Visioning the Future of the CGIAR

Report of Working Group 1 (Visioning) to the Executive Council of the CGIAR

6 May 2008

1 Introduction

1.1 Agricultural research and innovation

Agriculture and natural resource management have a fundamental role to play in reducing poverty and improving the livelihoods of the poor[1]. Throughout the developing world, rural people face daily challenges of hunger, poverty, ill-health, environmental degradation and gender inequality. The CGIAR can contribute to overcoming these global challenges, articulated in statements such as the Millennium Development Goals (MDGs), through a people-centered approach to innovation in agriculture and natural resources management. The CGIAR's research and innovation activities support the ability of smallholders and the rural poor to sustain and improve their livelihoods and meet these challenges and to keep food prices within reach of the urban poor.

As rural communities across the developing world feel the pressure of climate change, high food prices, and environmental and energy crises, new knowledge, technologies and policy insights have never been more critical. Global economic and population growth have contributed to increased pressure on food supplies. Natural resources are already over-stressed and further expansion of the agricultural frontier is in most cases not an option.

1.2 The need for change at the CGIAR

Meanwhile, the world of agricultural research has shifted dramatically. The entry of strong new actors into international agricultural research challenges the role of the CGIAR as a major player in the field. The demands of some national institutions also challenge the ability of the CGIAR to meet their needs.

Without change, the CGIAR may no longer be perceived as a critical provider of solutions for agricultural productivity, natural resource management or policy advice. As a result, CGIAR center funding is not increasing in proportion to client needs. If these trends continue, and the CGIAR does not adapt, it will rapidly lose relevance.

1.3 The right time for transformation

After nearly two decades of neglect, high level political recognition is being focused on the role of agriculture and agricultural research in poverty reduction. The World Development

[1] In this paper we use the FAO definition of agriculture, which includes forestry, hunting and fishing, as well as cultivation of crops and livestock production.

Report[2], policy statements from the G-8 and EU, and numerous reports from other institutions[3], together with the current international debates on food prices, climate change and biofuels, are again focusing attention on issues close to the heart of the CGIAR. There has never been a better time to re-establish the system's relevance and dramatically increase support and funding.

In addition, it is clear that the CGIAR has never been more open to change. This is the time to challenge the system's sacred cows, including multiple governance structures, donor sovereignty and center autonomy, and take bold and strategic steps designed to reinvigorate the CGIAR. It is for these reasons that the CGIAR has launched a major change initiative.

1.4 The CGIAR Change Management Process

In early 2008, the CGIAR Change Management Process was initiated. A Change Steering Team (CST) and four Working Groups representing stakeholders and shareholders were established to address: 1) visioning and development challenges, 2) strategic partnerships, 3) governance at the center and CGIAR levels, and 4) funding mechanisms.

Working Group 1 (WG1; see Annex 1), Visioning, was tasked to 1) explore and identify the most relevant development goals and challenges for the CGIAR; 2) develop a new vision and refine the CGIAR mission, 3) propose a set of measurable strategic objectives for the CGIAR that are closely linked to the development challenges, and 4) provide guidance to the other working groups on developing an appropriate business model in support of the revised mission, vision and strategic objectives.

This paper sets out WG1's proposal. The paper reflects the views of WG1, with significant input from stakeholders and the CST. It is intended to form a basis for feedback from the CGIAR Executive Council at their Ottawa meeting in May 2008, and other stakeholders. On

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[2] World Development Report, 2008: Agriculture for Development. The International Bank for Reconstruction and Development/The World Bank, Washington.

[3] International Assessment of Agricultural Science and Technology for Development (2008). Island Press, Washington, DC.

Intergovernmental Panel on Climate Change (2007) *IPCC Fourth Assessment Report: Climate Change*. Cambridge University Press, Cambridge.

Millennium Ecosystem Assessment (2005) *Ecosystems and Human Well-Being: Global Assessment Reports*. Island Press, Washington, DC.

Molden D (ed), 2007. *Water for Food, Water for Live: a comprehensive assessment of water management in agriculture*, Earthscan, London

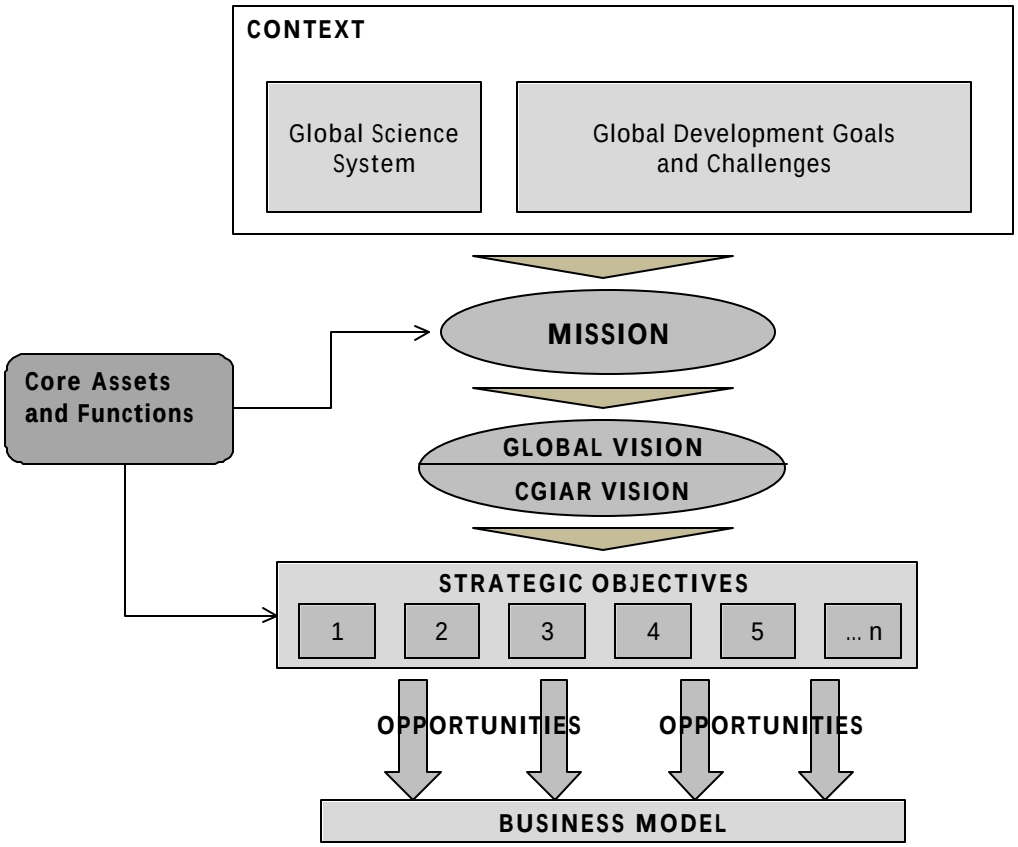
the basis of this feedback, WG1 will be in a position to incorporate more detailed specifications of opportunities and business models developed together with the other Change Management Working Groups.

2 Introducing the process and framework

Over a period of some two months, and through an intensive process of meetings, teleconferencing, document reviews, consultations and e-mail discussions, WG1 has developed a Visioning Framework that captures the global background and context of agricultural and natural resources research for development, and shows how that feeds into a CGIAR-specific framework. The WG1 process, launched in Washington on 27–28 February 2008, is described in detail in Annex 2.

The Visioning Framework provides the structure for the development of WG1's proposed mission, visions, strategic objectives, opportunities and business model. Through a broad review of existing declarations, studies and documents, WG1 identified a number of global development goals and challenges. Combined with an understanding of the existing global science system, these form the context for the Visioning Framework. The CGIAR's core assets and functions were identified to provide the initial conditions for defining the CGIAR's mission, strategic objectives, comparative advantages and the functions expected of the CGIAR by society at global and regional levels. These elements are shown in the Visioning Framework in Figure 1 and described in greater detail below.

Figure 1: The Visioning Framework



In order to ensure clarity and consistency of the sometimes confusing language around the visioning process, the working group developed a Glossary of Terms, shown in Table 1.

Table 1: Shared language around visioning

Term	Definition
Global Development Goals	The overarching external need(s) the vision should address that are relevant to the CGIAR
Global Development Challenges	The set of specific issues that must be addressed to achieve success in meeting the Global Development Goals
CGIAR Mission	The CGIAR's core values (i.e. its guiding principles) and its core purpose (i.e. its most fundamental reason for being)
Global Vision	The description of what we would like the world to look like in the future
CGIAR Vision	A measurable picture of the CGIAR's contribution to addressing Global Development Challenges over the next 15–20 years
Strategic Objectives	Key measurable targets that the CGIAR must achieve to deliver on the CGIAR Vision and in turn the Global Vision
Opportunities	Defined areas of work deemed important to achieve the Strategic Objectives and where the CGIAR, working with its partners, has potential comparative advantages
Business model	The implications for how the CGIAR implements its Strategic Objectives, including partnership requirements and alternative suppliers. Composed of the components such as the business concept, funding structure, system governance, partnerships, people requirements, values and beliefs, and indicative activities

3 The Context

3.1 The global science system

As highlighted in the Visioning Framework, the global science system forms a central part of the context for developing a vision of the CGIAR's future.

