IRRI-CIMMYT Alliance documents:

THE ROCKEFELLER FOUNDATION

November 12, 2004

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Dear Alex & Kei

Gordon Conway
President

As you know, at the request of the Board Chairs of IRRI and CIMMYT, the Rockefeller Foundation commissioned a Working Group and an Oversight Committee to examine alternatives for closer collaboration between the two Centers, ranging from a formal alliance to a full merger. Everyone we invited to serve on the Committee responded positively, I agreed to be Chair and all participated in a joint meeting with the Working Group held at the Bellagio Conference Center this past September.

The Working Group distributed a draft report of their findings and recommendations to the Oversight committee prior to the Bellagio meeting that served as the basis for discussion. There was lively debate and general agreement that IRRI and CIMMYT had taken a bold move that has the potential to further strengthen their programs and impacts. The Committee provided a number of constructive suggestions, including the need to maintain a clear separation between governance and management. With Keith Bezanson serving as the rapporteur the Committee prepared a summary of the discussion and their recommendations. The Working Group then revised their report based on input and insights they received at Bellagio.

Hence, I am pleased to submit a report that has two components. The first is a memorandum summarizing the ***Oversight Committee Discussion on the Report on the IRRI-CIMMYT Alliance***. The second is the final ***Report of the IRRI-CIMMYT Alliance Working Group.***

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On behalf of all members of the Working Group and Oversight Committee, we hope that the IRRI and CIMMYT Boards find the report to be highly useful as they consider options for a significantly closer alliance.

We look forward to following your progress.

regds Gordon

P.S. I am also enclosing Michael Brown's full report on merging service functions since I think you will find it useful.

Bellagio Conference
on the
IRRI-CIMMYT Alliance

September 13 – 17, 2004

List of Participants

Oversight Committee

Dr. Gordon Conway, Chair
President
The Rockefeller Foundation

Dr. Robert Bertram
Leader, International Research and Biotechnology
United States Agency for International Development (USAID)

Dr. Keith Bezanson
Retired Director, Institute of Development Studies
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Dr. Gelia Castillo
Former Professor of Rural Sociology
University of the Philippines

Dr. Jesus Moncada de la Fuente
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National Institute of Forestry, Agriculture
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Dr. Robert M. Goodman
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Dr. Hans-Jochen de Haas
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Federal Ministry of Economic Cooperation
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Mrs. Angeline S. Kamba
Former Public Service Commissioner
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Dr. John Mugabe
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Dr. William Otim-Nape
Director, National Agricultural Research Organization
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Dr. Chinnachamy Ramasamy
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Dr. Jian Song
Honorary Chairman
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Dr. Kunio Takase
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Dr. Jonathan Wadsworth
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Dr. Jikun Huang
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Oversight Committee Discussion

on the

Report on the IRRI-CIMMYT Alliance

November 2004

Oversight Committee Discussion Memorandum on the Report on the IRRI-CIMMYT Alliance

The Oversight Committee met for three consecutive days, 14-16 September, 2004, in Bellagio where it reviewed the draft report prepared by the Working Group and, under the chairmanship of Professor Gordon Conway, President of the Rockefeller Foundation, debated extensively issues, risks, opportunities and options for the integration of CIMMYT and IRRI. The complexity of the issues involved and the challenges inherent in trying to come up with conclusions and recommendations that would be on the one hand pragmatic and amenable to implementation and on the other hand sufficiently bold and ambitious as to seize the moment made the discussions no easy task. This notwithstanding, the Committee sought to reach conclusions on the basis of full consensus in order to sustain the momentum provided by possible alliances of the two centres. Many changes were made to the draft report of the Working Group as a result of our discussions. We are pleased to endorse fully the final report and to take complete ownership over it. We have added this discussion memorandum to the Report itself in order to underscore the extent to which we have grappled with the issues, challenges and dilemmas that it poses and to reflect the full extent of the consensus that we have reached.

The Larger Context

The unanimous view of the Oversight Committee is that the international policy climate of today is characterised by general complacency on issues of future food security. This complacency is sustained by static econometric models that assume continuation of trends in food output and prices of the past two decades. Projections based on these trends, in the view of the Committee, fail to take adequate account, *inter alia*, of demographic growth and distribution dynamics, the declining availability of arable land and ground water, diminishing incremental returns to available technologies and shifting climatic patterns. This complacency has lowered the priority assigned by the international community to agricultural investment in general and to agricultural research in particular. Following some twenty years of continuous programme growth and budgetary expansion, the CGIAR as a whole has been contracting since the early 1990s. Although financial constraints haved eased somewhat over the past year, the future of core funding, in particular from the World Bank, remains uncertain. The challenges facing the CGIAR, however, are much more profound than those solely of a financial nature. There have been over the past decade serious questions and concerns about how to ensure the continuing relevance and programmatic effectiveness of a development model that has been -- beyond any reasonable doubt -- one of the most important and successful of development innovations of the second half of the 20th century. Science and the

challenges of development, however, have shifted in major ways since the founding of the CGIAR in 1971. Some of the new drivers of change include:

- scientific and technological advances and breakthroughs, especially in genetics, including biotechnology, and the dominance of the international Private Sector in these areas;
- the increasing complexity of IPR issues and the challenges these pose to existing assumptions about the boundaries of essential public goods;
- the numerous and centrally important roles of Civil Society in all aspects of international development;
- the radical shift that had occurred in the comparative advantage of the CGIAR, whereby it had become increasingly difficult to make the case that the agricultural research needs of the more scientifically advanced Asian countries could best be served via CG Centres;
- the undeniable priority in agricultural research and all aspects of food security that needs to be accorded to Africa where yields continue to decline and where the problems of poverty, hunger and malnutrition are most acute;
- the essence of the CGIAR model itself that had been predicated on a few centres of excellence with intellectual and research linkages to the advanced centres of agricultural research in the most advanced countries. Many developing areas, including China, India and Brazil, now have 'world class' scientific and technological capabilities in the biosciences;
- the demands and 'conditionalities' of the donor agencies, especially in the 1990s, that have caused the CGIAR to transform its defining characteristic from one based almost exclusively on advanced scientific research to one of a full scale and full service development agency, including livelihoods development, gender advancement, poverty reduction programmes, environmental specialisation, and so on. This has blurred the nature and quality of the core competencies of the CGIAR and made it increasingly uncertain as to how to define and reflect its comparative advantage.

The result of these forces and factors configures an enormity of new demands and a requirement for extensive change, adaptatability and flexibility. Like many of the other international development institutional innovations of the 1940-1980 period, the CGIAR finds itself today challenged to redefine and reinvent itself in order to ensure that its undoubted strengths may apply beneficially and with greater impact in the new environment.

The IRRI-CIMMYT Challenge

In recognition of these factors and challenges, the two Chairs of the Boards of Trustees of CIMMYT and IRRI indicated in October 2003 a desire to explore all options for closer collaboration ranging from a formal alliance to a full merger. They further requested that

the Rockefeller Foundation facilitate this examination through an independent process involving a working group and oversight committee. This significant opportunity for major transformation of the CGIAR thus has its origins with the Centres themselves, whereas other efforts at CGIAR transformation have been externally driven. This opportunity, in the view of the Committee, is one that should not be missed.

Why Seek an Alliance/Merger?: The Vision for a Future IRRI-CIMMYT

The Committee acknowledged that there are a multiplicity of drivers for CGIAR change and for the initiative taken by the Chairs of the two organisations. These range from issues of detail, such as concerns for cost-efficiency, financial prospects and geographic coverage, to fundamental matters of long-term strategy for the role of agricultural research in the future development prospects of humankind. Important as administrative and financial considerations undoubtedly are, these should not be, in the unanimous view of the Committee, the principal drivers of transformative change to the CGIAR or any of its component parts. Rather, change should be driven by a vision for the future role of the CGIAR and the strategic imperatives and opportunities to realise that vision. In the specific case of the alliance and even merger of IRRI and CIMMYT, the key strategic driver is to determine how their combined strengths and efforts can best position them strategically and programmatically to respond to the new defining features of science and of development and to respond thereby to future challenges for food security and poverty reduction.

The guiding vision for any possible form of genuine CIMMYT-IRRI alliance involves the formulating of new institutional arrangements that will achieve and assure world leadership in the application of scientific and applied agricultural research in grains for food security, poverty reduction and secure livelihoods. The vision also entails the imperative to assure continuing attention to food security and poverty reduction as public goods and that a new alliance should catalyse a renewal of the international political commitment that this will require. Finally, the vision aims to establish the conditions and structural preconditions so that priority attention may be afforded to the needs and challenges of Africa.

This vision implies necessarily that the two institutions must be prepared to accept and to champion major changes, including those that require hard choices and the acceptance of implications that many long-established preferences and ways of doing things will need to be discontinued in the interests of longer term gains.

Given this vision and the factors outlined, the Oversight Committee agreed unanimously that:

- Business as usual should not be an option. Business as usual would not ensure that both IRRI and CIMMYT have the critical mass required in science and technology to address in significant ways the challenges of grains production for the future.

- If one were to begin with a completely clean slate and to establish for the first time today a CGIAR arrangement for global grains research, the choice would probably not be to establish separate entities such as IRRI and CIMMYT. Rather, while any choice would probably continue a predominant focus on the three essential grains of wheat, rice and maize, accounting for over 50% of the caloric intake of the world's population, the dynamic nature of changes in science would mean that the likely institutional design choice would be between a single global grains research institute or a single, strong central entity at the core of a distributed research network, including centrally robust partnerships with the NARES and the Private Sector.

- The achievement of critical mass is the key. At present, both CIMMYT and IRRI function well below the critical mass that needs to be attained in some areas and are challenged to retain critical mass in others.. The Chairs of both Boards have clearly realised that this is the case and that this deficiency cannot be resolved by small adjustments at the margin.

- Examination of options for CIMMYT and IRRI should be placed in a larger context of possible longer term spin offs and multiplier effects for the CGIAR as a whole and, even more broadly, for the general future well-being of international agricultural research. In other words, a successful achievement of critical mass for the future through integration of the two institutions should be viewed as an opportunity for learning and as a pioneer venture to the delivery of future agricultural research as a public good. In addition, achieving the critical mass essential for the CGIAR to have the kinds of impacts in the future that it achieved in the 1970s should also act as a catalyst to a much needed renewal of and reaffirmation of political support for food security and rural livelihoods.

What are the Main Barriers and Constraints?

In general, institutions -- and especially public institutions -- do not transform themselves in significant ways. This is all the more so for international development institutions that comprise vast constituencies and that generally operate under infinitely more complex political and governance circumstances than do other organisations. This explains why in over 50 years, for example, few if any significant exits, mergers or takeovers of multilateral development organisations have occurred and why institutions continue to exist even where there is evident consensus that they have ceased to hold utility. International development institutions simply do not operate in a market in any real sense of the term. If they did, just as might also be the case for IRRI and CIMMYT, there would doubtless have been numerous takeovers and mergers. Given the CGIAR's multiple components of governance and non-binding instruments of convergence and cooperation, the inertial forces within the CGIAR may be even greater than for other international development entities.

In pragmatic terms, therefore, it seems clear that the prospects for a successful integration of IRRI and CIMMYT will depend at least in some measure on the extent to which

inertial forces can be accommodated or managed. In 'pure' or 'ideal' terms (i.e. where it is assumed that 'all things are equal' which they never are), the conclusion of the Committee is that a full and immediate merger would provide the greatest strategic and programmatic gains possible. Because all things are not equal, however, this is not the option that we recommend. The Committee has interpreted its IRRI-CIMMYT challenge in the most pragmatic manner possible, as seeking to help to bring about the most positive set of changes realistically possible in the near term (meaning that these would carry with them a sufficiently broad constituency as to make the changes possible) while at the same time paving the way for possible further changes supportive of greater scientific breakthroughs in the future.

But the Committee also concluded strongly that there is a *de minimus* framework of changes that would need to be implemented or there would be no point in proceeding with the time consuming and demanding requirements to bring the two organisations closer together. Our conclusion is that without a *de minimus* set of changes, it would be preferable to abandon the effort completely and to default to a business as usual posture, although we would also underscore our view that this would comprise a major opportunity lost and that its implications for the future of the CGIAR would be decidedly negative.

A Framework of Guiding Principles

Our conclusion is that the *de minimus* requirements for a closer integration of IRRI and CIMMYT are best determined through clarity with regard the key guiding principles to any successful integration or merger, whether partial or complete. In other words, the *de minimus* standards and imperatives for any alliance or merger between the two institutions should derive from and respect the principles of a guiding normative framework. To this end, we discussed and agreed upon a normative framework of guiding principles and then applied this to an examination of organisational, structural and strategic options for IRRI-CIMMYT. The framework of guiding principles comprised the following:

- Complex, multi-layered institutional arrangements should be avoided. There is far too great a tendency in international organisations to establish 'partnerships' and arrangements for collaboration, cooperation or alliance that have merely served to create impenetrably dense decision structures, a debilitating emphasis on process over product, and exceedingly high levels of transactions costs.

- Any combination of IRRI and CIMMYT should adhere to the principles of simplicity, streamlined patterns of activity and clear loci of responsibility. Moreover, structures and their implications should be easily communicated and easily understood to all parties, both those directly affected and others.

- Roles, responsibilities and accountabilities should adhere to best practice management principles, including the requirement that these should facilitate communication and decision making, invite strong and decisive leadership, minimise overlap and duplication and empower actors at all levels by eliminating ambiguities.

- The delineation between governance and management should be unequivocal and there should be a single, transparent line of reporting/accountability of management to the governance level.

- In all cases, transaction costs should be kept to a minimum and a guiding principle should be to eliminate these completely wherever possible.

- Incentives and rewards should be aligned with strategic goals.

- Inter-institutional synergies can be established on the basis of the existing programmes and service needs of both institutions, but a longer-term and more durable strategic arrangement will need to go beyond these as the basis for integration.

- Not all things are equal, nor should they be treated as if they were. There are asymmetries in core competencies, experiences, acquired advantages, influence, power and capabilities. These are strengths on which to build and should not be obfuscated as this would serve only to diminish the potentials for an increased comparative advantage by combining two organisations.

- Any integration or alliance should be structured on the basis of clearly stated and focussed targets, a time specific critical path and explicit milestones to be the subject of regular monitoring, evaluation and feedback.

- Proposed changes should pass the stress tests of realism and 'do-ability' , including factors with respect to political dimensions.

Options Considered: A Full Merger or a Strong Alliance?

Against the above framework of guiding principles, the Committee examined the two basic options of a full merger or a strong alliance. We would repeat here that in a completely new situation the judgment would probably recommend unequivocally establishing a single international grains research institute. A full merger of the two Centres at this time, however, would create significant legal problems involving the closure of one or both Head Quarters with the possible loss of current assets to the host nations and would also probably require extended and costly negotiations in order to achieve a new Headquarters agreement. In addition, many existing arrangements and ongoing activities of very high value and/or of great potential would almost certainly suffer though the unavoidable disruption that a full and immediate merger would cause.

Finally there are other significant factors of inertia: in the conduct of its review, the Working Group determined that there would be concerted opposition in at least some quarters to a full merger. For all of these reasons, the Committee concluded, therefore, that, desirability and advantages notwithstanding, an immediate and full merger could not be recommended at this time.

The Committee also concluded that a substantial number of programmatic and shared services have already been established between the two Centres and judged that these could furnish a solid foundation on which to establish a genuine and enduing alliance as well as a base from which to expand into more extensive and newer arrangements over time. In recognition of these factors, therefore, the Committee specifically recommends immediate programmatic and managerial integration in the following programme and service areas:

- Genomics and biotechnology
- Intellectual property management and biosafety/environmental regulations
- Social sciences
- Sustaining intensive irrigated grains systems in Asia
- Expanded shared services to include use of a single external auditor, targeted public awareness programmes, a much strengthened single audit committee, a merging of scientific publications facilities such as editorial services, web-design or publications and printing, and broader co-location of country offices

The Committee recommends further that an integrated structure over the four programme areas be acknowledged not as ends in themselves but as means to larger strategic ends. While they serve as good examples for an initial alliance, they would also be vehicles that can provide for shared learning on how to enhance collective action approaches, and as catalysts to more extensive arrangements of change, adaptation and growth in the future. In this regard, there should be no delay in exploring and developing such further opportunities for additional shared initiative and collective action, including -- as a matter of high priority -- structural arrangements for potential larger alliances, including with other CGIAR Centres, in priority areas and with emphasis on Africa. It is expected that the ongoing work of the CGIAR Task Force for Africa will add significant impetus to such new and expanded alliances.

Governance: A Single Board or Two Boards of Trustees?

The success of greater integration in a strong alliance and as a foundation to larger future strategic potential will require strong, committed and fully united leadership at the governance level. For this reason, the Committee recommends unequivocally the establishment of a single governing body. Without this, the initial areas of programmatic integration that have been recommended would almost certainly remain 'one offs' and not

the platform to the strategic future that is envisaged. So central is this to the prospects for longer term strategic success that the Committee would go so far as to state that it would be preferable to default to a business as usual scenario if a single governing body is not established, although, again, we are convinced that the longer term implications of this for the CGIAR and for development would be distinctly negative.

On the assumption that this recommendation is adopted and acted upon, the Committee would recommend further that a template of skills, experience, specialities and other appropriate characteristics, including the manner and procedures for the selection and appointment or Trustees, should be prepared in order to guide and facilitate the establishment of membership on the new Board.

