kresovich	S. Kresovich	(absent)
EMBRAPA, Brazil	J. Eugenio de Franca	J. Eugenio de Franca	M.J. Sampaio	J. Eugenio de Franca, M.J. Sampaio	J. Eugenio de Franca
ICAR, India	(not yet member)	(not yet member)	D. M. Hedge	(absent)	(absent)
ICARDA	T. Blake	M. Madkour	M. Madkour	E. William	M. v. Ginkel
ICRISAT	D. Keatinge	D. Keatinge	D. Keatinge	D. Keatinge	D. Keatinge
IITA	R. Ortiz	S.Blade	P. Bramel	P. Bramel	P. Bramel
IRRI	R. Cantrell	R. Wang	R. Zeigler	R. Wang	(absent)
JIC, UK	M. Anderson	(absent)	(absent)	J. Snape	J. Snape
NIAS, Japan	H. Hirochika	K. Higo	T. Sasaki	T. Sasaki	T. Sasaki
WARDA	(not yet member)	(not yet member)	(absent)	K. Shellemiah	M. Wopereis
WUR, The Netherlands	N. Louwaars	N. Louwaars	T. den Nijs	T. den Nijs	T. den Nijs
Total PSC members	16	17	20	20	20
Number (%) present	16 (100%)	16 (94%)	18 (90%)	17 (85%)	16 (80%)
Number (%) overlapping with last meeting	n/a	7(41%)	8 (40%)	11 (55%)	13 (65%)

⁷ The meaning of “independent” is not further elaborated, but most probably refers to the absence of economical interests with regard to the consortium institutions.

⁸ With the exception that Agropolis represents CIRAD, INRA, IRD with one vote in total.

The meeting attendance of voting PSC members has been generally high, gradually decreasing from 100% at the inception meeting in September 2003 to 80% at the last meeting in December 2007. Due to the fact that the consortium institutions' representatives changed over time (but also because of new admissions), the institutional memory of the PSC was low in the initial years. In the second and third meeting, only about 40% of meeting participants had also attended the previous meeting. Continuity in meeting attendance improved gradually. At the last meeting (December 2007), 65% of voting PSC members had also attended the previous meeting in person. With 3 female participants (19%) of a total of 16 voting members in the last meeting, the PSC is clearly not gender-balanced. This may be caused by the fact that PSC participants are not chosen as individuals, but rather as institutional representatives and thus may reflect the gender balance of the senior scientist or management level in their home institutions.

Concerning the representation of developing countries, two thirds of the GCP Consortium institutions (12 out of 18) are headquartered in ODA-receiving countries.⁹

Voting in the PSC requires a quorum of at least 50% of PSC members with voting rights at a meeting. Apart from admissions of new Consortium members and changes to the Consortium Agreement (which require unanimity), decisions can be taken by simple majority. In practice, however, most PSC decisions are taken by consensus, based on a summary of the discussion by the chair and on a non-objection basis.

If decisions that exceed the authority of the GCP Director need to be taken in-between PSC meetings, the suggested way forward is circulated electronically amongst PSC members and is adopted on a non-objection basis.

PSC governance performance

In a survey conducted for this review, the performance of the PSC along key governance functions received mixed ratings, as can be seen from Figure 5.1. Please refer to the Appendix for complete survey results.

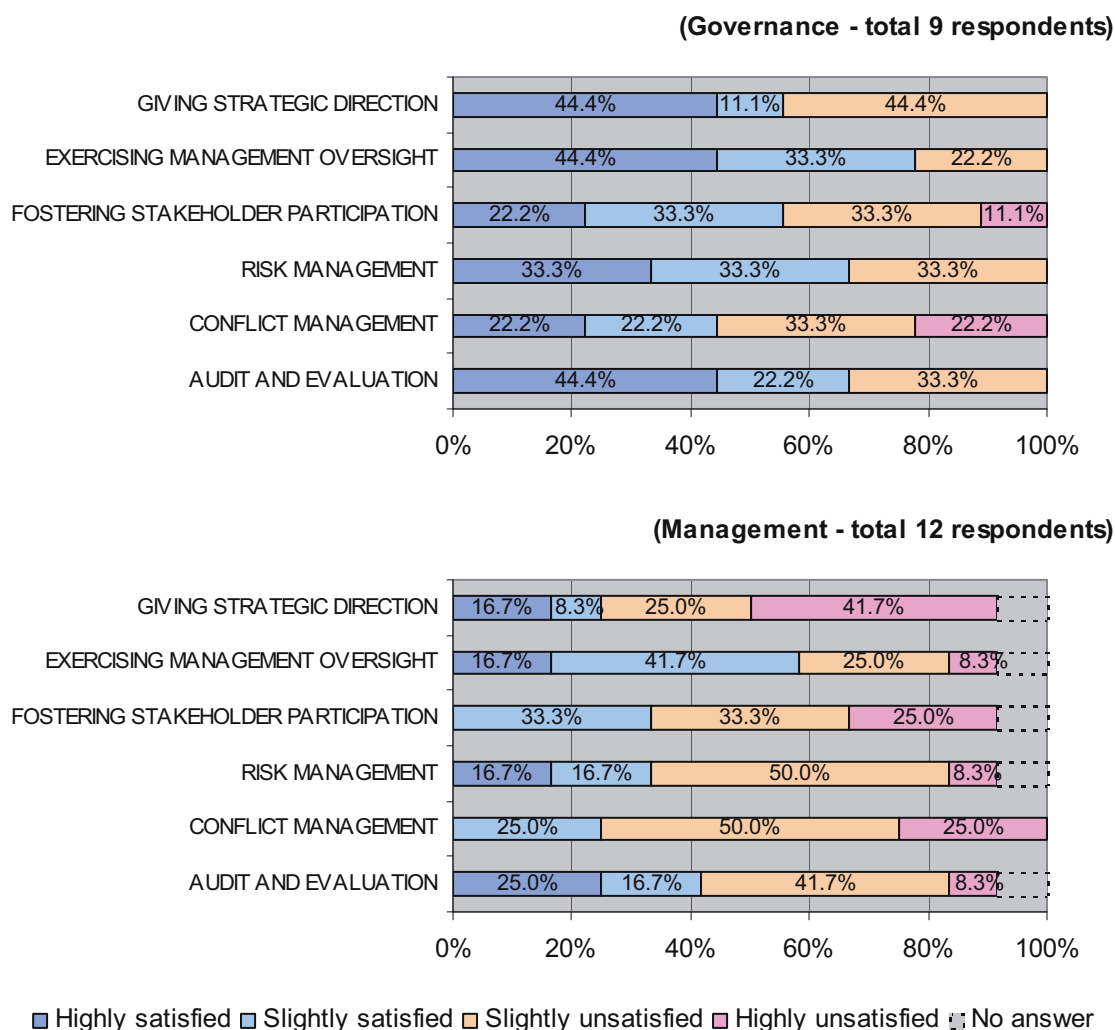
Although not fully representative regarding the governance group¹⁰ the responses indicate a rather mixed self-assessment for all key governance functions with "management oversight" receiving the highest approval with 78% of respondents being either highly or slightly satisfied with the PSC performance along that dimension. The governance respondents judged "conflict management" to be the weakest function of the PSC with 56% expressing either high or slight dissatisfaction with the performance of the PSC for that function.

⁹ Based on the "OECD DAC list of ODA Recipients", effective from 2006 for reporting on flows in 2006 and 2007.

¹⁰ 23% response rate (9 of 39) in the governance group (i.e. former or present PSC representatives) and 100% response rate (12 of 12) in the management group (i.e. GCP management team and CIMMYT managers with responsibility for GCP hosting).

Figure 5.1 Responses to governance and management survey question 1

Please indicate your satisfaction with the performance of the Program Steering Committee (PSC) in terms of the following functions.



The management group reflected a similar relative judgment but with a considerably more critical undertone. For all but one function, more than half of the management expressed slight or high dissatisfaction with PSC performance, including central governance functions as “giving strategic direction”, “fostering stakeholder participation”, “risk management”, “conflict management” and “audit and evaluation”.

This rather critical assessment of overall PSC performance has been confirmed by a series of interviews that review Panel members have held with GCP governance and management members.

At this point it is important to note that the GCP and more specifically the PSC has identified and reacted to these issues by starting a governance reform process as early as in 2006. This process will be addressed in detail in section 5.2.5 of this report.

One key reason for the underperformance of the PSC has apparently been the very nature of consortium representation in the PSC, i.e. the fact that membership in the consortium directly

leads to a seat on the PSC¹¹. All management respondents and 78% of the governance respondents agreed with the statement that “the fact that PSC members come from consortium institutions introduces institutional interest into PSC recommendations/decisions”.

More specifically, all management respondents and 78% of governance respondents felt that at least some institutional interests of e.g. the CGIAR centers in the consortium are reflected in PSC decisions.

Overall, all management respondents and more than half of the governance respondents agreed that the PSC would need to “be fundamentally overhauled”.

The review team agrees with most of these observations. In particular, the Panel has come to the conclusion that:

- the degree of economical interests of some consortium institutions reflected in PSC deliberations and decisions can potentially lower overall GCP program efficiency;
- steps taken to avoid conflict of interest regarding budget decisions that involve individual consortium institutions can effectively lead to excluding the most knowledgeable individuals from these decisions;
- the present setup of the PSC effectively blocks the admission of new stakeholders into the consortium. This is a direct consequence of the fact that consortium membership is directly linked to a seat on the PSC. In order for the PSC not to become too large to function efficiently, the number of consortium members needs to be limited.

In light of these conclusions the review Panel agrees with the observed need for governance reform.

5.2.2 *The Program Advisory Committee (PAC)*

In the GCP proposal, an important technical advisory body was suggested to support the work of the PSC:

The Program Advisory Committee [PAC] will assist the Program Steering Committee to develop performance indicators that will form the basis for ex ante and ex post impact assessment. It is expected that the Program Advisory Committee will provide regular advice on scientific issues, and assess progress. A subgroup of the Program Advisory Committee may also be constituted in year 4 for a more formal review in consultation with the CGIAR Science Council.

During 2004 and 2005, a tentative effort was made to set up a functioning PAC. PAC members were selected and the PAC Terms of Reference were developed, but this governance body never became operational. Apart from a very dedicated and active PAC chair, the remaining 4 members never met in person nor had any substantial virtual discussion. This situation was partly recognized by the PSC that decided in its 3rd meeting in 2005 that “a Task Force would review governance issues in the GCP, including the role and function of the PAC”.

This did however not resolve the situation. The PAC members that were contacted by the review team confirmed this. One PAC member couldn’t recall any communication regarding the GCP or the PAC during the last two years.

¹¹ With exception of the Agropolis Group, where three institutions share one seat.

This situation also put the PAC chair in a difficult situation. With several simultaneous functions within the GCP, without any relevant financial support and without support by a functional PAC, his ability to provide detailed and independent scientific input for the very different aspects of relevance for the GCP probably was stretched.

Surveyed management and governance representatives confirmed a strong need for a functional PAC. Only one management respondent (8% of respondents) and two governance respondents (22%) objected to “the PAC needs to be fundamentally overhauled”.

The absence of a functioning PAC may have caused the lack of strategic guidance from the PSC to the GCP management that was discussed in the previous section as well as the absence of clear targets per crop and for each subprogram as discussed in the programmatic part of this review.

The review Panel sees a great need for a governance body that fulfills the functions that were detailed in the program proposal (and shown at the beginning of this section). This can either be implemented through a decision-making body with the necessary expertise, through a functional scientific advisory panel with the necessary capacity and dedication, or through a combination of both.

5.2.3 The Review and Advisory Panel (RAP)

In 2005 the GCP Director set up a Review and Advisory Panel (RAP)¹² which has been functional since then.

The RAP has a dual function. On the one hand, it provides scientific advice on subprogram specific issues directly to the subprogram leaders. On the other hand, the RAP plays an active advisory and legitimization function in the selection of commissioned grants. In light of these functions and considering the fact that RAP members are chosen on an annual basis by GCP management as well as that no reporting relationship exists between the PSC and the RAP, this body should rather be considered an extension of management than a governance body.

The RAP consists of five scientists; one scientist being assigned to each GCP subprogram. It has virtual and in-person meetings and consults frequently with the GCP management.

GCP management is clearly supportive of the RAP, which is considered to provide strong management support by 92% (11 out of 12) of GCP managers surveyed. Similar agreement exists with the statement that “the RAP has provided strategic direction to the program”. Support for the RAP from survey respondents from the governance group was weak (only 22% and 33%, respectively, for the above two questions) which might however be influenced by the fact that little interactions exist between the PSC and the RAP.

The review Panel has observed the RAP as an active group that clearly has provided valuable assistance to the management team by adding capacity and providing independent advice, both as sparring partners for the subprogram leaders as well as in the selection of the commissioned grants.

¹² GCP Director asked the PSC in its 3rd meeting (November 2005) to endorse the decision to create the RAP. The PSC response to this was that the creation of the RAP was considered a management decision to be taken by the Director and that no endorsement from the PSC was needed.

5.2.4 The Stakeholder Committee (SHC)

In the GCP proposal, a further advisory governance body was proposed:

A suitably representative Stakeholders' Committee for this Challenge Program will be proposed under the auspices of GFAR. It will meet once annually, probably at the CGIAR AGM, to be updated on the progress of the Challenge Program, and to provide feedback to the Program Steering Committee on issues that impact on the beneficiaries of the research.

The SHC has played an important role during the program's inception phase. For example, during a SHC meeting in Egypt in January 2003 the foundation for the program programmatic orientation was laid.

The SHC has had meetings in 2003, 2004 and 2005 and no meetings have taken place since then. Funding shortfalls and lack of coordination have been mentioned as reasons for this to the review Panel. Currently, plans are made to revive this committee, as well as to identify additional channels for stakeholder involvement.

The committee has 14 members¹³ that represent most stakeholder groups of the Global Forum for Agricultural Research (GFAR), under whose auspices the SHC convenes.

Table 5.4 Stakeholder Committee members

Name	Organization/ Stakeholder Group
Raul Montemayor	Federation of Free Farmers, Philippine; Farmers' Organizations Representative
Philip Kiriro	East African Farmers Federation (EAFF), Kenya; Farmers' Organizations Representative
Esa Harmala	Central Union of Agricultural Producers and Forest Owners, Finland Farmers' Organizations Representative
Mamadou Goita	A.CO.R.D. - Agence de Coopération et de Recherches pour le Développement, Mali ; NGO Representative
Omar J. Fuentes	Agro-Chile; Chile; NGO Representative
Anne Chetaille	Groupe de recherche et d'échanges technologiques (GRET), France ; EFARD Representative
Victor Villalobos	Secretaría de Agricultura, Mexico; FORAGRO Representative
Anthony Hall	University of California Riverside, USA; NAFAR Representative
Guram Aleksidze	Academy of Agricultural Sciences, Georgia; CACAARI Representative
Charles Nkhoma	Plant Genetic Resources Center (SPGRC), Zambia; FARA Representative
Hamid Narjissee	Institut National de Recherche Agronomique (INRA), Morocco ; AARINENA Representative
Mutsuo Iwamoto	JIRCAS - Japan International Research Center for Agricultural Sciences, Japan; APAARI Representative
Arvin Kapur	Nunhems Seeds PVT.LTD. India; Private Sector Representative
Manuel Ruiz	SPDA - Sociedad Peruana de Derecho Ambiental, Peru Private Sector Representative

Representatives from the PSC seem to have mixed feelings about the SHC. While two thirds of the respondents agreed with the statement that "the stakeholder committee has provided

¹³ Since the SHC has not been active since 2005, this effectively represents the 2005 membership.

valuable scientific/development related input”, more than half of the respondents call for a complete overhaul of that committee.

In the eyes of GCP management, the SHC is seen mainly as a way to increase GCP legitimacy (please refer to the appendix for survey details).

In the programmatic part of this review, the review Panel has underlined the importance of strategic target setting on a crop-by-crop basis based on input from relevant stakeholder groups, such as breeders in national research and extension facilities. The SHC can be an important instrument to deliver such input. Therefore, the review Panel encourages reviving this important governance body and to search for additional ways to ensure a sufficient end-product focus of principal GCP activities.

5.2.5 Evolution of GCP governance

The GCP itself has identified many of the issues pointed out in the analysis of the different governance bodies in the previous sections.¹⁴

In its 3rd meeting in November 2005, the PSC decided to set up a governance task force with the mandate to *“review these issues and make recommendations to the PSC re: clarifications to the Consortium Agreement and the composition of the governance bodies of the GCP”*.

In the 4th PSC meeting in November 2006 a report from the task force suggesting to replace the PSC by an independent expert board¹⁵ was discussed in closed session, i.e. excluding management and PSC secretary. No written record of this session could be obtained by the review Panel. The result of the closed session was that *“The PSC did not agree to endorse any recommendation by the Task Force because further clarity is needed on some fundamental issues to the GCP’s identify”*.

Subsequently, the governance task force was tasked with refining the proposal within three months’ time.

In interviews the review Panel has conducted it has become evident that a legal constraint had prevented adoption of the task force’s recommendations during that PSC meeting. Since changes to the consortium agreement had to be adopted unanimously by all consortium members and since the proposed replacement of the PSC by an independent expert body would require such a change, a single consortium member would have been able to effectively block this reform process.

¹⁴ From the meeting minutes of the 3rd PSC meeting (November 2005): *“The GCP needs to review these issues because:*

- 1) The GCP is evolving and is under scrutiny by many outside observers
- 2) There are some loose ends in the GCP Consortium Agreement
 - a. rights and obligations of current consortium members are not precisely defined
 - b. definition and role of partners and ‘Supporting Participants’ are inadequate
 - c. criteria for new member admission are not well defined
 - d. governance body composition need to be better determined
- 3) The GCP suffers from the perception that it is a ‘closed box’
- 4) Both PSC and Stakeholders Committee expressed need for change re: the governance structure of the GCP”

¹⁵ Explain that there really were 3 options with option one preferred by the task force...

The governance task force deliberated for a further year and then suggested an adaptation of the original idea that would not require unanimous adoption anymore: instead of replacing the PSC by another governance body the new proposal suggested to delegate most PSC responsibilities to a new governance body, “the executive board”. Due to this design of the reform proposal, no change to the consortium agreement was any longer needed and the proposal was subsequently adopted.

In more detail, the PSC has set up a nomination committee that will select the 7 members of the Executive Board based on suggestions made by the broader GCP stakeholder community, including the consortium members and the GCP management team. Focus is placed on the independence of the Executive Board members and on sufficient capacity and expertise for the tasks assigned to this committee. The PSC transfers a broad range of governance responsibilities to the Executive Board, amongst which there is competence to decide matters relating to the following subject matter (cited from the resolution):

1. *determining the strategic direction of the GCP and setting overall goals for the Challenge Program;*
2. *establishing performance criteria to determine the progress of GCP activities, monitoring the implementation of those criteria, and judging whether those criteria have been met;*
3. *approving audits, annual operating plans, medium term plans, and budgets. This shall include the receipt of financial audits of the GCP from the Host Agent’s finance director and external auditor;*
4. *ensuring the integrity of the GCP’s accounting and financial reporting systems;*
5. *establishing a policy for managing risks and monitoring the implementation of that policy;*
6. *monitoring and managing potential conflicts of interests of members of the Executive Board and staff of the GCP Director;*
7. *overseeing the activities of, and providing guidance and advisory support and expertise to, the GCP Director and his staff;*
8. *making recommendations to Consortium Members and Supporting Participants regarding the commercialization of Challenge Program IP under Clause 26 of the GCP Consortium Agreement and any similar provision of any agreement for the conduct of GCP activities by a Supporting Participant; and*
9. *making recommendations to the PSC members and/or the consortium members.*

In the judgment of the review Panel, these terms of reference should allow the Executive Board to function as an effective governance body for the GCP. However, much care needs to be devoted to selecting Executive Board members and establishing a close and trust-based working relationship between this new governance body and the GCP management team.