The global science system has evolved rapidly in recent decades. The Green Revolution of the 1960s and 1970s stimulated the 'golden years' of rapidly increasing international and national investment in agricultural research and development (R&D). Although investments in R&D produced an average return of over 40 percent, failures of markets

and governance have led to a slowdown in public investment in R&D in recent decades. As a result, declining R&D capacity in many developing countries threatens to leave them as 'agricultural technology orphans'.

Driven by sharp increases in private R&D spending, the knowledge divide between industrial and developing countries is widening. Including both public and private spending, developing countries invest only one-ninth of the amount industrial countries put into agricultural R&D (as a share of agricultural GDP).

The nature of science itself is also changing rapidly. Revolutionary advances in biotechnology and information technology are driving productivity growth and market competitiveness, but the benefits have mainly accrued to larger and more commercial farmers. The vast majority of the poor have yet to benefit from such advances.

Meanwhile, the institutional setting for technological innovation is also changing rapidly. With the development of markets and integrated supply chains, innovation becomes less driven by science (supply side) and more by markets (demand side). Users, within and outside agriculture – including farmers, consumers and market agents – are increasingly important in setting the research agenda.

Agricultural science and technology are also becoming increasingly global, spurred by globalization, privatization and information technology. International cooperation in R&D goes well beyond the CGIAR. Growing capacities in large developing countries with dynamic R&D systems, such as Brazil, China, India and South Africa, are spurring increased South–South cooperation.

Overall, the emerging global agricultural science and technology system is increasingly complex, heterogeneous and corporate. Although the CGIAR is a major producer of global public goods (see Box 1), it is a small player in terms of resources. However, it can and must play a central role in this system given the global nature of many challenges and the opportunity to gain from economies of scale and scope.

Box 1: The research challenge of global public goods

The international donor community has shown itself to be increasingly willing to support programs that have global public good (GPG) characteristics. However, most of the growth in GPG grants has been in the areas of health and environment. Support for knowledge generation and science, including agricultural research, has been weaker.

Despite the increased interest in funding GPGs, unrestricted funding support for the CGIAR which helps support the generation of GPGs, has tended to fall. In the pursuit of GPG research, support from developed country science and technology institutions may be needed to work with the CGIAR on areas of mutual benefit.

3.2 Global Development Goals and Challenges

Agricultural growth in developing regions remains fundamental for poverty reduction and food security. Many smallholders' and rural people's livelihoods depend directly on their ability to produce, and market, agricultural products. The first MDG, to halve poverty and hunger by 2015, will not be reached without urgent revitalization of the agricultural sector, because the majority of the poor depend on the sector. At the same time, the sustainability of the agricultural and food sectors, on which all humanity depends for sustenance, relies on sound management of natural resources.

Multiple factors have recently driven food prices to new highs, demonstrating the vulnerability of the poor to food shortages and high prices. Increases in crop productivity have slowed dramatically in parts of the developing world, so that productivity has not risen in line with demand, compounding the potential for food shortages and prices rises. Substantial investments must be made in agricultural research and innovation if poverty and hunger are to be eradicated in the longer term, and decent livelihoods assured.

Furthermore, improved agricultural systems have crucial roles to play in meeting other development goals, including those highlighted in the MDGs related to achieving greater environmental sustainability, the promotion of gender equality, reduced child mortality and improved maternal health. Agricultural research must tackle how best to manage the scarce resources that affect agricultural production, including water, soils, forests and fisheries. Climate change increases uncertainty about climatic events and raises poor farmers' vulnerability to crop losses and damage. Research is essential to identify means of adapting agricultural systems to changing environmental conditions, as well as mitigating the contribution that agriculture and forest management make to climate change.

Agriculture has great potential to impact on health, both negatively through, for example, the prevalence of food-borne contaminants such as aflatoxins, and positively through the potential for improved nutrition. Agricultural systems themselves severely impact on rural people's health, for instance through pesticide misuse and the creation of breeding habitats for disease vectors. Agriculture's close connection to health demands research attention in the pursuit of future improvements in health and nutrition. At all levels, these and other crucial development challenges cannot be addressed without a specific focus on empowering women to grasp the opportunities for improving their livelihoods and those of their families.

As a first step towards defining the CGIAR's role in addressing global development goals and challenges, WG1 sought to clearly identify the goals and challenges that are relevant to, and within the scope of activities of the CGIAR. As the CGIAR works in the context of global development goals agreed upon by the international community, WG1 first reviewed major declarations, studies and documents which together represent the global community's view of the development goals and challenges facing the world (see Annex 3). These included the MDGs and other major development goals that the international community has committed itself to achieving.

Based on this review, five fundamental Global Development Goals were identified: to eradicate poverty, eradicate hunger, improve human health and nutrition, enhance and protect natural resources and the environment, and eliminate gender disparities and empower women. As a means of meeting these goals, six Global Development Challenges (GDCs) that the CGIAR's future activities should aim to address, were also identified (Box 2). Together with the existing global science system, these goals and challenges are considered to form the basic context in which to build a vision of the CGIAR's future roles and opportunities.

Box 2: Global Development Challenges identified by WG1

GDC1: Improving agricultural productivity and market value in sustainable ways

GDC2: Improving food security

GDC3: Enhancing empowerment and access to assets and markets by the poor, especially rural women

GDC4: Conserving, enhancing and sustainably using natural resources and biodiversity

GDC5: Mitigating and adapting to climate change

GDC6: Enhancing the positive synergies between agriculture and health

4 The CGIAR's core assets and functions

The concept of a global agricultural research for development system has been promoted by the Global Forum for Agricultural Research (GFAR) since 1995, to rationalize and synergize agricultural research for development (ARD) actors' functions based on their comparative and complementary advantages. Within this system, the CGIAR is widely recognized to have an international mandate and a number of core assets. These core assets provide an important element of the 'initial conditions' for defining the CGIAR's vision and mission, and especially its comparative advantage in international agricultural and natural resources research. The current core assets of the CGIAR are generally recognized to include:

- A group of 64 member countries and organizations who are committed to collectively addressing global development challenges through international agricultural research for development
- A critical mass of multidisciplinary scientific human resources with accumulated knowledge of key agroecosystems
- Extensive global research infrastructure (e.g. research stations representing many agroecosystems)
- Global, multidisciplinary research networks with especially strong links to national agricultural innovation systems (NAIS)
- Global collections of genetic resources held in trust for the world community
- Global public trust as an 'honest broker' acting in the interests of the world's poor in the global science, agricultural research for development, and policy-making communities.

Core assets must, of course, be altered in response to a strategic vision, in order to position the system to take on new and emerging challenges. However, core assets can only be changed gradually and usually at considerable expense, so that comparative advantage for the medium term future is largely determined by initial assets. The CGIAR must constantly adapt to the challenges cast by the fast changing context of innovation, policy and rural–urban linkages in developing countries. The CGIAR is thus not static, but must seek a dynamic comparative advantage, taking into account the capacities of other actors as they also change and develop in order to enhance and capitalize on the complementarities.

In addition to the comparative advantages relating to its core assets, the core functions of the CGIAR are defined by society's political and social demands at global and regional

levels. WG1 identified six core functions of the CGIAR, highlighting the unique position of the CGIAR in meeting development goals and challenges.

Research for development. Strategic agricultural research is recognized as a key function of the CGIAR centers, delivering knowledge and technologies, with a focus on poverty reduction, which are essentially global or regional public goods.

Conserving core collections of germplasm and knowledge. The collections of crop and animal germplasm and related passport information, supported by other unique resources such as databases and wider information about the collections, form a core and unique asset of the CGIAR. The value of these assets is likely to increase with growing demands created by, for example, climate change, so that collecting, maintaining, characterizing, enhancing and utilizing these collections will continue to be a core function of the CGIAR.

Catalyzing research and innovation. Based on its research function, a strong and explicit demand is made on the CGIAR to act as a catalyst, leveraging resources and competencies from other actors in support of shared objectives. This may encompass collaboration, brokerage and networking; facilitating spill-over and scaling-up of technologies; funding mobilization; and the establishment of regional and global technical facilities.

Awareness raising, including anticipation/foresight. The CGIAR is in a unique position to provide sound scientific bases for awareness-raising activities with both the public and international decision makers. Given its strong multidisciplinary scientific base, the CGIAR is also in a unique position to develop foresight studies on emerging global agricultural development challenges, for example related to climate change, food security shocks and bio-energies.

Support for policy and decision making. There is increasing demand from decision makers at global, regional and national levels for dedicated decision support systems and tools to facilitate evidence-based policy formulation. Enhancing appropriate policies and overcoming policy failures is a key mechanism for ensuring the CGIAR's impacts on the livelihoods of the poor. Sound and objective policy research is therefore a key function of the CGIAR. Analyses and predictions of demand and supply, trade, public investment in agriculture and rural services, and decision support tools, including models, aid our understanding of the consequences of different types of policies and decisions. The CGIAR's core research function forms the basis for the development of these decision support tools.