Management: How Many Directors General?

Recommendations on detailed aspects of management would take the work of the Committee beyond its terms of reference which are aimed at strategic matters only. The main structure of management, however, is a key strategic issue to the extent that it bears directly on the prospects for successful integration. The essential issues here are explicit in the framework of guiding principles that we have listed and these relate to clear delineation of roles, responsibilities and accountabilities, avoidance of structural and procedural arrangements that are complex, costly, and transaction costs intensive and a clear, singular reporting line from the management level to the governance level. These principles are firmly endorsed by the Committee as essential to good governance and the strategic aims of the strategic alliance. Even with such principles, however, it proved difficult to reach a consensus on what this should imply in practice. Three options were debated. The first would be to continue with two Directors-General but aim to arrive at a clear delineation of responsibilities and division of labour. Those aspects of programmes not included in the four initial areas for a full alliance would be quite unproblematic under such an arrangement as these would remain unchanged. The four areas of alliance would require new arrangements and an agreed *modus operendi* between the two Directors-General. It is conceivable that this could be made to work well, but it would clearly not accord with a single line of reporting between management and governance levels and the risks of conflict are significant as would be the difficulties to achieve conflict resolution.

The second option was to add a third Director General who would be assigned exclusive responsibility over the shared or alliance programmes with the remainder of functional distribution to remain unchanged. This was broadly viewed as unwise for many reasons, not least of which being that it would require of staff a complex matrix of reporting arrangements that would invite instability and conflict.

The third option was to establish a single Alliance Director-General (this would suggest a need for two positions reporting to that Alliance DG – one primarily responsible for IRRI and one primarily for CIMMYT). The disadvantage of this option is obviously that one D.G would be responsible for two Centres located several thousand and several time

zones apart. It might also create difficulties as to where the D.G. would reside and that, too, could hold implications for the alliance.

In the view of the Committee, therefore, the choice between these options was not as immediately apparent as we would have wished. On balance, however, the majority view would hold that the benefits of a single Director General would outweigh the risks and costs and that the converse would hold for the other two options. We recommend, therefore, that the single Board of Trustees be matched with a single Director-General General of the IRRI-CIMMYT Alliance, with a Center Director at IRRI and a Center Director at CIMMYT.

Moving Forward

On the assumption that the strong alliance option is adopted and that the supporting arrangements for this are put into place at the governance and managerial levels, the Committee would wish to underscore a further recommendation to which it would attach the very highest of importance. A decision by the Boards of CIMMYT and IRRI to forge the kind of strong alliance recommended in this report should be followed immediately by the production of an agreed and detailed implementation strategy. The imperative for this is clear from the very high incidence of failure in the history of attempted major structural and organisational change to existing and long-established institutions. The studies on the reasons for failure point to many factors, but consistently to the fact that key among these is the absence of well thought out implementation strategies. Solid internal and external commitment and the availability of internal and donor resources would appear often to have been frustrated by the failure to work through the detailed requirements for implementation. A strategy directed to major development purposes is necessarily highly complex, requiring a systemic approach and including major interdependent reforms. The old adage holds that 'the devil is in the details' and this is very much the case with the changes being contemplated for CIMMYT and IRRI.

The implementation strategy would include as a matter of absolute necessity the results of a thorough, rigorous and independently peer-reviewed examination of the comparative advantage of the new institutional arrangement. This should address comparative advantage in its dynamic sense, that is to say the advantage that has already been acquired and established and that which the synergies created and new potentials gained through the alliance would aim to achieve. Included here would be careful attention to the details -- to the steps, measures, instruments and resources required to secure and assure the comparative advantage. This would provide the defining framework for a strategic plan for a global centre(s) for grains research and the baseline against which dialogue would follow with the full constituency of interested parties, including donor agencies.

In a very real sense, the development of an implementation strategy and the clear delineation of what is needed to assure and achieve comparative advantage are far more important and far more challenging than the preparation of the basic model for change itself. Implementation needs to contend with the unavoidable fact that there is always

opposition to major changes. Some opposition is a matter of groups who have vested interests, which includes retaining power, authority, position and status. Other opposition derives from traditions and even deep belief systems that would be shifted through major reforms. And we know that opposition is very often due to misunderstandings as to what is intended and why.

Experience shows that, even with the very best of efforts to build consensus through persuasion and consultation, aggressive opposition to change from some quarters can be expected to continue. The management, therefore, of a delicate change strategy will almost certainly confront opposition and adversity when the difficult changes are actually introduced and the major reforms are moved from theory and proposal and put into practice. Success here will require decisiveness, strong resolve and determined leadership on the part of the Board of Trustees and management.

……...list of members p. 12

IRRI – CIMMYT Alliance Oversight Committee

Dr. Gordon Conway, Chair
President
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Leader, International Research and Biotechnology
United States Agency for International Development (USAID)

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Report of the IRRI-CIMMYT Alliance Working Group

November 2004

Table of Contents: IRRI-CIMMYT Working Group Report

1. Terms of Reference

The IRRI-CIMMYT Alliance Workgroup (WG) took the Joint Statement of the Board Chairs (October 2003, Appendix 1) as the basis for assessing options for a closer functional alliance between IRRI and CIMMYT. In conducting this assignment, the WG adhered to the following guidelines:

Justification for any such alliance must be driven first and foremost by the potential to enhance scientific capacity and program impact on the missions of the two institutes. Both the supply of scientific output from IRRI-CIMMYT programs and the demand for these products will be taken into consideration.

- The potential for reductions in operating costs or administrative positions are not the primary motives for establishing a particular alliance or merger. In fact, any alliance or merger would be expected to enhance opportunities to maintain or increase program resources and funding.

- The full range of potential alliances will be considered, from formal integration of specific discipline-based programs and programmatic initiatives, to amalgamation of technical and administrative support services, or a complete merger of the two institutions.

- Logistical aspects of alliance options must be considered to ensure that administrative transaction costs are not increased at the expense of program effectiveness. Particular attention will be given to human resource management, internal and external collaboration, and strategic planning—which represent the foundation of a vibrant and responsive scientific institution.

- Alliance options will be developed through consultations with the respective Board of Trustees and the Oversight Committee, and with input from staff and key stakeholder groups. A 'preferred scenario' will be identified if the Work Group can reach consensus. Results will be reported to a joint meeting of the Boards of Trustees scheduled for early 2005

2. Background Information and Process

2.1. Meetings with Board of Trustees (BOT) and staff

The Working Group consists of five members (Appendix 2). Members of the WG met with the Boards and staff of each Center to discuss their views about opportunities and challenges associated with a closer alliance or merger between IRRI and CIMMYT. Two WG members traveled to New Delhi to meet with CIMMYT Board members and senior management during the CIMMYT Board meeting, March 18 - 20, 2004. Three WG members traveled to CIMMYT Headquarters to hold discussions that were open to internationally recruited staff (IRS) and representatives of the national staff. One member of the WG met with several CIMMYT staff based in Africa. Phone conference calls were held with IRS staff posted at outreach research sites.

The IRRI Board meeting was held April 28-May 1, 2004 at IRRI Headquarters in Los Banos. Two WG members traveled to IRRI to meet with Board members during this time and also

met with IRS and representatives of the national staff. Written comments were also received from the review team that has just completed the 6th External Evaluation of IRRI.

At both IRRI and CIMMYT, group meetings with staff were organized around programs, projects, and service functions such that most meetings included three to ten people. Discussions appeared to be candid and open. Some staff that could not participate in these discussions provided additional comments via email messages. Taken together, the input from Board members and staff was very constructive and useful to the WG in performing their assignment.

In addition, the WG engaged an experienced consultant who visited IRRI and CIMMYT to assess opportunities for merging major service functions such as human resources, finances, and information/communications technology. To accomplish this task, the consultant made site visits to both IRRI and CIMMYT to meet with key staff members and administrators.

2.2. Contacts with Oversight Committee and Major Donors

An Oversight Committee consisting of fifteen persons was established. Members were selected to represent a broad range of stakeholders and included several who currently work or formerly worked for national agricultural research systems in developing countries. All were sent a list of questions concerning the alliance and invited to provide additional comments. A slightly modified list of the same questions (see below) was sent to representatives of the ten major donors of IRRI and CIMMYT. Most of the donors and some of the Oversight Committee members were contacted by phone to further discuss key issues. Input was also received from several individuals who have extensive experience with the CGIAR and the two centers. The list of questions sent to the major donors follows and is representative of the list sent to other individuals from whom feedback was solicited.

- What do you see as the primary justifications for an alliance/merger of IRRI and CIMMYT (e.g., enhance scientific capacity, achieve greater impact, better serve NARS, cost savings)?
- What do you see as the major advantages of an alliance/merger between IRRI and CIMMYT?
- What do you see as the major disadvantages of an alliance/merger between IRRI and CIMMYT?
- What specific programs at IRRI and CIMMYT are the most likely candidates for a formal alliance/merger, (e.g., biotechnology and genomics, rice-wheat consortium, social science)?
- What specific service functions at IRRI and CIMMYT are the most likely candidates for a formal alliance or merger (e.g., legal/IPR, human resources, IT)?
- Do you think greater efficiencies and significant financial savings would result from an alliance/merger of IRRI and CIMMYT?
- How would an alliance/merger affect the ability of IRRI and CIMMYT to collaborate with NARS, advanced research institutions, private sector, NGOs and government policy makers?

- Would an alliance/merger of IRRI and CIMMYT result in greater opportunities to maintain or increase funding from the donor community to support their programs? Specifically, how would the alliance/merger affect core funding and project funding?
- Is there justification for a full merger of IRRI and CIMMYT? If not, what level of alliance would be most appropriate? What type of administrative structure (e.g., full merger, common Board of Trustees with separate institutes, formal alliance of selected activities) would achieve maximum benefits with limited transaction costs?

2.3. Working Group Meeting

The WG met at the Rockefeller Foundation headquarters from July 19-22 to review findings, arrive at a consensus view about the alliance/merger options, and to prepare a draft report. The discussion initially focused on identifying areas of general agreement that were evident in a majority of responses received from donors and Oversight Committee members. These points of general agreement are presented in Section 3. Programs with greatest opportunities for enhanced quality and impact as a result of closer alliance were identified, and various organizational schemes for achieving a successful alliance were discussed. A "Draft Report of the IRRI-CIMMYT Alliance Working Group" resulting from these discussions was sent to the Oversight Committee for discussion at the joint meeting held in Bellagio, Italy, September 13- 17, 2004.

2.4. Bellagio Meeting with Oversight Committee

Prior to the Bellagio meeting, the Working Group submitted a draft report to the Oversight Committee. The report included the Working Group's analyses and recommendations, and it formed the basis of discussion at the Bellagio meeting. The Committee felt that the draft report was very useful but also recommended additional analysis of the pros and cons of the recommended options. The Oversight Committee prepared a "Covering Memorandum" for the report indicating where there was consensus and where their was a clear majority opinion. The Working Group modified several sections of their report based on the feedback and insight gained from discussions with the Oversight Committee at Bellagio.

3. Points of General Agreement

A wide range of views were represented in the feedback received from Oversight Committee members, representatives of the major donors, and several individuals with comprehensive knowledge of IRRI and CIMMYT. Despite this diversity of views, there was a general consensus on a number of key issues as we have attempted to summarize below:

- The global leadership role of IRRI and CIMMYT to help ensure food security, natural resource conservation, and poverty alleviation was considered to be of crucial importance to the international agricultural research community.
- The impact on scientific capacity should be the primary justification for recommending a stronger alliance or merger. Opportunities to maintain critical mass in key scientific discipline areas, recruit and retain quality leadership, and facilitate greater coordination

with the national agricultural research and extension systems (NARES)[1] were often cited as potential advantages of a stronger alliance or merger.

- While all respondents indicated that closer coordination and cooperation between IRRI and CIMMYT is needed, there was a wide range of perspectives concerning the degree
- of association and the organizational framework for it. There was, however, a clear consensus on two issues: (1) that the "brand identities" of the two Centers must be preserved, and (2) that a full merger was not the best option at this point in time for a number of reasons (section 7.2).
- Although cost savings from greater efficiencies were not considered to be the driving force, most respondents felt there would likely be opportunities for some reduction in costs from greater efficiency as a result of a stronger alliance or merger. At the same time, a number of respondents were concerned that any alliance or merger option might increase transaction costs. However, some suggested that a short-term increase in transaction costs could be tolerated during an implementation phase if these costs would be reduced over the longer-term.
- Four areas were often highlighted as programs or services that would benefit from a stronger alliance or merger. These were genomics/biotechnology, social sciences, intellectual property management (IP) and biosafety, and the rice-wheat consortium.
- There was a general consensus that the core funding of CG Centers in general, and IRRI and CIMMYT in particular, is not likely to increase substantially in the foreseeable future. Few respondents felt a stronger alliance or merger would have an immediate impact on resource availability although some donor representatives stated that it might be difficult to justify funding at current levels for a merged Center that would be much larger than any of the other CG Centers. Other respondents felt that the effects on funding would be largely driven by the impact of a stronger alliance or merger on program quality and potential impact.
- Most responders emphasized the need to preserve the valuable "brand identities" of both Centers in any type of stronger alliance or merger.
- A number of responders felt that changes in the CGIAR system were overdue, and that a move toward a stronger alliance or merger between IRRI and CIMMYT would "set the standard" and prove to be a positive, catalytic force for change.
- Most responders felt that this "bottoms-up" initiative for structural change taken by IRRI and CIMMYT was a timely opportunity that should not be missed.

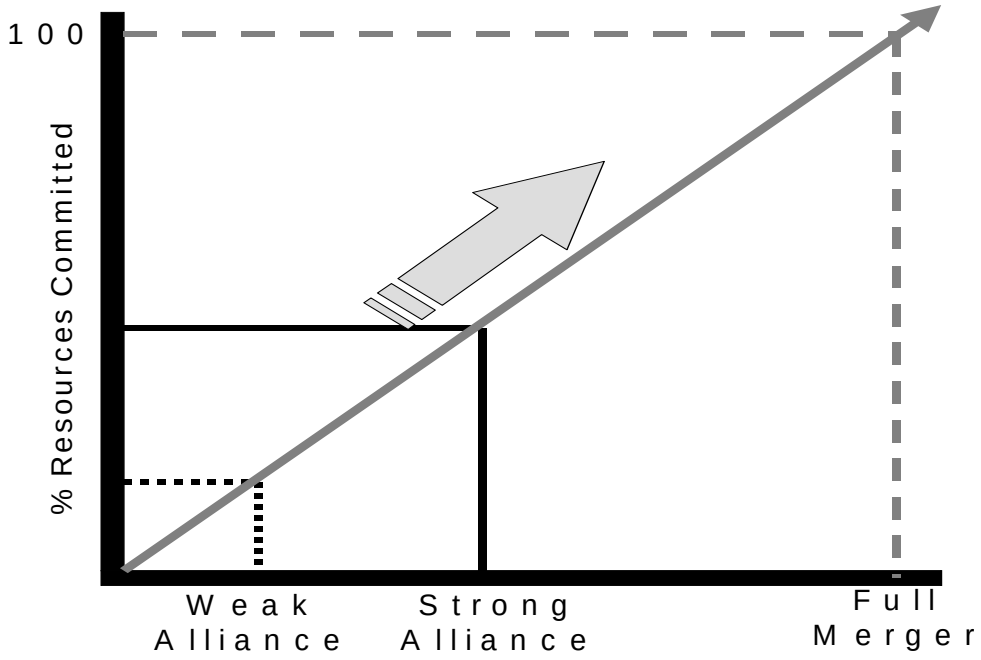
4. Conceptual Framework of an Alliance to Full Merger Continuum

The WG was asked to explore alternatives for closer collaboration between IRRI and CIMMYT ranging from a formal alliance to a full merger. At one extreme are relatively loose programmatic alliances involving one or two projects on which the two Centers collaborate and coordinate activities (weak alliance in Figure 1). Responsibility for the individual Center efforts on such projects flow through normal reporting and strategic planning channels within

[1] NARES are considered to include public research institutions, universities, and extension services, as well as non-governmental organizations (NGOs), and the private sector.

each Center and budgets remain separate. The Rice-Wheat Consortium is an example of such a loosely aligned program.

Figure 1. Conceptual Framework of the Alliance to Merger Continuum



A more formal, stronger alliance would involve the merger of specific programs into unified program entities, each with its own leadership and a dedicated budget and staff who are responsible for planning and implementation of program activities. A *merged program* would therefore have the following features:

- A Program Leader with responsibility for strategic planning, implementation of activities, and evaluation of program staff performance;
- A dedicated budget under control of the Program Leader with contributions from both Centers;
- A clear and unambiguous line of reporting/accountability to senior management.
- Internationally recruited staff (IRS) with primary responsibility to the unified program (i.e. >70% time allocation);
- A unified staff evaluation and reward system for IRS in the program.

To initiate a merged Program that combines staff and budgets from the two Centers, it is likely that an international recruitment would be needed for the Program Leader position, recognizing that current staff would be eligible to apply.

A further step towards closer alliance would be the appointment of one or more common Board members with expertise related to one or more of the merged programs. Having two or three common members serving on both Centers' Board of Trustees might help strengthen the coordination and monitoring of the unified programs, and might also serve as a sign of institutional commitment. Line reporting for merged programs, however, would be cumbersome as Program Leaders would report to two Director Generals, and the specific roles of shared Board members would need to be carefully defined. Such an arrangement could serve as a first step toward a strong alliance.