Once the Executive Board has been set up and is functional, further reform steps must be envisaged. The resolution by the PSC for establishing the Executive Board does – rightly – not specify how the overall GCP governance structure will need to be adapted to efficiently and effectively accommodate and make use of this new body, since this should be driven by the Executive Board itself. The Panel is, however, of the opinion that such further reform steps should be taken to increase overall governance effectiveness and to reduce governance-related expenditures.

Please refer to the appendix for the full resolution text.

5.2.6 Recommendations regarding governance

Based on the analysis of the GCP governance presented in this chapter the review Panel confirms the strong need for fundamental changes to the GCP governance structure that have been identified by different groups, including the PSC itself.

The review Panel therefore strongly endorses the decision taken by the PSC in its last meeting to create an independent executive board and to delegate some key governance functions to this body in the future.

The Panel wishes to stress that during this reform process, special care should be taken to address all critical governance issues pointed out in this chapter. Most importantly, the new governance setup needs to:

- Improve strategic direction and target setting;
- Improve financial oversight;
- Foster stakeholder participation.

The capacity and expertise of the new executive board needs to allow for increased focus on these points while continuing to provide general oversight. To this end the executive board will most probably have to re-create the PAC (or a similar body) for scientific advice and will need to set up an audit subcommittee.

While being supportive of the approach taken, the review Panel is of the opinion that even after introduction of the executive board the GCP will urgently need to address a series of governance issues.

- The unanimity clause for amendments to the Consortium Agreement has necessitated the current workaround of creating an additional governance body with subsequent delegation of authority from the PSC to this body. In the opinion of the review Panel, a further attempt should be made to adapt a 2/3 clause¹⁶ and, in this way, to open the way for a more general governance reform.
- Building on the need for more specific input from NARS and other stakeholders regarding program priorities, the interaction with relevant stakeholders on both the governance and the management level needs to be intensified.

In view of the finite lifetime of the GCP, a substantial degree of pragmatism should be applied and solutions that are too resource-intensive should be avoided.

The review Panel strongly endorses the governance reform process the GCP has started with its decision of establishing an Executive Board composed of experts without institutional affiliation to the GCP consortium member.

The review Panel recommends that during setup of the Executive Board a strong emphasis be placed on creating sufficient capacity and expertise for the Board to fulfill its duties, especially in

- **Setting strategic direction for the GCP;**
- **Overseeing GCP finances and managing risks, also those relating to the host center.**

¹⁶ The Challenge Program on Water and Food, for examples, operates under a two thirds clause for amendments to the Consortium (Joint Venture) Agreement.

In order for the necessary capacity and expertise to be present, the Executive Board might need to set up dedicated advisory committees, e.g. a technical advisory committee replacing the current PAC, and an audit committee.

The review Panel recommends that an attempt is made to further simplify and clarify the GCP governance by adapting the consortium agreement to the de facto status quo and to clearly define the role and responsibilities of additional GCP governance bodies (the PSC, the PAC, the SHC).

As a suggestion, one simplification of GCP governance could be to merge the current PSC and the SHC into a GCP stakeholder group that subscribe to a common goal and shared principles. This stakeholder group would provide advice on strategic direction of the program, especially providing the necessary end-product orientation of operational targets but could also play a role in accepting nominations for the Executive Board.

5.3 Management of the GCP

This section will assess the GCP management structure, its performance and analyze the project monitoring mechanisms.

5.3.1 GCP management structure

Management Structure was provided above (Figure 2.5). The GCP is currently managed by the GCP Director and 5 subprogram leaders and is supported by a secretariat of 7. While most of these positions are full-time positions, some GCP managers work under half-time contracts, e.g. the leaders of subprograms 1, 2 and 4.

It is important to note that the current management structure is oriented along subprograms, favoring prioritization of activities *within* subprograms but not *across* subprograms. Commissioned projects, for example, are proposed and managed by the individual subprogram leaders. While being a structure that supports excellence in scientific research by providing the possibility of selecting the highest-quality projects within each subprogram, it does however not structurally support any integrated and harmonized approach across the different subprograms with end products of the whole program in mind. Instead, the current structure favors optimization of disconnected subprogram results, but not optimization of the overall program results. This structural bias towards subprogram-centric work could only partly be overcome by the efforts of GCP to work together as a team when prioritizing and selecting commissioned projects.

The Panel finds that it would be useful to include a stronger end-product orientation that requires integration across subprograms, into the management structure, e.g. by adding end-product specific management functions (e.g. crop-specific, or responsible for individual program outcomes) to the present structure. This would effectively introduce a management matrix of functions (the present subprogram) and products as quite usual in the private sector but also in other Challenge Programs.¹⁷

¹⁷ See, for example, the HarvestPlus Challenge Program that is managed by functional leaders (part of the HarvestPlus Management Team) and Crop Leaders that provide the necessary crop-specific focus across functions.

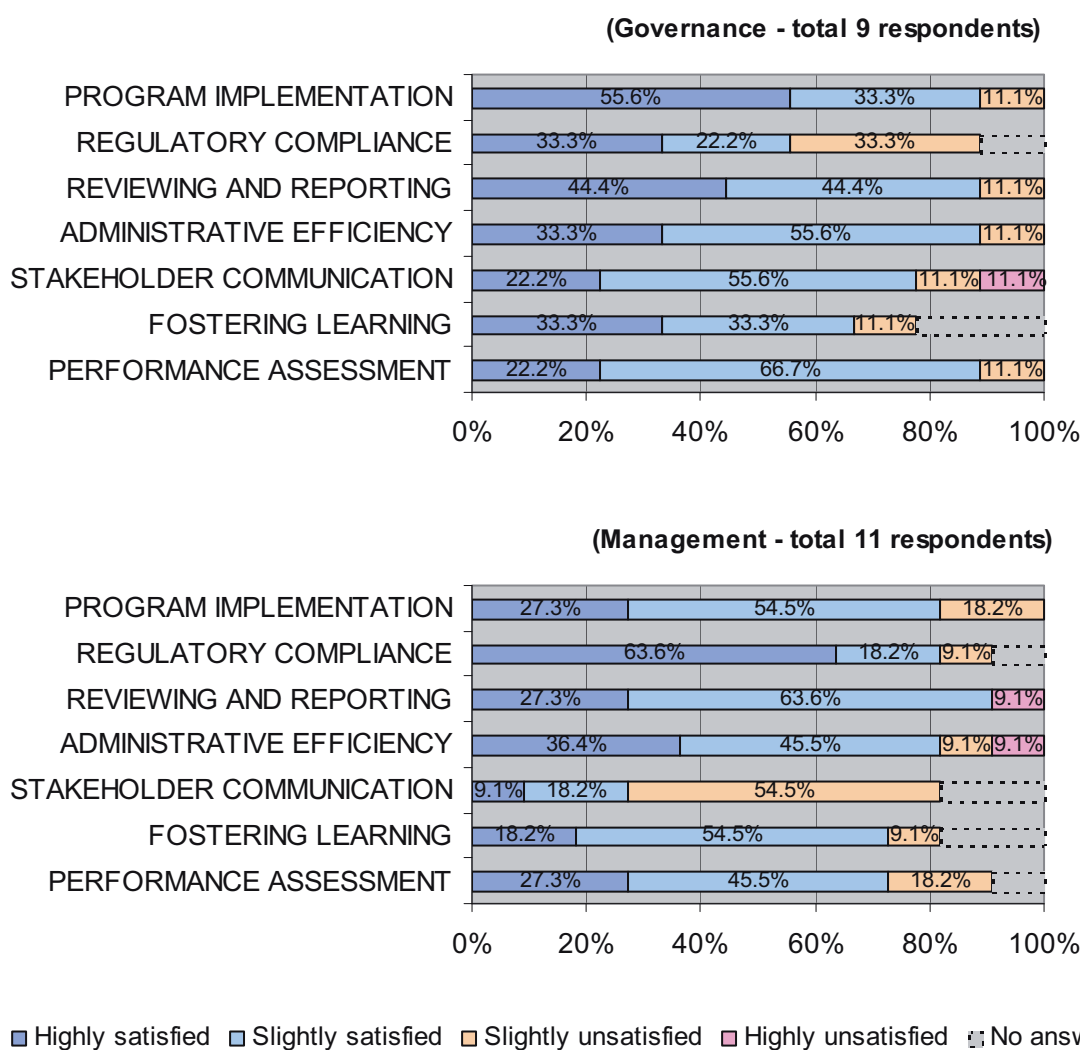
That said, it is important to keep in mind that these considerations are based on the management structure only and cannot replace an assessment of management performance.

5.3.2 GCP Management Performance

The performance of the GCP management is generally rated high, both from the perspective of GCP governance and in self-assessment as shown in Figure 5.2.

Figure 5.2 Responses to governance and management survey question 7

Please indicate your satisfaction with the performance of Program Management in terms of the following functions.



Interestingly, while generally very positive, the self-assessment of GCP management is slightly more critical than the assessment of management by survey respondents from the governance group.

Apart from slight concerns from respondents from the governance group regarding regulatory compliance, the only issue that can be identified from the survey seems to be a rather critical self assessment of GCP management regarding stakeholder communications. The review Panel

welcomes and agrees with this specific assessment and encourages the management team to increase focus on stakeholder involvement as has been pointed in the previous section.

Overall, the review Panel can confirm this generally positive assessment based on interviews with GCP stakeholders and its direct interactions with the management team itself.

One particular point, however, is found to be of concern and should be addressed by the GCP. In the view of the review Panel, the GCP management team has not been able to foster enough thinking across subprograms, e.g. to focus on program end products that require a common strategy and close coordination between subprograms. As one interviewee from the donor community put it: “This program has produced a lot of high quality project results, but has not left a footprint yet”. The structural setup of GCP management that has been discussed in the previous section is most probably the main reason for this. In addition, two factors might have contributed as well. On the one hand, the GCP management team has experienced a high turnover rate. At the time this report was written, half of the management team had rotated or was in the process of leaving the management team. On the other hand, the fact that some management team members contribute with only 50% of their capacity to the GCP has left little time to contribute to topics outside of individual subprograms.

This said, it should be acknowledged that the management team has recognized the lack of end product orientation and of coordination across subprograms in the past and has developed a Strategic Framework that has been presented and adopted by the PSC in 2006. This framework contains important elements such as increased regional and crop focus and a clear definition of what steps in the product development and delivery pathway the GCP should focus on and can be considered a good start into generating a stronger strategic focus for the GCP. Building on this, the management team needs to firm-up and implement operational GCP objectives.

Table 5.5 GCP management capacity

Responsibility	Title	Name	% Capacity for GCP
Overall program management	GCP Director	Jean-Marcel Ribaut	100%
SP1	Subprogram Leader	Jean-Christophe Glaszmann (Agropolis)	50%
SP2	Subprogram Leader	Rajeev Varshney (ICRISAT)	50%
SP3	Subprogram Leader	Philippe Monneveux	100%
SP4	Subprogram Leader	Theo van Hintum (WUR)	50%
SP5	Subprogram Leader	Carmen de Vicente	100%

The review Panel has come to the conclusion that an increase in leadership capacity in those subprograms that have been led by half-time managers would result in a considerable added value in terms of strategic input across subprograms and in increased project management quality and would more than compensate the related additional costs. In spite of this positive return on investment, the GCP should make efforts to compensate these high-priorities staff increases with not research-related cost savings elsewhere.

In addition to a potential increase in staff capacity, the GCP management should increase efforts to contribute to an end-product oriented strategy for the overall program, building on input from the “users” of GCP outputs.

The review Panel recommends that the GCP upgrade all subprogram leader positions to full-time positions for the next three years. Since SP3 and SP5 leaders already have full-time positions, this implies to move the leadership of SP1, SP2 and SP4 from half-time to full-time positions. This is needed in order to provide the necessary management capacity for program-level management and the fulfillment of management duties in their respective SPs; and to avoid split responsibilities between the GCP and the SP leaders' home institutions.

As discussed in the programmatic part of this review, the focus on crop-specific priorities relating to specific program objectives needs to be increased. The current alignment of management responsibility along the subprogram functions, while certainly important and useful, does not include any structural crop-focus.

As discussed in the previous section, this might be supported by adding "product"-specific management functions that would help to integrate and prioritize across subprograms. For example, the introduction of "Crop Leaders"¹⁸ that are based in NARS or similar institutions might be an option. In order to remain cost-effective, this additional functions should not reflect new management positions, but rather be incorporated into relevant commissioned project work.

The review Panel recommends that the GCP management adopt an end-product orientation for the GCP activities, i.e. the integration, alignment and prioritization of product oriented projects across subprograms in line with high priority program-level product objectives. To support this, the review Panel recommends that the GCP management acquire or develop a product project portfolio management system to help it plan, monitor and manage it best opportunities (achievable high priority program-level objectives).

The review Panel suggests that one possible way to increase the end product focus of subprogram activities could be to introduce crop leaders for each core species (e.g. NARS-based breeders that are PIs in relevant commissioned projects) that provide input on need-based crop-specific research priorities that can then be translated into SP1-SP5 priorities.

In addition, it might be useful to move the current work on impact pathways into a dedicated management function that would liaise between the subprogram leaders and the crop leaders. This function is currently somewhat addressed by the SP5 Leader that, in addition, also has responsibility for all capacity building activities.

5.3.3 Project Monitoring

The GCP subprogram leaders monitor projects in their respective portfolio through annual technical and financial reports, flanked by inception and project-final reports.

The technical reports are based on a template developed and provided by the GCP secretariat. Apart from a descriptive text body containing information on project activities and data produced and explanations for potential deviations from the original work plan, the template also effectively forces GCP project principal investigators into defining and reporting against quantifiable outputs for each project subcomponent and to follow a rigorous milestone-based workplan.

¹⁸ As, for examples, reflected in the management setup of the HarvestPlus Challenge Program.

This reporting mechanism has replaced a biannual reporting scheme that has been in use until 2007.

The review Panel supports the recent attempts towards more professional and informative reporting and finds that the current mechanism is generally evolving into the right direction. Some fine-tuning of the current reporting content and process is most probably still needed and has been reflected by comments received from GCP project leaders. This should be considered, however, as part of the usual adaptation process of calibrating a reporting scheme into satisfying central information needs while not imposing inconsiderate workload on the reporters.

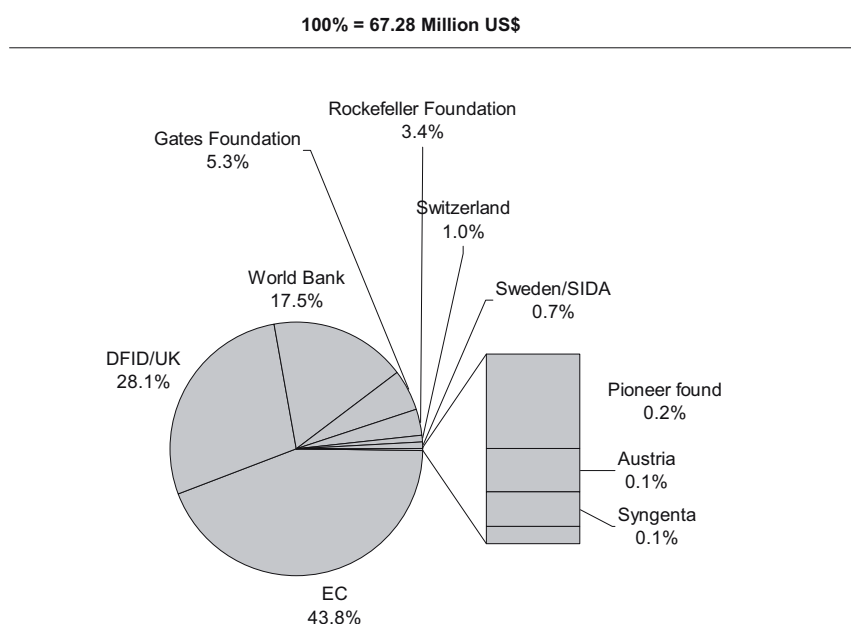
6 RESOURCE MOBILIZATION AND FINANCIAL HEALTH

This section assesses the past and future fund raising performance of the GCP, performance against the original budgets, and financial management and its financial health.

6.1 Fund raising performance and outlook

The Generation Challenge Program has successfully managed to raise considerable funding from a range of donors, underlining the perceived relevance of the program for the donor community. From the program's inception in 2003 until 2007¹⁹, the GCP has raised a total of more than 67 Million US\$ from a diverse group of donors. As shown in Figure 6.1, the largest donor, the EC, has donated a total of 29.5 Million US\$ (43.8% of the total), DFID has contributed 18.9 Million US\$ (28.1%) and the World Bank has provided 11.8 Million US\$ (17.5%).

Figure 6.1 GCP total donor contributions from 2003 to 2007



These three major GCP donors combined have provided close to 90% of overall GCP funding. The remaining GCP donors are the Bill and Melinda Gates Foundation, the Rockefeller Foundation, the Swiss Government, SIDA, the Pioneer Fund, the Austrian Government and the Syngenta Foundation.

From interviews with the GCP's largest donor, the EC, it has become clear that the GCP fits current priorities of the EC well and has therefore been a funding priority. Donor feedback regarding GCP performance in general was positive and the Panel has detected no signs of changing donor funding priorities.

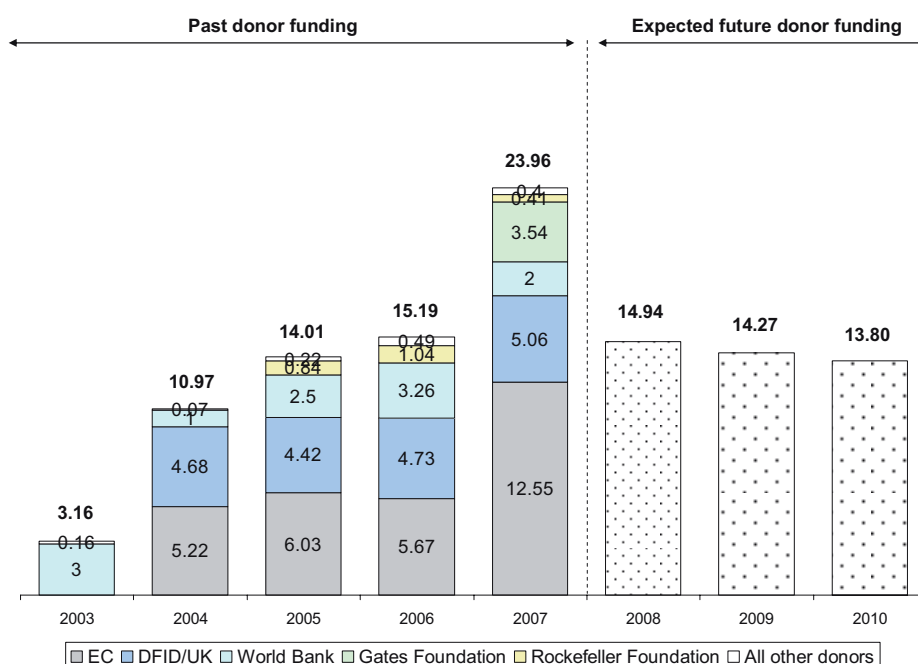
A very positive feature of the current GCP funding structure is the rather balanced donor portfolio. The combined contribution of the second- and third-largest donors (DFID and the

¹⁹ Expected funding for 2007.

World Bank), for example, exceed the EC contribution. In this way, no exclusive dependence on a single donor exists and the GCP therefore has the possibility to safeguard its financial and strategic independence.