Capacity strengthening. The CGIAR's capacity-strengthening function contributes to the global agricultural knowledge system by training individuals and supporting institutional development adapted to the diversity of partners' needs, and enhancing the synergies among national agricultural research systems (NARS) and the CGIAR in the process.

5 Mission and Vision[4]

As outlined in the Visioning Framework presented in Section 2, the Global Development Goals, Global Development Challenges and the global science system provide the context for the future development of the CGIAR. The Core Assets and Functions determine to some extent the strategies and opportunities available to the CGIAR. The Mission and Vision statements draw on these bases, in order to articulate the direction of the CGIAR.

The Visioning Framework for the CGIAR shown in Figure 1 comprises the CGIAR Mission, a Global Vision and a CGIAR-specific vision.

The CGIAR mission aims to reflect the CGIAR's core purpose and values – its guiding principles and fundamental reason for being. It emphasizes what is different about the contribution the CGIAR makes to global development goals and challenges, compared to other organizations that are also working towards the same goals.

CGIAR Mission

To be the proactive and forward-looking global leader, catalyst and partner of choice in the conduct of international agricultural research for development, harnessing human ingenuity and innovation, leading to the empowerment of the poor, especially women, to overcome poverty, hunger and ill-health and to sustainably manage and enhance natural resources in the face of climatic and socio-economic change.

The global vision describes how we would like the world to look, in the context of the CGIAR's potential contribution.

[4] The Mission and Vision may evolve following discussion at the Change Management retreat in Ottawa as well as the ExCo discussion.

Global Vision

A world free of poverty and hunger, supported by healthy and resilient ecosystems.

Finally, the CGIAR vision reflects the CGIAR's contribution to addressing the global challenges over the next 15–20 years.

CGIAR Vision

To significantly reduce poverty and hunger, improve human health and nutrition, and enhance ecosystem resilience through high-quality international agricultural research, partnership and leadership.

6 Strategic Objectives

The Strategic Objectives (SOs) introduced in the Visioning Framework provide key measurable targets that the CGIAR must achieve in order to deliver on the CGIAR Vision and, in turn, contribute to the Global Vision. Based on the development and science context discussed in Section 3, and the assets and functions of the CGIAR outlined in Section 4, the SOs aim to operationalize the CGIAR Vision in a way that can be clearly understood and assessed by the CGIAR itself and partners[5].

Initially, WG1 identified eight SOs (shown in Annex 2), reflecting the breadth of the Vision and Global Development Challenges. Through an iterative process of discussion and refinement, in consultation with the CST, this number was reduced to the five SOs below:

SO1: Accelerate the sustainable increase in yields of food staples

SO2: Conserve, enhance and sustainably use natural resources and agricultural biodiversity

SO3: Facilitate institutional innovations and an enabling policy environment to support pro-poor agricultural growth and gender equity

SO4: Improve availability of safe, nutritious food and healthy production environments

SO5: Improve mitigation and adaptation to climate change in agricultural systems

[5] We note that there is a great deal of consistency between the results of this approach and the current System Priorities, but with some new areas and some different areas highlighted.

A number of elements were recognized as being applicable to all SOs. In order to avoid the need for constant restatement, these universal elements are shown in Box 3.

The SOs are intended to be limited in number, mutually exclusive (to the extent possible) and collectively comprehensive. That is, the opportunities under one SO overlap minimally with the opportunities under other SOs. At the same time, collectively, the SOs should describe the essential international agricultural research portfolio needed to meet the key Global Development Challenges (highlighted in Box 2 in Section 3). Time frames for achieving the SOs will vary, depending for example on how much work has already been completed in some areas.

Box 3: Elements applying to all Strategic Objectives

- Agriculture includes crops, livestock, fisheries, hunting and forestry (as per the FAO definition of agriculture)
- The SOs focus on developing countries (as defined by the UN system)
- The SOs focus on the poor, both producers and consumers. Poor producers include smallholders and wage laborers
- The SOs focus on promoting sustainable systems
- Gender enters as a key opportunity with measurable indicators under each SO
- The CGIAR's new ways of doing business, related to its core functions and to be elaborated in the business models, will be embedded in all SOs with measurable indicators

The SOs all contribute, in cross-cutting ways, to the vision of a world with less hunger and poverty, improved health and nutrition, and more productive and resilient ecosystems. Increased productivity (SO1) can increase farm incomes and food availability as well as reduce prices for poor consumers. The increased productivity must be achieved by using resources efficiently and improving the health of the ecosystems on which food production depends (SO2), including the atmosphere which is affected by greenhouse gases (SO5). Technical solutions often do not take root without the proper enabling environment, institutions, and ability of women, as well as men, to actively participate and contribute (SO3). Higher quantities of food produced through increases in productivity must also be healthier food, with higher levels of micronutrients and lower levels of food-borne diseases (SO4). Production of life-sustaining food must not come at the expense of producers' health (SO4). Poor farmers need the skills and tools to adapt to changing markets (SO3)

as well as an unpredictable and changing climate (SO5). Small farmers need assistance in connecting to dynamic and changing elements in the world food system, including high value animal, fish, fruits and vegetables (SO3) as well as ecosystem services (SO5).

The impact pathways through which the SOs contribute to achieving the CGIAR Vision are complex and necessitate complementary actions by partners as well as a conducive policy environment, which cannot necessarily be assured by the CGIAR. Development-oriented research produces international public good scientific outputs; when adapted to local conditions by collaborators and partners in agricultural innovation systems (i.e. NARS and other partners), these produce outcomes such as adoption of technology options or influence on policy formulation that lead to widespread economic, social and/or environmental benefits. Ultimately these contribute to the global goals relating to poverty, hunger, health, enhancing natural resources, and improving the status of women in agriculture and the food system.

The CGIAR recognizes that it must position its research and related activities to have relevance to its R&D partners, and that this begins at the research conceptualization stage. There must be joint planning and ownership of the endeavors with clarity of roles and responsibilities. Each partner's comparative and complementary advantages need to be harnessed within the research for innovation system if the ultimate development goals and challenges are to be successfully addressed. The conduct of high quality international scientific research and the resulting generation of knowledge is a necessary but not sufficient condition to achieve this. The CGIAR must catalyze and respond to others in this endeavor to transform research into development outcomes and impacts. This is what separates a 'mission-oriented' institution from an academic one. The CGIAR does not have primary responsibility for, or comparative advantage in, the actual delivery of development outcomes and impacts. However it does have a responsibility to ensure its research strategies and priorities align with those of its R&D partners, so that interactive synergies ensue (a GPG) and the resultant outputs are eagerly sought after and acted upon by partners along the various impact pathways.

Impact pathways will differ for the five SOs, as will the combination of R&D partners that will help ensure the ultimate development outcomes and impacts. Sometimes the CGIAR will be primarily involved in the research, while in other cases the emphasis may be more in catalyzing others and awareness-raising. The precise balance will emerge as the business models are articulated. The essential point, as the World Development Report (2007, p.170) indicates, is that in contrast to the Green Revolution GPG era, the CGIAR will be operating in an environment where "... collective action and partnerships involving a variety of actors in an innovation systems framework are emerging as important. Such a

framework recognizes multiple sources of innovation, and multiple actors as developers and users of technologies, in a two-way (nonlinear) interaction. Such systems have many advantages. They can pool complementary assets such as intellectual property, genetic resources and research tools. They can reap economies of scale and scope. They can facilitate technology transfers through arrangements with private input distributors. They can promote integrated value chains. And they can foster mechanisms to express consumer and farmer demands for technology and product traits." As a result, the range of partners for the CGIAR in the future will be much more varied than in the past, and will include the public NARS, the private sector, advanced research institutions, development agencies, NGOs, CSOs and producer organizations both in developing and developed countries. These must be carefully identified to minimize the transactions costs and maximize strategic interactive synergies, a task admittedly easier said than done.

Based on the five SOs, Table 2 was developed by adding the following elements to each SO.

Notional indicators. These are measurable indicators of intermediate outcomes along the development impact pathway. The indicators shown are examples only and are very incomplete. Much further work will be needed in the development of the business models to refine indicators with input from experts in those fields. The indicators will be developed using the SMART framework – that is the indicators will be Specific, Measurable, Attainable, Relevant and Timely.

Key opportunities. These are defined areas of work for achieving the SO where the CGIAR, working together with complementary partners, has a comparative advantage (see below). These should be further refined and prioritized as part of the development of the business models.

Major players and the CGIAR's comparative advantage. The next two columns highlight the existing and potential major players for a key opportunity, and the CGIAR's comparative advantage, based on its core assets and its mission.

Core functions. The six functions of the CGIAR are used to highlight no more than three priority functions that the CGIAR could play for each key opportunity.

A start has been made by WG1 to fill out the elements of Table 2 relating to key opportunities, notional indicators, major players, the CGIAR's comparative advantage and its functions. However, this is necessarily a highly demanding task, which must be completed by experts in close consultation with stakeholders while maintaining a focus on poverty reduction. In many cases, there are strong regional specificities that must be taken into account as well. Research outputs of new technologies, products, policies and

practices (that may be developed with research partners) need to adapted and adopted by users through interaction with national innovation systems. Partnerships and comparative advantage will be key in determining specific research agendas.