Still further along the continuum of a loose to strong alliance (Figure 1) would be a scenario in which four or five programs were merged as described above, and a single Board of Trustees governed both Centers. Although each Center would maintain its "brand identity" and there would be separate Director Generals under this scenario, the merged programs would represent a significant portion of each Center's budget. The single Board would continually examine opportunities for evolution towards even closer collaboration and coordination of services and programs to enhance program quality, impact, and operating efficiencies in support of their respective missions and strategic plans. It should be clearly noted, however, that strong separate programs would be maintained where little is gained from an alliance and the strong brand identities of both IRRI and CIMMYT would be protected under a "strong alliance" scheme. An even stronger alliance would result from having a single Board and a single Director General, while still maintaining the legal status and brand identity of IRRI and CIMMYT.

A full merger would involve complete integration of the two Centers into a single legal entity—a single Board of Trustees, one Director General (DG), combined administrative support services, and a unified budget. In contrast to all forms of alliances previously described, a full merger scenario does not ensure the protection of separate brand identities. It would require the creation of a new legal entity and, most likely, the termination of two existing legal entities. In addition, there would be significant uncertainties with regard to use of land and facilities and on the international status granted to Center staff under current agreements between the Centers and their respective host country.

5. Anticipated Effects of Alliance/Merger on External Relations and Resources

5.1 Collaboration with National Agricultural Research and Extension Systems

Both CIMMYT and IRRI have had a long history of working closely with National Agricultural Research and Extension Systems (NARES) through collaborative works, research output disseminations, scholar exchanges, training and other collaborations.

Both Centers in recent years have been moving toward a more decentralized research system, with CIMMYT moving more sharply in this direction. For example, while IRRI locates more than 90% of its IRS at its Los Banos headquarters, CIMMYT locates just slightly more than 50% of its IRS at its headquarters in Mexico and allocates more than 80% of its budget to programs focused on regions outside Latin America (Appendices 3a and 3b).

As decentralization has taken place, both Centers are exploring closer collaboration with the NARES. IRRI has 10 country offices in Asia while CIMMYT has a total of 14 country offices with four in Africa, eight in Asia, and one each in South America (Colombia) and Europe

(Turkey). There are only three countries in which IRRI and CIMMYT both have offices—Bangladesh, China and India.

With regard to interactions with NARES, the following advantages and disadvantages of forming a closer partnership should be considered:

Potential Advantages

- A merger might increase the capacity for collaboration and improve service delivery in dealing with NARES partners. In the cases in which there currently are three-way collaborations, a formal partnership between IRRI and CIMMYT would certainly reduce formalities and transaction costs. One voice and one direction are important and maybe better reached via a strong alliance/merge. In some cases, it could increase scientific benefits, particularly where scientific work is spread over more than one crop, which is the case with most NARES.
- It would allow more careful coordination and possible improvements in the efficiency of national and regional programs of IRRI and CIMMYT in the three countries where both have programs present. In certain countries in which there is only one office, but in which there is production of the crop of the other center, closer linkages between IRRI and CIMMYT could help bring additional expertise at minimal cost. For example, as rice production becomes more important in East Africa, IRRI could more effectively contribute to rice research in the region by building on CIMMYT's well-established presence and programs in this region.
- More narrowly, but quite important in certain NARES, a merger would enhance NARES rice-wheat, rice-maize and other system programs. There could be even greater spillovers, such as introducing new models of collaboration to NARES. In this way a new IRRI-CIMMYT merger could play a catalytic role in promoting interdisciplinary research in some NARES.

Potential Disadvantages

- To work effectively as merged partners, the management and scientists need (and require) closer coordination. The loose alliance that exists at present does not require this, so it is possible that there would be increased management costs (instead of expected savings).
- Because country managers would have superiors in both Mexico City and Los Banos, it is possible that there would be added management difficulties when running joint country offices. It is also possible that if the country director was an expert in a single crop, he/she would promote that crop and there would be less advocacy for the other crops. According to one interview CIMMYT currently has a slight problem promoting both wheat *and* maize. Adding another crop could make this an even more serious problem.
- Although there are certain gains, many of the gains could be realized by simple inter-center collaboration and do not need formal partnerships.

Conclusions

Stronger alliance or merger would enhance IRRI and CIMMYT's ability to collaborate with the NARES, although the expected gains may not be great. For example, CIMMYT could gain from IRRI's infrastructure and strong linkages with NARES in Asia—including a vast network of collaborators. This could allow CIMMYT to play a more important role in Asia where maize production is growing rapidly. Similar gains could accrue to IRRI in some African and Latin American countries. Even without a formal merger, merging the country offices of IRRI and CIMMYT in Bangladesh, China and India would appear to be a worthwhile move. In addition, a stronger alliance or merger should increase the coordination of linkages with NARES by simplifying the lines of communication and providing a more unified front for collaboration with the NARES.

5.2 Collaboration with Advanced Research Institutions

There are hundreds of Advanced Research Institutions (ARIs) with which IRRI and CIMMYT might wish to collaborate, and vice-versa. Some of these are discipline-specific. Both IRRI and CIMMYT already collaborate with many ARIs. The issue is whether a stronger alliance or merger between IRRI and CIMMYT would make collaboration with ARIs easier and more effective or would make collaboration harder. It is assumed here that ARIs include those both in the public sector and the private sector.

Collaboration with ARIs requires IRRI and CIMMYT to have:

- Productive research programs that are having an impact;
- Strong (world quality) researchers;
- Attractive resources (germplasm, databases, equipment, testing sites, access to particular countries);
- An attractive research environment (IP arrangements, MTAs, and so on); and
- Access to funds (e.g., from donors wishing to link the Centers to ARIs).

Given these prerequisites for collaboration with ARIs, it is likely that a stronger alliance between IRRI and CIMMYT would lead to *better* collaboration with ARIs if the attractiveness of the researchers, resources, research environment and impacts were increased, or if new project funds were provided by donors for collaborative projects with ARIs. Conversely, collaboration with ARIs would be *poorer* if the attractiveness of the researchers, resources, research environment and impacts were decreased, or if the flow of donors' funds for linkages to ARIs were to shrink.

If the two Centers were to establish merged Programs that led to stronger research teams through creation of a critical mass under a unified program management structure as described in Section 4, it is likely that collaboration with ARIs would increase. Such an increase could be substantial in the area of genomics and biotechnology, and might lead to a much greater attractiveness to the private sector, particularly if closer collaboration between IRRI and CIMMYT led to significantly increased investment in such research.

5.3 Donor Relations and Funding Support

This analysis is based on financial data for 2001, 2002 and 2003 (Appendices 4 and 5).

Total funding levels: Composition of the donor funding base of both Centres is broadly similar. The largest donors in most years include the USA, the World Bank, Japan, UK, European Community, Switzerland, Rockefeller Foundation, Australia and Canada. Germany and France are also among the "top 10" donors in some years. Some donors are *less important* for IRRI and CIMMYT than they are for the CGIAR as a whole (Netherlands, Sweden, maybe Denmark). Some donors are *more important* for these two Centres than for the CGIAR as a whole (Rockefeller Foundation, Australia).

There are some important *differences* between the two Centres. Japan and the UK are relatively much more important donors to IRRI than to CIMMYT. IRRI's European funding tends to be stronger than CIMMYT's. IRRI obtains a higher proportion of its total funding from its "top 10" donors (84-86%) than does CIMMYT (61-74%, but increasing). CIMMYT is said to obtain about 10% of its funds from the private sector (broadly defined), and there is potential for growth of such funding.

Of particular concern for both Centers is the fact that while total funding for the CGIAR system as a whole has increased by 13% from 2001 to 2003, funding levels for IRRI and CIMMYT decreased by 8-10% (Appendix 4)

Unrestricted funds: Although IRRI **(**48-51%) has a higher percentage of unrestricted funds than CIMMYT (36-41%), the actual amount of unrestricted funding for both Centers is about the same (Appendix 5). Annual unrestricted funding for CIMMYT averaged $13.9 million from 2001-2003 versus $14.3 million for IRRI. Both Centres place a high premium on unrestricted funds. The biggest donors of unrestricted funds tend to be the same for the two Centres (World Bank, USA, Japan, Denmark, Canada, Germany, Sweden [but to a lower extent than for the CGIAR as a whole] and Australia). Some donors of unrestricted funds are *less important* for IRRI and CIMMYT than for the CGIAR as a whole (Netherlands, Switzerland, Sweden, Norway), and some are *more important* than for the CGIAR as a whole (Korea, USA, Japan, Australia)

What might be the effect of a merger or strong alliance? The following analysis assumes a *significant* shift towards shared programs and services, and relies to some extent on the information we have received from the major donors.

Potential advantages

- Possible reduction in overall costs of fundraising efforts.
- Opportunity to consolidate and build on shared constituency of major donors, and lift overall attractiveness to them.
- Possible enhanced attractiveness of a common entity to the private sector; opportunity to increase the value of IP and contributions to the restricted funding base.
- Opportunity to attract/seek increased funding for a reasonably extended period (5-10 years) as an incentive from some key supporters for shared research activities that have potential for greater impact through merging.

Potential disadvantages

- Possible reduction overall support from traditional donors. Some major donors mentioned that it would be hard to justify the total level of pooled funding to a single, large merged Center. However, none of the major donors advised us that their funding would be reduced if the two Centres maintained their separate identities.
- Risk some donors may be marginalised or disenchanted by an overt emphasis on molecular biology

Conclusions

In the current funding environment, it does not seem likely that total funding for the two Centers will be increased significantly or that the percentage of unrestricted funds will increase regardless of whether the Centers remain completely independent or form a stronger alliance or full merger. Some donors indicated that a full merger might make it difficult to justify maintaining the current (pooled) level of funding. In contrast, none of the major donors indicated that the pooled level of funding would be reduced if the two Centers were to form a strong alliance in which each Center's "brand identities" were maintained. Some innovative new research programs that are developed as a result of a stronger alliance might be attractive candidates for additional project funding.

6. Opportunities for Merging Specific Programs and Services

6.1 Development of Improved Germplasm and Varieties

Both IRRI (rice) and CIMMYT (wheat and maize) have world-class crop improvement programs, with impressive impacts on grain production and poverty reduction. Plant breeding involves the generation of genetic diversity and the selection of genotypes that perform better in particular environments. IRRI and CIMMYT have a comparative advantage in generating enhanced germplasm, and the task of evaluating it in countless locations worldwide and releasing it in finished varieties (cultivars) is shared with the NARES and others. Wheat and rice are self-pollinated species, while maize is cross-pollinated. Plant breeding methods for self- and cross-pollinated species are different, and there is not much scope for integration of breeding activities of wheat or rice (on the one hand) and maize. There may be some scope for integration of wheat and rice breeding, but it is not immediately obvious. There is some overlap in where the three crops are grown, but they are mostly grown in different environments, so the opportunities for sharing field sites are also limited.

On the other hand, there is plenty of room for beneficial collaboration in activities that support plant breeding. In logical sequence, these are: a) the collection, storage, regeneration and dissemination of plant genetic resources (but probably not in germplasm characterisation); b) the development of Plant Genetic Resource (PGR) software, and software for tracing the ancestry of cultivars and selecting parents for crosses; c) the development of gene introgression technologies and other "platform" biotechnologies, including the use of molecular markers and the development of gene transfer systems;
d) the development of specialized field equipment for plot sowing, harvesting, and processing seed; e) data processing and statistical analyses; and, f) the protection of

Intellectual Property associated with novel genes and cultivars. There may also be opportunities to share disease diagnostic services and plant/crop physiology capabilities. Some of these opportunities are summarised below.

Possible advantages

- Opportunity to share and expand support services in biometrics (statistical analysis, GxE, experimental design) and provide a world-class advisory service to NARES
- More effective development of breeding lines well adapted for rice-wheat and rice-maize rotations.
- Opportunity to share a common IP management capability
- Possible opportunity to share and nurture plant protection capability (plant pathology, entomology), including the sharing of expensive equipment and facilities
- Opportunity to share specialised research facilities for plant/crop physiology (eg rain-out shelters, heat tolerance equipment, photoperiodicity equipment and other controlled environment facilities)
- Scope for greater diversity of breeding approaches (more staff, more ideas, more options)
- Opportunity to create a “molecular marker café”, serving 3 crops, greatly assisting use of markers by NARS

Possible disadvantages

- The three crops are mainly sown in different regions (of course, there are some overlaps). Thus, there are not many opportunities to share experimental sites, and there might be *disadvantages* in the rate of genetic progress if cost-saving forces breeders to share sites that are not optimal
- Possible ***reduction*** in diversity of approaches if decisions on breeding methods are excessively centralised and young researchers are not permitted to try new approaches.

Recommendation

It is recommended that there should be no merger of plant improvement activities (ie germplasm enhancement, field testing, and the production of cultivars), but that there should be closer collaboration in research and services associated with plant improvement, including biotechnology and genomics as indicated in 6.3 below.

6.2 Germplasm Conservation

Both IRRI and CIMMYT hold globally significant plant genetic resources in world-class facilities. These facilities are not only internationally important, but also add to the profile and status of the Centres as custodians of the world’s key germplasm of the three main grain crops. Together, IRRI and CIMMYT hold more than 40% of the plant genetic resources held by the CGIAR system.

Provided the Global Crop Diversity Trust is successfully established and provided that it focuses substantial resources on the international collections held in trust by the CGIAR, the long-term funding for conservation of both germplasm collections should be assured. Thus, the pressure to reduce the level of investment in germplasm conservation may be less in the future than it is currently. At present, however, it is not certain that the Trust will generate substantial funding in the near future, or that a substantial portion of those funds would necessarily be used for the CGIAR collections as originally expected.

Storage of plant genetic resources is less crop-specific than is the development of germplasm and varieties. Thus, there are opportunities to share storage facilities, software development and perhaps regeneration facilities. The two Centres have a particular opportunity to consolidate a world leadership role in the development and delivery of software systems that link plant genetic resources to plant breeders and, ultimately, to farmers. Such systems encompass a wide range of "passport" and performance data, including information on pedigree and/or descriptors of the location of origin of the material, reaction to various disease organisms and races, possession of particular genes, performance in crosses, and so on. The CGIAR Centres have already moved some way towards a uniform PGR software system, but more remains to be done.

Conservation of plant DNA is now occurring in DNA banks outside the CGIAR system. There are opportunities for IRRI and CIMMYT to share a common DNA bank, perhaps in conjunction with a shared molecular biology research program.

Possible advantages

- Considerable benefits in further development of shared software, which will probably also be shared world-wide with other groups. Faster, more efficient software means better PGR use.
- United response to PGR issues and input to policy development. Single voice for the world's major collection of the world's three major staple crops.
- Cost savings in rationalization of storage, germination testing and plant regeneration/ propagation facilities, and in distribution of seed.
- Opportunity to establish a world leading shared DNA bank and associated bioinformatics system.

Possible disadvantages

- If germplasm collections are combined, this could delay access by breeders to material stored at a location remote from them. Breeders may react by setting up their own local storage facilities if one or other PGR centre (seed store) is closed down.
- Possible reduced funding for PGR overall if Centre storage facilities are combined.

Recommendation

Provided the Global Crop Diversity Trust is established as an effective funding mechanism, there is little incentive to amalgamate the two germplasm banks, and there are benefits in duplicating germplasm in more than one Centre. However, greater collaboration in PGR

software development, DNA storage and bioinformatics could be recommended. If the Global Crop Diversity Trust fails to deliver adequate funds to the two germplasm banks, there would be significant cost savings in rationalising facilities provided that breeders and other PGR users were able to access materials rapidly and efficiently.

6.3 Genomics and Biotechnology

Genomics, the comprehensive examination of an organism's entire set of genes and how they work together to produce traits, will have a tremendous impact on plant breeding in the new century. It should enable plant breeding to move from being primarily an empirical science, based on experience and observation, to a more theoretical science based on a set of well-established facts, principles and systems. Genomics has the potential to provide a detailed understanding of exactly which genes control agriculturally important traits, how they do so and how they can be manipulated in ways that lead to desired new or modified traits. Linking such new understanding of gene content and gene function in rice, wheat and maize with practical breeding and genetic resource conservation and utilization programs, should become one of the most important functions of IRRI and CIMMYT over the coming decades. Genomics will provide the tools necessary to characterize and make greater use of the genetic resources available in IRRI's and CIMMYT's gene banks.

Although scientists working in genomics are still at an early stage of identifying and characterizing all the genes present in any important crop species, it is already clear from early results that the genes controlling many traits are conserved (shared) across related species. Thus, many of the same genes control the same traits in rice, wheat and maize. This should not be too surprising since all grasses evolved from a common ancestor. More surprising was the discovery of a remarkable conservation of gene order within large segments of chromosomes across all of the cereals. This colinearity in gene order is termed "synteny". Once a gene is discovered in one species such as rice, synteny relationships often provide a means of rapidly locating, isolating and characterizing homologous genes in the other species. Thus, much of what is learned in genomics about one species is highly relevant to all related species. Furthermore, rapid improvements are being made in genomics research techniques and equipment. Some of these improvements, such as microarray technologies, enable scientists to look at the expression of thousands of genes at one time.