Figure 6.2 shows the evolution of funding since program inception in 2003. In the same chart, the current “best guess”²⁰ for future funding is indicated.

Figure 6.2 GCP annual funding from 2003-2006 (actual), 2007 (expectation) and 2008-2010 (extrapolation) in US\$ Million



The abnormally high funding flow in 2007 is mainly caused by fluctuations in both the absolute level of funding and the timing of the recognition of EC funding for 2003-2007 period. In particular, it is noted that these changes resulted in the effective recognition of two annual EC contributions within 2007²¹. Once the EC funding reverts to its normal level, the GCP expects to continue at the projected high funding levels for 2008-2010. Based on the feedback the Panel received from donors that were interviewed, this expectation seems reasonable.

²⁰ This “best guess” is estimated by the Program Director on the basis of the expected grant size, weighted with the expected realization probability. It therefore reflects an expectation value and differs from conservative estimates as, for example, in the Medium Term Plans. If, however, all donor contributions fully materialized, the total amount would be even higher.

²¹ Payments from the EC for the years 2003-2005 have been received in January of the subsequent year and therefore appear for the years 2004-2006 in figure 6.2. The payment for 2006 had to be canceled entirely due to trust fund-related issues with the World Bank. The EC then re-processed the original payment for 2006 together with the payment for 2007, and while both were received in early 2008, they were recognized as receivables as at December, 2007, thereby explaining the double contribution for 2007 in figure 6.2. It is assumed, that from 2008 on, payments will be received within the same year they are dedicated to.

6.2 Performance vs. budget

The original GCP proposal suggested cash contributions of about 14 Million US\$ per year in order to successfully implement phase 1 of the program as shown in Table 6.1.

Table 6.1 Suggested GCP cash contributions for phase 1 in original proposal (in 000 US\$)

Activity	Year					Total
	1	2	3	4	5	
Governance and management	4,000	1,000	1,000	1,000	1,000	5,000
Genetic diversity	4,500	4,000	3,500	3,000	2,000	17,000
Comparative Genomics	1,500	1,500	2,500	2,500	2,500	10,500
Gene transfer, crop improvement	--	1,500	2,000	3,000	4,000	10,500
Information systems	4,000	4,000	3,000	2,500	2,500	16,000
Capacity building	2,000	2,000	2,000	2,000	2,000	10,000
Total	13,000	14,000	14,000	14,000	14,000	69,000

After 2003, the GCP has stabilized annual funding at a value above the envisaged 14 Million US\$. Compared to the total fundraising amount of about 67 Million US\$, the GCP has almost reached its phase I target by the end of 2007. If the “inception year” 2003 is not counted, phase 1 of the GCP began in 2004 and will end in 2008. In this case the GCP will exceed its phase 1 target considerably, e.g. by about 13 Million US\$ or almost 20% based on the extrapolation in Figure 6.2.

The original proposal, however, suggested substantial additional in-kind contributions from consortium members in addition to donor cash contributions as depicted in Table 6.2.

Table 6.2 Suggested GCP in-kind contributions for phase 1 in original proposal (in 000 US\$)

Institution	Full-time equivalent researchers (US\$ 000s)	Allocation by Subprogram (%)			
		Genetic Diversity	Comparative Genomics	Gene Transfer, Crop Improvement	Information Systems
CG Centers	2,328	40	30	20	10
NARS	1,357	20	20	40	20
ARIs	2,041	10	50	10	30
Total	5,726				

While some of these in-kind contributions certainly have been made to the GCP, others may have not. Reporting on the amount of these contributions has been done by simple notification through the consortium members and has not been audited. The individual consortium member’s in-kind contributions were reported in GCP financial statements until 2005 and have been omitted after that.

The review Panel finds the obligation of in-kind contributions of consortium members should be entirely abandoned, closing the current gap between responsibilities stated in the consortium agreement and actual practice. This is based on the following two reasons.

First, without adequate control mechanisms, the actual amount of in-kind contributions remains unclear and might trigger unproductive discussions among the consortium members.

Second, and more importantly, since the consortium agreement doesn't specify any guaranteed benefit for the consortium members in return for these in-kind contributions, they encourage the consortium institutions to look for opportunities to generate a return on these investments, amplifying the conflict of interest issues in the PSC.

6.3 Financial management and financial health

6.3.1 Financial management

Financial transactions of the GCP, inflows and outflows of funds, are processed through the accounting and internal control systems of CIMMYT. CIMMYT prepares an annual supplemental schedule to its annual financial statements on the basis of cash receipts and disbursements.

In addition, the GCP annual reports contain a detailed financial record of the previous year, listing individual competitive and commissioned projects, and detailing overall income and expenditures as well as a plan for the next year.

While being based on the same financial data, the reports by CIMMYT and the financial records in the GCP annual reports are not easily comparable due to the fact that data are reported using different category definitions and, in some cases, assigned to different years. The head of the CIMMYT corporate services department shares this observation and has committed to harmonization of both forms of reports for the 2007 year end.

In order to increase transparency and accountability regarding financial (and other) hosting services, CIMMYT and the GCP have developed and signed a host agent agreement that details reciprocal responsibilities and defines the remuneration CIMMYT is entitled to receive for its hosting services from the GCP.

As will become apparent from the analysis of the GCP financial health in the next paragraphs, the level of remuneration CIMMYT has received from the GCP has grown considerably (to ca. 0.74 Million US\$ in 2007), mostly triggered by a 4% throughput fee charged on certain GCP funds distributed by CIMMYT on behalf of the GCP, as well as by the introduction of an 18% overhead charge on selected direct costs CIMMYT incurs on behalf of the GCP in 2007.

Therefore, the review Panel suggest to review the quantitative arrangements made in the host agent agreement (as suggested in that agreement) and to adjust them if necessary. As a point of reference, fee-levels that would be required for outsourcing services to external providers could be considered.

Overall, the review Panel has been very pleased with the degree of transparency, clarity and professionalism regarding GCP financial management. Especially noteworthy is the fact that responsibilities and related remuneration are clearly defined in an agreement between the host center and the consortium. Such an agreement has been suggested for another challenge program as well.²²

²² An audit of the CPWF recommended to establish such a formal agreement between the CPWF and its host institution, IWMI.

6.3.2 Financial health

Overall cash in the GCP has evolved as summarized in Table 6.3.

Table 6.3 GCP cash balance²³

(US\$ Million)	2003	2004	2005	2006	2007
Cash receipts	3.2	11.0	14.2	15.5	24.0
... cumulative	3.2	14.1	28.3	43.8	80.6
Disbursements (excluding reserves)	0.5	6.9	15.1	13.0	17.0
... cumulative	0.5	7.4	22.5	35.5	67.7
Cumulative undisbursed cash	2.7	6.7	5.9	8.3	12.9
... in days	1939	355	142	234	277

The GCP has build up a considerable amount of undisbursed cash, reaching an equivalent of more than 230 days at year end of 2006 and of 277 days at year end 2007.

These large amounts of cash at year ends are mainly due to the fact that the GCP receives a substantial amount of donor funding at the end of the year. Since GCP only enters into contractual project arrangements after the respective funding is received, this leads to a high amount of cash at year end that subsequently will be committed to projects in the course of that following year.

Overall planning of project expenditures is careful. Projects receive 80% of their annual funds upfront, i.e. in the early months of each year. This also explains the need for a rather large amount of undisbursed cash at year end. Using this policy of upfront payment, project-related liabilities for GCP are minimized. In the 3rd PSC meeting in November 2005, the GCP management suggested to abandon the 80%/20% policy in favor of full upfront funding which was however declined. The review Panel agrees with this PSC decision regarding the need to withhold some portion of the annual project funds in order to maintain some degree of financial leverage.

The expenditures can be further broken down and are summarized in Table 6.4.

²³ Based on actuals from GCP Annual Reports for 2003-2006 and on revised data for 2007 received from GCP on February 18, 2008. Transfers to reserves of 0.5 Million US\$ each in 2004 and 2005, respectively, as well as one in 2007 of 2.0 Million US\$, have been excluded from disbursements for clarity. The number of days has been calculated by dividing the cumulated undisbursed cash by the disbursements of the same year and based on 365 days per year.

Table 6.4 GCP cost structure²⁴

	2003	2004	2005	2006	2007
Management (salary and travel)	96,732	323,859	602,561	662,625	927,574
Conferences and PSC	36,283	304,205	281,260	659,109	299,254
Office	17,730	80,449	123,095	136,089	124,772
Consulting	14,902	39,513	58,159	165,541	251,459
Finance	6,247	33,597	23,221	19,862	23,245
Overhead to CIMMYT	328,994	236,085	324,330	487,207	739,524
Research & other project work (SP5)	-	5,888,429	13,647,004	10,900,742	14,664,590
Transfer to reserve	-	500,000	500,000	-	2,000,000
total	500,888	7,406,137	15,559,630	13,031,175	19,030,418

Based on the GCP schedule in the CIMMYT financial statements, the indirect cost rate of the GCP can be approximated as shown in Table 6.5.

Table 6.5 GCP transaction cost ratios²⁵

	2003	2004	2005	2006	2007
Component without fees to CIMMYT	n/a	13.3%	8.0%	15.1%	11.1%
Fees to CIMMYT	n/a	4.0%	2.4%	4.5%	5.0%
GCP indirect cost rate	n/a	17.3%	10.4%	19.5%	16.1%

The indirect cost rates listed in Table 6.5 show a rather unusual behavior. While high setup costs and low research budgets typically lead to high indirect costs during program inception phases, a gradual decrease of indirect costs is generally expected when the research budget grows and initial setup has been completed. The GCP indirect cost rates, however, show a sharp decrease to 10.4% in 2005 (the second full year of program operation since the program started in the second half of 2003) and a subsequent strong increase to 19.5% in 2006 and an expected decrease to 16.1% in 2007.

While the increase of indirect cost from 2005 to 2006, as well as the subsequent decrease can be partly explained by fluctuating research funding and other effects²⁶ in that period, some expenditure categories have shown considerable absolute growth.

In order for the GCP to operate with maximum efficiency, the main cost categories responsible for the growth in indirect cost should be further analyzed and remedial action taken where possible.

- Costs for the management team are expected to increase by almost 60% from 2005 to 2007 and represent the largest single cost driver for indirect cost. These management costs are likely to increase further if the recommendation of this report to increase all

²⁴ Explanation in terms of categories used by CIMMYT: Management (Salaries & Benefits, International Staff, Operational Travel); Conferences and PSC (Conferences, PSC expenses); Office (Office Supplies & Services, Printing & Design, Vehicle Expenses); Consulting (Consulting); Finance (Capital); Overhead to CIMMYT (Overhead 4%, Indirect Cost 4%, 18%); Research & other project work (Research, Capacity Building SP5); Transfer to reserve (Transfer to Reserve).

²⁵ According to CGIAR Financial Guidelines calculated as indirect cost divided by expenditures for research. Transfers to the reserve in 2004 and 2005 have been excluded.

²⁶ E.g., some of the 2005 expenditures for „Conferences and PSC“ have been paid in 2006.

subprogram leader positions to 100% is implemented without accompanying cost-saving measures. The Panel considers the recommended upgrade of the subprogram leader positions essential and suggests reprioritizing other activities in order to control overall costs.

- Fees to the host center are expected to more than double (increase by 128%) between 2005 and 2007. This increase is caused by the increase in budget distributed by the host center (on parts of which a 4% margin is charged), as well as by the introduction of a formal host agent agreement in 2007 that allowed CIMMYT to charge 18% overhead on its direct contributions to the GCP. Since neither of these increases in overhead fees directly corresponds to an increased level of support services by the host center, the Panel suggests that the host agent agreement is reviewed with respect to the adequacy of the host center remuneration with service fees from alternative service providers as a benchmark.

While the above analysis is useful for understanding how indirect cost have changed from year to year within the program, it is important to note that no direct comparison of these indirect cost rates with those of CGIAR centers or other Challenge Programs is possible. The reason for this is that while CGIAR centers' indirect costs are calculated according to common guidelines, no such guidelines exist yet for Challenge Programs. For example, the GCP assigns all subprogram leader costs to the indirect costs category, while other Challenge Programs divide these into research-related (direct costs) and non-research related (indirect) costs. As a consequence, indirect cost definitions vary among Challenge Programs, making the percentile values hard to compare.

Acknowledgements

The Panel thanks GCP management and scientific staff for what it believes is a great program that has accomplished much to date in spite of its very short existence. It also extends its gratitude to the many contributors in GCP who helped shape our understanding of the program and guided the Panel to its conclusion through frank and constructive discussions during interviews and via surveys. We wish the GCP every success in its effort to advance the state of genetic resources and enhanced varieties accessible by resource poor farmer.

Annex 1
Generation Challenge Program External Review (2008) Panel Membership

Wallace D. Beversdorf (Canada) – Panel Chair

Position: Independent consultant

Expertise: Plant breeding/genetics, agronomy

Education: Ph.D., (Plant Breeding and Genetics), University of Wisconsin, Madison (1975); M.Sc., (Agronomy), University of Wisconsin, Madison (1974); B.Sc., (Agronomy), University of Wisconsin, Madison (1972).

Experience: Board of Director and Treasurer for ISAAA (1994—current); Committee member for CSIRO National Flagship Initiative Review (2006); Vice-President, Biotechnology Strategy, Syngenta CP AG, Basel (2000- 2003); Chair, Board of Directors, Zymetrics Inc. (Enzyme JV of Diversa and Novartis (1998-2003); Global Head of Research and Development, Novartis Seeds (1994-1999); has held the same post in the United States (1993-4); Scientific Manager, Plant Biology and Vice President, Allelix Agriculture, Allelix Inc. (1983-88); Chairman, Crop Science Department (1988-92). Successively Assistant Professor (1976-80), Associate Professor (1980-85), and Professor (1985-92), University of Guelph; Member/Chair of the Board of Governors of the Plant Biotechnology Institute, National Research Council of Canada ; Member of the Board of Trustees of the Centro Internacional de Agricultura Tropical (1994-99). Awards include: 1984-87: Three University of Guelph "Innovation Awards"; Sigma Xi Excellence in Research Award (1986); OAC Alumni Outstanding Research Award (1987) and several Patents.

Contact: 1360 Bear Tail Point Phelps, WI 54554 USA. Tel/fax: +1 7155452355. Mobile: +1 612 803 3563. Email: wbeversdorf@nnex.net

Markus A. Palenberg (Germany) – Governance

Position: Managing Director of the Global Public Policy Institute (GPPi), Germany

Expertise: governance & management, program evaluation, research in theoretical physics

Education: Massachusetts Institute of Technology, USA, 1998-2000. PhD, RWTH Aachen University, Germany, 1994-1998. Doctoral thesis in theoretical physics. Graduation with "summa cum laude" and award of the "Borchert medal" for academic excellence. Diploma in theoretical physics, RWTH Aachen, Germany, 1988-1994.

Experience: 2004-2005: Corporate Projects Manager for three business units, leading and driving toplevel projects and taking on interim management roles on board and director level, SCOUT24 GMBH, Munich, Baar, Switzerland. 2000-2004: Team leader of up to 5 consultants and 20 client team members on projects in Germany, France, Italy and Portugal, reporting directly to board-level client management. Focus on strategy development (market research and benchmarking-based) and overall project management, McKinsey & Company Inc., Paris, Cologne, Munich. Other part time professional activities include: Business Consultant for Etnoka.com, Paris, 2004; Part-time teaching assistant, RWTH Aachen and Laser-Laboratorium Göttingen e.V, (1990-98) and freelance research consultant, (1993-2000). Dr Palenberg is member of the McKinsey Alumnus, non-profit alumni association; the MIT alumnus association and member of the ICAN career advisor network.

Contact: Global Public Policy Institute, Reinhardtstr. 15, 10117 Berlin, Germany. General: +49 3 2759 5975 – 0. Direct: +49 (3) 2759 5975 – 112. Mobile: +49 177 7815 204. Fax: +49-30-6908 8200. Email: mpalenberg@gppi.net

Jennifer A. Thomson (South Africa) - Consultant

Position: Professor/Head Department of Microbiology, University of Cape Town, South Africa

Expertise: Microbiology, maize biotechnology, molecular biology, modern biotechnology

Education: 1971 - 1973: PhD in Microbiology at Rhodes University, Grahamstown, South Africa. 1968 - 1970: MA in Genetics at Cambridge University, England. 1965 - 1967: BSc (with distinction) in Zoology and General Physiology at the University of Cape Town, South Africa.

Experience: 1996 - present: Deputy Dean of Faculty of Science, University of Cape Town 1984 - 1988: Director of CSIR Laboratory for Molecular and Cell Biology; 1982 - 1983: Visiting Scientist, Dept Nutrition and Food Science, Massachusetts Institute of Technology 1977 - 1983: Lecturer, Senior Lecturer, and Associate Professor, University of the Witwatersrand 1974 - 1977: Research and Teaching Fellow, Harvard University Member of over 10 national/international societies and committees. Over 50 publications in prominent journals, referee/editorship for a number of international journals, author of five book chapters, holder of two patents. Has had industrial contracts with DeKalb Plant Genetics ('93-'95) and Pannar (Pvt) Ltd.('94-'99) on maize and el callus studies.

Contact: Department of Microbiology, University of Cape Town, P B Rondebosch 7701, South Africa. Tel: +27 21 650 3270. Email: jent@telkomsa.net

Annex 2
CGIAR CHALLENGE PROGRAM EXTERNAL REVIEWS (CPER)
GUIDELINES

Joint Document by the SC and CGIAR Secretariat- January 30, 2007

Background

Challenge Programs (CPs) are time-bound, independently-governed programs of high impact research that target CGIAR research goals and priorities and require partnerships with a wide range of organizations. CPs are meant to improve the CGIAR's relevance and impact, better target and integrate existing activities, achieve greater efficiency and cohesion among CGIAR Centers, widen and improve their partnerships with non-CGIAR research partners and mobilize more stable and long term financing.

Three CPs were approved for implementation beginning in 2003: Water and Food (W&F); HarvestPlus (HP+); and Generation (GCP). At AGM04, the Sub-Saharan Africa Challenge Program (SSA CP) was approved in principle for an 18-month inception phase. ExCo 6 (May 2004) requested the SC and the CGIAR Secretariat to synthesize some lessons learned from the three pilot CPs. One of the recommendations of the ensuing 2004 report was that "the current CPs be evaluated by an external panel after five years from start to assess the value added provided by the CP structure in terms of the effectiveness of partnerships and generation of outputs, evidence of adoption and impact of research, cost effectiveness of operations and sustained donor interest".

At the AGM 2005, the Group endorsed a set of 20 System Priorities to enhance the focus and cohesion of the CGIAR's research agenda. CPs may be an important option for the implementation of priority research and need to be reviewed also in this context to ensure that their rationale is validated by experience.

The guidelines for the CPERs have been prepared to address the particular characteristics of the programs that make their operations and governance distinctly different from those of the CGIAR Centers, and anticipating that CPs of different nature and duration will increasingly be used to implement a part of the CGIAR's research agenda, and help the CGIAR leverage external research capacities.

Issues

These guidelines provide the general principles that guide all CPERs. For each individual review, the specific Terms of Reference (TOR) will include both the generic issues listed below and a set of strategic issues identified through consultation with stakeholders, including the SC and the CGIAR Secretariat.

The CPER is aimed at informing the CGIAR members, stakeholders and other investors about the relevance of the program, and that the investment is sound, or recommend measures to make it so. It will advise the program and its partners about the efficiency and effectiveness of their work and the appropriateness of their internal monitoring and evaluation, and make recommendations for improvements.