This should therefore be seen as the beginning of a process, rather than a product that is ready for in-depth scrutiny. The task of filling out and refining Table 2 will be conducted through the refinement of the Business Model.

Table 2: Strategic Objectives, notional indicators and key opportunities

Strategic Objective	Notional indicators	Key opportunities (to be further refined)	Major players (research partners/ development partners)	CGIAR comparative advantage	CGIAR functions which support key opportunities
1. Accelerate the sustainable increase in yields of food staples	• Yield increases of food staples per unit of land (by region) • Resource use efficiency—e.g. water, nutrients and fossil fuels • Yield stability • A narrowing of gender disparities in the adoption of new technologies	1.1 Genetic improvement to push out the yield frontier and improve yield stability (abiotic and biotic stresses)	CGIAR NARIS Private sector	Germplasm collection Networks Expertise Strong IPG	Research Germplasm collection
		1.2 Developing a global commons of molecular tools and techniques to harness advanced science (including proprietary tools) for the poor	ARIs (PIPRA) BIOS Private sector CGIAR	Strong IPG Honest broker	Catalyzing Capacity
		1.3 Sustainable intensification through on-farm management and institutional innovations and policies (input systems, innovation systems, etc.) with a special focus on reducing fossil fuel use	NARIS CGIAR NGOs	Systems perspective Networks Policy expertise?	Research Capacity Support to decision making?
		1.4 Methods for empowering users in technology development and uptake, especially women	CGIAR Some NGOs Donor projects	Strong IPG Networks	Research Awareness raising Capacity

Strategic Objective	Notional indicators	Key opportunities (to be further refined)	Major players (research partners/ development partners)	CGIAR comparative advantage	CGIAR functions which support key opportunities
2. Conserve, enhance and sustainably use natural resources and agricultural biodiversity	• Conservation and use of increased range of genetic resources and information systems by public and private national breeding systems • Increased latent diversity in cultivated species • More 'crop per drop' trends in soil health and land degradation indicators at benchmark sites in at-risk agro-ecosystems • Improved gender equity in access to benefits from natural resources	2.1 Augmenting, safeguarding, characterizing and disseminating germplasm collections of crops, indigenous livestock and aquatic animals	CGIAR GCDT FAO	Strong IPG Honest broker	Germplasm collection Research Catalyzing
		2.2 Gender-balanced policies, institutions and technologies for sustainably managing land, water, pastures, forest and aquatic resources at ecosystem levels to deliver agricultural products and/or environmental services	Many players, global to local	Networks Databases and models	Catalyzing Support to decision making Awareness and anticipation

Strategic Objective	Notional indicators	Key opportunities (to be further refined)	Major players (research partners/ development partners)	CGIAR comparative advantage	CGIAR functions which support key opportunities
3. Facilitate institutional innovations and an enabling policy environment to support pro-poor agricultural growth and gender equity	• Index of policy distortions (nominal rate of assistance) • Investments in core public goods (R&D, rural roads, etc.) as a share of agricultural GDP • Rural governance indicators • Number of women participating in agricultural policy making, and innovation systems	3.1 Trade, price, and public investment policies	MFIs, OECD (Sub-)regional organizations National governments	Models Databases	Research Awareness raising Support to decision making
		3.2 Rural institutions and governance	MFIs, FAO CGIAR NARIS	Networks Analysis capacity	Research Awareness raising Support to decision making
		3.3 Mainstreaming women's participation in agricultural innovation systems at global, national and local levels	CGIAR Donor projects	Expertise Networks Databases	Catalyzing Awareness raising Support to decision making
		3.4 Policies and institutional innovations to connect smallholders to markets and facilitate diversification	National governments Donor projects NGOs Private sector	Expertise Databases	Research Support to decision making Awareness raising

Strategic Objective	Notional indicators	Key opportunities (to be further refined)	Major players (research partners/ development partners)	CGIAR comparative advantage	CGIAR functions which support key opportunities
4. Improve availability of safe, nutritious food and healthy production environments	• Production of biofortified crops (Zn, Fe, Vitamin A) • Incidence of food-borne diseases • Incidence of zoonotic diseases • Number of households newly achieving food security • Number of women and children eating more nutritious diets	4.1 Biofortification of crop varieties	CGIAR ARIs Private sector	Strong IPG Germplasm collection	Research Catalyzing
		4.2 Developing safer food systems and management practices (e.g., pesticides, aflatoxins)	ARIs Private sector WHO FAO	Networks Strong IPG in some cases Integrated research approach to human health	Research Awareness raising Anticipation
		4.3 More nutritious diets, to improve women's and children's health in particular	NGOs CGIAR	Networks Policy expertise	Catalyzing Awareness raising Policy and support to decision making

Strategic Objective	Notional indicators	Key opportunities (to be further refined)	Major players (research partners/ development partners)	CGIAR comparative advantage	CGIAR functions which support key opportunities
5. Improve mitigation and adaptation to climate change in agricultural systems	• New crop varieties made available for adapting to climate change stresses • Adoption of conservation tillage • Numbers of smallholders participating in carbon financing programs for reducing deforestation • Land area and livestock participating in methane and nitrous oxide emission reduction program • Rate of deforestation attributed to land use changes (i.e. agriculture)	5.1 Improving resilience of key at-risk ecosystems to shocks and ability to adapt to climate change	Many players, global to local	Germplasm Networks Databases and models	Research Catalyzing Anticipation and Awareness
		5.2 Institutional innovations for smallholders, both women and men, to access carbon sequestration funds to reduce deforestation and improve soil management	International organizations NGOs Donor projects projects	Forestry and land use expertise	Research Support to decision making Catalyzing
		5.3 Technologies to reduce nitrous oxide and methane emissions from crops and livestock	ARIs	Crop and livestock expertise	Research Catalyzing Anticipation

7 The Business Model

A business model describes the added value that an organization offers, as well as what is required for creating this value[6]. The CGIAR's business models should flow from the strategic objectives: how the CGIAR sees the world, what it wants to do, and how it moves from mission to vision to outputs, outcomes and impacts on the developments goals. In short, the business model is how the CGIAR system organizes itself to carry out its mission.

In our work we have made the assumption that the origin of the CGIAR system lies in the realization that science, technology and research are key drivers of development. Indeed, the gap between science leaders and laggards is even greater than the more widely cited gap between rich and poor countries[7]. This has given rise to the field of development research, interpreted as research for development, rather than research on development.

The CGIAR business model should therefore ensure that the research products are generated with the clear perspective that they will be used for ensuring the delivery of the system's vision through its strategic objectives. The broad elements of the business model revolve around research for development, partnerships, governance structure and financing, as well as human resources.

An outline of the elements of the business model is shown in Table 3. This table provides some broad guidance from WG1 on possible key elements to be considered in the development of the business model in the near future. The CST, as well as the Chairs of the Working Groups on Partnerships, Finance and Governance, have already reviewed this table, which is provided as a basis for discussion at the Ottawa Change Management Process retreat.

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[6] Osterwalder, A.; Y. Pigneur, and C. Tucci (2005) Clarifying business models: origins, present and future of the concept. Communications of the Association for Information Systems 15. [online] http://www.businessmodeldesign.com

[7] UNESCO (2005) World Science Report. UNESCO: Paris, France.

Sagasti, F. (2004) Knowledge and Innovation for Development: The Sisyphus Challenge of the 21st Century. Edward Elgar Pub: London, UK.

Wagner et al. (2001) Science and Technology Collaboration: Building Capacity in Developing Countries? RAND Corporation [online] http://www.rand.org/publications

Table 3: Operationalizing the Vision: Guidance for the Business Model

Business Model Criteria	Guidance from WG1	Accountability
Research agenda	▪ Ensure that the focus of the CGIAR research portfolio includes climate change and agriculture and human health linkages, in addition to the current focus areas ▪ Make a requirement that all research activities conducted by the centers must support the CGIAR's vision ▪ Determine the right research focus for synergy between the system components (e.g. each center does not have to address each of the components of the vision) ▪	Science Council in collaboration with Working Group 1
System governance	▪ Recommend a system that closely ties the Strategic Objectives to performance measurement and accountability in the system ▪ Consider the research areas implied by the vision to determine how to streamline the system ▪ Identify opportunities for collaboration among centers and between other key stakeholders ▪ Ensure that the pro-poor focus of the vision is translated into the system structure ▪ Recommend appropriate mechanisms to perform each of the key functions as outlined by WG1 in the ExCo paper (esp. decision making)	Working Group 3 - Governance

Business Model Criteria	Guidance from WG1	Accountability
Funding structure	▪ Consider which new sources of funding are available to us based on the new research agenda and system structure ▪ Determine how we can best anticipate areas of high opportunity according to the system's strength ▪ Recommend how to limit/eliminate restricted project funding that does not support the CGIAR vision and research agenda	Working Group 4 - Funding
Partnerships	▪ Consider how the key functions impact partnerships ▪ Determine how partnerships can support the new research agenda, and develop operational guidelines in relation to the modes and frameworks that are necessary ▪ Analyze ways in which the CGIAR can contribute to the global innovation process integrating partners in achieving the vision ▪ Ensure that the CGIAR's partnership structure matches the pro-poor focus of the vision	Working Group 2 - Partnerships
People requirements	▪ Ensure the CGIAR has the right talent to: ▪ Address the new research agenda ▪ Perform the key functions as outlined in the WG1 ExCo paper ▪ Put a system in place to close the gender gap, promote excellence and increase women's and young people's opportunities for advancement	TBD

8 Concluding remarks

The process of Visioning the Future of the CGIAR has moved a considerable distance since the launch of the Change Management Process in Washington in February 2008. Working Group 1 has drawn together a variety of information, resources and inspiration to identify clear and specific Global Development Goals, Global Development Challenges and the Core Assets and Functions of the CGIAR. Based on these elements, the Working Group has developed the Mission, Global Vision and CGIAR Vision, and a comprehensive set of Strategic Objectives for discussion at the Executive Council meeting in Ottawa in May 2008.