Rice has become the model plant for cereals genomics research. Of the grasses studied to date, rice has the smallest genome, 430 million base pairs (Mb) of DNA compared to 2,400 Mb for maize and 16,000 Mb for wheat (the human genome has 3,000 Mb). The expansion of the DNA content in the larger genomes is primarily due to duplication of chromosomes (rice is a diploid, wheat is a hexaploid) or large segments of chromosomes and to the insertion of non-coding repetitive DNA elements. The large size and repetitive content of the maize and wheat genomes make these species unlikely candidates for complete genome sequencing in the near term. For rice, draft sequences of the complete genome have been available for over two years. More importantly, a highly accurate complete sequence will be published and put in the public domain before the end of 2004 by the International Rice Genome Sequencing Project. This sequence is the product of a public-private partnership that invested well over $100 million and is likely to be the only complete crop genome sequence available without restrictions for several or more years. Coding regions of the maize and wheat genomes are being sequenced and may also be placed in the public domain while whole genome sequencing of maize has been primarily a private

sector activity. Thus, the rice genomic sequence will be much more than a tool for understanding the biology of a single species. It can and should function as window into the structure and function of genomes in other grasses as well, including maize and wheat.

IRRI and CIMMYT have not played major roles in sequencing crop genomes. DNA sequencing *at the genome level* requires expensive specialized equipment and is better left to advanced laboratories dedicated to sequencing. IRRI and CIMMYT have performed useful sequencing of coding regions. Both centers should play important roles in functional genomics - determining the function of each gene once it has been identified. In the case of rice, it is estimated that there are up to 50,000 genes in the genome. This estimate is based on the number of "open reading frames" in the sequence, which appear capable of coding for a protein or functional RNA. Of the 50,000 rice genes, the function of only a few hundred has been clearly demonstrated. For several thousand rice genes some ideas about function can be inferred based on sequence homology with known genes from other organisms but true function still needs to be confirmed. For the majority of rice genes, the DNA sequence is known but the function of the gene remains totally unknown.

Gene function is often determined by mutating a gene so as to delete its function or by introgressing a different version of the gene (allele) and studying any resulting change in the plant. IRRI is committed to playing an important role in rice functional genomics. It has helped to organize and serves as a coordinator of a worldwide network termed the Rice Functional Genomics Consortium. IRRI has established large collections of mutant lines and introgression lines having site-specific deletions or introgressions. It provides these genetic stocks to Consortium members and other researchers. In return, IRRI receives data and information on the function of rice genes generated by other laboratories. This information is organized into a database available to all researchers. It is linked to other rice databases, most of which are in the public domain.

CIMMYT has similarly produced genetic stocks of maize and wheat for genomics researchers and has made a major commitment to bio-informatics. However, CIMMYT is not the primary source of such materials and information. Much data and information concerning maize genomics exist but much of it is in the private sector and available only under licensing agreements.

In 1999 CIMMYT and IRRI launched the "Maize-Rice Functional Genomics Project" designed to discover the key genes responsible for drought tolerance and produce tools that will enhance breeding for this trait. Both centers have made progress albeit with only modest levels of direct collaboration. Much of this research will become part of the "Generation" Challenge Program, which is designed to assure that advances in the crop sciences, including genomics, are applied toward the needs of poor farmers. IRRI and CIMMYT are also both founding members of the International Crop Information System, a CGIAR-sponsored database. Both centers have small but effective bioinformatics units.

Marker-assisted selection (MAS) and genetic engineering are two additional tools of biotechnology being used by IRRI and CIMMYT. MAS involves the identification and use of DNA sequences located near genes to follow the inheritance of these genes in a breeding program. Using MAS, progeny plants are tested in the laboratory rather than the field to determine which progeny did or did not inherit specific genes or chromosome loci. Multiple markers can be screened simultaneously. It is a proven technology that can speed up breeding and is particularly useful for traits that are complex and/or difficult to score phenotypically. In a breeding program, however, thousands of plants need to be screened

for multiple genes and traits, so the cost effectiveness of MAS becomes an important factor. IRRI and CIMMYT both use MAS routinely and effectively. With Asian Development Bank funding both has established biotechnology networks in Asia that are successfully transferring MAS technology to NARES. The coordinator of CIMMYT's Asian Maize Biotechnology Network is based at IRRI. To use MAS routinely and cost effectively, both centers need access to a high throughput marker screening facility that operates as a service function to the breeding programs. This is in addition to research aimed at advancing MAS as an effective breeding tool.

IRRI and CIMMYT have the capacity to genetically transform (add new genes to) their mandate crops. However, they have not been at the forefront of such genetic engineering research, although CIMMYT does now have one of the world's most efficient wheat transformation protocols. Both centers can do transformations but neither has much capacity to create the new gene constructs that breeders would like to add to their varieties. Consequently, they have been dependent on borrowing gene constructs from others. Such constructs often come with restrictions (e.g., for research purposes only) or other legal (e.g., intellectual property, biosafety and regulatory) constraints.

Regulations concerning transgenic crops will likely require that some research be conducted on food safety issues and environmental impacts. Often the centers will not have the necessary expertise in-house to meet these requirements but they will need sufficient expertise to know what is needed, how to get it done most cost effectively and how to interpret the results. NARES face these same restrictions and regulatory constraints but neither IRRI nor CIMMYT have been very effective in helping NARES gain unrestricted access to useful gene constructs or to obtaining regulatory clearance in a timely fashion.

Possible advantages and disadvantages of a merged genomics/biotechnology program follow.

Possible advantages

- The gene content of rice, wheat and maize are very similar and gene function across these related species is also likely to be similar. Much that is learned about genes in one species will be relevant to the other two. A common strategy for research on gene function, drawing on the genetic stocks of both IRRI and CIMMYT and the combined skills of their scientists, could lead to faster, greater and more significant results for both centers. A merged program in functional genomics with strong leadership, a critical mass of scientific talent and a unique focus on traits important to the mission of the centers would have the potential to be one of the world's outstanding programs and one that the best scientists would want to be associated with. A merged and expanded program could assume responsibility for coordinating a worldwide collaborative program in cereal genomics.
- Rice is already the model cereal for genomics. A detailed complete sequence of the rice genome will soon be available and many scientists worldwide will be using it and developing genomics tools based on it. IRRI and CIMMYT both need to take advantage of this worldwide research effort. They should be at the forefront of research utilizing rice sequence data to help characterize their genetic stocks and to better understand the genetics underlying traits that are important but complex and of little interest to the

private sector. A merged and expanded program should be able to assume leadership in extending what is learned with rice to other cereals.

- A merged program would be more likely to attract the critical mass of talent and leadership required to establish a world-class program in genomics that should attract the best young scientists from throughout the world for training. It is often such young scientists who have the insights that result in major scientific breakthroughs.
- Genomics will help make the genetic resources in IRRI's and CIMMYT's gene banks more accessible and more valuable. A merged program would even further increase the value of these genetic resources since genes and allelic variation in genes could be studied and utilized across rice, wheat and maize. Many traits important to IRRI's and CIMMYT's mission are not likely to be studied by others with similar capacity.
- Use of marker assisted selection and/or genomics in a breeding program requires the ability to analyze thousands of plant samples for multiple markers/genes. This is best done with a high through-put dedicated facility. If plant samples are being sent for analysis from different field stations, one excellent, central facility serving both IRRI and CIMMYT (and maybe others) should be more cost-effective. Such a service function would be in addition to cutting edge research aimed at advancing genomics and its applications.
- The equipment used in genomics research is expensive and quickly becomes obsolete. A merged program could better afford the best available equipment and to keep it updated.
- Some markers used in MAS work across species. A merged program could more readily select, use and share with others such valuable markers.
- Bio-informatics is becoming a key component of genomics research. Each center has a small but effective program. A merged program on bioinformatics would be more informative to all using it, more cost-effective and more likely to attract additional leading scientists and postdocs. A bio-informatics capacity that linked genomics and genetic resources would be unique and valuable contribution.
- Gene constructs developed for genetic engineering of one cereal are likely to work in most cereals. Whether they are produced by center scientists or obtained from others, such constructs will be of much greater value if available for use in rice, wheat and maize. This is particularly true if constructs need to be purchased or require protracted negotiations to access them. Such constructs could also then be shared with a greater number of NARES for a greater range of crops.
- Specialized skills and facilities are required for greenhouse and field testing of transgenic plants. A merged program could share one excellent, central facility for production and testing of transgenics of all three cereals. A merged program would be better able to hire the right talent to ask the right questions with regard to food safety and environmental impact, to make sure the necessary research is conducted, to interpret the results, to learn from experience, to provide feedback to crop scientists, to provide regulators what they need and to assist NARES with similar issues.

<u>Possible disadvantages</u>

- A merger of existing programs would not be sufficient to move the centers to the forefront of this rapidly advancing field. That would require dynamic leadership, vision,

an increase in scientific capacity and a focus on areas where the centers have a comparative advantage.

- Close interaction between breeders and those working in genomics and biotechnology is useful and would, no doubt, be diminished by having specialized facilities at a distance from field research programs.
- It may be difficult to recruit a program leader who can maintain a world class reputation in genomics while contributing to practical crop improvement programs.
- Some increase in transaction costs might occur but advances in information technology should make this a diminishing concern.

Recommendation

Genomics and biotechnology will become increasingly important components of modern crop improvement programs. Currently, IRRI and CIMMYT have relatively small programs in these areas. Although they are making useful contributions, the current programs are not of sufficient magnitude to be at the forefront of the field. Nor is current capacity likely to meet the anticipated needs of both Centers moving forward. Much could be gained scientifically if the two efforts were merged into a single genomics and biotechnology program due to the similarity of the cereal genomes and from increased ability to attract leading scientists, which would help to create and maintain a critical mass of talent. Such a merged program would need strong leadership, it would need to be expanded to include talent in critical areas, and it would need to focus on those aspects of genomics where the centers have a comparative advantage (e.g., characterizing genetic resources and understanding the genetic base of complex traits such as drought tolerance and temperature sensitivity). Such a combined and expanded program would have the potential to assume a leadership position in the field, attract the best young post-docs, provide coordination for multi-institutional collaborations (perhaps including ICRISAT, ICARDA, CIAT, IITA and WARDA) and better serve the NARES as well as the centers' own breeding programs. The advantages of a merged program in genomics and biotechnology would far outweigh the disadvantages and is therefore recommended.

6.4 Social Sciences

Apart from a difference in regional emphasis and crop coverage, the similarities between the research activities and services provided by the social science programs at IRRI and CIMMYT are numerous. Both Centers conduct studies aimed at identifying the highest priority technologies and research needs for developing the most appropriate research agendas to achieve their respective missions and implement strategic plans. Both Centers also conduct similar types of constraint analyses of prospective technologies, and they both assess and document the impacts of technologies at both the micro- and macro scales—including effects on productivity, incomes, livelihoods and the international diffusion of technologies.

Both IRRI and CIMMYT conduct policy analyses of demand, supply, trade, prices and marketing of cereals (the difference being that IRRI focuses on rice, while CIMMYT focuses on wheat and maize) and local resource management. And both Centers have also developed statistical databases for their mandate cereals to support their policy analyses.

For example, IRRI has developed a world rice statistics database while CIMMYT has similarly developed a number of wheat and maize databases, including a variety and genetic diversity database. Furthermore, each Center's IRS work closely with NARES social scientists to evaluate policy interventions that can strengthen technology delivery systems and remove constraints to technology adoption. Though capacity building for social science research in NARES remains another common objective of the two Centers, such work has been substantially reduced over time due to the financial constraints.

IRRI's Social Sciences Division consists of 4 IRS (3 economists and 1 Global Information Systems (GIS) specialist) and a few affiliate and project scientists all based at headquarters. CIMMYT's social sciences group, which was formerly constituted in an Economics Program, is now dispersed between the Impacts, Targeting and Assessment Program and other eco-regional research programs. In total this group now includes 6 IRS (5 economists and 1 human ecologist) and a few associate scientists. Of these, half (2 economists and 1 human ecologist) are based at the headquarters, and the other half are based in country and regional offices. Both Centers are increasingly encountering challenges in recruiting economists and other social scientists to leadership positions.

The advantages and disadvantages of merging the social sciences at IRRI and CIMMYT are summarized below.

Possible advantages

- A merger would very likely improve the efficiency of most activities of both Centers' economics and social sciences activities. Not only are the researches and policy issues covered by these programs similar – apart from differences in commodity and regional focus – but the databases and research methodologies are also similar.
- Merging the social sciences into one unit will help create and maintain a critical mass of economists/social scientist expertise. Maintaining a critical mass of expertise allows for more effective mentoring of young social scientists and could increase the quality of recruits.
- A merger would provide better social science services for IRRI-CIMMYT joint programs that require economic and policy analysis—assuming that other programs are also merged. Hence, in the case of programs on rice-wheat or rice-maize, or genomics and biotechnology, a joint social science program could better serve these merged programs by providing a greater array of expertise in the social sciences.
- A joint effort will not only enhance IRRI and CIMMYT's understanding of the long-term development of three major cereals and related commodities, but also improve their capacities to serve the research needs of both Centers. This would be the so-called cross-fertilization effect—as one learns about issues in the rice economy, for example, they also can be applied to work on maize and wheat.
- A merger of the social sciences would facilitate a broader, more integrated approach to investigations on rural development and the role of new technology, and would improve the effectiveness of policy analysis that responds to the demands of policy makers. Though single commodity-based policy analysis was very useful in the 1960s, 1970s and 1980s, in more recent periods developing countries are struggling to achieve goals of national grain or food self-sufficiency while dealing with trade liberalization. Encouraging agricultural diversification and promoting farm income growth are also

receiving greater emphasis. Trying to analyze the role of agricultural technology within a matrix of such issues requires a broader approach and wider set of skills that a larger group of social scientists could bring together. As such, a joint policy analysis program could serve policy makers more effectively by providing a package of recommended policies that are consistent across commodities and which address issues facing policy makers in a global economy.

- A merger would strengthen the financial resources of both Centers' economics and social sciences programs. Although historically both IRRI and CIMMYT have had strong programs in economics and policy analysis, increasing demands to play a service role in
- priority setting and for public relations information at both Centers, combined with increasingly strict budget constraints, have gradually weakened their research capacities in the social sciences.
- A joint program would improve the ability of both Centers to attract and successfully recruit top economists. Broadening the social science research focus of these Centers to encompass a variety of cereal crops would improve their attractiveness to both young and established scientists.

Possible disadvantages

- One possible danger of a merger is that if social scientists in a single larger group might decrease their interactions and collaboration with scientists in other disciplines. Although collaboration among social scientists is desired, it should not exclude or inhibit the needed collaboration with agricultural scientists, which has been a hallmark of social science research at both Centers since the very beginning. Management and evaluation policies would need to be carefully set up to ensure that social scientists in a merged unit continue to play a strong collaborative role with scientists in other disciplines as needed.
- Differences in organizational structure might increase the transaction costs of a merged social science program, particularly regarding communication and personnel management. Such an increase might occur because IRRI's social scientists are located in one Division and are mostly located at headquarters while CIMMYT's social scientists are distributed between several programs and are located both at headquarters and at regional programs. On the other hand, this complementarity could help to strengthen the overall effectiveness of a merged program with significant social science expertise located both at headquarters and in the field.

Recommendation

Although there are a few potential disadvantages, a merger of the economics and social sciences programs into a united social science program could improve capacity in the following key areas: research prioritization, *ex ante* technology assessment; policy analysis, constraint analysis to technology adoption, impact assessment, and capacity building for social science research in the NARES. As such, we recommend the formation of a unified Social Sciences Program headed by a single Program Leader.

6.5 Plant Pathology and Entomology

Both IRRI and CIMMYT maintain research programs that focus on applied and basic aspects of plant protection. The numbers of IRS in this area have decreased significantly at both Centers during the past five years. Currently, there is some concern amongst the scientists themselves about losing a critical mass of expertise in plant pathology and entomology.

Research in plant pathology and entomology at both IRRI and CIMMYT has emphasized identification of durable genetic sources of resistance to major pests—using both conventional breeding and molecular tools—and introduction of this resistance into elite germplasm that is shared with NARES breeding programs. Both Centers maintain some effort on pest management strategies at the field level, especially in collaboration with the NARES. IRRI has also maintained a research effort focused on host-pest interactions and ecology with the goal of using this knowledge to develop more effective integrated pest management options that reduce dependence on pesticides. It is perceived by some that CIMMYT pathologists play more of a "service" role to the breeding programs.

Possible advantages

- A merged program would help maintain a critical mass of expertise in plant protection sciences, including plant pathology, virology, nematology, and entomology across levels of integration—from basic molecular biology, genomics, and host-pest ecology to the application of this knowledge towards development of improved integrated pest management strategies at the field level.
- A merged program would have the potential for greater integration of applied research programs on diseases and insects of rice-wheat systems and on the emerging rice-maize systems in Asia.
- The difference in emphases and approaches of the two Centers—more basic pest ecology and wide spread IPM implementation at IRRI versus more applied and problem-solving pest management research and collaboration with breeders at CIMMYT—could potentially be a positive factor because of the potential complementarities and interactions amongst the scientists.

Possible disadvantages

- Differences in emphases and focus (i.e. applied versus fundamental) of entomology and plant pathology research at the two Centers would reduce the potential synergies of a merged program.
- Critical mass may be achieved in numbers only but large distances between the two Centers and between outreach sites where several CIMMYT IRS are located would make it more difficult to forge effective collaborations and take advantage of disciplinary complementation.

Recommendation

Differences in organizational structure and focus of the plant protection sciences at the two Centers, and the large distance between scientists would limit the benefits of such a merger.