The CPER should address the overall scientific quality of the program, the program's effectiveness in reaching its research goals and the appropriateness of management and governance. The CPER should focus on the extent to which the key defining characteristics of a CP have been met: high-

impact research; targets the CGIAR goals in relation to complex issues of overwhelming global and/or regional significance; requires partnerships among a wide range of institutions in order to deliver its products; is time-bound; and is independently-governed.

The individual CPERs are expected to provide inputs to a broader assessment or analysis of the extent to which the CP model is fulfilling its objectives, i.e. the purposes for which it was conceptualized and adopted.

The issues that the CPER needs to address can be clustered in two main categories:

Programmatic issues:

1. Is it likely that the CP research will eventually have a high impact based upon the conduct of the program to date? Has the CP clearly identified its direct and final beneficiaries? Were the CP's key assumptions/expected impact pathways concerning critical scientific and technological constraints, socioeconomic conditions, adoption, markets, researchers' motivation and donors' interests appropriate? Is there any evidence of progress along these pathways? Are there changes required to help increase the chances of success and the extent of impacts?
2. What has been the added scientific value from the CP; in particular, by the partnerships represented by the CP? What has been achieved by the CP that could not have been achieved without it, through Center activities or SWEPS? Is there any evidence of synergies and/or new modes of operation of the Centers involved in the CP? Can these synergies be improved?
3. Is the science in the CP overall and in the different components of high quality and are the scientific outputs recognized by peers? Does the CP, including all its partners, follow a clear policy of best practices regarding ethics and intellectual property?
4. Was the international public goods nature of the planned outputs clear at the outset and has this been reinforced from the conduct of the program?
5. To what extent have the objectives of the CP been achieved? Has the CP been effective in delivering outputs? Is there already evidence of adoption and other outcomes among the intended users? If there was a technology exchange process, how effective and efficient was it?
6. Is the CP cohesive, allocating a critical mass of resources to research with a clear set of goals in terms of outputs, outcomes, and impacts that can be monitored to measure collective progress at a system level? Was an appropriate M&E system included in the design of the CP and has it been implemented (including, inter alia, baseline data and outcome monitoring) in order to be in a position to generate, disseminate and use credible and timely evidence concerning program impact?
7. In what ways has the CP contributed to capacity building of partners? Is capacity building included in the business plan and appropriately integrated into the program?

Management/governance/partnership issues:

1. Is there a clear, balanced, and formal governance structure involving research partners? Does it provide effective and adequate oversight, including financial oversight? Are there any perceived or real conflicts of interest in the governing body? Is there a clear and effective M&E system in place? What are the constraints and benefits for the CP (in terms of research, synergies, financial arrangements, etc) that result from the arrangements with the host institution?
2. What is the relationship between CP governance systems and the Boards of the Centers leading or participating in them?
3. Is the breadth of the CP in terms of partners optimal for reaching the objectives? Is there clarity of roles and responsibilities of all partners? Is there an effective system for internal

knowledge sharing and communication across regions and research sites? Are the transaction costs in partnering well-managed?

4. What internal / external audit arrangements are in place, and do these cover site operations? For commissioned research, are the rules and mechanisms transparent? Is there a well-established, clearly defined and transparent internal control environment on implementing competitive grants?
5. How is the program's multi-year funding ensured? Is financial support diversified enough to avoid funding risks? How much is the deviation (if any) between budget and actual expenditures? What is the percentage of unidentified funding in budget at time of approval by the CP governing body? What is the proportion of transaction costs to expenditure/budget/funding?

The purpose and objectives of the CPER are to learn and to assess; hence the following general principles guide the conduct of the review:

- The Panel should take into account assessments made of the CP and available information such as MTP reviews, ex ante project reviews, reports to donors and any other information from internal monitoring and evaluation mechanisms.
- The Panel should identify key program assumptions, particularly those having implications for costs, benefits, outcomes and impact, indicating which items are expected to be included as costs or benefits, their expected magnitudes and time profiles.
- The Program needs to ensure that critical data on performance, benchmarks and context are available at the time of the CPER.
- The Panel needs to document any unexpected costs and benefits of the CP, including spillovers.
- The review process should involve adequate communication of the CPER with the CP both during the review and after it, and the results should be communicated using various approaches, preferably electronic means, reaching also external audiences.

Implementation

The CPERs are commissioned by the SC on behalf of the Group. They are organized jointly by the SC and the CGIAR Secretariat and their implementation is coordinated by the SC Secretariat. They complement the other elements of the CGIAR's Monitoring and Evaluation systems, namely the annual MTP review by the SC and the Performance Measurement System, which will be adjusted also to accommodate the CPs.

An external review panel of at least two, maximum three members will be assembled. The Panel Chair should have demonstrated experience and skills in research management as well as in scientific research. The profile of the Panel Chair would also depend on the nature of the CP's research as well as the stage that the CP is in, in its life cycle. S/he would have an understanding of international agricultural research for development; have excellent analytical capability, and excellent command of English. S/he should have experience in reviewing complex research programs and demonstrated capacity to lead an independent external review. The Panel member responsible for the governance, management and partnership component of the review should have expertise in program governance, management of multi-partner consortia and program funding.

The review team may include 1-2 consultants to cover specific aspects corresponding to the complexity of the concerned program in which the Panel requires ad hoc expertise. Thus, the review Panel will have more flexibility to deal with issues that may not require an expert to be on board for the full period of the review. In consultation with the SC and the CGIAR Secretariat the Panel will determine if there is a need for consultants, who subsequently are selected through a standard Panel

selection process led by the SC. The TOR of these consultants should include time for consultations upfront and towards the end of the review process.

All Panel members and consultants participate in the review in their personal capacity and should have no conflict of interest with the CP. Causes of potential conflict include: current employment with a CGIAR Center or CP; previous employment or consultancy with the CP; employment with any of the CP partners; participation or consultancy in planning of the CP or its components; representative of a donor to the CP with any responsibility related to the program funding.

In addition to the generic questions presented in this document, additional review questions will be included in the TOR for each CPER. These would reflect the specific nature and focus of the CP and its research and review history. The CPER should provide information to guide decisions about continuing the program's activities.

The review will include one visit to the host institution of the CP and also a visit to at least one CP partner. It is essential that the CPER reviews the efficiency of the partnerships and captures both the internal partners' and external stakeholders' perceptions.

The report should be clear and succinct. It should explicitly address all the points of the TOR with sufficient analysis to support the conclusions; and present clear and explicit recommendations for improvement, or for bringing the CP to closure. The report should be brief and concise (not to exceed 60 pages), and should include a short Executive Summary (not more than 2 pages). Any supplementary evidence and/or tables could be included in an annex, but the text should be self-contained.

The CP will prepare a response to the Panel report. The SC and CGIAR Secretariats will prepare a commentary to the report prior to its submission to the ExCo and to the Group. The SC and the CGIAR Secretariat will monitor the follow-up of the CPER through the MTP and report their assessment to ExCo.

Background Documents that the CPER Panel is expected to use

1. CP specific Terms of Reference
2. CP full project proposal
3. SC commentary on CP full proposal
4. CP final Business plan
5. CP Annual reports
6. CP MTPs, including annual work plans
7. SC commentaries of CP MTPs
8. CP annual budgets
9. Description of competitive grants process
10. Major funding applications
11. Reports to donors
12. Donor assessments
13. Description of internal monitoring and evaluation processes
14. Internal monitoring and evaluation reports
15. List of program publications by category (to be decided)
16. List of program partners, the specific contribution to the research and the associated budget share
17. CGIAR documents of lessons learned from CPs (e.g. 2004)
18. Selected peer reviewed papers/books produced by the CP

Annex 3
CGIAR EXTERNAL REVIEW OF THE GENERATION CHALLENGE PROGRAM
TERMS OF REFERENCE

BACKGROUND

The Generation Challenge Program (GCP) began its operations in September 2004. This Challenge Program External Review (CPEP) evaluates the progress of the GCP as it is coming towards the end of its first phase. The review will be conducted following the CGIAR CPER Guidelines, a companion document to this TOR and available at <http://www.sciencecouncil.cgiar.org>.

For logistics please see the “Implementation” section of the CPER Guidelines. It is expected that this review will take up to a total of 30 working days. The schedule for the review as well as contract details will be specified in the appointment note to panel members.

TOPICS TO BE COVERED

The main topics to be covered by the CPER are:

1. The seven (7) programmatic issues as described in pg. 2 of the CPER Guidelines.
2. The four (4) management, governance and partnerships issues as described in pg. 3 of the CPER Guidelines.

In addition, while addressing these issues, the Panel is asked to comment on the following specific items:

3. **Priority setting and research focus:** How has GCP managed to balance the general goal (to create an integrated platform for dissecting genetic diversity in crop plant genetic resources applying genomics and bioinformatics) with the specific research targets that address fundamental questions related to tolerance of drought stress as a proof of concept to demonstrate the application of the CP’s outputs? GCP has a broad mandate targeting almost all CGIAR crops – has the research been focused enough? Has the system of competitive/commissioned research been used appropriately and effectively to achieve the optimal research portfolio. Has it been successful in mobilizing science beyond the CGIAR?
4. **Impact pathway and exit strategy:** Does the program engage optimal partners and does it integrate capacity strengthening in the best possible way to enhance research output delivery/uptake and the likelihood of outcomes and ultimate impacts? Has the program a delivery plan to support a time bound completion of its tasks and does it have a viable and explicit exit strategy, including plans for the institutionalization of the tools and processes beyond the term of the GCP?
5. **Spillover effects within the CGIAR System:** How has GCP contributed to the individual Centers synergistically in consolidating upstream, high-cost research, i.e., genomics, informatics, and related areas in a cost-effective manner? Given the large number of crops targeted by the GCP, are there mid-term corrections that might better express the comparative advantages of individual CGIAR Centers involved in crop research and the GCP?
6. **Governance and management:** GCP has a complex governance operating model, involving the Program Steering Committee (PSC), the Program Advisory Committee (PAC) and the Stakeholders Committee. Is this model of governance efficient and transparent? Do all the three committees fulfill their roles and responsibilities adequately? What are the achievements and limits of endowing the PSC with functions of both governance and representation/inclusiveness? Have efforts been made to avoid conflict of interest and assure independence? What is the relationship between the governing bodies and the Management

Team? How has the GCP dealt with recommendations of the Governance Task Force that it had set up? To what extent does the GCP Consortium Agreement allow or enable the GCP to respond effectively to ongoing governance challenges?

Annex 4 Reviewed Document List

Reference Documents (provided by the CGIAR Science Council)

- a. CGIAR-SC Guidelines for CP External Review
- b. GCP External Review TOR
- c. CG Secretariat document on lessons learned from CPs (2004)
- d. iSC commentary on GCP
- e. Report of the first Challenge Program external review of the Challenge Program Water & Food--Overview Documents
- f. External Review on Challenge Program Water & Food (2007)
- g. Report of the first Challenge Program external review of the Challenge Program Harvest Plus--Overview Documents
- h. External Review on Challenge Program Harvest Plus (2007)
- i. Lessons Learnt from Selection and Implementation of the CGIAR Challenge Programs (2007)
- j. ADE Study: Lessons Learnt Analysis of First Cycle Challenge Programs

Documents requested by the EPMR Panel

1. Original proposal, original program contracts and all amendments made:
 - 1a) Proposal to establish the GCP - This document outlines the original proposal submitted to the CGIAR to develop a Challenge Program on Unlocking Genetic Diversity in Crops for the Resource Poor.
 - 1b) GCP Consortium Agreement - This document is the original blueprint for the GCP and how it would be run, including its objectives, management structure, IP regulation and governance, budgeting, and more. All of the members of the GCP Consortium have signed this document in agreement with its rules and procedures. Our IP Helpdesk is tailored to provide an understanding of the GCP Consortium Agreement, thereby facilitating its implementation. The Helpdesk also includes background information on the Consortium Agreement.
 - 1c) GCP Humanitarian Use Agreement - This agreement, approved by all of the GCP Consortium Members in November 2005, is a complement to the IP and Copyright guidelines for use of GCP products included in the consortium agreement.
2. All MTPs (medium term plans) + all comments from the program and the CG
 - 2a) GCP 2005-2007 Medium-Term Plan - The Medium Term Plan, required of all CGIAR centers each year, lays out the work plan in detail for the following 3 years. This plan describes the work to be done in the GCP from the years 2005-2007.
 - 2b) GCP 2006-2008 Medium Term Plan - The Medium-Term Plan, required of all CGIAR centers each year, lays out the work plan in detail for the following 3 years. This plan describes the work to be done in the GCP from the years 2006-2008.
 - 2c) GCP 2007-2009 Medium Term Plan - The Medium-Term Plan, required of all CGIAR centers each year, lays out the work plan in detail for the following 3 years. This plan describes the work to be done in the GCP from the years 2007-2009.
 - 2d) GCP 2008-2010 Medium Term Plan - The Medium-Term Plan, required of all CGIAR centers each year, lays out the work plan in detail for the following 3 years. This plan describes the work to be done in the GCP from the years 2008-2010
 - 2e) GCP MTP SC commentary & GCP Response (excerpt from a larger document with all Center & CP MTPs) 2005-2007
 - 2f) GCP MTP SC commentary & GCP Response (excerpt from a larger document with all Center & CP MTPs) 2006-2008

- 2g) GCP MTP SC commentary & GCP Response (excerpt from a larger document with all Center & CP MTPs) 2007-2009
- 2h) GCP MTP SC commentary & GCP Response 2008-2010
- 3. All Annual Reports + all comments from the program and the CG
 - 3a) 2004 GCP Annual Report - This report outlines the research and the finances of the GCP in the year 2004, as well as a projected research and financial work plan for the year 2005.
 - 3b) 2005 GCP Annual Report - This report outlines the research and the finances of the GCP in the year 2005, as well as a projected research and financial work plan for the year 2006.
 - 3c) 2006 GCP Annual Report - This report outlines the research and the finances of the GCP in the year 2006, as well as a projected research and financial work plan for the year 2007.

Also included in this section are the Reports submitted to the Executive Council of the CGIAR, which outline the research and finances of the GCP, as well as the lessons learned:

- 3d) 2003-2004 Progress Report for the Executive Council (ExCo) of the CGIAR - submitted 22 April 2004
 - 3e) 2004 Annual Report for the Executive Council (ExCo) of the CGIAR - submitted 20 April 2005
 - 3f) 2005 Annual Report for the Executive Council (ExCo) of the CGIAR - submitted 4 September 2006 (please note that this is the 2005 final report, incorporating the amendments recommended by the Executive Council feedback on the original report - see 3g below for feedback on original report)
 - 3g) Executive Council (ExCo) Feedback on 2005 Annual Report
 - 3h) 2006 Annual Report for the Executive Council (ExCo) of the CGIAR
- Please note that feedback from the CG Secretariat for reports submitted in April 2004 and April 2005 were only ever received via email. Unfortunately, due to a change in Director during this time (September 2005) we are now not in a position to access these emails. Therefore no official documentation of feedback is available for these two years.

- 4. A selection of project contracts and progress reports - organized below per subprogram:
 - Subprogram 1: enclosed are the progress reports and project proposal for Commissioned Project 2006-03 "SNP Analysis of the Genetic Diversity along the Rice Genome (HAPLORYZA)", Principle Investigator: Kenneth McNally, IRRI, Philippines
 - Subprogram 2: enclosed are the progress reports and project proposal for the Competitive Project 16 "Isolation and Characterization of Aluminum Tolerance Genes in the Cereals: An Integrated Functional Genomic, Molecular Genetic and Physiological Analysis", Principle Investigator: Leon Kochian, U.S. Plant, Soil and Nutrition Laboratory, USDA/ARS and Cornell University, U.S.
 - Subprogram 3: enclosed are the progress reports and project proposal for the Competitive Project 5, "Unlocking the Genetic Diversity in Peanut's Wild Relatives with Genomic and Genetic Tools", Principle Investigator: José Valls, EMBRAPA, Brazil
 - Subprogram 4: enclosed are the progress reports and project proposal for the Commissioned Project 2006-08 "Data Analysis Support for Existing Projects in SP2 with Emphasis on Integrating Results from Microarray and Mapping Experiments", Principle Investigator: Guy Davenport, CIMMYT, Mexico
 - Subprogram 5: enclosed are the progress reports and project proposal for the Commissioned Project 2006-13 "Targeting and impact analysis of Generation Challenge Program (GCP) technologies", Principle Investigator: Glen Hyman, CIAT, Colombia
<http://www.generationcp.org/gen.php?da=0642324> for GCP Project Reporting Requirements and policies (including templates)
- 5. All existing evaluations of the program or parts of the program (CG, other donors, or commissioned by the program itself), e.g. the recent EU evaluation

- 5a) PAC Assessment of GCP 2004: a report by Wayne Powell (PAC Chair) providing feedback on the GCP's first year of work, as viewed at the first Annual Research Meeting In Brisbane in 2004. Report provides a summary of the events and projects displayed at the ARM, highlighting key points, as considered appropriate by the PAC.
- 5b). 2005 World Bank Review - This document, the Generation Challenge Program Follow Up on Executive Council and Science Council Inquiries for Autumn Meetings of the ExCo and SC, outlines the funding, partners, governance, and focus of the GCP.
- 5c). 2005 EC Review Team Report - This report was generated by the EC after a comprehensive review of the efficiency, effectiveness, relevance, impact, and sustainability of the GCP. Recommendations can also be found inside.
- 5d). 2005 GCP Response to the EC review - This document represents the GCP's responses to each of the individual recommendations made by the EC in their 2005 report (above).
- 5e). 2007 EC Review Team Report - This report was generated by the EC after a comprehensive review of the efficiency, effectiveness, relevance, impact, and sustainability of the GCP. Recommendations can also be found inside.
- 5f) Stakeholder Committee report on GCP Governance (August 2006): a thorough evaluation of the GCP governance and administration, carried out by the SHC, with the aim of expressing its concerns at the current structure and roles of the GCP's governance bodies (in particular the PSC), and as such providing recommendations (from the SHC) as to how to improve this structure.
- 5g) Report on an audit on GCP's Risk Management System (2007): a report produced by the CGIAR's internal auditing unit in September 2007 following on from an audit on GCP's Risk Management System - findings and recommendations can be found here.
6. All existing audits + all comments from the program and the CG
2006 Internal audit report - In 2006, the CGIAR-IAU completed an internal audit to review the structure and function of the GCP. Their findings can be found here.
7. All PSC (program steering committee) minutes, plus draft version of the most recent meetings if not yet final
- 7a) PSC Meeting Minutes 2003: a report from the PSC Meeting held in September 2003, providing an overview of GCP, its progress to date, including highlights of that year, a commentary on GCP Governance and management framework, and a discussion on various issues, including, amongst others: clarifying the PSC role and function, the search for the Program Director, GCP's research plan, and GCP's fundraising, partnership development and communications, and more.
- 7b) PSC Meeting Minutes 2004: a report from the PSC Meeting held in December 2004, providing Highlights of Year 1 Implementation Phase, Research Highlights and Perspectives, Communications Strategy, Competitive and Commissioned Grants Process and Outcomes, and more.
- 7c) PSC Minutes 2005: a report from the PSC Meeting held in Marrakech, Morocco, in November 2005, providing Highlights of Year 2005 in the Generation Challenge Program, Research Highlights and Perspectives (SP1 through 5), Presentation of the GCP Strategy, Quality control, partnerships, and other 2005 activities, 2005 Commissioned Grants process and 2006 Call for Competitive Grants, Review team and Program Advisory Committee details, Report from Stakeholders Committee Chair, SHC comment on transgenics and genetically modified products, Financial Statement 2005, GCP Management Staffing plan, Income projections and approval of 2006 budget, Resource mobilization/potential new donors, GCP Funding Policies, GCP Consortium Composition and Governance Structure, Potential new Consortium members, GCP Statement on Use of Transgenics, Intellectual Property and Related Issues, Evaluation of Performance of GCP Director, and a presentation of forthcoming action items and deadlines to be applied to the PSC and/or GCP Management team.