The CGIAR Vision and Mission provide clear guidance to the system and to outsiders about the CGIAR's core purpose and values, and how the CGIAR contributes to a global vision, shared with many partners, of a world free of poverty and hunger supported by healthy and resilient ecosystems.

The Strategic Objectives for the CGIAR proposed by the Working Group identify the separate elements necessary for achieving this Vision. Clear, outcome-based Strategic Objectives, supported by measurable indicators and addressing the key opportunities where the CGIAR has a comparative advantage, will demonstrate to stakeholders the CGIAR's progress towards fulfilling the CGIAR Vision.

The Working Group proposes the development of business models to take forward and provide the operational structure for implementing the Strategic Objectives. These business models should encompass the CGIAR's research itself, the system's governance structure, funding mechanisms, partnerships with other organizations and human resources requirements.

In a very short space of time, Working Group 1 has made significant progress in meeting the mandate that it was given at the start of the Change Management Process. Working with a system-oriented mindset, in an atmosphere of mutual trust and empathy among working group members, has proved to be an effective approach to change management. The Working Group offers this proposal as a solid basis for the future of the CGIAR.

Annex 1: Working Group Members and Terms of Reference

Jean Lebel (Chair)	IDRC
Felix Franca	Brazil
Amelia Goh	Gender and Diversity
Monica Idinoba	Nigeria
Jean-Luc Khalfaoui	EIARD
Miriam Kinyua	Kenya
Martin Kropff	Wageningen University
Mangala Rai	India
Jim Ryan	SPIA
Takuji Sasaki	NIAS
Joachim von Braun	IFPRI
Funing Zhong	China
Support to the working group	
Derek Byerlee	Consultant
Meredith Soule	USAID
Ruben Echeverria	FAO
Xiaoyue Hou	Administrative Support, CGIAR Secretariat

Working Group Terms of Reference

Individual Terms of Reference for Each Working Group

Working Group 1 (Visioning):

- Create clarity, shared understanding and alignment around the CG visioning and goals, while not "reinventing" the CGIAR's mission
- Identify and develop major research challenges/themes that bridge to Millennium goals

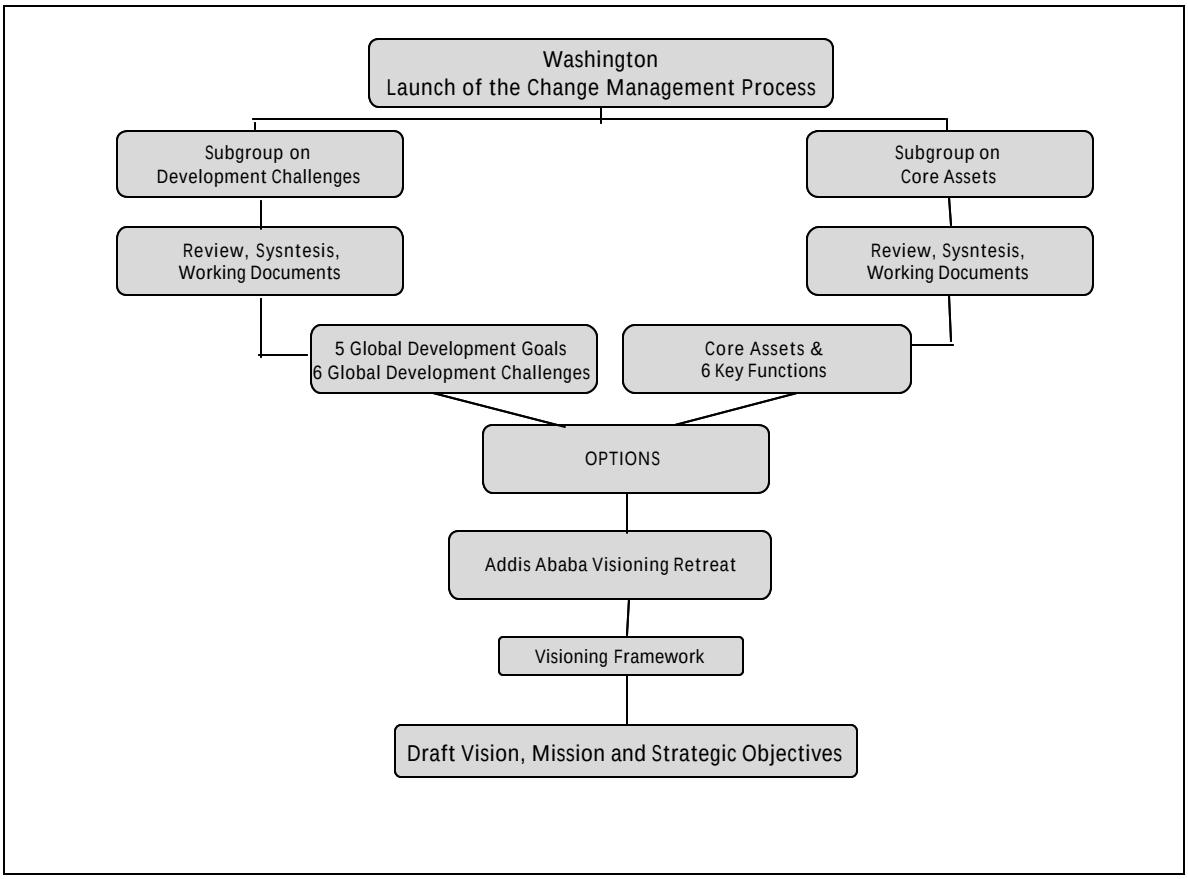
- ***Amendments (as presented by the Working Group):***
- Recommend a vision for the CGIAR and its impact on the agriculture landscape
- Review the external landscape to identify development challenges, assess our current capabilities and assets and develop options over the next few weeks as to how we are uniquely able to meet those challenges
- Primarily focus on the vision and only adjust the mission if it doesn't serve the vision
- Recommend where we stand on the research for development continuum
- Recommend how to position the CG
- Leverage existing research

Annex 2: The process

The Change Management Process was launched in Washington on 27 and 28 February, 2008. A Change Steering Team (CST) and four working groups were established to examine the issues surrounding Visioning, Partnerships, Governance and Funding Mechanisms. Working Group 1 (WG1) was given the task of Visioning the Future of the CGIAR, with the Terms of Reference shown in Annex 1.

The process followed by WG1 is outlined in Figure 1, below.

Figure 1 a: The process to date



Following the launch of the Process, WG1 established two sub-groups on identifying:

- Development Challenges
- Core Assets

The CST and WG1 met for a stakeholder consultation process, followed by a day long Visioning Retreat in Addis Ababa on 3-4 April, 2008. Discussions were held in break out and plenary sessions on the global development goals and challenges, and on the CGIAR's assets and competencies within each of the challenges.

Following the retreat, WG1 developed a Visioning Framework in order to capture the global background and context for the development of the proposed CGIAR Mission, Visions and Strategic Objectives. This Annex summarizes the process followed by WG1 in identifying the Development Challenges and Core Assets upon which the Mission, Visions and Strategic Objectives are based.

Global Development Goals and Global Development Challenges

The CGIAR works in the context of global goals agreed upon by the international community, such as the Millennium Development goals, as well as a world of fast-changing global challenges and an evolving science system.

In looking at global development goals and challenges with potential relevance to the CGIAR, as expressed by the international community, WG1 took a broad view of the landscape by reviewing major declarations, studies, and documents and categorizing them according to the approach taken for defining the goal or challenge. A list of the documents reviewed can be found in Annex 3. The framework had three types of approaches:

1. Type 1: Normative approaches (prescriptive, derived from norms, declarations, set goals, rights to achieve, sometimes with a set timeline).
2. Type 2: Positive approaches (descriptive, based on outlooks, scenarios, threat analyses, comparisons with desired developments).
3. Type 3: Political economy approaches (mega trends analyses, visionaries' perspectives, big thinkers' and opinion leaders' perspectives, mixes of positive and normative).

A matrix of global challenges was developed which categorized the studies and statements according to the three part framework. Table 1 summarizes the types of challenges found under the three approaches.