On the other hand, such differences could also be a complementary and positive factor in a merger of these programs if it helped maintain a critical mass in the various sub-disciplines within the plant protection sciences and resulted in greater synergies and program balance. At this point in time, however, we do not recommend merging activities in plant pathology and entomology into a combined unit. Improvements in distance video-conferencing technologies and changes in program emphasis may favor a merger at a later date.

6.6 Agronomy/Soil Science/Plant Physiology

Crop and soil scientists at IRRI and CIMMYT are currently working within a number of integrated "systems" programs of each institute. Their work includes both fundamental research to understand the process controls on yield potential and resistance to abiotic stresses such as drought and temperature, and applied research to alleviate constraints to productivity of rice, wheat and maize-based cropping systems while protecting natural resources. Both Centers also conduct crop physiology research in collaboration with geneticists to understand the genetic control of key processes governing crop yield potential and response to stress.

At IRRI, crop and soil scientists primarily work in Programs 2 and 3. Program 2 focuses on irrigated rice ecosystems and is titled "Enhancing productivity and sustainability of favorable environments". Crop, soil, and physiology research in this program contributes to Project 4 – "Managing resources for intensive rice", which involves developing and maintaining a knowledge intensive "tool set" that requires integrated crop and soil management and information packages for farmers and advisors; Project 5 – "Enhancing water productivity in rice-based systems", which seeks to develop alternative production systems that reduce water requirements of irrigated rice; and Project 6 – "Irrigated Rice Research Consortium" (IRRC) – a multinational collaboration to promote interdisciplinary research among rice-growing countries in Asia. Program 3 is focused on the less favorable rainfed rice ecosystems and is titled "Improving productivity and livelihoods for fragile environments". In this program, crop, soil, and physiology research contributes to Project 8 – "Natural resource management for rainfed lowlands and upland rice", and Project 9 – "Consortium for unfavorable rice environments (CURE)" – a collaborative management network in which IRRI and NARES partners identify and prioritize regional research needs, implement interdisciplinary research on productivity, sustainability, and diversity of rice-based rainfed cropping systems and exchange and evaluate germplasm and technology.

Of these IRRI programs, collaboration with CIMMYT occurs only in Program 2 under Project 4, which houses IRRI's work on the rice-wheat systems of the Indo-Gangetic region in south Asia.

At CIMMYT, a new program structure places crop, soil and physiology research in four eco-regional research programs. These include: Program 3 – "Sustaining African Livelihoods - improving food security in Africa through better technology and improved markets" (which focuses on rainfed maize systems and crop diversification in sub-Saharan Africa, primarily eastern and southern Africa); Program 4 - "Reducing vulnerability by managing risk in rainfed systems" (which focuses on rainfed wheat systems in Eurasia, Central India, South America, and comparable ecologies in southern Africa); Program 5 – "Improving livelihoods and conserving natural resources in tropical ecosystems" (which focuses on maize systems in Latin America, Southeast Asia, and tropical areas of southern China); and Program 6 – "Irrigated, high-potential maize and wheat systems - safeguarding food security through

sustainable intensification" (which focuses on irrigated wheat in rice-wheat systems of the Indo-Gangetic Plains, Mediterranean littoral, Yellow River Basin, and northwestern Mexico; and irrigated maize in these regions). Direct collaboration with IRRI occurs only in Program 6, which includes CIMMYT's work on rice-wheat systems in south Asia.

Given existing efforts in crop, soil, and physiology research under the current program structure at IRRI and CIMMYT, the potential advantages and disadvantages of closer alliance or merger of this work are given below.

Possible advantages

- Although both IRRI and CIMMYT already conduct research on improving rice-wheat systems in the Indo-Gangetic region of south Asia, their programs would benefit from more formal collaboration in terms of strategic planning, partnership with NARES, implementation, and reporting of research.
- A merger would facilitate a more holistic research approach through integration of the different disciplines that contribute to identifying productivity and natural resource constraints to productivity and farm profitability in Asian farming systems, which sometimes include two or more of the major cereals and additional diversification with other crops.
- Smoother collaboration with NARES partners within the Rice-Wheat Consortia as well as with collaborators on other projects.

Possible disadvantages

- The limited existence of farming systems involving two or more of the major cereals outside of Asia would limit synergistic interactions and add transaction costs among crop and soil scientists who work in less favorable rainfed systems in Eurasia, South Asia, and Latin America.
- Limited potential for collaboration between CIMMYT and IRRI in Africa because of few prospects for rice-wheat or rice-maize farming systems in the region, and other CGIAR Center partners may be better positioned to work with CIMMYT in this region.

Recommendation

A unified program in crop and soil science is not recommended because it currently only makes sense for research on intensive, irrigated cereal systems in Asia. While we see substantial opportunities for a unified program on rice-wheat systems in the Indo-Gangetic region of South Asia, and also on the rapidly emerging rice-maize systems in Asia (see Section 6.7), there currently appears to be little potential for synergy on rainfed systems outside of Asia. However, if rice production continues to expand in eastern and southern Africa, there may also be future opportunities for a merged program in that region.

One option would be to establish a single program on Managing Resources in Intensive Cereal-Based Systems, which would include work on rice-wheat, rice-maize, and rice-rice systems, which together account for the vast majority of all cereal production in Asia. This scenario is discussed in Section 6.7 below.

6.7 Rice-Wheat and Other Intensive, Irrigated Cereal Systems

As noted in the previous section, both IRRI and CIMMYT conduct research on improving rice-wheat systems in the Indo-Gangetic region of south Asia. Both Centers provide expertise on varietal improvement and pest protection issues related to rice or wheat in these systems. However, IRRI's major emphasis has been on improved nutrient management and crop simulation to increase yields and maintain soil quality while CIMMYT has focused on planting technologies and conservation tillage to decrease turnaround time between crops, increase crop yields, and reduce water requirements. Both programs are highly complementary and would benefit from closer formal collaboration.

Of the three major cereals, maize demand will increase significantly more than wheat or rice over the next 30 years. The greatest increase in maize production will likely occur in Asia, and rice-maize systems are rapidly becoming a major cropping system—especially in China, Vietnam, Thailand, and Indonesia. Currently, CIMMYT has relatively little presence in these countries while IRRI has a major presence in all four countries under Program 2—Project 4 in areas where rice-maize systems are expanding. There is clearly potential for a combined effort on this emerging system, which has the potential to become as important as the current rice-wheat systems.

Possible advantages

The core scientific disciplines required to conduct the fundamental and applied research on improving productivity, profitability, and protection of natural resources in irrigated cereal systems are the same for wheat, rice, and maize. Moreover, the need for scientific capacity building in key areas of NARES programs—such as simulation modeling, GIS and geospatial analysis, crop physiology, plant pathology, and entomology, and impact assessment—are the same for rice-wheat, rice-maize, and other more diversified systems that include these crops.

- Both programs would benefit from closer collaboration in terms of strategic planning, partnership with NARES, implementation, and reporting of research. In particular, the NARES would find it much easier to interact directly with a unified program rather than two separate programs.
- There is a high degree of complementation and potential synergy between the program emphases and expertise contained within existing IRRI and CIMMYT efforts on rice-wheat systems.
- A combined program would have the capacity to develop more holistic, integrated programs and could more easily maintain a critical mass of expertise. A stronger, better-coordinated program would be more likely to have positive impact, which in turn would be more attractive to donors. The rapid rise of importance of rice-maize systems represents another area that might attract substantial donor support.
- The potential for better deployment of resources across the rice-wheat countries, and perhaps countries in which rice-maize systems are rapidly expanding, would lay the foundation for greater impact across the developing countries of south and southeast Asian.

- Both maize and rice production are increasing in Africa and substantial further increases are required to meet demand. CIMMYT has a major presence in eastern and southern Africa and IRRI is exploring opportunities for working in that region. A merged program would greatly facilitate any expansion of IRRI's programming into eastern and southern Africa where irrigated rice has the potential to become an important crop.

Possible disadvantages

- Program decrease in funding if some major donors were led to believe that a unified program could achieve efficiencies that would allow equivalent effectiveness and impact with less total funding.
- Need for a new Program Leader position that would be responsible for the unified program and would report to both IRRI and CIMMYT.

Recommendation

Substantial opportunities would result from the establishment of a unified program on improving rice-wheat systems in Asia. Moreover, the same rationale for merging the respective rice-wheat programs of the two Centers would also argue for a larger combination of all research programs on intensive, irrigated cereal systems in Asia. This would include the rapidly expanding rice-maize systems and the continuous rice-rice systems that dominate the tropical and subtropical lowlands in south and southeast Asia. Similar scientific approaches are needed to address constraints in all intensive cereal systems, such as field-specific nutrient management, simulation modeling to improve the efficiency of applied research and to explore effects of climate change and crop diversification, GIS and geospatial analysis, weather forecasting, appropriate small-scale mechanization that can promote conservation tillage and more efficient irrigation. The required scientific expertise to support these approaches is not crop or cropping system specific. Therefore, strategic research could be conducted at the Centers and in collaboration with ARIs while applied research could be implemented at outreach sites in partnership with NARES.

In summary, we recommend the formation of a unified program focused on "Sustaining Intensive Irrigated Cereal Cropping Systems" with an initial focus on Asia, and the potential for expansion to Africa as opportunities arise. This new program would include IRS from a number of existing IRRI and CIMMYT programs with representation of agronomists, soil scientists, the plant protection sciences (entomology and plant pathology) and plant physiology. The program would have scientists based both at headquarters and at key locations in the intensive cereal production domains of Asia and possibly Africa in the future. It would include work on rice-wheat, rice-maize, and rice-rice systems, which together account for the vast majority of all cereal production in Asia.

6.8 Sub-Saharan Africa Projects

CIMMYT has just reorganized its program structure to create a new program area (*Program 3)* "Sustaining African Livelihoods – improving food security in Africa through better technology and improved markets" that is primarily focused on maize and crop

diversification in sub-Saharan Africa, primarily eastern and southern Africa. This program contributes to the three approved CGIAR Challenge Programs (Generation; Harvest Plus; Water and Food) and emphasizes improving system resilience and productivity in the face of biophysical and socio-economic risk. It will develop a range of maize varieties with tolerance to drought and low soil fertility, resistance to pests (including insects and S*triga*), and improved nutritional content. Hence, it should also contribute to a fourth Challenge Program focused on sub-Saharan Africa which is currently under development. Consistent with local biosafety regulations and informed deliberation by civil society, the program will also explore the release of transgenic maize with resistance to stem borers. With partners, it will provide suitable wheat varieties to smallholders in Ethiopia. Participatory selection of varieties will expand, and new approaches will be established to disseminate improved seed effectively through the private sector and community organizations. The program will support efforts to make good quality seed reliably available at fair prices to smallholders. Policy and market analyses will be conducted to foster market development and better integrate smallholder cropping systems into national markets. Complementary research on crop and natural resource management will focus on soil fertility management practices for clearly defined land types and farmer categories. Considerable attention will be given to crop-livestock interactions.

IRRI presently has little presence in Africa although they are planning to post an IRS position in eastern or southern Africa to work collaboratively with WARDA. The 6th EPMR suggests that IRRI critically examine whether it would have a comparative advantage in establishing an Africa program, given the costs and benefits. With limited resources, a key issue for IRRI is whether an expansion of activities in Africa would come at the expense of its current program investment in Asia. The Review Panel's view was that the IRRI's comparative advantage was in Asia. However, African NARES, particularly in eastern and southern Africa where rice production is expanding and where WARDA has limited presence, are anxious to gain greater access to IRRI's expertise and genetic resources.

Potential advantages and disadvantages of expanded collaborations between IRRI and CIMMYT in Sub-Saharan Africa are summarized below.

<u>Possible advantages</u>

- IRRI would benefit from the existing CIMMYT network in Africa should it choose to launch an African program.
- CIMMYT would have access to IRRI rice expertise, which would be helpful for activities in the very limited areas where maize is grown after rice in small lowland valleys ("Dimbas" in Tanzania, Malawi, Mozambique). These systems are currently of little regional economic significance but production is increasing.

<u>Potential disadvantages</u>

- There is a potential of conflict with WARDA, which now regards itself as the "Africa Rice Centre" and which might interpret an alliance as a disguised attempt by IRRI and CIMMYT to move into its "territory".
- IRRI does not currently have a presence in Africa, so that the focus of the nascent CIMMYT African Livelihoods program could be diverted by transaction costs and

strategic planning associated with the establishment of a formal collaboration with IRRI.

- There could be pressure to change CIMMYT's decentralized, more applied approach in favor of IRRI's more centralized "upstream" approach, which would be disadvantageous, especially in Africa. On the other hand, if IRRI chooses to establish a program in Africa, CIMMYT can clearly help IRRI to implement the kind of decentralized approach that would be required for such an effort.

Recommendation

There appears to be no pre-existing conditions favoring the creation of an IRRI-CIMMYT Africa program. IRRI has no comparative advantage in mounting a regional program in Africa, and there are no significant areas where maize-rice or rice-wheat are currently cropping systems of significant economic importance. Moreover, alliances between CIMMYT and other CG Centers—such as CIAT-TSBF and ICRAF for soil management work, ILRI for crop-livestock work— may be more relevant to existing African farming systems. However, rice production in eastern and southern Africa is likely to continue expanding, and the CG system should provide backup research for the NARES. A merged IRRI-CIMMYT program in the region is one option for meeting this need, and it deserves consideration in developing future strategic plans.

6.9 Intellectual Property Management and Biosafety/Environmental Regulations

Historically IRRI and CIMMYT established policies for sharing knowledge and materials that they produced and germplasm held in their collections as global public goods. For the most part, they shared and disseminated germplasm and knowledge to anyone that requested it, without restraints. Until recently the international exchange of crop germplasm and plant materials involved minimal regulatory oversight with use of phyto-sanitary procedures designed to prevent the spread of crop pests and diseases being the major requirement.

Over the past two decades, however, the use of intellectual property rights (IPRs) and material transfer agreements (MTAs) have become more common place in agricultural research and regulatory oversight has expanded significantly. Several international treaties and agreements have come into force that are leading to worldwide use of IPRs and affect the international distribution of germplasm. They include: International Undertaking on Plant Genetic Resources, 1983 and revised in 1989, 1991, 1993; Convention on Biological Diversity (CBD), 1993: Trade Related Aspects of Intellectual Property Rights (TRIPS) agreement in the World Trade Organization 1995; Cartagena Protocol on Biosafety to the CBD, 2000; International Treaty on Plant Genetic Resources for Food and Agriculture 2004.

IRRI and CIMMYT have tried their best to comply with all legal obligations, but they have been reactive rather than proactive. Increasingly, when they try to negotiate research collaborations with both public and private sector partners, IPR becomes a constraint that causes delays, sometimes deters productive collaborations and often complicates their implementation. Biosafety regulations are being enacted by many countries that further complicate the dissemination of plant materials, particularly for transgenic plants. IRRI and CIMMYT have had to adjust their IPR and germplasm exchange policies to accommodate these new realities and may well need to make further adjustments. Moreover, national

agricultural research systems in developing countries are faced with many of these same problems and look to IRRI and CIMMYT for significant expertise and advice on these issues.

Senior management at IRRI and CIMMYT traditionally made decisions concerning IPRs and biosafety based on CGIAR guidelines and, when necessary, advice from external legal counsel. In 2001 CIMMYT recruited an intellectual property counsel with seed company experience as a full-time international staff member. He spent considerable time helping CIMMYT put in place an IPR policy that reaffirmed CIMMYT's role as a producer of global public goods. This necessarily means that CIMMYT (as with any other modern research center) must deal with the obstacles and opportunities presented by intellectual property rights to the effective deployment of research products. This requires working as thoroughly as possible on the front end in contracts and material transfer agreements to ensure that CIMMYT will have freedom to operate in the future. As research products progress toward eventual deployment, CIMMYT has to identify and remove constraints to the distribution of these products. CIMMYT continues to work toward these goals and now pays more attention to legal aspects of all agreements and relationships with outside parties. The recently appointed Deputy Director General for Research at CIMMYT has training and experience as both a research scientist and as an attorney specializing in IPR. He should add further in-house legal experience.

IRRI, too, has reaffirmed its commitment to producing global public goods. In 2001 IRRI recruited an "Intellectual Property Rights Specialist" who had experience as a research scientist and a patent examiner at USDA-ARS. She helped IRRI to update MTAs and licensing agreements, streamlined the process by which MTAs were handled and advised researchers on IPR issues. In 2003 IRRI recruited a biotechnology research manager from the corporate sector who had extensive experience in negotiating MTAs and licensing agreements. He has assumed responsibility for IPR issues at IRRI and the "IPR Specialist" position was not renewed.

Experience at IRRI and CIMMYT with regulatory issues is mostly limited to phyto-sanitary requirements. They do not have much experience in obtaining regulatory approvals for field testing or commercial release of transgenic crops. They are learning from experience but both centers could use the help of specialists with experience in obtaining regulatory approvals. They may also need greater scientific expertise in food safety research and environmental impact assessment. At a minimum they need sufficient expertise to access relevant information from others, if necessary arrange for research to be done by others with appropriate expertise and interpret the results. Accomplishing this in a cost-effective manner will require innovative thinking and accumulated knowledge. Done successfully it will benefit the NARES as well as all CG Centers.