- 7d) PSC Meeting Minutes 2006: a report from the PSC Meeting held in Washington in December 2006, providing Highlights of Year 2006 in the Generation Challenge Program, Research Highlights and Perspectives (SP1 through 5), Reference Studies, discussion of the GCP Strategic Framework, a Report from the Chair of the Program Advisory Committee, a brief presentation of the findings of the October 2006 Internal Report, a Report from the Task Force on Governance and PSC Discussion on Governance, a presentation of the 2006 Financial Report, Income Projections and the 2007 Workplan, an Evaluation of the GCP Director, and the next steps to be taken as per the Task Force on Governance's recommendations.
8. All RAP (review & advisory panel) minutes, plus draft version of the most recent meetings if not yet final
- 8a) 2005 Review & Advisory Panel Report: This document includes extensive feedback from the RAP on GCP's Competitive and Commissioned Research Projects carried out as of mid-2005. The RAP participate in the Annual Research Meeting each year, provide an objective perspective on GCP activities, and they are able to focus on major issues they believe each Subprogram Leader must deal with.
- 8b). 2005 Management Team Response - The MT's response to the 2005 RAP Report
- 8c). 2006 Review & Advisory Panel Report - This document includes extensive feedback from the RAP on GCP's Competitive and Commissioned Research Projects carried out as of mid 2006. The RAP participate in the Annual Research Meeting each year, provide an objective perspective on GCP activities, and they are able to focus on major issues they believe each Subprogram Leader must deal with.
- 8d). 2006 Management Team Response - The MT's response to the 2006 RAP Report
- 8e). 2007 Review & Advisory Panel Report - This document includes extensive feedback from the RAP on GCP's Competitive and Commissioned Research Projects, examining the progress made since the production of the last RAP report in October 2006. The RAP participate in the Annual Research Meeting each year, provide an objective perspective on GCP activities, and they are able to focus on major issues they believe each Subprogram Leader must deal with.
9. All audited financial reports from CP Generation – please note that this is not applicable to this CP: all audited financial reports are carried out by the host center CIMMYT (please see no.12 below)
10. All yearly overall CP budgets and cash-actuals, as well as in the following split-ups: programmatic/non-programmatic; competitive mechanisms/commissioned grants; per project, per subprogram
- 10a). Overall GCP budgets and cash-actuals for 2004: this document, extracted from the Annual Report 2004, details overall budgets and cash actuals for 2004, as well as in the following split-ups: programmatic/non-programmatic; competitive mechanisms/commissioned grants; per project, per subprogram
- 10b). Overall GCP budgets and cash-actuals for 2005: this document, extracted from the Annual Report 2005, details overall budgets and cash actuals for 2005, as well as in the following split-ups: programmatic/non-programmatic; competitive mechanisms/commissioned grants; per project, per subprogram
- 10c). Overall GCP budgets and cash-actuals for 2006: this document, extracted from the Annual Report 2006, details overall budgets and cash actuals for 2006, as well as in the following split-ups: programmatic/non-programmatic; competitive mechanisms/commissioned grants; per project, per subprogram
11. Policy documentation and quantitative information (cash amounts) for: administrative charges by host center and others, indirect cost charged on services, additional hosting-related costs, program interest:
- Hosting agreement with CIMMYT: a Host Agent Agreement made by and between CIMMYT and the institutions which have signed the GCP Consortium Agreement as Consortium Members. The agreement describes the relationship between CIMMYT and the Consortium regarding operational support and specifies the services the Host Agent shall provide to the Consortium to meet its administrative, legal, financial, and programmatic requirements.

12. All audited financial reports from the host institution (CIMMYT) since the inception of the CP :
 - 12a). CIMMYT: audited financial report on GCP, 2004
 - 12b). CIMMYT: audited financial report on GCP, 2005
 - 12c). CIMMYT: audited financial report on GCP, 2006
13. Program organizational chart, indicating functions and reporting relations:
 - 13a). GCP Program Organizational Chart - extracted from the "Proposal to Establish the GCP" (document 1), this chart (with preceding introductory paragraph) indicates the overall governance and management structure of GCP, including functions and reporting relations.
 - 13b). GCP Program Organizational Chart: revised version - taken from the forthcoming Product Development Guide, this PowerPoint slide provides a more up-to-date representation of the GCP governance and management structure, including the removal of the PAC and the addition of the Stakeholders' Committee.
14. An xls list of all relevant people in and around the program containing name, function in CP, function/work title outside CP (if relevant), %work for CP, telephone, mail and email contact information. This list should include donor contacts, steering and advisory committee members, all program staff (management, secretariat), as well as the DG, board chair and relevant management of host center – currently awaiting comments from the Panel on this before proceeding further with documentation
15. Preliminary (draft) reports and contact information of the currently active governance task force (Yves Savidan et al) :
 - 15a). Consortium Composition and Governance Structure (Nov 2005): This document serves as an introductory paper developed by the GCP Management Team to introduce the topic of the need for the creation of a Task Force on Governance, first presented at the 2005 PSC annual meeting.
 - 15b) Task Force on Governance Terms of Reference (July 2006): Due to concerns raised by both the PSC and the Stakeholders Committee regarding the governance structure of GCP, it was proposed that a Task Force on Governance be established to address the relevant issues. This document outlines the composition of the Task Force, the issues to be addressed, and the way in which their responsibilities should be carried out.
 - 15c). Report of the Task Force on Governance (Oct 2006): this report serves as the recommendation paper produced by the Task Force on Governance, submitted to the PSC at the 2006 annual meeting.
 - 15d). Task Force on Governance Contact Details - an xls spreadsheet providing contact details for the five (5) members of the Task Force on Governance
16. Subprogram Leader Presentations:
 - 16a). Subprogram 1: Genetic Diversity of Global Genetic Resources--Jean-Christophe Glaszmann
17.
 - 17a). GCP Contacts database - Master list (final version 11/11/07)
 - 17b). GCP Contacts database - PSC Meeting Participants
 - 17c). GCP Contacts database - Competitive Grants (Round I): Pre-proposals, full proposals and successful proposals
 - 17d). GCP Contacts database - Competitive Grants (Round II): Pre-proposals, full proposals and successful proposals

Annex 5
People Consulted by the Panel

Early meetings

- Shawn Sullivan, GCP Legal Advisor, USA
- Maria Jose Sampaio, Brasilia
- Yves Savidan, Agropolis, PSC member

ARM-Meeting, Benoni, S. Africa, September 12-16, 2007

- Hei Leung, IRRI, for SP2 Leader
- Michel Ragot, RAP, France
- Theo van Hintum, SP4 Leader, WUR, Netherlands
- David Marshall, Chair, RAP, UK
- Peter Lanngridge, RAP, U of Adelaide, Australia
- Wayne Powell, Chair PAC, NIAB, UK
- Jean-Christophe Glaszmann, SP1 Leader, France
- Rajeev Varshney, SP2 Leader, ICRISAT, India
- David Hoisington, ICRISAT, India
- Douglas R. Cook, UC-Davis, USA
- George W. Norton, VPI, USA
- M. Carmen de Vicente, SP5 Leader, Mexico
- Philippe Monneveux, SP3 Leaders, Mexico
- Mark Laing, ACCI UKZN, S. Africa

Visit to GCP Secretariat, CIMMYT, Mexico, October 28 – November 3, 2007

- Masa Iwanaga, CIMMYT DG
- Jean Marcel Ribaut, GCP Director
- Jean-Christophe Glazmann, SP1 Leader
- Rajeev Varshney, SP2 Leader
- Philippe Monneveux, SP3 Leader
- Theo van Hintum, SP4 Leader
- Carmen de Vincente, SP5 Leader
- Namita Datta, Governance Advisor, CGIAR Secretariat
- Shawn Sullivan, GCP Legal Advisor
- Wayne Powell, GCP PAC Chair
- David Marshall, GCP RAP Chair
- Adriana Santiago, GCP Project Officer
- Martin van Weerdenburg, CIMMYT Director of Corporate Services
- Bruce Fraser, CIMMYT (consultant?)
- Emmanuel Okogbening, Project officer, Nigeria
- Seraj Zeba, Project Officer, U Dahka, Bangladesh
- Jurandir Magalhaes, Project Officer, Brasil
- Joel Ellis, Project Officer, JIC, UK
- Fred van Eeuwijk, Project Officer, WUR, Netherlands
- David Hoisington, ICRISAT, India
- Mathias Lorieux, CIAT, Colombia
- Marilyn Warburton, CIMMYT, Mexico

Attendance of CGIAR Annual Meeting and GCP Steering Committee Meeting, Beijing, December 5 – 9, 2007

- Paula Bramel, IITA, PSC member
- Ton den Nijs, WUR, PSC member
- José Eugenio Geraldo, PSC member
- Masa Iwanaga, CIMMYT, PSC member
- Jane Morris, ACGT, PSC member
- Yves Savidan, Agropolis, PSC member
- Laura Snook, Bioversity, PSC member
- Shawn Sullivan, GCP Legal Advisor
- Eugene Terry, PSC Chair
- Jean Marcel Ribaut, GCP Director
- Jean-Christophe Glazmann, SP1 Leader
- Rajeev Varshney, SP2 Leader
- Philippe Monneveux, SP3 Leader
- Theo van Hintum, SP4 Leader
- Carmen de Vincente, SP5 Leader

Review Team Meeting, CGIAR Science Council Secretariat, Rome, January 22-24, 2008

- Antonio Schiavone, GFAR
- Ajit Maru, GFAR
- Mark Holderness, GFAR Executive Secretary
- Maurizio Lopez, Embrapa
- Peter Gardiner, Science Council Secretariat
- Sirkka Immonen, Science Council Secretariat
- Ruben Echeverria, Science Council Secretariat

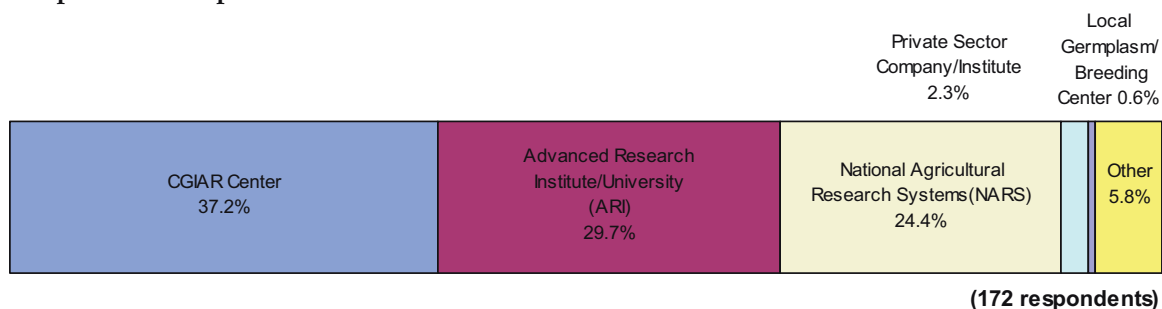
Other interviews conducted by telephone

- John Mugabe, GCP PAC member
- Marc Debois, European Commission
- David Coombs, EC review panel member
- Jonathan Wadsworth, DFID
- David Bergvinson, Bill and Melinda Gates Foundation

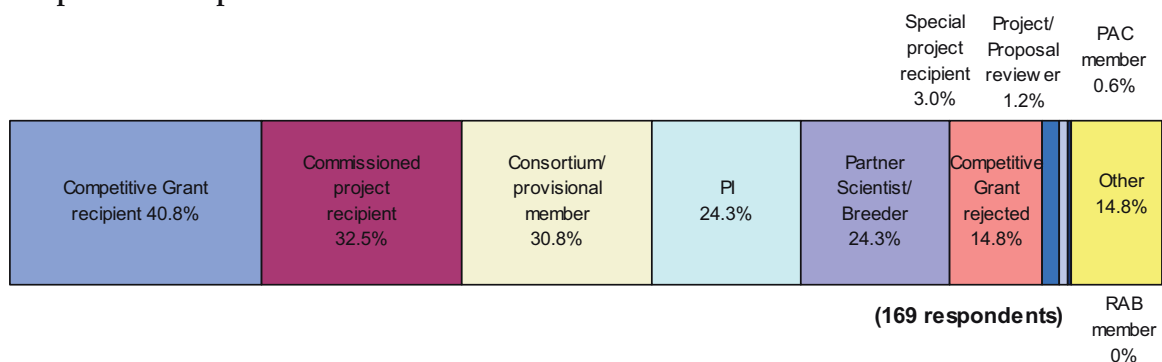
Annex 6 Stakeholder Survey Results

- Out of 417 contacted, a total of 173 respondents submitted the survey by answering at least one question, which gives a response rate of 41.5%.
- 133 respondents completed the survey.
- The outcome below shows a summary of all responses for each of the survey question. When the response patterns showed any divergence among the major affiliation groups (from Q1) or respondent roles (from Q2), the results were further broken down into these categories.

1. Respondent composition: Institutional affiliation(s)



2. Respondent composition: Basis of collaboration and roles with GCP



3. Professional focus: Please check the item(s) that apply to your participation.

Answer Options	Response Percent	Response Count
Variety Development (Variety Breeding, Evaluation / Multiplication / Distribution)	35.1%	59
Germplasm enhancement (upgrading collections, populations and/or lines for any purposes other than direct use by farmers)	20.8%	35
Germplasm characterization (genotyping, phenotyping germplasm)	57.1%	96
Germplasm maintenance (storage and/or rejuvenation of germplasm collections)	11.9%	20
Germplasm collection (adding genotypes to germplasm collections designated for maintenance)	9.5%	16
Gene discovery / characterization	35.7%	60
Marker / QTL discovery	41.7%	70
Marker / MAS platforms	29.2%	49
IS / IT support	14.3%	24
Other	13.7%	23
TOTAL		168

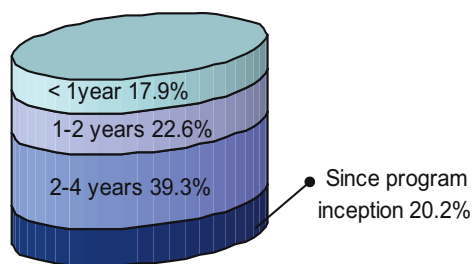
4. Farming system: Please check the system(s) most closely aligned with your efforts.

Answer Options	Response Percent	Response Count
Agro-pastoral millet / sorghum	6.7%	11
Dry rainfed	32.1%	53
Cereal-root crop mixed	8.5%	14
Rainfed mixed	17.0%	28
Highland mixed	3.0%	5
Highland temperate mixed	0.6%	1
Root crop	13.3%	22
Maize mixed	15.8%	26
Rice-Wheat	9.1%	15
Rice	24.8%	41
Temperate Mixed	2.4%	4
Upland intensive mixed	1.2%	2
Maize-beans (Mesoamerica)	3.6%	6
Dryland mixed	6.7%	11
Lowland rice	7.3%	12
Other	22.4%	37
TOTAL		165

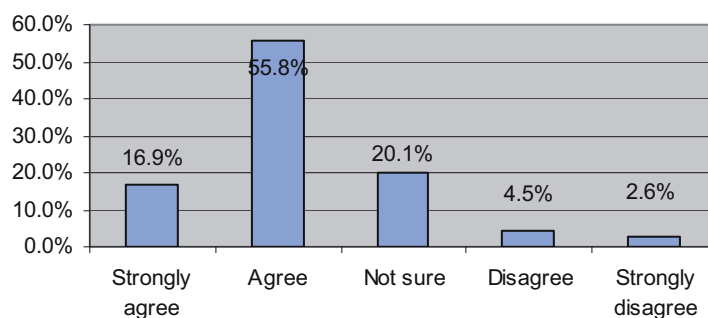
5. Species focus: Please check the species for which you participate directly.

Answer Options	Response Percent	Response Count
Wheat	20.8%	35
Rice	31.5%	53
Pearl millet	4.2%	7
Barley	10.7%	18
Sorghum	13.1%	22
Maize	19.6%	33
Common Bean	5.4%	9
Cowpea	8.3%	14
Soybean	4.8%	8
Pigeon Pea	4.2%	7
Lentil	2.4%	4
Chick pea	9.5%	16
Ground nut	10.1%	17
Cassava	8.9%	15
Potato	6.5%	11
Yam	1.2%	2
Sweet Potato	2.4%	4
Forage spp.	0.6%	1
Musa spp.	4.2%	7
Other	15.5%	26
TOTAL		168

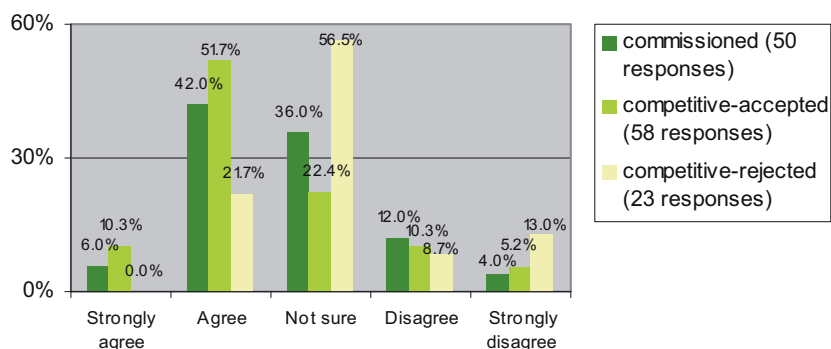
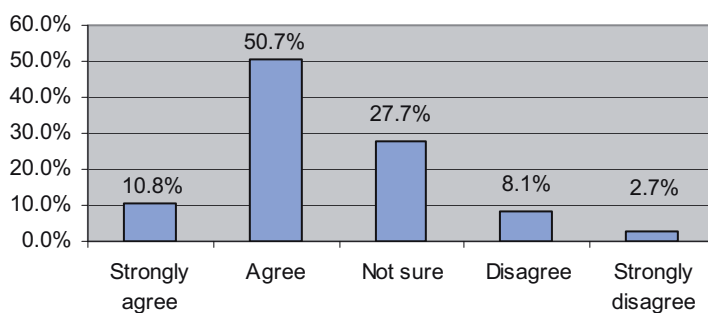
6. How long have you been participating with the GCP? (168 responses)



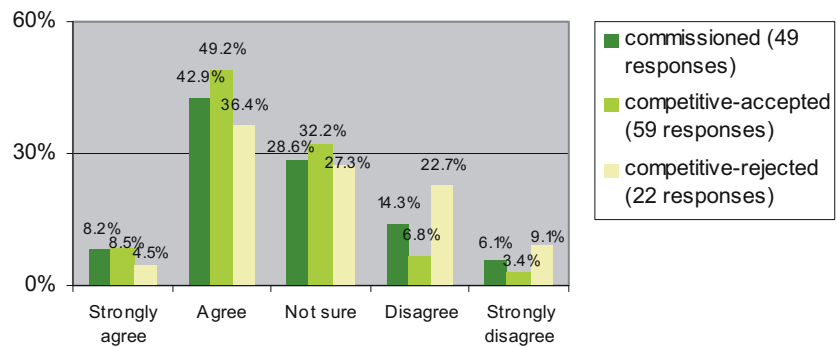
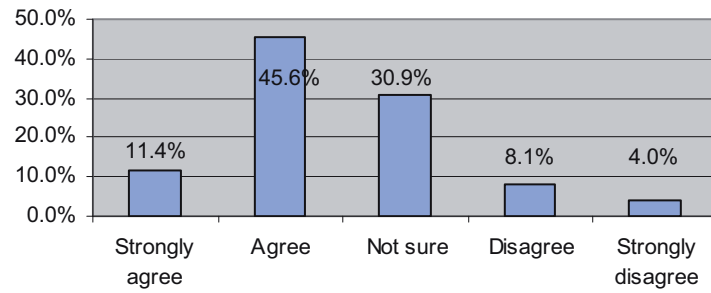
7. The GCP has been successful in identifying and communicating specific goals that will have highest impact on priority beneficiaries (smallholder farmers). (154 responses)