Table 1a: Global Goals and Challenges derived from Statements and Studies

Normative Approaches	Positive Approaches	Political Economy Approaches
Right to food; Eradicate hunger; Achieve food security; Combat malnutrition	Food security; Ensure global and local food supplies; Address micronutrient deficiencies;	Ensuring food security in light of rising food and energy prices; Hunger; Malnutrition; Biofortification
Improve human health; Control major diseases		Diseases
Eradicate poverty; Improve rural livelihoods; Reduce inequity	Poverty reduction; Build assets of small farmers;	Meeting basic needs of the poor; Overcoming poverty
Reverse loss of and conserve and manage natural/environmental resources; Protect biodiversity	Sustainable land management; Desertification; Deforestation	Competition for land and water and earth's productivity;
Access to safe drinking water; Improved water management & sanitation	Water security; Efficient water use; Sustainable water management	Water and sanitation
Combat climate change	Climate change adaptation and mitigation	Global warming
Increase agricultural production	Targeted investments in agricultural knowledge, science and technology; Raise agricultural production while protecting the environment	Accelerating scientific and technological breakthroughs;
Sustainable development	Sustainable development	Sustainable growth
Good governance		
Trade liberalization	New policies, regulatory frameworks, and international agreements	Subsidies and trade barriers
	Biofuel production and agriculture-energy linkages	Growing energy demands; Energy/environment dilemma
	Population increases and changes in eating habits	
	Conflicts and security; Refugees and immigration	Conflicts
		Women and development

This review was used to suggest a set of global goals and challenges relevant to the future of the CGIAR. A number of goals and challenges were deemed to form an important part of the context for the CGIAR but to not be the goals and challenges that the CGIAR itself

should directly work on such as population growth, refugees and migration, conflicts, access to safe drinking water, good governance outside of the agricultural sector, etc. A set of four goals were proposed, which were collapsed to three by agreement of the entire WG: 1) Eradicate poverty; 2) Eradicate hunger and improve health; and 3) Enhance and protect natural resources. The fourth goal had been Improving human health, which was included with the eradicating hunger goal. Under these three goals, a total of six global development challenges (GDC) relevant to the CGIAR were elucidated, shown in Box 1 below.

Box 1a: Global Development Challenges

GDC1: Improving agricultural productivity and market value in sustainable ways.

GDC2: Improving food security.

GDC3: Enhancing empowerment and access to assets and markets by the poor, especially rural women.

GDC4: Conserving, enhancing, and sustainably using natural resources and biodiversity.

GDC5: Mitigating and adapting to climate change.

GDC6: Enhancing the positive synergies between agriculture and health.

For the Addis visioning retreat, WG1 grouped the six challenges under the three goals and discussed these under the headings:

- Implied global development challenges relevant to the CGIAR
- Key opportunities for the CGIAR
- Major players
- Comparative/complementary advantage of the CGIAR
- Roles and functions
- Geographic specificity
- Current emphasis and gaps to be filled
- Business model

At the Addis retreat, small groups were formed to discuss these papers in detail. The result of this extensive and useful input was that the 6 challenges are relevant, but that they cross-cut across the three goals. Therefore, the three goals as a separate construct

were dropped and replaced by five Global Development Goals shown in Box 2 below, defined as the overarching external needs that form a basis of the vision and that are relevant to the CGIAR.

Box 2a: Global Development Goals

1) Eradicate poverty
2) Eradicate hunger
3) Improve human health and nutrition
4) Enhance and protect natural resources and the environment
5) Eliminate gender disparities and empower women.

Core Assets and Functions of the CGIAR

The second sub-group was tasked with identifying the Core Assets of the CGIAR, which represent the current and potential offer of the system.

The Core Assets of the CGIAR are broadly defined as its:

- Sixty-four member countries and organizations committed to addressing global development challenges through international agricultural research
- Critical mass of multidisciplinary scientific human resources
- Global research infrastructure (e.g. research stations representing many agroecologies)
- Global research networks with especially links to NARSs
- Global collections of genetic resources
- Global public trust as an "honest broker" in the interests of the world's poor.

The Core Assets of the CGIAR comprise two sets:

1. The Core Competencies of the CGIAR Centers, in the areas of the five System Priorities
2. The current and potential five Key Roles & Functions of the CGIAR within the global ARD system compared to other agricultural research for development (ARD) providers.

These two sets of Core Assets should apply complementarily for a given development challenge, at a given global, international or regional level, in order for the CGIAR to play its full potential as a problem solving institution.

CGIAR's Core Competencies

During 2005, the Science Council led an exhaustive process of participatory information gathering, analysis, synthesis and debate, through which a set of 20 research priorities emerged, organized within 5 priority areas, shown in Box 3:

Box 3a: CGIAR Research Priorities

1. Sustaining biodiversity for current and future generations;
2. Producing more and better food at lower cost through genetic improvements;
3. Reducing rural poverty through agricultural diversification and emerging opportunities for high-value commodities and products;
4. Poverty alleviation and sustainable management of water, land, and forest resources; and
5. Improving policies and facilitating institutional innovation to support sustainable reduction of poverty and hunger.

During the Addis Ababa retreat of the Change Management Process, a debate took place on how to consider these five System Priorities in the ongoing change exercise. There was a consensus that CGIAR's assets have enabled the Centers to develop Core Competencies in the area of these five priorities:

- Conservation of genetic diversity of agricultural crop and animal species
- Genetic improvement of food crops especially relevant to the poor
- Knowledge and tools for better management of natural resources in developing countries
- Polices and institutional innovations relating to alleviation of poverty and hunger.

These core competencies are considered to encompass all the research and development competencies of the CGIAR.

CGIAR's Key Functions

Since 1995, GFAR has been developing the concept of a global Agricultural Research for Development (ARD) system, in which the CGIAR plays a pre-eminent role at the global level. This is an attempt to rationalize and synergize ARD actors' roles based on their comparative and complementary advantages.

As an international public body, the CGIAR's roles are defined by the political and social demands of society at global and regional levels. The CGIAR can be expected to play five types of functions in the global ARD system[8], along the two fundamental functions of sciences – namely, ontological and innovation functions shown in Box 4 below.

Box 4a: Innovation and Ontological functions of science

Innovation functions: Science plays a role in providing knowledge and technologies that change the world. Innovation functions include:

- Research function
- Catalyzing function

Ontological function: Science plays a role in making the world intelligible and workable. Ontological functions include:

- Anticipation function
- Awareness raising function
- Support for decision making function

The CGIAR's involvement in these five functions of science was assessed, and its unique position to contribute was identified.

Research Function

This is the classical function of research institutions to develop knowledge and technologies.

Current involvement of the CGIAR:

[8] Additional functions could be considered, e.g. knowledge integration function.

CGIAR Centers play a recognized key role in basic and strategic agricultural research to deliver ARD knowledge and technologies, which are essentially GPD, IPG or RPG[9], ultimately translated into ARD innovations that support its mandate. This function is based on the Core Competencies of the CGIAR (see above Section 2)

Recommendation for future involvement of the CGIAR:

It should be stressed that this function is the core business of the CGIAR and it forms the fundamental and necessary basis for the four following functions. It is recommended that the CGIAR maintains its current high level of involvement in the Research Function, with the necessary dynamic adjustment to tackle new and evolving challenge at global and regional levels, and becomes more flexible in order to adapt its role at regional level according to the diversity of ARD partners in and between the regions.

Catalyzing Function

Based on the research function, there is an explicit and strong demand on the CGIAR from ARD actors at global and regional levels to play a catalyzing role that fosters agricultural research for development and its impacts.

This catalyzing function encompasses different dimensions:

- The brokerage and networking sub-function: the capacity of the CGIAR to bring together, mobilize and synergize current and new public and private research actors from developing, emerging & developed countries on defined ARD development challenges.
- The spill-over and scaling-up sub-function: the capacity of the CGIAR to transfer and adapt ARD technologies developed in and for a given location or environment to other locations or environments[10].
- The funding mobilization sub-function: the capacity of the CGIAR to mobilize funding for ARD from CGIAR Members, Foundations, Global, Regional and National agencies, to support the activities of the various ARD providers, and not only CGIAR activities. Challenge Programs are also an illustration of such a role played by CGIAR Centers.

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[9] GPD, IPG and RPG = Global, International and Regional Public Goods
See J. Ryan - International Public goods and CGIAR niche in the R for D continuum: Operationalizing concepts. In Positioning the CGIAR in the Research for Development Continuum. CGIAR Science Council. 2006

[10] See J. Ryan - International Public goods and CGIAR niche in the R for D continuum: Operationalizing concepts. In Positioning the CGIAR in the Research for Development Continuum. CGIAR Science Council. .2006

- The technical platforms sub-function: the capacity of the CGIAR to set-up and manage regional and global technical facilities that are available for use by all ARD actors (e.g. the Biosciences eastern and central Africa platform hosted by ILRI).
- The capacity development sub-function: the capacity of the CGIAR to contribute to the global agricultural knowledge system by training individuals and institutions from the South and the North , in a flexible way in order to adapt its training offer to the diversity of the needs of partners.

Current involvement of the CGIAR:

CGIAR is already significantly involved in the Catalyzing Function.