Possible advantages

- IRRI and CIMMYT still have relatively limited IPR and legal expertise. Having a common IPR policy and shared in-house IPR expertise would enable them to increase their capacity at minimal additional costs.
- IRRI and CIMMYT have the same basic goal of producing global public goods. MTAs, research agreements, and other documents should be usable by both centers and become models for other CGIAR centers.

- When negotiating access to proprietary property it may be just as easy to negotiate for two centers and three crops as it is for one center. Hence, each center would gain access to additional technologies and materials.
- When negotiating with other organizations, having access to the resources of both institutions would strengthen the merged programs' negotiating position.
- A combined biosafety program could have the necessary expertise to serve as a model for how to deal with biosafety issues, including impacts on food quality and the environment, in a serious, professional and cost effective manner.
- A combined biosafety program could more easily and effectively devote some resources to providing constructive input to those formulating new regulations.
- By combining their in-house IPR and biosafety expertise, IRRI and CIMMYT would be able to provide greater assistance to national programs dealing with these same issues.

Possible disadvantages

- Close interaction between IPR experts and researchers is essential. IPR and biosafety issues need to be considered when research priorities are being set and when research plans are being made. Having such expertise on-site can help to assure that scientists give these issues appropriate consideration.
- IPR laws and biosafety regulations in the host country will be particularly important so local expertise will still be required.

Recommendation

Intellectual property and biosafety issues are areas where a merged program between IRRI and CIMMYT could clearly be beneficial to both centers. Greater expertise than is currently available in the centers would be necessary for the program to become a model for and have the ability to advise the broader international agricultural research community. It is recommended that these functions be merged and strengthened.

6.10 Finance, Human Resources, and Other Services[2]

6.10.1 Support Services to More Effective Programs

The first group of support services recommended for sharing between IRRI and CIMMYT are those that directly underpin and facilitate stronger and more effective programmatic collaboration between the two centers.

It is recommended that IRRI and CIMMYT initiate a shared Intellectual Property (IP) Management service, which at some point could be extended across the other cereals-focused centers and CIP. IP support services require increasing levels of expertise and

[2] Michael Brown performed a consultancy to evaluate opportunities for merging services in support of a closer alliance between IRRI and CIMMYT. He visited both Center and met with management and other personnel. This section is based on his report.

specialization because of the increasing complexity of managing intellectual property, ensuring freedom to operate, and avoiding any breach of others' IP rights. This is hard to achieve when IP support services are "one deep" or part-time.

IRRI currently has three staff that spend part of their time on IP issues while CIMMYT has one full-time general legal counsel who spends part of his time on IP issues. This level of staffing is small relative to the increasing demand for IP services and will likely require additional resources. Hence, there is little room here for cost savings in either CIMMYT or IRRI from a merger of IP services. Having a common IPR policy and shared in-house IPR expertise, however, would enable them to increase their capacity at minimal additional cost. The change required within existing resources is better-targeted application of a range of expertise that already exists across the two Centers.

It is also recommended that IRRI and CIMMYT share their regional offices. This is especially true in those locations where IRRI and CIMMYT are to carry out a merged program of work. Currently there are three Asian countries (Bangladesh, China and India) where IRRI and CIMMYT have separate offices, in some cases in the same building, and this is likely to become four shortly with the addition of Nepal. Moreover, regionally focused programs and decentralization are expected to increase for both Centers. Substantial cost savings should result from sharing regional offices (Appendix 6).

Advantages of merging offices include: greater coordination with the NARES (an important component of the feedback provided to the Working Group), the symbolic impact on both staff and stakeholders (including NARES) of having a single physical presence to underpin a joint program of work, the knowledge-sharing effects of collocated staff, and efficiencies gained through the reduction of duplication in physical infrastructure and support staff. Collocation of IRRI's and CIMMYT's existing offices in the three Asian countries in which both already have offices, along with collocation of offices in Nepal, is recommended, though this should not preclude discussions with other centers located in these four countries with a view to broader collocation.

It is also suggested that IRRI and CIMMYT initiate an arrangement for their regional offices in countries other than the four identified above, whereby each is able to use any of the other's regional offices (and headquarters) as a base for initiating new work or for temporary activity associated with existing work in these locations.

A third recommendation is to coordinate investments for enhancing the information and communication technology (ICT) infrastructure needed to underpin scientific collaboration in areas such as genomics and bioinformatics. This includes but extends well beyond videoconferencing facilities. Specifically, it is recommended that CIMMYT join with IRRI (and also extend this to other centers, notably CIP and ICRISAT) to establish a critical mass of CG Centers with the ICT infrastructure that can take advantage of advanced research networks and facilitate new opportunities for scientific collaboration with each other and with advanced research institutes outside the CG system. Amongst other aims, this development should allow the sharing and backup of large germplasm, phenotypic, molecular and functional genomics data sets, as well as access to computing and software infrastructure that can accommodate large geospatial databases and simulation models that support economic analyses and natural resource management research.

In relation to videoconferencing, optimal communication facilities should be introduced for intra-program meetings that connect scientists at different locations. A large-screen

videoconference room facility should be introduced at CIMMYT headquarters similar to the one that currently in place at IRRI. Further, desktop video cameras that can be moved from desktop to desktop in accordance with need should be purchased and used at all or most IRRI and CIMMYT locations (both headquarters and regional offices). It is also recommended that discussion take place with other CG Centers located with or near IRRI and CIMMYT regional offices with a view to contributing to the cost of and securing access to large-screen videoconferencing facilities at all or most regional locations.

6.10.2 Support Services that Reinforce Governance of a Strong Alliance

The second group of support services recommended for sharing between IRRI and CIMMYT are those that support the governance of a "strong alliance" that includes the merger of specific programs and a single BOT. Risk management and audit services are already shared, and this joint arrangement appears to work well. IRRI currently hosts a three-person internal audit team that provides an advisory service to nine CG Centers, including CIMMYT. No significant change to this shared internal audit arrangement is needed. Therefore, no savings or additional costs will occur.

However, the Centers will need to further strengthen their governance frameworks, including their risk assessment and internal control policies and procedures. DFID's request for formal BOT statements on risk assessment and on the adequacy of internal controls is an indication of the improved governance, risk management, audit and internal control framework expected by donors in the CGIAR system.

There is significant scope to rationalize audit committees from three to one. A single audit committee of the merged BOT is recommended, chaired by a Board member with considerable expertise in risk management. Use of a single external auditor (to be replaced every five years) is also recommended.

Assuming that a strong alliance is to be under the strategic direction of a single BOT, then it is also recommended that the single BOT be served by a single Board secretariat, located in one center. (Should an alliance have two DGs, then the secretariat would need strong links to both DGs.) Significant cost savings cannot be expected from such an arrangement (Appendix 6). In fact, the role of Board secretariat should be boosted, in keeping with the need to strengthen governance arrangements under a strong alliance. However, any increase in costs of a merged secretariat would be more than offset by the large annual savings of a single BOT. An option is to offset these savings partially by greater remuneration for at least the Board Chair and possibly BOT committee chairs, to reflect the seriousness with which the role of the Board should be taken under the strong alliance form of governance.

6.10.3 Support Services for Publishing, Public Awareness

A third group of support services recommended for sharing between IRRI and CIMMYT are those that must be shared to ensure public visibility and support for the two Centers and their strong alliance. Three such services can be identified: scientific publishing; public and targeted awareness; and business management in relation to donor projects. Sharing these services would enhance their overall effectiveness while also demonstrating commitment to the strong alliance structure. Conversely, the lack of shared services in these areas could undermine the credibility of the new arrangement in the eyes of key stakeholders, including donors and other Centers, and the NARES.

Scientific publishing activities should be shared by merging editorial services, web-design of publications, printing and all associated technical services. While there is also a working group of several Centers (led by IWMI) under the ICT – Knowledge Management umbrella, which is examining opportunities for greater sharing and coordination of publication services and protocols across the CG system, the merger of the scientific publishing groups at IRRI and CIMMYT should proceed concomitant with formation of a strong alliance. Substantial cost savings are anticipated from such a merger (Appendix 6).

Public awareness (including relations with traditional donors, host-country relations, and targeting of potential new donors) is a more sensitive and less straightforward activity for sharing. The sensitivity stems from tension between the goal of increasing support for the CG system as a whole versus competing for a fixed amount of resources from the donor community. In addition, IRRI and CIMMYT have developed different strategies for increasing their funding from both core and restricted sources. Despite these sensitivities, it is recommended that public and targeted awareness activities be integrated and tackled by a single team, taking advantage of the opportunity to build critical mass and strengthened fundraising capability through shared services.

IRRI's emerging emphasis is on attracting developing countries in Asia to become stronger donors to its programs. CIMMYT recognizes the importance of having a diverse support base of funding, which may include new windows of opportunity with traditional donors, foundations, and/or partnerships with the private sector (particularly its technical capacity and expertise). Therefore, partnerships with private industry and private philanthropic funding appear likely to be a stronger emphasis in the medium term in CIMMYT than at IRRI, just as developing new donor relations with public sector institutions of developing countries appears likely to be a stronger emphasis in the medium term at IRRI than in CIMMYT. An important issue, therefore, is whether these different emphases can be more effectively and efficiently addressed by a single team. In giving strategic direction to a strong IRRI-CIMMYT alliance, a single BOT would need to consider this issue in deciding whether to merge public awareness efforts.

It is not recommended that the business management function be fully shared at this stage although it is recommended that this be reconsidered two years after the formation of a strong alliance as outlined in this report. However, it is recommended that IRRI and CIMMYT jointly take note of and implement the outcomes of the project to develop exemplar contracts for project execution that are due to be prepared by the time of the October 2004 CGIAR AGM. It is also suggested that all major donor project proposals outside the program areas recommended for merger be discussed by the two Centers at an early stage of development, so that potential scientific and geographical complementarities can be built into these proposals setting the stage for further strengthening of the alliance.

6.10.4 Broader Sharing of Support Services Across the CGIAR System

The fourth group of support services recommended for sharing between IRRI and CIMMYT are those that would not only provide net benefits to IRRI and CIMMYT but would also facilitate collective action across the CGIAR system. *These include information technology, financial management, training, human resources, library, and travel services.* A detailed description of the justification for broader action across the CG system for sharing of these functions and the potential savings is provided in the full report on services, attached.

Of particular note, however, are *information technology* (IT) services because there is much that could be gained from establishing a single IT team across multiple Centers. It is recommended that IRRI and CIMMYT share a common IT service, with a designated team leader. The core IT function (including the development and implementation of IT policies and standards in such areas as Internet gateway and other security etc) should be headquartered in one place. This could be supplemented by a very small local generalist IT team that can be responsible largely for network infrastructure and local network administration but with some helpdesk and training capability where needed. Substantial cost savings should be realized from this arrangement (Appendix 6).

In *financial management* there is also some limited value in CIMMYT and IRRI handling their insurances together, and in jointly sharing a USA address in order to receive the purchasing benefits that such an address provides (Appendix 6). Other aspects of financial management (financial processing; payroll; the Financial Management and Information System or FMIS) are best tackled together more broadly across the CGIAR system.

7. Options Considered

7.1 Business as Usual

One option for collaboration between IRRI and CIMMYT is “business as usual”. This scenario would involve continued collaboration within the rice-wheat consortium, cooperation in a range of research support services in conjunction with CGIAR initiatives, such as Challenge Programs and System Wide Programs, and two separate Boards. This scenario would maintain two autonomous Centers with only a small amount of loose and informal collaboration.

Possible advantages

- Strong cultures and allegiances developed at both Centers are based on strong commodity foci.
- The transaction costs and governance mechanisms for collaboration are known and well established.
- The rice-wheat consortium has been quite successful despite a limited amount of common planning and activities.
- The different approaches of the two centers are appropriate for their respective missions and strategic plans, and there is “safety in the known”.

Possible disadvantages

- The strongest argument against the status quo is the opportunity foregone.
- It is unlikely that the two Centers will be able to achieve their ambitious missions without enhancing their scientific capability. Whereas together, the two Centers have an opportunity to achieve world leadership in some aspects of genomics, in fundamental and strategic cropping systems research, and perhaps in some aspects of socio-economics

- It is not likely that world eminence in any area of genomics would be possible without a pooling of resources, recruitment of new key staff, and greater investment that may follow a merged program
- We detected among several major donors and other stakeholders a “readiness for change” that suggests they would be dissatisfied by “business as usual”. The representatives of almost all of the “top ten” donors to the two Centers indicated the need for enhanced scientific capacity in key areas.
- “Business as usual” for these Centers is at best static. In recent years, the Centers have expanded their research agenda, but the resources for this expanded agenda have not been forthcoming. In fact, both Centers have faced declining levels of funding. IRRI’s funding has declined by about 15% since 1998. After a period of growth in project-specific funds between 1998 and 2001, CIMMYT’s funding has since declined by 8%
- Each Center has lost very significant numbers of staff in recent years. Between 1997 and 2002, in two separate cut-backs, IRRI’s total staff numbers were reduced from 1680 to 845 – a decline of almost 50%. Between 2002 and 2004, CIMMYT’s total staff numbers were reduced from 856 to 695 – a decline of 19%. The former wheat program alone lost 35% of its staff, including 14 senior scientists, and a recent external review of CIMMYT’s wheat breeding program concluded that it was under-resourced.
- Each Center is below critical mass in several key areas and is finding it difficult to recruit staff in these areas. In some cases, the Centers compete for resources and NARES’ attention, and there is some duplication of programs and equipment.

In summary, “business as usual” is not in a particularly robust state for either Center.

7.2 A Full Merger

A full merger of IRRI and CIMMYT would create a unified governance mechanism that would unify the budgets, programs and service functions to take advantage of synergies. It would create the largest single Center within the CGIAR system under the assumption that such a large research institution would be better able to compete for funds and scientific staff in an increasingly competitive international agricultural and natural resource science landscape.

Possible advantages

- A full merger would result in a management structure with clear lines of responsibility and authority thus encouraging strong leadership and effective decision making.
- The delineation between governance and management would be unequivocal and there would be a single, transparent line of reporting/accountability of management to the governance level.
- A full merger into a single legal entity would facilitate interaction and collaboration with the private sector.

- A full merger would be a dramatic step that could stimulate useful further restructuring within the CG system.
- Tough decisions could more readily be made leading to greater cost savings and more effective use of resources.

Possible disadvantages

- A merger of IRRI-CIMMYT would create an imbalance within the CGIAR, with one very large and 13 medium and small size Centers. This might create financing difficulties for the new Center as some donors may have difficulties justifying allocations to the new Center that are commensurate with its size. In fact, a few donors indicated there would be a high possibility that their contributions to a merged IRRI-CIMMYT Center would be less than the combined total of their contributions to the two individual Centers.
- Merging the two Centers would create serious legal problems involving the closure of one or both headquarters with possible loss of current assets to the host nations. There are also likely to be long drawn out negotiations involved in establishing new headquarter agreements.
- The transaction costs of a full merger are likely to be very high. CIMMYT is currently going through major structural changes, IRRI has just been given a “thumbs-up” by its 6th EPMR and CIMMYT begins its 5th EPMR in November 2004. A full merger would require creation of new governance structures, review of all programs and staff positions, creation of unified financial and administrative systems, replacement of staff that may not meet the requirements of the merged institute, etc.
- There is significant risk of diminishing the brand recognition of IRRI and CIMMYT within a fully merged structure. Over the last 40 years, both IRRI and CIMMYT have been associated with major successes in international agricultural research. They are recognized as leading international institutions by all of the NARES with which they interact. Although steps can be taken to preserve some of the advantages of the brand names, their brand recognition might be diminished in a full merger.
- On-going system-wide discussions are considering the advantages of major changes in the CGIAR system which would allow even bigger and more efficient exploitation of economies of scale. A full IRRI-CIMMYT merger at this time would need to become part of this larger effort, which would likely delay taking any action towards closer integration. On the other hand, the establishment of strong, formal alliances for specific IRRI and CIMMYT programs could have substantial short-term payoffs and can be considered as a more feasible step towards creating the larger construct.
- As discussed in Section 6, there are a limited number of programs and activities that would benefit from stronger alliances or mergers at this point in time. A majority of existing and planned programs and activities of IRRI and CIMMYT would still need to be conducted as separate and independent activities.
- CIMMYT currently has a decentralized, more applied research approach, while IRRI has a more centralized “upstream” approach. Each approach has its advantages and may be quite appropriate for the current strategic plans of the respective Centers. A full merger may compromise these differences and reduce the flexibility of the merged institute to apply different approaches to different regions, and pursue

different types of funding. On the other hand, some of these differences might nicely complement each other within a merged institution.

7.3 Strong Alliance

A third option considered is the establishment of a much stronger, more formal alliance between IRRI and CIMMYT through establishment of a single Board of Trustees and the merging of several major scientific programs—each with unified leadership and budget. The characteristics and management of these merged programs as distinguished from the remaining Center-based programs are described in Section 3.

The specific programs recommended to merge include:

- Genomics and Biotechnology
- Social Sciences
- Sustaining Intensive Irrigated Systems in Asia
- Intellectual Property Management and Biosafety/Environmental Regulations

Descriptions of the existing programs in these areas and justification for merging were described in sections 6.3 (genomics), 6.4 (social sciences), 6.7 (rice-wheat and intensive cereal systems), and 6.9 (IP and biosafety). Based on a quick look at total resources allocated to these program areas at the two Centers, we roughly estimate that these programs and underpinning services currently receive about 30% of total funding. We note, however, that this estimate is highly uncertain because of existing or expected vacancies in leadership IRS positions in some of the programs, and the final scope and size of the proposed merged program on Sustaining Intensive Irrigated Systems.