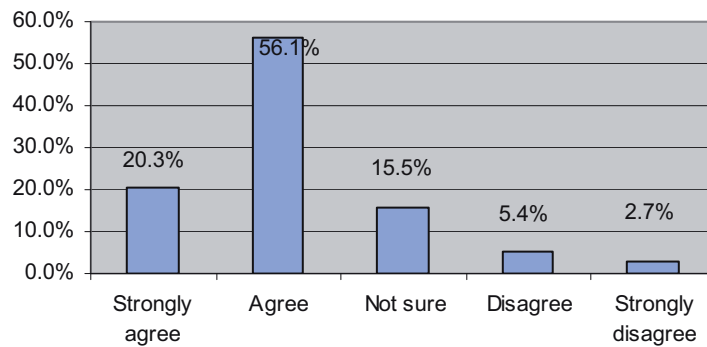
8. The GCP has focused available resources on highest priority / highest impact genetic improvement goals to maximize impact on small stakeholder farmers. (148 responses)



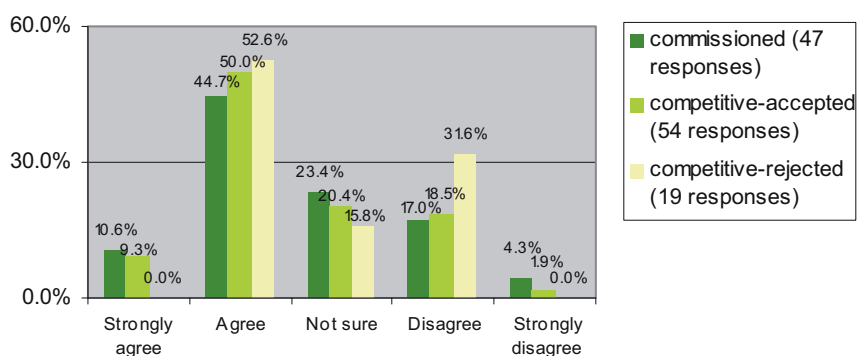
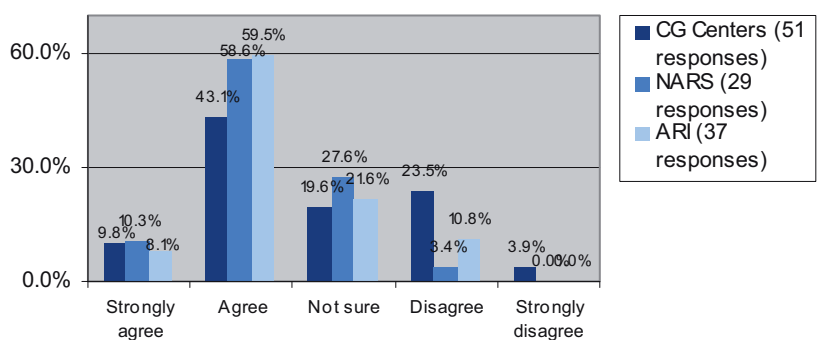
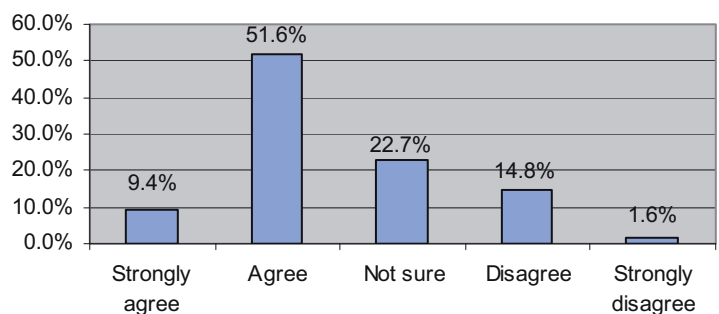
9. The GCP has established efficient and effective methods of disbursing resources to partners and collaborators to overcome technical and capacity limiting barriers to achieve highest priority goals. (149 responses)



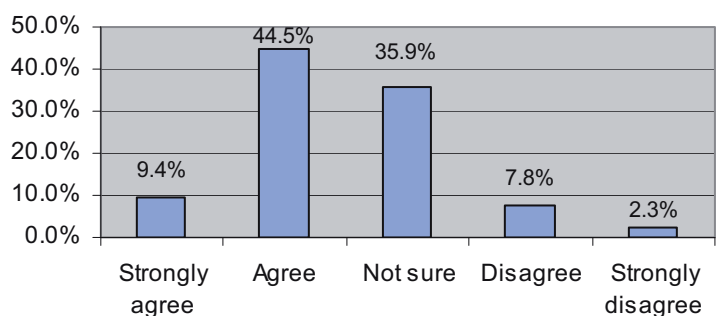
10. The GCP leadership team members have sufficient skills and interaction time with collaborators (to rapidly identify / eliminate barriers, identify opportunities and support optimal progress towards highest priority goals). (148 responses)

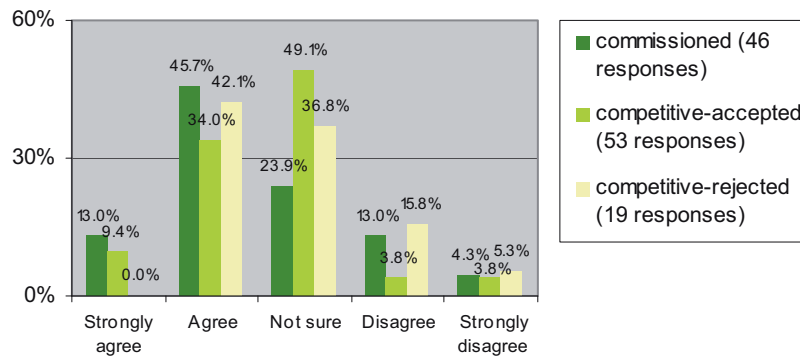
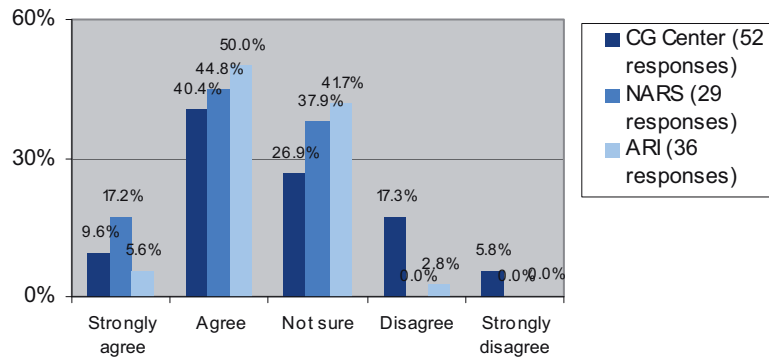


11. The GCP has established optimal procedures for soliciting, negotiating and implementing *competitive projects* that are clearly aligned with need, attract highest quality collaborators, and ensure timely and effective delivery of necessary scientific/technical inputs for highest priority goals. (128 responses)

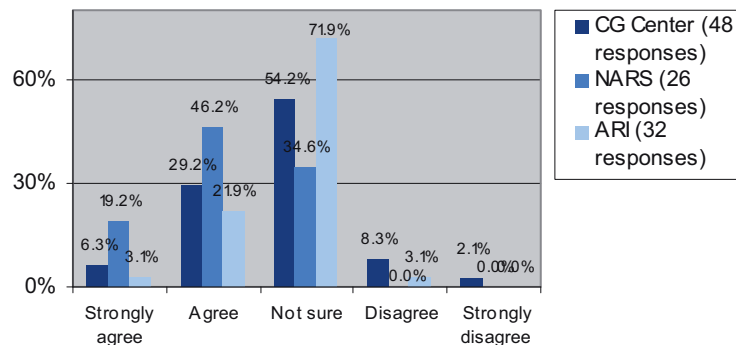
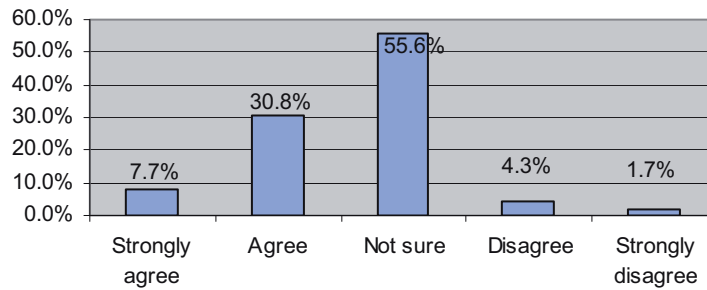


12. The GCP has established optimal procedures to undertake *commissioned projects* consistent with the highest priority goals and most appropriate collaborators (appropriate logistics/facilities and skills). (128 responses)

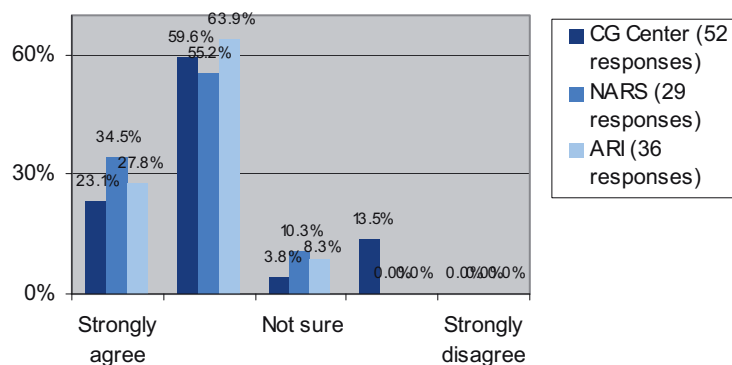
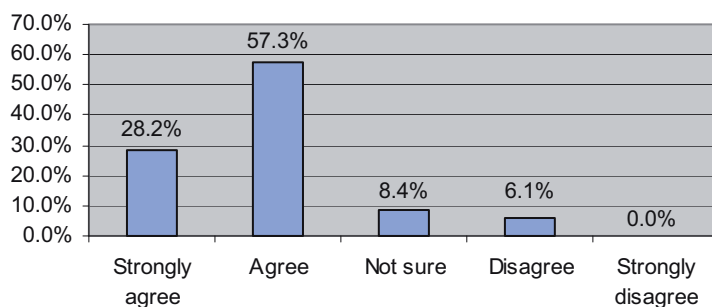




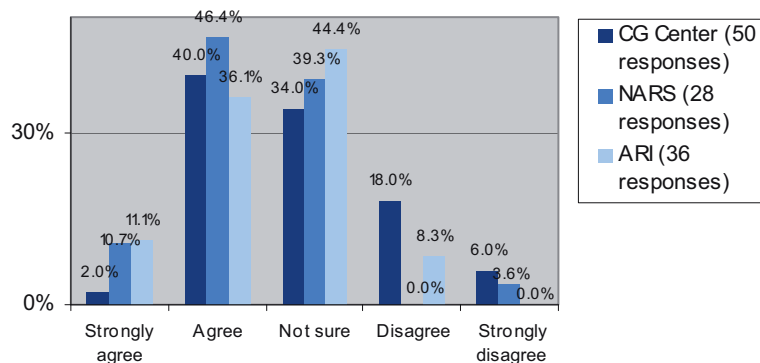
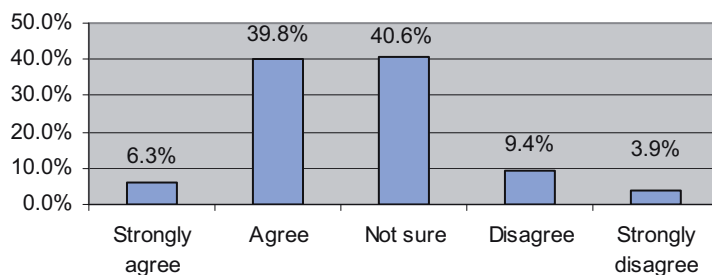
13. The GCP has established optimal procedures to undertake Special Projects consistent with the highest priority goals and most appropriate collaborators (skills, logistics) to ensure timely delivery of needed technical or scientific inputs. (117 responses)

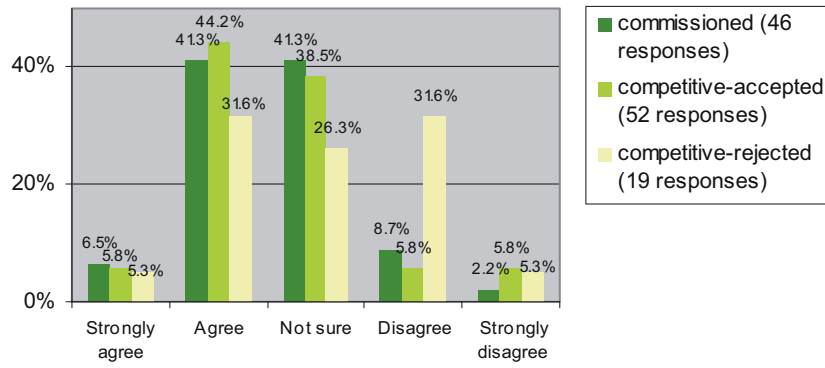


14. Your role and responsibility as a GCP partner in a competitive, commissioned or special project has been clearly defined and communicated to you. (131 responses)

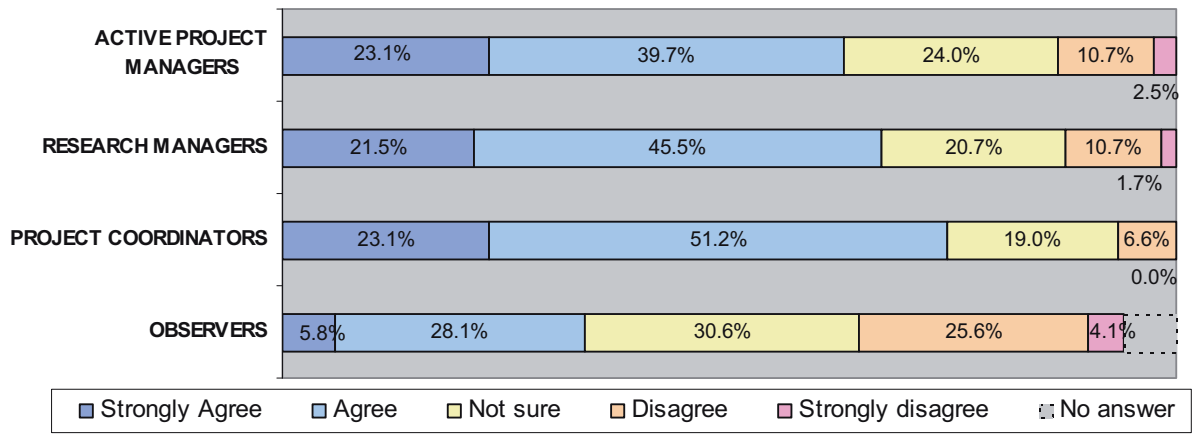


15. The current balance of Competitive Projects (about US\$ 5 Million p.a.), Commissioned Projects (about US\$ 7 M p.a.) and Special Projects (about US\$ 3 M p.a.) is appropriate for maximum impact on priority beneficiaries (small stakeholder farmers). (128 responses)

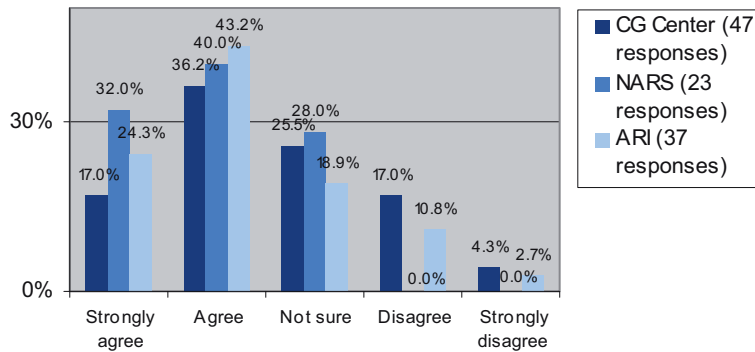




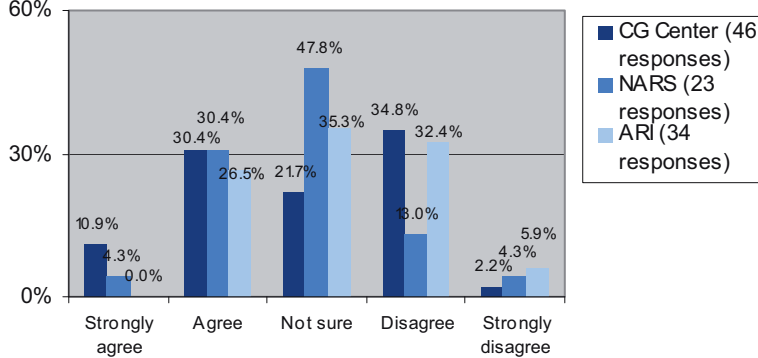
16. The GCP Sub-Program leaders fulfill the role of:

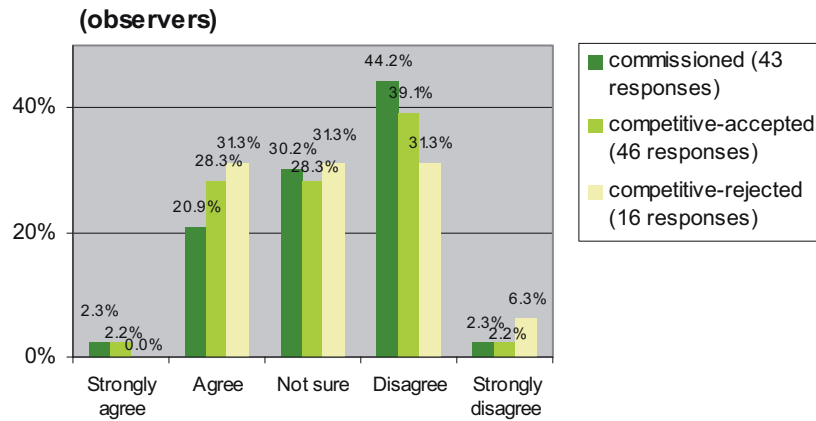


(Active project managers)

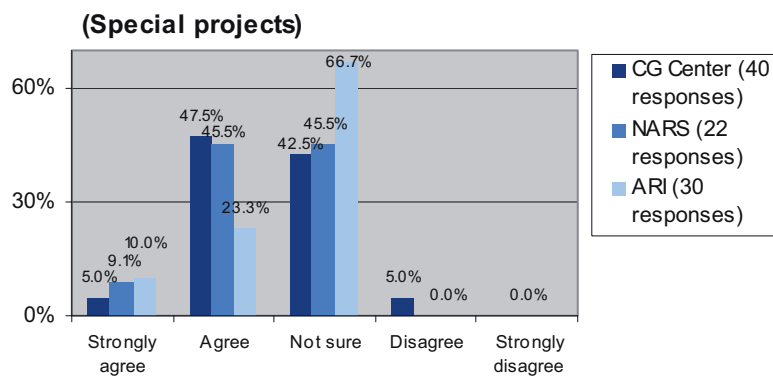
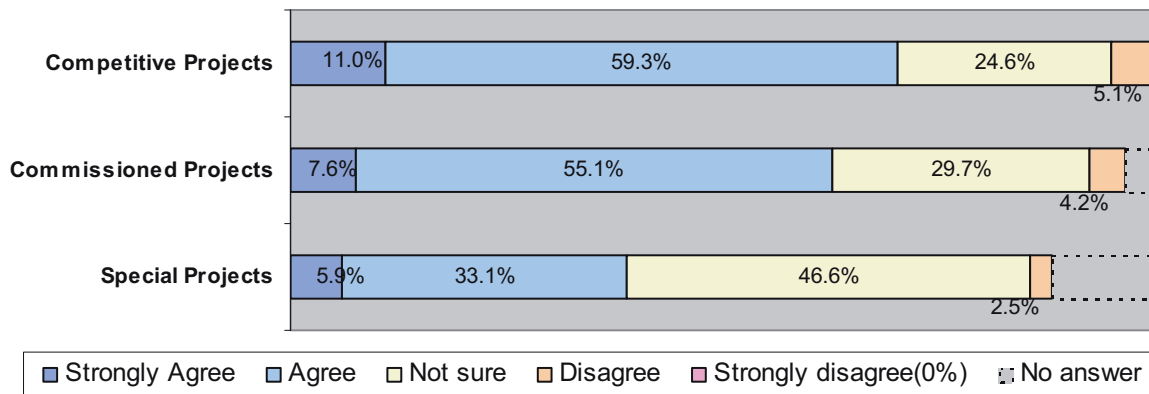