Recommendation for future involvement of the CGIAR:

Despite this strong involvement, there is a clear consensus by all ARD actors that the CGIAR is in a unique position at global and regional levels to play a much more active role in catalyzing ARD activities.

It is recommended that the CGIAR increases very significantly its involvement in the four dimensions of the Catalyzing Function, and in particular in networking and brokerage. The CGIAR should move toward the implementation of, and become a pillar in the ARD area of, the new concept of third generation universities. It is recommended to take this move as one of the first priorities in the change process.

For the capacity development sub-function, it is recommended that the CGIAR explore the potential of distance learning approaches, that can link research and applied research institutions, and the private sector.

The future involvement of the CGIAR in the Catalyzing Function should be kept focused on ARD to avoid driving the CGIAR out of its core business.

Anticipation Function

There is a growing demand from society for researchers to foresee the future state of the world, its key issues and challenges, based on their scientific capacities to understand and simulate causes and effects dynamics. Foresight studies are therefore taking an increasing share of research activities. A milestone in this evolution has been the Millennium Ecosystem Assessment in 2005, which directly influenced and continues to influence the ARD agenda. The recent achievements of the IPCC and the increasing demand to anticipate the effects of global challenges (e.g. climate change) will certainly bring more impetus to this function.

Current involvement of the CGIAR:

With the exception of IFPRI, the CGIAR Centers' current involvement in foresight studies is limited, or lacks the international visibility they would deserve.

Recommendation for future involvement of the CGIAR:

A number of emerging challenges with uncertain future impacts on the world are directly related to agriculture in developing and emerging countries in the global. The CGIAR is in a unique position to develop foresight studies on global development issues related to agricultures in developing & emerging countries.

Awareness Raising Function

Science plays an increasingly important function of awareness raising for policy and decision makers but also, more broadly, of the public. Awareness raising is clearly a way to increase the impact of research.

Current involvement of the CGIAR:

The CGIAR is currently significantly involved at system and center levels in awareness raising activities, and is internationally recognized for its efficiency in this function.

Recommendation for future involvement of the CGIAR:

Many critical development issues at a global level are directly related to agriculture in developing and emerging countries. The CGIAR is in a unique position to provide the global scientific bases for awareness raising activities directed at the public and of international policy and decision makers.

It is recommended that the CGIAR continues to play a significant role in the Awareness Raising Function at global level in partnership with leaders like the Word Bank, FAO and IPCC, and significant actors like GFAR. To this end, the CGIAR should define a clear awareness raising strategy, identifying the topics, the targets, its role and potential partners.

Support for Decision Making Function

Decision support tools usually take the form of models that allow a situation to be represented and simulate the consequences of different types of decisions.

Current involvement of the CGIAR:

CGIAR Centers' support for decision making is currently limited. Interesting initiatives have been developed in the past by the CGIAR, in particular in collaboration with Advanced

Research Institutions (ARIs), but with limited impacts due to a lack of adoption by stakeholders.

Recommendation for future involvement of the CGIAR:

With increasing multilateralism in international decision making processes related to agricultural issues (e.g. impact of globalization of trade on developing countries), there is increasing demand from decision makers at global and regional levels for dedicated decision support systems and tools. Since the CGIAR is significantly involved in the research disciplines that are necessary for the development of decision support tools related to agriculture at a global level, and because it can potentially develop processes in which all stakeholders are involved in an innovation system approach, it is in a unique position to play an important role at this level.

Developing the Vision, Mission and Strategic Objectives

As outlined in the Visioning Framework, the global development goals and challenges, and the global science system provide the context for the future development of the CGIAR. The Core Assets and Functions partially determine the strategies and opportunities available to the CGIAR. The Mission and Vision statements draw on these bases, in order to articulate the future direction of the CGIAR in a manner which clearly sets out for internal and external stakeholders what they can expect the CGIAR to contribute, and where the strengths of the CGIAR lie, in meeting the global development challenges of the 21st century.

The Strategic Objectives (SOs) introduced in the Visioning Framework provide key measurable targets that the CGIAR must meet in order to deliver on the CGIAR vision and thereby contribute to achieving the global vision. By considering the development goals and challenges, in combination with the potential contribution that the CGIAR can make towards achieving the goals and vision (as expressed in its core assets, functions and mission), WG1 initially developed a set of eight Strategic Objectives.

Each of the strategic objectives identified contributes to one or more of the six Global Development Challenges, as shown in Table 2 below.

Table 2a: Strategic Objectives and the Global Development Challenges

	Strategic Objectives	Global Development Challenge addressed					
		GDC 1	GDC 2	GDC 3	GDC 4	GDC 5	GDC 6
1	**SO 1:** Accelerate the increase in yields of food staples in the face of climate change and stagnant productivity growth.	++	++	+	+	+	+
2	**SO 2:** Increase producer incomes through diversification into high value products.	++	+	+			+
3	**SO 3**: Conserve, enhance and sustainably use natural resources and agricultural biodiversity.	+		+	++		
4	**SO 4**: Reduce greenhouse gas emission in major at-risk agro-ecosystems.				+	++	
5	**SO 5**: Make food and agricultural systems safer and more nutritious.	+	+	+			++
6	**SO 6**: Enable women's proportionate participation and advancement in all levels of agricultural and support systems.	+	+	++	+	+	+
7	**SO 7:** Facilitate an enabling policy and institutional environment to support pro-poor agricultural growth.	+	+	+	+	+	+
8	**SO 8:** Foster a global coalition on international agricultural research for development	++	++	++	++	++	++

Legend:

GDC 1	Improving agricultural productivity and market value in sustainable ways.
GDC 2	Improving food security.
GDC 3	Enhancing empowerment and access to assets and markets by the poor, especially rural women.
GDC 4	Conserving, enhancing, and sustainably using natural resources and biodiversity.
GDC 5	Mitigating and adapting to climate change.
GDC 6	Enhancing the positive synergies between agriculture and health.
++	Major linkage
+	Secondary linkage
Blank	Minor or no linkage

In this process, one SO could to relate to a number of different global development challenges. So, for example, SO1 (Accelerate the increase in yields of food staples) contributes most directly to GDC1 (Improving agricultural productivity), and GDC2 (Improving food security). But SO1 may also contribute to technologies that are developed with women farmers and will enhance their access to assets (GDC3). Increasing resource-use efficiency can contribute to the conservation of natural resources (GDC4), while genetic improvement for drought-tolerance will assist in adaptation to climate change (GDC5). Increasing yields through increased input efficiency may also improve human health through potential reductions in pesticide use (GDC6).

The link to the identified global development challenges is clearly an essential part of the context for developing the Strategic Objectives. However, at this stage in the process it was considered more helpful to focus on the Strategic Objectives themselves as the way of putting the CGIAR Vision and Mission into operation. On the basis of the eight SOs, a range of other key elements were compiled, including the notional indicators, key opportunities, major players, comparative advantage of the CGIAR, and core functions. For information, these are shown in Table 3 below.

Following review of this proposal by the CST, it was decided to reduce the number of Strategic Objectives to a maximum of five. A further round of consensus building and discussion considered the manner in which the SOs relate to the CGIAR Mission and Vision, and to the Global Development Challenges identified by WG1. In reducing the SOs from eight to five, the WG aimed to create a balance between the core, traditional elements in the original SO1, SO2 and SO3, and the newer, innovative and forward looking objectives encapsulated by SO4, SO5 and SO6. A new set of six Strategic Objectives was drawn up, which were subsequently reduced to the five presented in the main report.

Table 3a: The original 8 Strategic Objectives, Notional Indicators, Key Opportunities.

Strategic Objective	Notional Indicators	Key Opportunities (to be further refined)	Major Players (research partners/ development partners)	CGIAR Comparative Advantage	CGIAR Functions which support key opportunities
1. Accelerate the increase in yields of food staples in the face of climate change and stagnant productivity growth.	• Yield increases of food staples per unit of land and labor (by region) • Resource use efficiency—e.g. water, nutrients and fossil fuels • Yield stability	1.1 Genetic improvement to push out the yield frontier and improve yield stability (abiotic and biotic stresses)	CGIAR NARS Private Sector	Germplasm collection Networks Expertise Strong IPG	Research Germplasm collection
		1.2 Developing a global commons of molecular tools and techniques to harness advanced science (including proprietary tools), for the poor	CGIAR? ARIs (PIPRA) BIOS Private Sector	Strong IPG Honest Broker	Catalyzing
		1.3 Sustainable intensification through on-farm management and institutional innovations and policies (input systems, innovation systems, etc) in both low- and high potential areas	NARS CGIAR NGOs	Systems perspective Networks Policy expertise?	Research Capacity Support to decision making?
		1.4 Technologies to reduce fossil energy use in agriculture (e.g., N-fixation)	NGOs ARIs	Strong IPG	Research Catalyzing
2. Increase producer incomes through diversification into high value products.	• Number of Producers with higher incomes from growing new high value and value-added products	2.1 Development of new breeds and sustainable and safe production practices for high value products for local and global markets	CGIAR AVRDC NARs Private Sector	Strong IPG Livestock, fish and forest expertise etc.	Catalyzing Research Capacity