Possible advantages

- A strong alliance with several merged programs would substantially increase scientific capacity and help attract and maintain a critical mass of expertise. The merged research programs will be focused on strategic scientific issues of global importance for the world's three most important food crops and they will have access to the vast germplasm resources, field research facilities, and a network of cooperators in both the NARES and ARIs. Such scientific "muscle" and resources should facilitate the recruitment of outstanding senior scientists and greater numbers of postdocs in disciplines for which it has become increasingly difficult for the Centers to attract talent.

- While it is not likely that the strong alliance scenario will result directly in greater funding from current donors, such an alliance could enhance opportunities for increased donor funding to support new initiatives made possible by the program mergers. Alleviating constraints and avoiding environmental degradation in the rapidly expanding rice-maize systems of Asia and social science research on policy analysis, rural development, and impact assessment involving the three major cereals are examples. Moreover, the greater critical mass of the merged research

programs make them more attractive partners for collaborative research with both NARES and ARIs.

- Opportunities for complementation and synergy are also evident, especially in response to unexpected changes in donor support. For example, Section 6.2 describes the uncertainty about whether the Global Crop Diversity Trust will generate enough money to maintain conservation of the plant genetic resources held in the IRRI and CIMMYT germplasm banks at current levels. A strong alliance (including collaboration in research underpinning PGR conservation) would make it easier for IRRI and CIMMYT to rationalize germplasm storage facilities in the event that insufficient money was available from the Global Crop Diversity Trust.

- While each of the merged programs will likely have scientific and support staff housed at different locations sometimes separated by large distances, this need not be a serious constraint. Indeed, a number of successful programs and projects involve scientists who work at separate locations. The key to overcoming this challenge is a clear strategic vision for each of the merged programs, strong program leadership and staff committed to making the merged programs work and support from senior administration in both Centers. Investment in expanded capabilities for video conferencing and electronic communication may also be helpful. Moreover, continued improvements and reduced costs in "real-time" distance communication technologies are expected.

- A strong alliance would facilitate IRRI's and CIMMYT's participation in broader CG collaborations including Challenge Programs and System Wide Programs.

Possible disadvantages

- The management structure for a strong alliance will likely be more complex and less transparent than with a full merger.

- Without dynamic, coordinated leadership from the Boards and DG offices at both Centers during the transition period, transaction costs associated with merging several programs and services could be greater than anticipated.

- Success of the merged programs will depend on timely recruitment of Program Leaders with strong disciplinary with strong administrative leadership skills and international recognition for excellence in their respective disciplines.

- A strong alliance could lead to a greater geographical distribution of research programs rather than a greater concentration of effort.

8.0 Recommended Option

Based on the above analysis presented in Section 7, the Working Group concludes that the best option is a much stronger alliance between IRRI and CIMMYT through the formation of a single Board of Trustees, the merger of several major scientific programs, each with a unified leadership and budget, and the merger of several service functions. Following

discussions with the Oversight Committee at the Bellagio Meeting, the Working Group also recommends that the strong alliance have a single *Director General* and two *Center Directors*—one located at each Center headquarters**.** A significant majority of the Oversight Committee and the Working Group felt that this was the best option for achieving effective leadership and maintaining a clear delineation between governance and management.

8.1 Legal Issues Regarding the Recommended Option

Establishing a single Board and a single Director General as proposed in our recommended scenario will raise several legal issues associated with the legal arrangements through which each Center is constituted. Are there any legal impediments to a single Board?

In the case of CIMMYT, there are several legal documents:

- The Agreement between the International Bank for Reconstruction and Development and the UNDP to establish CIMMYT with the annexed constitution of CIMMYT INT;
- The Agreement between CIMMYT-INT and the Mexican Government establishing CIMMYT's headquarters in Mexico;
- The Constitution of CIMMYT AC (the Associado Civil according to Mexican law); and
- The collaboration agreement between CIMMYT-INT and CIMMYT AC.

The constitution of CIMMYT's Board was recently revised to be no more than 13 voting members, 3 of whom are "*ex officio*": two appointed by the government of Mexico and the Director General of CIMMYT INT. As long as CIMMYT has its headquarters in Mexico, the Secretary of Agriculture and Water Resources of Mexico shall be an *ex officio* member without vote, serving as Honorary Chairman of the Board. Three of the remaining members are chosen by the Board from among persons nominated by the CGIAR.

In the case of IRRI, its Articles of Incorporation (as amended in 1984) state that the Institute shall have 15 members. The Minister of Agriculture of the Philippines, the President of the University of the Philippines and the Director General of IRRI shall be elected members. Three of the remaining members are to be elected with the concurrence of the CGIAR.

Thus, it should be possible to have a single Board. For example, such a Board could have the following features:

- 15 members, including two from the Philippines, two from Mexico and the Director General;
- The Secretary of Agriculture and Water Resources of Mexico as ex officio honorary chairperson, without a vote;
- 8 other members (including some nominated by the CGIAR); and
- A single chairperson.
- Two non-voting members

According to advice we have received, it would be necessary for the Board to specify when it is in session as the IRRI Board and when it is in session as the CIMMYT Board. It would

also be necessary to keep separate records for each Center. However, it appears that a unified Board would not abrogate the current legal status of the two Centers.

9.0 Summary Points

Based on the background reports and discussions at Bellagio, the Oversight Committee and Working Group are in agreement on the following summary points.

- **IRRI and CIMMYT have an outstanding record of accomplishment and the potential to make significant further contributions to agricultural development and poverty alleviation in developing countries throughout the world.**

- **IRRI and CIMMYT need to strengthen their capacity to better utilize the rapid advances in science and to adapt more quickly to emerging challenges confronting the production of global public goods for international agriculture.**

- **Forming a strong alliance with a single Board of Trustees and a single Director General is the best option at this point in time for strengthening IRRI's and CIMMYT's research capacity and for achieving the missions of both Centers.**

- **All members of the new, single Board must be fully committed to the success of the alliance, of the merged programs, and the missions of both Centers.**

- **Each merged program must have a strong leader capable of building and maintaining a world-class research capability and attracting outstanding staff and trainees.**

- **The complementarities of the research programs and research cultures at IRRI and CIMMYT provide opportunities for the alliance to build on combined strengths and synergies.**

- **A strong alliance should strengthen existing collaborative research programs involving IRRI and CIMMYT, as well as with other CG Centers, such as Challenge Programs and other System-wide Programs.**

- **A strong alliance would enable IRRI and CIMMYT to build stronger collaborations with NARES, ARIs and the private sector.**

- **A strong alliance provides a framework that could be extended to partnerships with additional CGIAR Centers.**

- **A strong alliance would enhance capacity to meet the need for maize research in Asia and rice research in Africa.**

- **Merged programs would signal the importance of investment in these program areas to policy makers, donors, the scientific community, and collaborating partners.**

APPENDIX 1

Joint Statement on IRRI-CIMMYT Alliance Process to Explore Alliance Underway

The International Rice Research Institute (IRRI) and the International Maize and Wheat Improvement Center (CIMMYT) have agreed to explore alternatives for closer collaboration, ranging from a formal alliance to a full merger.

IRRI and CIMMYT will ask the Rockefeller Foundation to commission a working group and an oversight committee to examine these alternatives more closely. Their objective is to provide a report for action at a joint meeting of the Boards of Trustees in mid-2004.

The rationale for moving towards a more formal relationship is founded on the anticipated gains in international agricultural research and development from greater complementarity in research on rice, maize, and wheat:

- As the discoveries of recent years have revealed, the genomes of the three major cereals are remarkably similar. Genes for drought tolerance for example are often similar in rice, maize, and wheat. Bringing the scientists together who work on *functional genomics* for all three cereals could have dramatic effects on our understanding of cereal genetics and physiology. Coupled with the centers' *germplasm banks* and their *field-testing facilities*, this would provide a basis for far-reaching practical application. Moreover, it would constitute a unique working relationship.

- The two-research institutes are highly complementary. They have similar mandates: to conduct crop improvement and systems research related to their respective crops throughout the developing world. More than half of all calories consumed by people in developing countries come from rice, maize, and wheat. The three crops are grown on 350 million hectares, where they are sometimes components of the same system. The impact of the Rice-Wheat Consortium for the Indo-Gangetic Plains, which focuses on only two of these staples in just one sub-region of Asia, exemplifies the potential scope, value, and impact of a more formal approach to cropping system and livelihood research on all three staples.

- Closer collaboration could sustain a critical mass in crucial research areas such as the social sciences and biotechnology. There could be economies of scale in information management, capacity building, and intellectual property management.

The impetus for considering a more formal alliance has come from within IRRI and CIMMYT. By joining our expertise and our networks of partners, we believe that we can create an extremely powerful scientific endeavor for sustainable development. Potential financial and administrative gains from more formal collaboration are not the primary motive for an alliance.

Together, IRRI and CIMMYT would complement the work of a wide array of public and private research institutions throughout the world, in a way that would facilitate the transfer of the latest research discoveries and benefits to developing countries and the people we are committed to serve.

Angeline Kamba,
Chair of the Board, IRRI

Alex McCalla
Chair of the Board, CIMMYT

October 2003

Appendix 2.

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Appendix 3a. Total budget and staff of CIMMYT and IRRI, FY2004 data.

	CIMMYT	IRRI
Number		
Internationally Recruited Staff	70	60
International Research Fellow	N/A	12
Post-Doctoral Fellow	14	15
Liaison Scientists	3	4
Proportion of IRS at HQ	55%	92%
NRS number	650	814
Total operating budget	43.22M	$33.76m
Core unrestricted and attributed funding	18.74M	$17.51m

Appendix 3b. Allocation of budget and IRS positions by region and subregion, FY2004.

	CIMMYT	IRRI
Budget allocation by region (%)		
Sub-Saharan Africa	35%	4%
Near East/North Africa	11%	1%
Latin America and the Caribbean	15%	3%
Asia	39%	92%
Total IRS[1] positions	70	60
Total IRF[2] positions	N/A	12
Post-doctoral positions	14	15
IRS/IRF/Postdoc location by region (%)		
Sub-Saharan Africa	22%	0
Near East/North Africa	8%	0
Latin America and the Caribbean	55%	0
Asia	15%	100%

1 IRS = internationally recruited senior scientific staff positions.

2 IRF = internationally recruited fellows

Appendix 4. Total Funding to IRRI, CIMMYT, and the CGIAR, 2001-03 (million US$)

2001			2002			2003		
Member	Amount	%	Member	Amount	%	Member	Amount	%
CIMMYT								
United States	5.4	14	United States	5.9	17	United States	8.2	23
World Bank	4.8	12	World Bank	3.6	10	World Bank	4.0	11
European Com.	2.4	6	European Com.	2.4	7	European Com.	2.9	8
Rockefeller Fdn	2.4	6	Rockefeller Fdn	2.4	7	Japan	2.0	6
Japan	1.9	5	Australia	1.8	5	Rockefeller Fdn	2.0	6
Switzerland	1.6	4	Switzerland	1.5	4	Australia	1.9	5
Australia	1.4	4	Japan	1.4	4	Canada	1.9	5
Canada	1.4	4	United Kingdom	1.3	4	United Kingdom	1.4	4
United Kingdom	1.3	3	France	1.2	3	Switzerland	1.2	3
Mexico	1.2	3	Canada	1.0	3	Syngenta Fdn.	1.1	3
Germany	1.2	3	ADB	0.8	2	Germany	1.0	3
France	1.0	3	Denmark	0.8	2	France	0.8	2
ADB	0.7	2	Germany	0.8	2	Denmark	0.7	2
Denmark	0.7	2	Mexico	0.6	2	ADB	0.6	2
Belgium	0.6	2	IFAD	0.4	1	Netherlands	0.5	1
All Donors	**39.3**		**All Donors**	**35.4**		**All donors**	**36.2**	
IRRI								
Japan	6.9	23	United Kingdom	4.6	16	United Kingdom	5.0	18
World Bank	4.2	14	World Bank	3.9	14	Japan	4.1	15
United States	3.9	13	United States	3.9	13	United States	3.7	14
United Kingdom	3.4	11	Japan	3.7	13	Switzerland	2.4	9
European Com.	1.8	6	European Com.	2.3	8	World Bank	2.2	8
Australia	1.5	5	Switzerland	2.2	8	European Com.	1.9	7
Switzerland	1.4	5	Rockefeller Fdn	1.1	4	Germany	1.1	4
Denmark	1.0	3	Germany	1.0	3	Canada	0.8	3
Germany	0.9	3	Australia	0.8	3	France	0.7	3
Rockefeller Found.	0.8	3	Canada	0.7	2	Rockefeller Fdn.	0.7	3
ADB	0.7	2	Denmark	0.7	2	Australia	0.6	2
Canada	0.6	2	France	0.6	2	Denmark	0.6	2
France	0.5	2	Korea	0.5	2	Korea	0.5	2
Sweden	0.4	1	ADB	0.5	2	Sweden	0.5	2
Netherlands	0.3	1	Sweden	0.4	1	Netherlands	0.4	1
All Donors	**30.3**		**All Donors**	**28.7**		**All donors**	**27.3**	
CGIAR								
United States	45.4	13	United States	54.9	15	United States	55.5	15
World Bank	45.0	13	World Bank	50.0	14	World Bank	50.0	13
Japan	29.2	9	United Kingdom	24.8	7	European Com.	27.2	7
European Com.	21.7	6	European Com.	24.5	7	United Kingdom	26.4	7
United Kingdom	19.2	6	Japan	17.1	5	Canada	20.9	5
Switzerland	15.7	5	Netherlands	17.0	5	Netherlands	19.2	5
Germany	12.3	4	Switzerland	16.0	4	Switzerland	15.6	4
Netherlands	12.2	4	Canada	10.7	3	Japan	15.0	4
Canada	11.6	3	Sweden	10.7	3	Sweden	13.6	4
Denmark	10.6	3	Germany	10.5	3	Germany	11.6	3
Sweden	9.2	3	Norway	10.4	3	Norway	11.2	3
Norway	8.3	2	Denmark	10.2	3	Denmark	9.1	2
Australia	7.2	2	France	7.8	2	Rockefeller Fdn	7.8	2
ADB	6.9	2	Rockefeller Fdn	7.5	2	France	7.6	2
IFAD	6.6	2	Australia	7.3	2	Australia	7.3	2
All Donors	**337**		**All Donors**	**357**		**All Donors**	**381**	

Appendix 5. Unrestricted funding to IRRI, CIMMYT, and the CGIAR, 2001-03 (million US$)

2001			2002			2003		
Member	Amount	%	Member	Amount	%	Member	Amount	%
CIMMYT								
World Bank	4.8	34	United States	4.3	34	United States	5.0	34
United States	4.3	30	World Bank	3.6	28	World Bank	4.0	27
Japan	1.8	13	Japan	1.4	11%	Japan	2.0	13
Canada	0.7	5	Denmark	0.7	5%	Canada	1.3	8
Denmark	0.5	4	Canada	0.7	5%	Denmark	0.6	4
Australia	0.4	3	Australia	0.4	3%	Australia	0.4	3
Austria	0.2	1	Sweden	0.3	2%	Sweden	0.3	2
Germany	0.2	1	Norway	0.3	2%	Switzerland	0.3	2
Norway	0.2	1	Germany	0.2	2%	Germany	0.3	2
Sweden	0.2	1	Switzerland	0.2	2%	Norway	0.2	1
Switzerland	0.2	1	China	0.1	1%	China	0.2	1
Belgium	0.1	1	India	0.1	1%	India	0.1	1
Netherlands	0.1	1	Mexico	0.1	1%	Mexico	0.1	1
R. of Korea	0.1	1	Netherlands	0.1	1%	Belgium	0.1	1
China	0.1	1	Belgium	0.1	1%	R. of Korea	0.1	0.3
All Donors	**14.1**		**All Donors**	**12.7**		**All Donors**	**14.9**	
IRRI								
World Bank	4.2	29	World Bank	3.9	27	Japan	4.1	30
Japan	3.6	25	Japan	3.7	25	United States	3.4	25
United States	3.4	23	United States	3.4	23	World Bank	2.2	16
Denmark	0.6	4	Denmark	0.7	5	Canada	0.8	6
Canada	0.6	4	Canada	0.6	4	Denmark	0.6	4
Sweden	0.4	3	Australia	0.4	3	Sweden	0.5	3
Australia	0.4	3	Sweden	0.4	3	Australia	0.5	3
Netherlands	0.3	2	Netherlands	0.3	2	Netherlands	0.4	3
Germany	0.2	1	Germany	0.2	2	Germany	0.3	2
Switzerland	0.2	1	Switzerland	0.2	2	Switzerland	0.3	2
R. of Korea	0.2	1	Norway	0.2	1	Norway	0.2	2
Belgium	0.1	1	R. of Korea	0.2	1	R. of Korea	0.2	1
Norway	0.1	1	China	0.1	1	China	0.1	1
China	0.1	1	Belgium	0.1	1	Belgium	0.1	1
Philippines	0.1	1	Philippines	0.1	1	Philippines	0.1	1
All Donors	**14.5**		**All Donors**	**14.7**		**All Donors**	**13.7**	
CGIAR								
World Bank	45.0	31	World Bank	50.0	32	World Bank	50.0	30
United States	25.7	18	United States	25.8	17	United States	26.1	15
Japan	14.7	10	Japan	17.1	11	Canada	16.9	10
Netherlands	8.4	6	Netherlands	9.1	6	Japan	15.0	9
Canada	8.0	6	Norway	8.5	5	Netherlands	10.8	6
Denmark	6.4	4	Canada	7.7	5	Norway	9.4	6
Norway	6.0	4	Denmark	6.5	4	Sweden	7.2	4
Sweden	5.8	4	Sweden	6.2	4	Switzerland	6.7	4
Switzerland	5.5	4	Switzerland	5.6	4	Denmark	5.7	3
Australia	3.2	2	Germany	3.2	2	Germany	4.3	3
Italy	2.4	2	Australia	3.1	2	Italy	3.0	2
Germany	2.2	2	Italy	2.8	2	Australia	2.9	2
Belgium	1.5	1	Ireland	2.1	1	Ireland	2.5	1
Austria	1.5	1	Belgium	1.8	1	Belgium	2.2	1
Ireland	1.5	1	Finland	1.3	1	Finland	1.6	1
All Donors	**145.4**		**All Donors**	**155.5**		**All Donors**	**169.4**	

Appendix 6. Estimated savings and extra costs of sharing services between CIMMYT and IRRI ($US)*

Support service	Reference in text	Ongoing savings	Additional one-off costs	Net savings (+) or additional costs (-) in Year 1
IP	1a	0	0	0
Regional offices	1b	240,000	100,000	140,000
ICT infrastructure	1c	0	20,000	-20,000
Risk management and audit	2a	5,000	0	5,000
BOT and secretariat	2b	190,000	0	190,000
Scientific publishing	3a	150,000	0	150,000
Public and targeted awareness	3b	0	0	0
Business management	3c	0	0	0
Finance	4a	60,000	0	60,000
IT	4d	160,000	90,000	70,000
TOTAL		**805,000**	**210,000**	**595,000**

*This table does NOT include savings achievable from a broader collaboration across the CGIAR system.