(Observers)

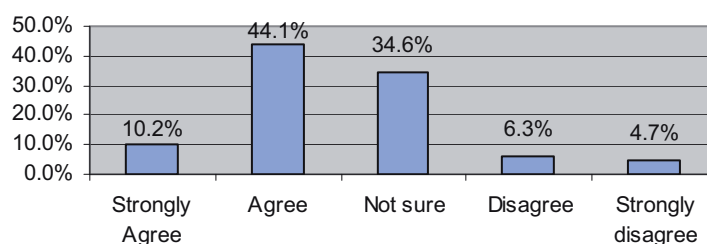


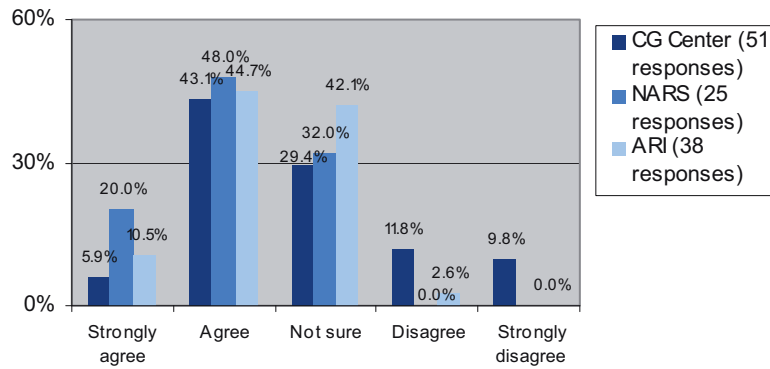


17. The GCP project management systems (e.g., reporting templates and schedules) are sufficient to provide timely assessments of progress and timely handoff of deliverables for: (118 responses)

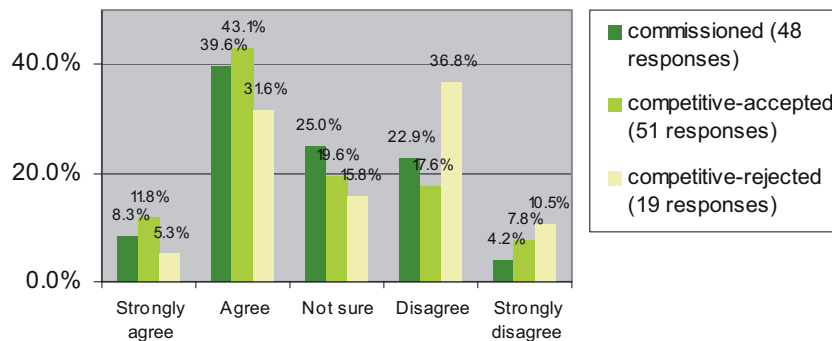
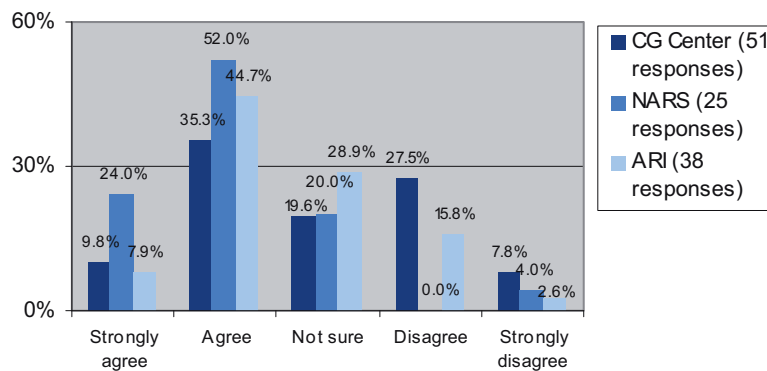
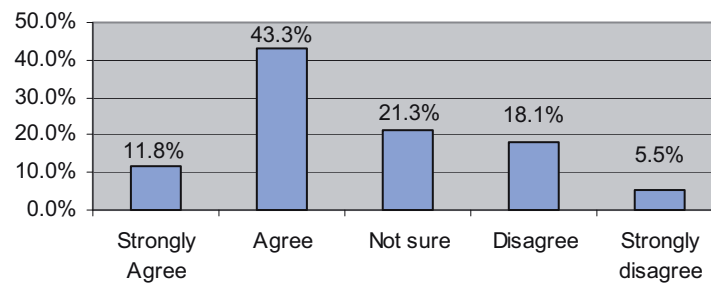


18. The GCP has provided or is developing efficient Information Systems appropriate to support the highest priority GCP goals and facilitate linkage with downstream delivery path to priority beneficiaries (smallholder farmers). (127 responses)

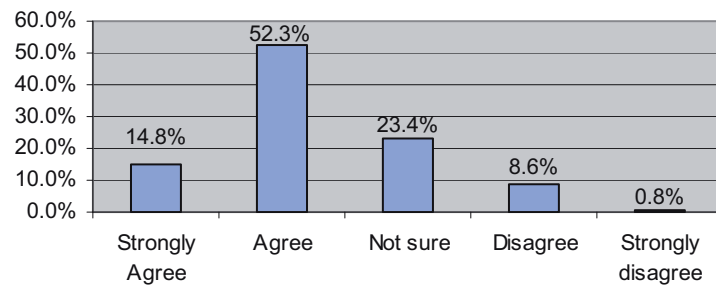




19. The GCP in defining the limits of its projects (e.g., genotypic characterization of germplasm and formulation of diverse reference samples or core collections; trait gene and associated-marker discovery and characterization; and marker platforms) has sufficiently considered and linked to the down-stream delivery chain (breeding and seed/nursery sectors and extension sectors) to ensure timely access to GCP achievements by priority beneficiaries (smallholder farmers). (127 responses)



20. The GCP has provided / is providing stakeholder and collaborator training programs sufficient to ensure adequate skills availability for highest priority projects among GCP collaborators and appropriate for the downstream delivery chain participants. (128 responses)



21. What improvements (if any) would you recommend for GCP (in order of priority)?

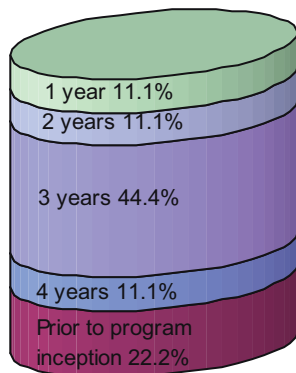
(responses omitted here)

Annex 7
Governance and Management Survey Results

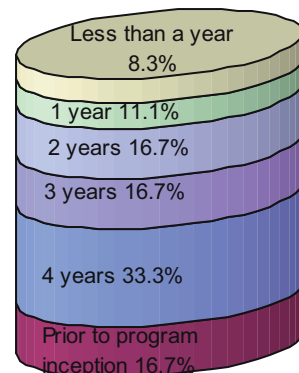
- Out of 52 contacted, a total of 23 respondents submitted the survey. This gives a response rate of 44%.
- One respondent did not fit the governance respondent category and was excluded from the analysis (both as contact as well as respondent).
- One respondent only filled the introductory information and did not respond to the main survey, and this has also been treated as a non-respondent.
- The respondents were divided into two groups:
 - 9 Governance respondents (out of 39 contacted – response rate 23%)
 - 12 Management respondents (out of 12 contacted – response rate 100%)

How long have you been involved with the Challenge Program?

(Governance - total 9 respondents)



(Management - total 12 respondents)

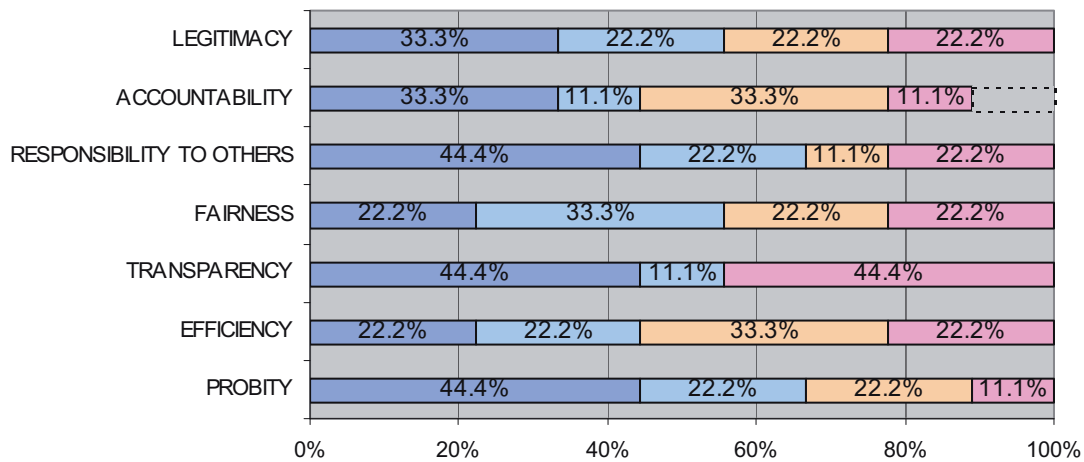


1. Please indicate your satisfaction with the quality of Generation CP Governance and Management along the dimensions listed below.

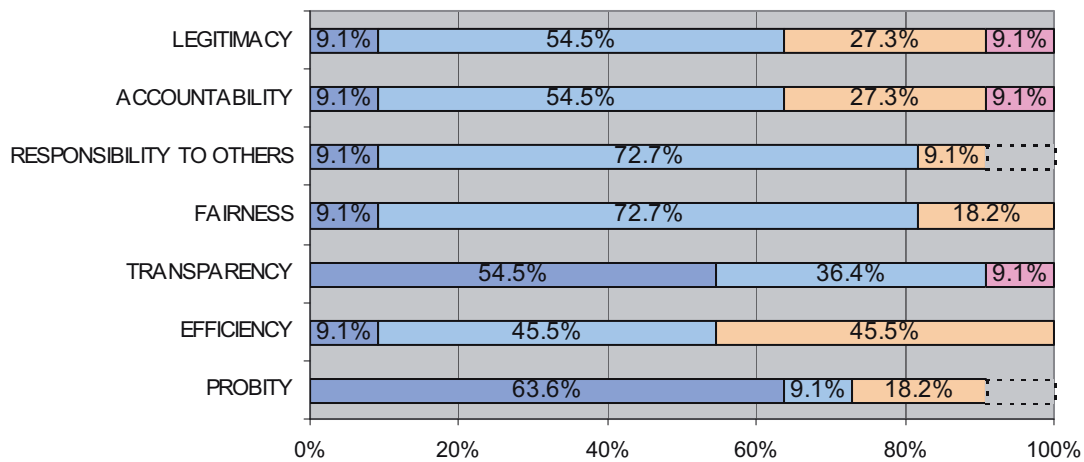
- *Legitimacy.* To what extent do the governance and management structures permit and facilitate the effective participation and voice of the different categories of stakeholders in the major governance and management decisions, taking into account their respective roles and relative importance?
- *Accountability.* To what extent is accountability defined, accepted, and exercised along the chain of command and control, starting with the PSC and the participating centers' boards and going down to the program director, the program management team, project partners and implementers?
- *Responsibility to others.* To what extent does the program accept and exercise responsibility to stakeholders who are not directly involved in the governance of the program and who are not part of the direct chain of accountability in the implementation of the program?
- *Fairness.* To what extent do partners and participants, similarly situated, have equal opportunity to influence the program and to receive benefits from the program (e.g. absence of barriers in terms of structure, process, language, technical or legal information)?
- *Transparency.* To what extent are the program's decision-making, reporting, and evaluation processes open and freely available to the general public?
- *Efficiency.* To what extent do the governance and management structures enhance efficiency and cost-effectiveness in the allocation and use of the program's resources?

- *Probity.* To what extent do all persons in leadership positions adhere to high standards of ethics and professional conduct over and above compliance with the rules and regulations governing the operation of the program?

(Governance - total 9 respondents)



(Management - total 11 respondents)



■ Highly satisfied ■ Slightly satisfied ■ Slightly unsatisfied ■ Highly unsatisfied ■ No answer

2. Please provide comments/suggestions and/or specific examples illustrating your choices in question 1 above.

(responses omitted)

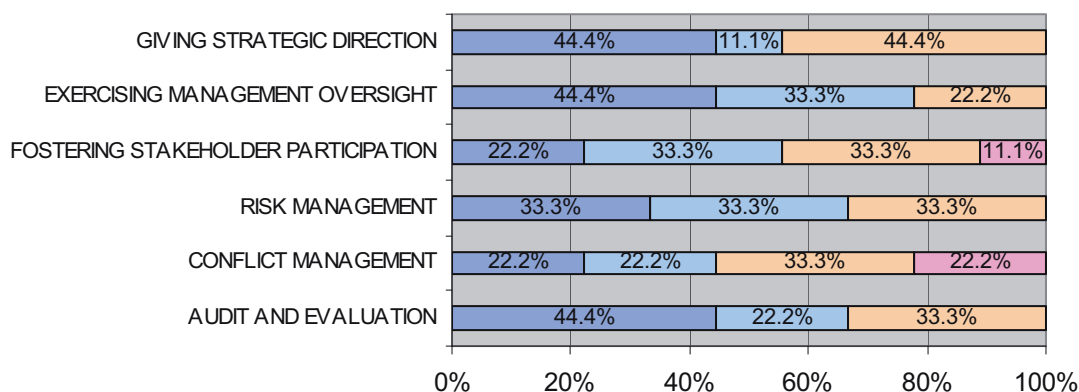
3. Please indicate your satisfaction with the performance of the Program Steering Committee (PSC) in terms of the following functions.

- *Giving strategic decision.* (e.g., exercising effective leadership that optimizes the use of the financial, human, social, and technological resources of the program. Establishing a vision or a mission for the program, reviewing and approving strategic documents, and establishing operational policies and guidelines. Continually monitoring the effectiveness of the program's governance arrangements and making changes as needed.)
- *Exercising management oversight.* (e.g., monitoring managerial performance and program implementation, appointing key personnel, approving annual budgets and business plans,

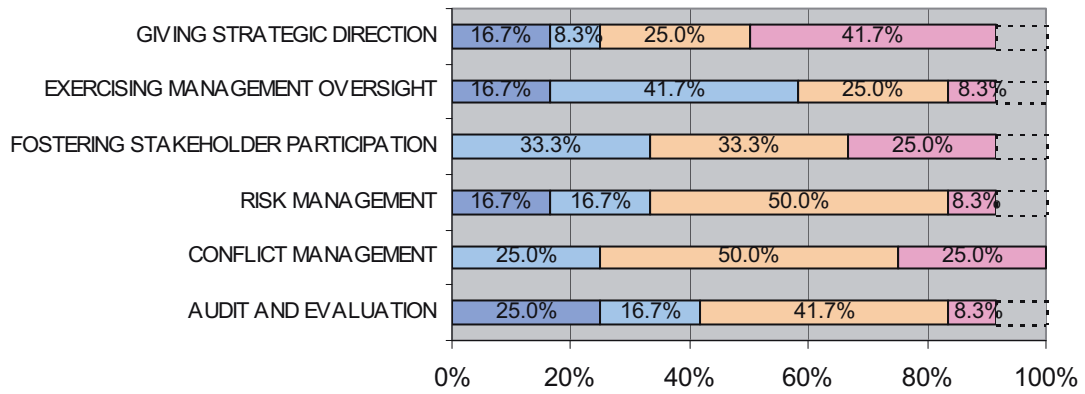
and overseeing major capital expenditures. Promoting high performance and efficient processes by establishing an appropriate balance between control by the governing body and entrepreneurship by the management unit. Monitoring compliance with all applicable laws and regulations, and with the regulations and procedures of the host organization, as the case may be.)

- *Fostering stakeholder participation.* (e.g., establishing policies for inclusion of stakeholders in programmatic activities. Ensuring adequate consultation, communication, transparency, and disclosure in relation to program stakeholders that are not represented on the governing bodies of the program.)
- *Risk management.* (e.g., establishing a policy for managing risks and monitoring the implementation of the policy. Ensuring that the volume of financial resources is commensurate with the program's needs and that the sources of finance are adequately diversified to mitigate financial shocks.)
- *Conflict management.* (e.g., monitoring and managing the potential conflicts of interest of members of the governing body and staff of the management unit. Monitoring and managing conflicting interests among program partners and participants, especially those that arise during the process of program implementation.)
- *Audit and evaluation.* (e.g., ensuring the integrity of the program's accounting and financial reporting systems, including independent audits. Setting evaluation policy, commissioning evaluations in a timely way, and overseeing management uptake and implementation of accepted recommendations. Ensuring that evaluations lead to learning and programmatic enhancement.)