Strategic Objective	Notional Indicators	Key Opportunities (to be further refined)	Major Players (research partners/ development partners)	CGIAR Comparative Advantage	CGIAR Functions which support key opportunities
	(horticulture, livestock, fish and forest products, organics etc).	2.2 Policies and institutional innovations to connect smallholders to markets and facilitate diversification	National governments Regional Development Organizations NGOs Private Sector	Market and policy analysis expertise Farm and rural databases	Conserving knowledge Support to decision making Awareness Raising
3. Conserve, enhance and sustainably use natural resources and agricultural biodiversity.	• Conservation and use of increased range of genetic resources and information systems by public and private national breeding systems • Increased latent diversity in cultivated species • Rate of deforestation attributed to land use changes (i.e., agriculture) • More "Crop per drop" Trends in soil health and land degradation indicators at benchmark sites in at-risk agro-ecosystems	3.1 Augmenting, safeguarding, characterizing and disseminating germplasm collections of crops, indigenous livestock and aquatic animals	CGIAR GCDT	Strong IPG Honest Broker	Germplasm collection Catalyzing
		3.2 Policies, institutions and technologies for sustainably managing land, water, pastures, forest and aquatic resources at ecosystem levels to deliver agricultural products and/or environmental services	Many players global to local	Networks Databases and models	Catalyzing Support to decision making Anticipation and Awareness
		3.3 Improving resilience of key at-risk ecosystems to shocks and ability to adapt to climate change	Many players global to local	Networks Databases and models	Catalyzing Support to decision making Anticipation and Awareness

Strategic Objective	Notional Indicators	Key Opportunities (to be further refined)	Major Players (research partners/ development partners)	CGIAR Comparative Advantage	CGIAR Functions which support key opportunities
4. Reduce greenhouse gas emissions in major at-risk agro-ecosystems.	• Adoption of conservation tillage • Numbers of smallholders participating in carbon financing programs for reducing deforestation • Land area and livestock participating in Methane and Nitrous Oxide emission reduction program	4.1 Institutional innovations for smallholder access to carbon sequestration funds to reduced deforestation and improve soil management	International organizations NGOs Donor projects	Forestry and land use expertise	Research Support to decision making Catalyzing
		4.2 Technologies to reduce nitrous oxide and methane emissions from crops and livestock	ARIs	Crop and livestock expertise	Research Catalyzing Anticipation
5. Make food and agricultural systems safer and more nutritious.	• Production of biofortified crops (Zn, Fe, Vitamin A) • Incidence of food-borne diseases • Incidence of zoonotic diseases	5.1 Biofortification of crop varieties	CGIAR ARIs NGOs Private Sector	Strong IPG Germplasm collection	Research Catalyzing
		5.2 Developing safer food systems and management practices (e.g., pesticides, aflatoxins)	ARIs Private sector WHO FAO	Networks Strong IPG in some cases Integrated research approach to human health	Research Awareness Raising Anticipation
6. Enable women's proportionate participation and advancement in all	• An increase from the current baseline of the number of women participating in	6.1 Enhancing gender-responsive technology development and access to services by smallholders	CGIAR Limited NGOs Donor projects	Strong IPG Networks	Research Awareness Raising Capacity

Strategic Objective	Notional Indicators	Key Opportunities (to be further refined)	Major Players (research partners/ development partners)	CGIAR Comparative Advantage	CGIAR Functions which support key opportunities
levels of agricultural and support systems.	agricultural policy making, research and development, training & extension • A narrowing of gender disparities in the adoption of new technologies	6.2 Mainstreaming women's participation in agricultural innovation systems at global, national and local levels (IARCs, NAIS, advisory services)	CGIAR Donor projects	Expertise Networks Databases	Catalyzing Awareness Raising Support to decision making
7. Facilitate an enabling policy and institutional environment to support pro-poor agricultural growth.	• Index of policy distortions (nominal rate of assistance) • Investments in core public goods (R&D, rural roads, etc) as a share of Ag GDP • Rural governance indicators	7.1 Trade, price, and public investment policies	WTO (Sub-)regional organizations National governments	Models Databases	Awareness raising Support to decision making
		7.2 Rural institutions and governance	CGIAR NARS	Networks Analysis capacity	Awareness raising Support to decision making
		7.3 Empowerment and access to assets	National governments NGOs	Data systems Analysis capacity	Awareness raising Support to decision making
		7.4 Facilitation of agricultural policy reform	National governments (Sub-)regional organizations UN System (FAO, WFP, IFAD, WHO, World Bank, UNICEF)	Data systems Models Analysis capacity	Awareness raising Support to decision making

Strategic Objective	Notional Indicators	Key Opportunities (to be further refined)	Major Players (research partners/ development partners)	CGIAR Comparative Advantage	CGIAR Functions which support key opportunities
8. Foster a global coalition on international agricultural research for development	• Catalyze: Increase in the number of agricultural research players and multi-stakeholder agricultural research arrangements; and increase in the funding to agricultural research actors • Capacity strengthening: Development of individual and institutional agricultural research capabilities in developing countries • Anticipation and awareness-raising: public and decision makers better aware of current and future Global Development Challenges • Decision making: Increase in the number of decision support systems and tools related to agriculture.	8.1 Development of innovative international South-North agricultural research and training platforms and coordinated initiatives	Southern and Northern ARIs GFAR World Bank FAO IPCC	Strong scientific and technical bases Recognized as the only relevant global broker Influential international voice in agricultural R&D	Catalyzing Capacity strengthening
		8.2 Setting-up of an international fund for agricultural research and development			
		8.3 Development of specific research and information initiatives dedicated to serving the public and decision makers.			Support to decision making Awareness building

Annex 3: Documents reviewed

Documents and websites consulted in overview of Global Development Challenges

(In approximate order of importance)

1. UN Millennium Development Goals

http://www.un.org/millenniumgoals/index.html

2. New Partnership for Africa's Development (NEPAD)

http://www.nepad.org/2005/files/inbrief.php

3. World Water and Food to 2025

http://www.ifpri.org/pubs/books/oc42.asp

4. World Economic Forum, Annual Meeting 2008 Report

http://www.weforum.org/pdf/summitreports/am2008/am2008.pdf

5. The ten challenges in the Copenhagen Consensus 2008

http://www.copenhagenconsensus.com/Default.aspx?ID=955

6. IPCC, Climate Change 2007,

http://www.ipcc.ch/

7. Human Development Report 2007/2008

http://hdr.undp.org/en/

8. World Development Report 2008: Agriculture for Development

www.**worldbank**.org/wdr**2008**

9. IAASTD, Global Summary for Decision Makers (and other documents)

http://www.agassessment.org/index.cfm?Page=Plenary&ItemID=2713

10. The Millennium Project, 15 Global Challenges for Humanity

http://www.millennium-project.org/millennium/challeng.html

11. The Copenhagen Consensus 2004

http://www.copenhagenconsensus.com/Default.aspx?ID=158

12. World Economic Forum, Global Risk 2008, A World Economic Forum Report, January 2008

http://www.weforum.org/pdf/globalrisk/report2008.pdf

13. AAAS Presidential Address, AAAS 2007 Annual Meeting, John P. Holdren

http://www.aaas.org/news/releases/2007/0216am_holdren_address.shtml

14. United Nations Convention to Combat Desertification

http://www.unccd.int/convention/text/convention.php?annexNo=-1

15. Grand Challenges in Global Health, detailed in 2003 (see *Science* 17 October 2003)

http://www.sciencemag.org/cgi/content/full/302/5644/398

16. OECD-FAO Agricultural Outlook 2007-2016, OECD/FAO 2007

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17. Bill and Melinda Gates Foundation, Global Development Program Statement

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18. Judith Rodin, President of the Rockefeller Foundation, Remarks delivered at the AAAS 2008 Annual Meeting, Feb. 15, 2008

http://www.rockfound.org/about_us/speeches/021508jr_cc.pdf

19. Global Forum for Agricultural Research (GFAR):

http://www.egfar.org/egfar/

20. UN Commission on Sustainable Development, Johannesburg Declaration on Sustainable Development

http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/POI_PD.htm

21. Declaration of the World Food Summit: Five Years Later

http://www.fao.org/DOCREP/MEETING/005/Y7106E/Y7106E09.htm#TopOfPage

22. Remarks of Robert B. Zoellick at the Annual Meeting of the governors of the World Bank Group, Oct. 22, 2007

http://go.worldbank.org/HC825FYCA0

23. FAO, The State of Food and Agriculture 2007

http://www.fao.org/docrep/010/a1200e/a1200e00.htm

24. Millennium Ecosystem Assessment

http://www.millenniumassessment.org/en/index.aspx

25. 2020 Vision for Food, Agriculture, and the Environment

http://www.ifpri.org/2020/welcome.htm

26. European Parliament Council Commission, The European Consensus on Development, 2006

http://ec.europa.eu/development/icenter/repository/eu_consensus_en.pdf

27. The Lisbon Declaration, Lisbon, 8-9 December, 2007

http://ec.europa.eu/development/icenter/repository/EAS2007_lisbon_declaration_en.pdf

28. Commission of the European Communities, Advancing African Agriculture, July 24, 2007

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0440:FIN:EN:PDF

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