(Governance - total 9 respondents)



(Management - total 12 respondents)

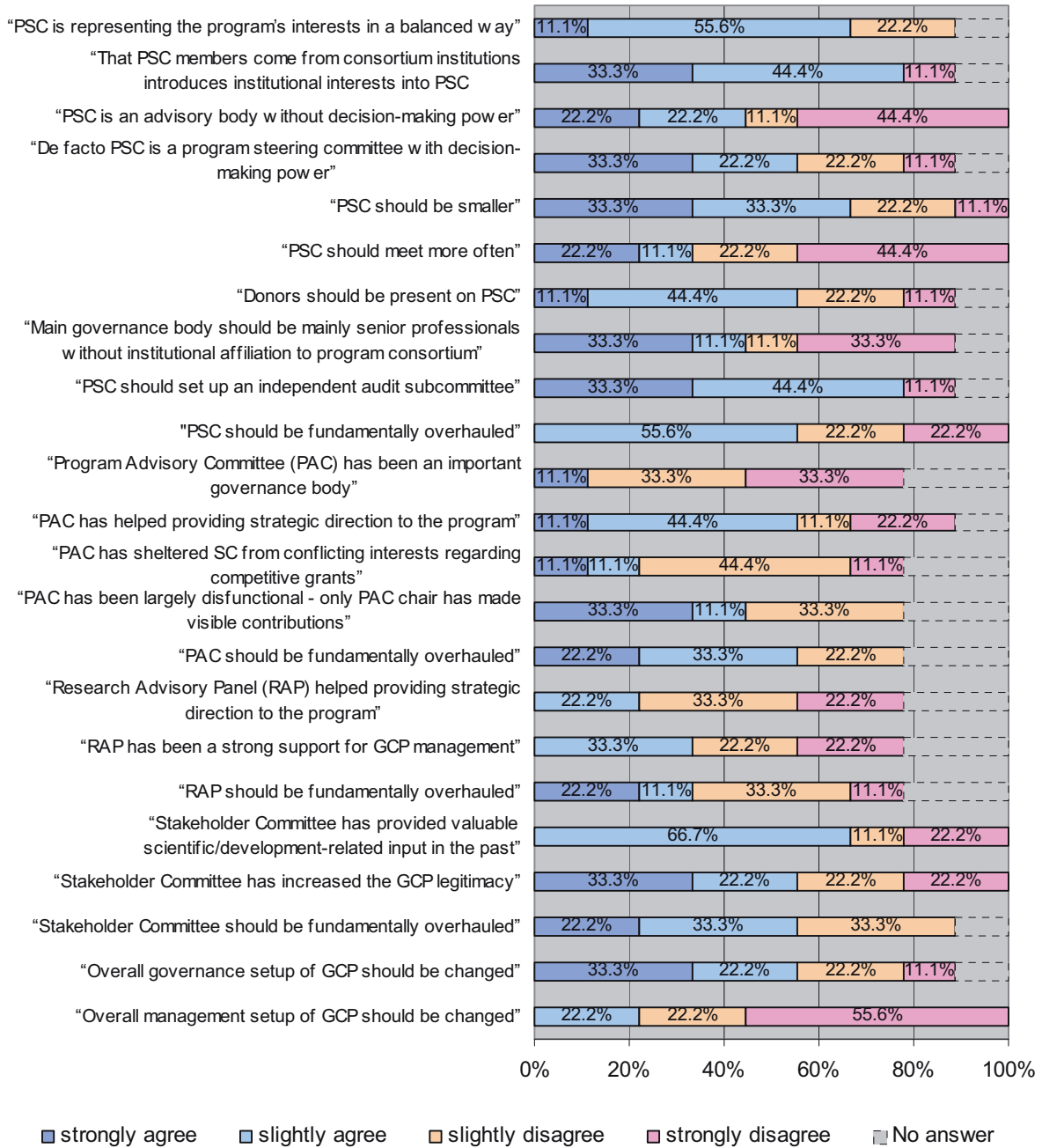


■ Highly satisfied
 ■ Slightly satisfied
 ■ Slightly unsatisfied
 ■ Highly unsatisfied
 ■ No answer

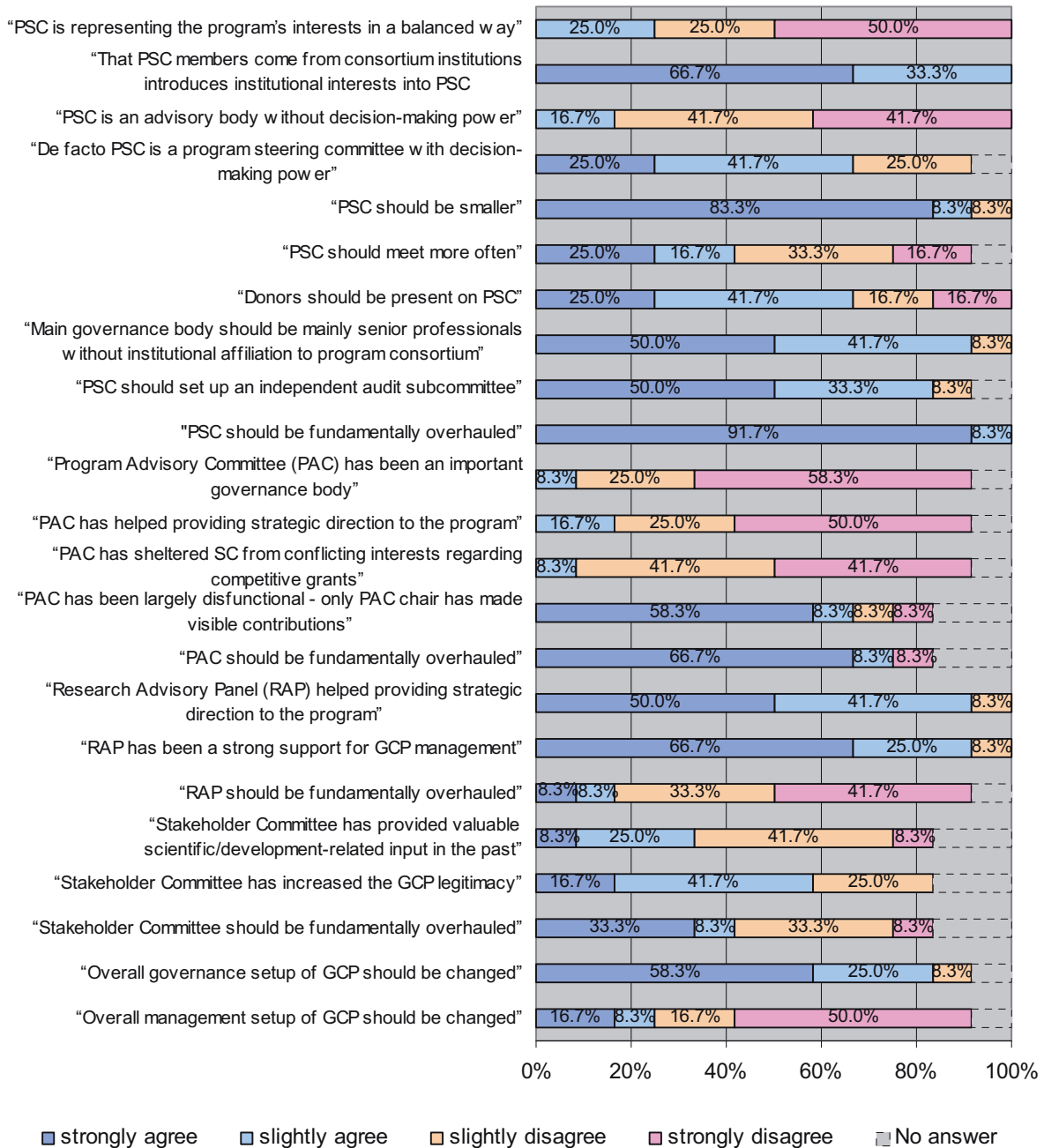
4. Please provide comments/suggestions and/or specific examples illustrating your choices in question 3 above.
 (responses omitted)

5. How much do you agree/disagree with the following statements?

(Governance - total 9 respondents)



(Management - total 12 respondents)



6. Please provide comments/suggestions and/or specific examples illustrating your choices in question 5 above.
(responses omitted)

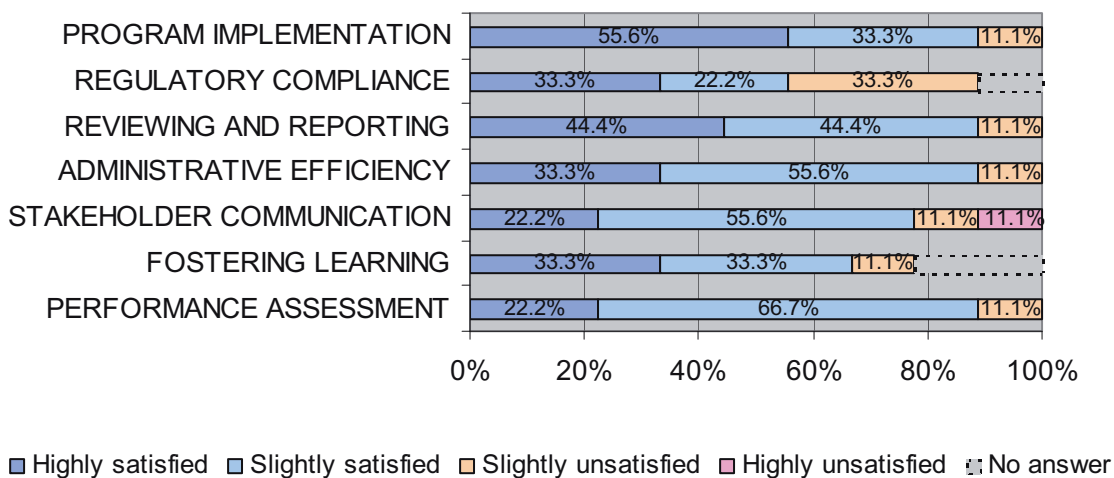
7. Please indicate your satisfaction with the performance of Program Management in terms of the following functions.

- Program implementation. (e.g., managing financial and human resources. Reviewing proposals for inclusion in the portfolio of activities and allocating financial resources among activities. Supervising the implementation of activities. Contracting with implementing or executing

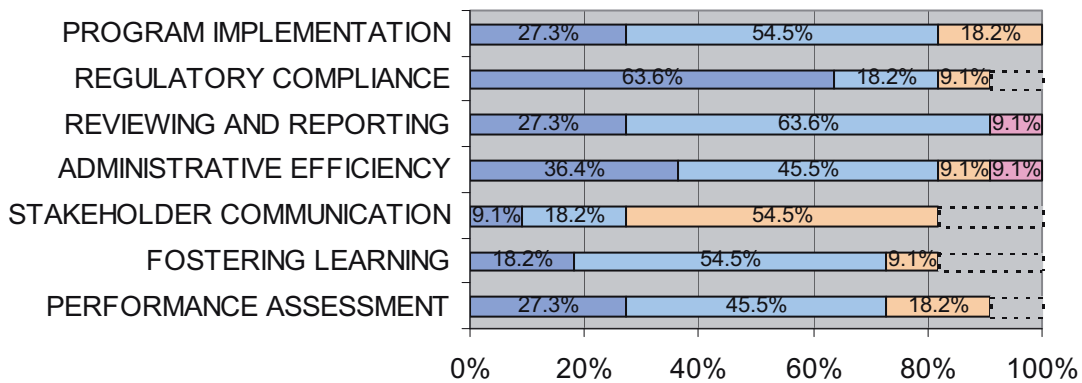
agencies to implement individual activities. Ensuring that these agencies are self-monitoring and reporting their progress in a timely way.)

- *Regulatory compliance.* (e.g., ensuring compliance with all applicable laws and regulations at the international, national, and institutional levels, including the regulations and procedures of the host organization, as the case may be. Being aware of and adhering to these requirements and standards on a day to-day basis.)
- *Reviewing and reporting.* (e.g., taking stock of the overall performance of the portfolio in relation to the program’s objectives and strategies. Reporting progress to the governing body, including any adverse effects of the program’s activities. Serving the needs of the governing body by preparing strategies, policy statements, etc.)
- *Administrative efficiency.* (e.g., maintaining a lean administrative cost structure (while recognizing that administrative costs tend to be higher during the launch period of a global partnership program). Proposing ways to maintain high performance while reducing costs to increase operational effectiveness.)
- *Stakeholder communication.* (e.g., implementing board-approved policies for stakeholder inclusion in programmatic activities. Finding ways to increase the effectiveness of stakeholder participation in all aspects of the program.)
- *Fostering learning.* (e.g., distilling and discerning lessons from the implementation of activities across the portfolio. Transmitting these lessons to both governing partners and beneficiaries in order to inform policy making and to enhance implementation of activities.)
- *Performance assessment.* (e.g., reviewing the performance of operational staff on a regular basis, as well as the performance of consultants at the end of their assignments.)

(Governance - total 9 respondents)



(Management - total 11 respondents)



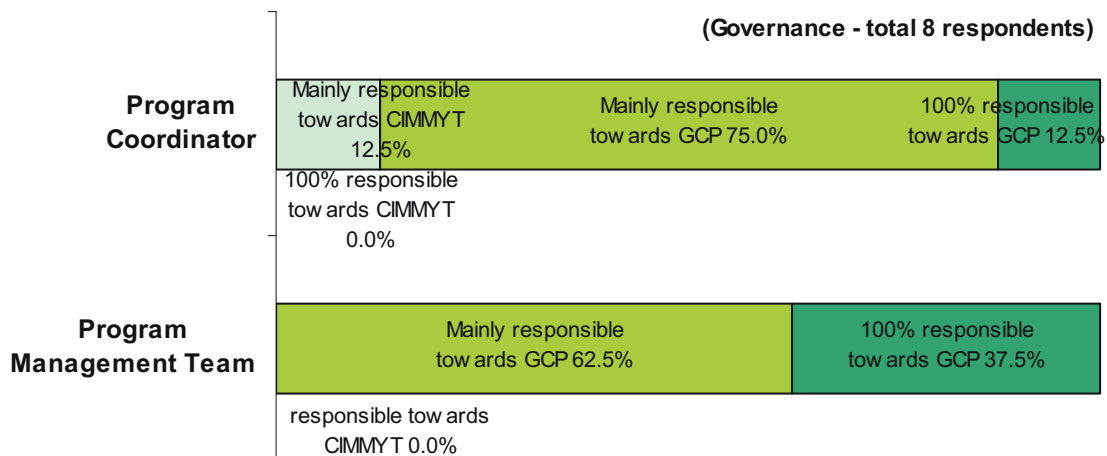
■ Highly satisfied ■ Slightly satisfied ■ Slightly unsatisfied ■ Highly unsatisfied ■ No answer

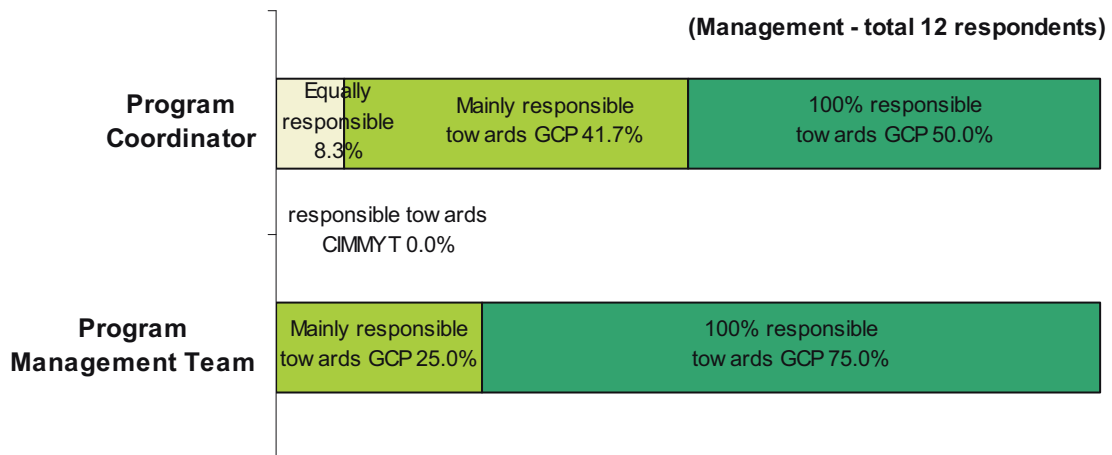
8. Please provide comments/suggestions and/or specific examples illustrating your choices in question 7 above.

(responses omitted)

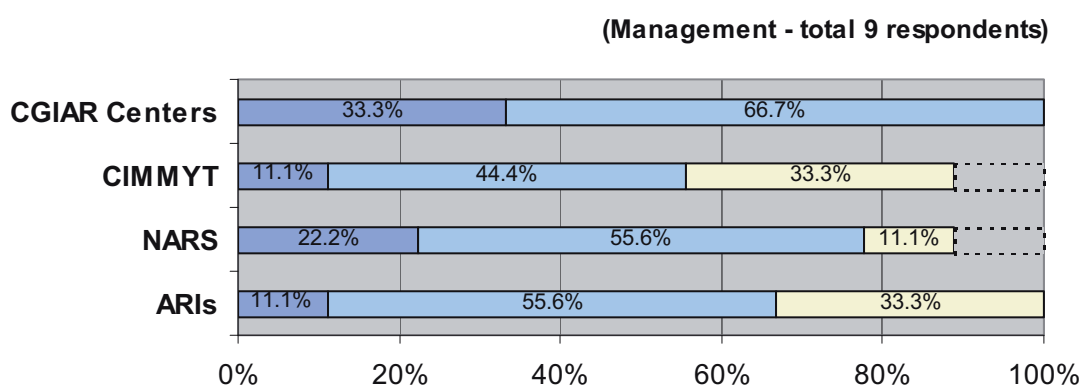
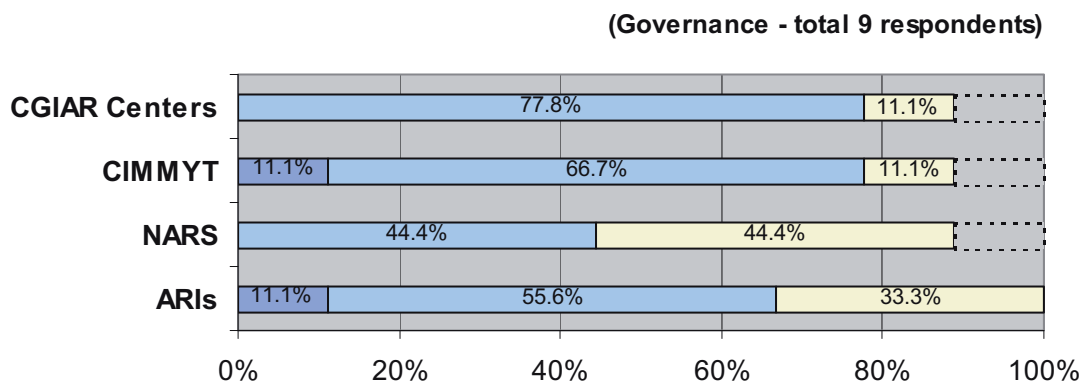
9. The Challenge Program is hosted by the International Maize and Wheat Improvement Center (CIMMYT); the program director and most of the management and secretariat staff are employed by CIMMYT. To what extent does this situation lead to a “two masters problem”, i.e. to a situation of unclear or overlapping responsibilities of program management towards the PSC (or program management) on the one hand and towards CIMMYT governance and management on the other hand?

(Governance - total 8 respondents)





10. The Generation Challenge Program itself is based on a Consortium Agreement. The current consortium members include CGIAR research centers, Advanced Research Institutions (ARIs) and National Agricultural Research Systems (NARS). The composition of the Program Steering Committee reflects this composition. To what extent does this setup lead to potential conflict of interest in the sense that PSC decisions may be driven by institutional interests of PSC members rather than programmatic interests?



- PSC decisions tend to be mainly driven by institutional interests of this subgroup
- Some institutional interests of this subgroup tend to be reflected in PSC decisions
- PSC decisions are taken independent of institutional interests of this subgroup
- No answer

11. **Do you think the current situation as described in the above questions 9. and 10. needs to be improved in any way?**

All Governance and Management responded who responded to this question (9 and 10 respondents, respectively), said "Yes".

12. **Please comment on the advantages and disadvantages of the current hosting arrangement.**
13. **Please add any additional suggestions, comments or feedback you might have.**

Annex 8 Acronyms

ARI	Advanced Research Institute
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo (International Maize and Wheat Improvement Center)
CMD	Cassava Mosaic Virus Disease
COS	Conserved Ortholog Set
CP	Challenge Program
DFID	UK Department for International Development
DNA	Deoxyribonucleic acid
EC	European Commission
EST	Expressed Sequence Tag
GFAR	Global Fund for Agricultural Research
GCP	Generation Challenge Program
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IP	Intellectual Property
IT	Information Technology
IPG	International Public Goods
LIMS	Laboratory Information Management Systems
MAB	Marker-Assisted Breeding
MAS	Marker-Assisted Selection
NARS	National Agricultural Research System
PAC	Program Advisory Committee
QTL	Quantitative Trait Locus
PSC	Program Steering Committee
R&D	Research and Development
RAP	Review and Advisory Panel
SHC	Stakeholder Committee
SIDA	Swedish International Development Cooperation Agency
SP	Subprogram
SWEP	System-wide and Ecoregional Programs (of the CGIAR)



CGIAR

Science Council Secretariat
c/o FAO
Viale delle Terme di Caracalla snc
00153 Rome, Italy

t 39 06 57056782
f +39 06 57053298
e sc-secretariat@fao.org