IRRI-CIMMYT Alliance

Assessment of opportunities for merging major service functions

Consultant's report: Final version – 20 September 2004

Michael Brown

I. Terms of reference

Terms of reference were set out as follows in a letter of 15 July 2004 from Dr Gary Toenniessen of the Rockefeller Foundation:

The International Rice Research Institute (IRRI) and the International Maize and Wheat Improvement Center (CIMMYT) have agreed to explore alternatives for closer collaboration, ranging from an alliance to a full merger. The Rockefeller Foundation agreed to facilitate this process by commissioning a Working Group to examine these alternatives more closely. Members of the Working Group have visited both centers and met with their Boards of Trustees and staffs. However, the Working Group has limited expertise related to human resources, finance and other service functions required for effective administration of Centers. A consultant, having such expertise, is needed to help identify and better define and quantify opportunities that may exist for merging such service functions. The consultant would:

- Visit IRRI and CIMMYT and meet with administrators and those providing service functions such as finance and human resources.
- Identify specific service functions that might be effectively merged and those where a merger would be of little value, and provide a thorough analysis of the justification for each case.
- Estimate the potential savings (or extra costs) that would result from merging specific services and identify the key factors that determine these savings (or costs).
- Provide an overall assessment of the total gains, including quality and quantity of services and net change in resource requirements, which might be realized by merging all or selected service functions.
- Make a "best judgement" assessment of whether or not merging service functions of the two Centers is an objective worth pursuing within the context of the Terms of Reference for the Working Group.

It is estimated that this consultancy would require 15-20 days of work by the consultant.

II. Background and process

This report has been prepared, at the request of the Rockefeller Foundation, to contribute to the deliberations of the IRRI-CIMMYT Working Group (WG). The background to and processes of that WG are set out in its report and need not be reiterated here.

This report takes into account information, data and views obtained from the following sources from 9 July to 15 August 2004:

- an initial briefing on the WG's considerations from one of its members, Dr Bob Clements (9 July), and information from many of the documents generated by, obtained by and submitted to the WG as provided to me by Dr Clements;
- the WG's report;
- written (including published) information obtained from IRRI and CIMMYT in the period from 13 July to 15 August: annual reports, DG reports, financial statements, organisation charts, personnel data, job descriptions and the like;
- 53 meetings with a total of 108 people at CIMMYT HQ, Mexico (29-30 July) and IRRI HQ, Philippines (2-4 August) - specifically with the DGs, other senior management, heads of support services, internal clients (research program staff) and other support service staff, in both cases with a final wrap-up session in which I offered and checked my perspectives from each center;
- interaction with the head of the Strategic Advisory Service for Human Resources, Nellooli Rajasekharan (29-30 July);
- discussions on "lessons learned" with past and current actors in other alliances, including ILRI (Dr John Vercoe; Dr Hank Fitzhugh – 2 August) and Food Science Australia (Mr John Baistow – 9 August);
- discussions with and documentation obtained from Dr Meryl Williams, Future Harvest Alliance Office (9-10 August) on recent CGIAR system-wide discussions on collective action;
- other opportunistic discussions with past and current members of the Boards of Trustees and other stakeholders; and
- general perspectives from heads of support services in other agencies on what services are best shared and not shared between similar institutions in remote locations.

This report takes account of comments received on a draft of this report from the Working Group Chair, CIMMYT and Dr Meryl Williams, along with comments made by the Oversight Committee on 14-16 September.

III. Guiding principles

4. Primarily, support services should be shared by IRRI and CIMMYT wherever that would directly underpin and facilitate the enhancement of scientific capacity and program impact between the two centers. The IRRI-CIMMYT Alliance WG's terms of reference state that "justification for any … alliance must be driven first and foremost by the potential to enhance scientific capacity and program impact on the missions of the two institutes. … The potential for reductions in operating costs or administrative positions [is] not the primary motive… for establishing a particular alliance or merger".
5. Support services should also be shared by IRRI and CIMMYT wherever that would support the governance of agreed joint effort.
6. Support services should also be shared by IRRI and CIMMYT where that would be necessary to ensure publicly visible support for a strong alliance.
7. Support services should also be shared by IRRI and CIMMYT where that would not only provide net benefits to IRRI and CIMMYT but at the same time be consistent with, help and not hamper collective action on support services more broadly across the CGIAR system. There are currently significant moves being made in this area, as set out in the document *Center Directors Committee: Towards a Framework for Collective Action*, which reflects understandings reached at the 8-9 July 2004 Center Directors Committee (CDC) Collective Action Retreat. Some of the actions agreed are underway, and others are subject to agreement on recommendations to be put to the October 2004 meetings of the Committee of Board Chairs and the CDC. Significantly for this discussion of shared services between IRRI and CIMMYT, the short notice given for the retreat resulted in IRRI being one of three centers not represented.
8. The principles above need to be qualified by a fourth principle: support services should be shared in an IRRI-CIMMYT pairing where the net benefits of that would exceed those that would arise from other groupings of centers.
9. The sharing of services should be purposeful and not an end in itself. Apart from serving the aims set out in the first two principles, shared services should provide net benefits of efficiency (mainly where the services are of a processing nature) and/or effectiveness (mainly where the services represent value-addition to the RD&E effort).
10. The same performance principles that apply to good standalone services should apply to shared services. Shared services, no less than standalone services, should be led; accountable; responsive to all customers without partiality; responsive to the owners of the service; and be run with expectations of scope, costs, performance levels and service availability that are clear to owners, customers and service providers, normally in the form of service agreements.

11. The chosen location(s) of any shared service should be tailored to support the performance aims of that service. Therefore factors to be taken into account in determining location(s) include: the degree of face-to-face interaction with customers, owners and team members needed to achieve the right outcomes for the cultural context; the degree to which low-cost and efficiency is a performance aim; and the degree to which good performance outcomes depend on the use or exchange of digital data vis-à-vis materials or physical human presence.

IV. IRRI-CIMMYT shared services: issues, options and recommendations

1. Following the guiding principle in III.1 above (ie support services should be shared by IRRI and CIMMYT wherever that would directly underpin and facilitate the enhancement of scientific capacity and program impact between the two centers): if IRRI and CIMMYT are to have a strong alliance and merge their programs such as:

   - genomics and biotechnology;
   - social sciences; and
   - sustaining intensive irrigated systems in particular regions,

   then shared support services in three areas should be considered: intellectual property support services; regional offices; and information and communication technology infrastructure.

   d. **Intellectual property (IP) support services** should be shared. The increasing complexity of managing intellectual property, ensuring freedom to operate and avoiding any breach of others' IP rights means that support services require increasing levels of expertise and specialisation. This is hard to achieve when IP support services are "one deep" and/or part-time commitments only. Several options, individually or in combination, are available to IRRI and CIMMYT:

      - Initiate a boost in the resources devoted to the current Central Advisory Service for Intellectual Property (CAS for IP), hosted by IPGRI. Though this is a system-wide service, its current resourcing arrangements considerably limit its effectiveness. A corollary could be a reduction in IRRI's and CIMMYT's own resourcing of this function, though in CIMMYT's "one-deep" arrangement especially, where IP management is part of a general legal counsel role, it is difficult to see a resource reduction as feasible.
      - Initiate a shared IP management service amongst just those CGIAR centers that face very similar IP issues. The cereals-focused centers and CIP could form such a grouping.

- Begin a shared service between IRRI (three staff who each spend part of their time on IP issues including a general legal counsel who spends some 30% of his time on IP issues and links with an external legal counsel which has an IP management unit) and CIMMYT (one part-time general legal counsel who spends part of his time on IP issues) so that the quite different areas of specialisation represented in this group are joined in a "virtual" team, geographically separated.
- Begin a shared service between IRRI and CIMMYT, collocated.

This is a service which, at least in IRRI and CIMMYT, is not over-resourced and if anything requires a boost in resources. There is no room here for savings in either CIMMYT or IRRI: as indicated by the WG report, both centers still have relatively limited IPR and legal expertise, and having a common IPR policy and shared in-house IPR expertise would enable them to increase their capacity at minimal additional cost. The change required within existing resources is better-targeted application of the variety of expertise that already exists across at least IRRI and CIMMYT, and quite possibly across other centers too. Of the options above, the increasing complexity of IP issues, yet at the same time the commonality of issues faced (or due to be faced) by the cereals-focused centers and CIP, suggests a need for critical mass across these centers at least. IRRI and CIMMYT could begin a shared service which could subsequently be extended across these other centers. However, there is an arguable though not compelling case also for "on tap", local general legal counsel.

It is therefore recommended that IRRI and CIMMYT initiate a shared IP support service, initially between the two centers but subsequently extended across the cereals-focused centers and CIP. This could at this stage this be a "virtual" team, remaining geographically separated, formed from existing personnel and within existing resources, but with a designated leader, regular video or at least audio meetings, looser links with the CAS for IP as part of a broader team and the most specialised advice outsourced. Members of the team, including the designated leader, would undertake projects on behalf of other centers whenever comparative advantage in expertise made this sensible. However, the time-zone problems of regular video or audio meetings ought to be given careful consideration. If they are regarded as insurmountable, then collocation is recommended.

It is suggested that the team leader propose team priorities annually and report achievements, emerging challenges and actual effort and cost (divided into effort on behalf of specific centers and non-center-specific effort) regularly (eg quarterly) to the centers' management. If, after (say) a year, the actual effort on behalf of specific centers varies significantly from center-specific effort before the shared service began, then an ongoing transfer of financial resources should be carried out, to be reviewed at a designated time – eg every two years.

To help minimise the possibility of "capture" by a center, it is suggested that one member of the centers' senior management take the lead role as "service owner" and mentor (with a primary role of considering priorities proposed annually by the team leader), and that this owner/mentor be located in a center other than that of the team leader. For example, the DDG(Research) of CIMMYT might be the designated lead owner/mentor, and the team leader might be IRRI-based.

As the case for collocation is arguable but probably not compelling enough to justify the relocation and/or replacement of existing personnel, it is suggested that, at the time that each professional appointment ends, the designated team leader should recommend to the centers' management the ideal location of any replacement professional staff.

These comments on a shared IP management service are consistent with the extensive comments in the report of the WG.

e. **Regional offices** should be shared. This is especially so in those regions where IRRI and CIMMYT are to carry out a merged program of work. Currently there are three countries in Asia (Bangladesh, China and India) where IRRI and CIMMYT both have separate offices, in some cases in the one building. This could become four countries shortly with the addition of Nepal.

Moreover, regionalisation or decentralisation, which has been a more and more prominent feature of CIMMYT's organisational style in recent years, is expected to increase for both centers.

Advantages of merging offices include: facilitation of greater coordination with the NARES (an important component of the feedback provided to the Working Group); the symbolic impact on both staff and stakeholders (including NARES) of having a single physical presence to underpin a joint program of work; the knowledge-sharing effects of collocation of staff; and the efficiencies gained through the reduction of duplication in physical infrastructure and support staff. Several options are available to IRRI and CIMMYT, individually or in combination:

- Collocate IRRI's and CIMMYT's offices in Asia and share common services in those offices. (There are examples in Asia of CGIAR centers, including IRRI and CIMMYT, being collocated in the one building but with little if any shared services, thus missing significant opportunities for efficiencies.)
- Initiate broader collocation of CGIAR centers' offices in at least four Asian countries (Bangladesh, China, India and Nepal) with a view to sharing common services in those offices.

- Begin an arrangement whereby IRRI and CIMMYT, through their regional offices in countries other than the four identified above, each provide the other with a base for initiating new work and/or for temporary activity associated with small pieces of existing work in those locations (noting that IRRI currently has seven offices in Asian countries where CIMMYT has no office, and CIMMYT has five in Asian countries where IRRI currently has no office, along with four in Africa, one in South America and one in Europe).
- Collaborate with the broader CGIAR initiative, to be piloted in Africa, to collocate offices and share corporate services on a subregional basis. This could, over time, involve both IRRI and CIMMYT negotiating collocation with, and paying to use the services of, a third center with a major presence in a particular country rather than opening or maintaining separate offices elsewhere in that country. (It is worth noting a recommendation adopted at the CDC Collective Action Retreat: "more conducive and comprehensive policies should be created for the hosting of staff of one Center by another Center, … to encourage greater inter-Center programmatic integration.")

Collocation of IRRI's and CIMMYT's existing offices in the three Asian countries in which both already have offices, along with collocation of offices in Nepal, could provide "quick wins". It is recommended that IRRI and CIMMYT precede such action, however, by approaching other centers located in these four countries to assess the possibilities (taking into account both willingness and practical feasibility) for broader collocation. Wherever such broader action appears likely to involve lengthy delays and/or considerable angst, then it is recommended that IRRI and CIMMYT proceed just as a pair to amalgamate their offices in these countries.

If tackled only on a two-center basis, it is estimated that the initial extra costs of collocation would be $100,000, with ongoing annual savings of $240,000.

It is also recommended that IRRI and CIMMYT initiate an arrangement whereby each is able to use the other's regional offices (and headquarters) as a base for initiating new work and/or for temporary activity associated with small pieces of existing work in these locations. Should the arrangement be significant (eg >1 person-year) then it is suggested that a suitable inter-center charging arrangement be initiated.

In any instance of office amalgamation, or of significant arrangements of the type described in the paragraph above, it is recommended that one center (preferably with the larger regional presence) be regarded as the lead center and therefore as the service provider, with both centers regarded as the service users. Service agreements between the provider center and the user center, reviewed annually, are recommended. This is to help ensure that there is no favouritism in service provision and that expectations are clear. The service agreements would include the services to be delivered, the cost of such services, and indicators of service performance expectations and service availability.

It is suggested that the distribution of costs and savings take place in the following way. The extra up-front costs of change should be distributed between the centers in proportion to their shares of the running costs of the amalgamated centers. The ongoing savings should be distributed between the centers in similar proportions, by way of the costs attached to the service agreements put in place.

It is also recommended that IRRI and CIMMYT collaborate fully with the broader CGIAR initiative, to be piloted in Africa, to collocate offices and share corporate services on a subregional basis, subject to decisions made by the Center Directors' Council in association with the CGIAR AGM in October 2004.

f. A significant boost in **information and communication technology (ICT) infrastructure** is needed to underpin scientific collaboration in areas such as genomics and bioinformatics. This includes but extends well beyond videoconferencing facilities.

It is recommended that CIMMYT join with IRRI (and extend this to include other centers such, notably CIP and ICRISAT) in a project to establish a critical mass of CGIAR centers with the ICT infrastructure to take advantage of available advanced research networks and facilitate new opportunities for scientific collaboration with each other and with advanced research institutes beyond the CGIAR. Amongst other aims, this development should allow the sharing and backup of large germplasm, phenotypic, molecular and functional genomics data sets. The project cost is estimated to be $110,000. However, this cost should not be regarded as a cost of establishing an IRRI-CIMMYT alliance. This is an investment that should be made anyway to take proper advantage of the benefits of current and future inter-center collaboration across Challenge Programs and other cross-center work.

In relation to videoconferencing specifically: unless the several merged programs of the two centers are to be collocated, then optimal communication facilities should be introduced for intra-program meetings. Given that the time-zones at IRRI and CIMMYT headquarters are almost completely opposite, e-mail would be the most common and normally most acceptable form of communication. However, there will be occasions when virtual face-to-face meetings will be beneficial, despite these needing to be at less than ideal times - eg at 7am at IRRI headquarters and 8pm at CIMMYT headquarters. Several options are available to IRRI and CIMMYT, individually or in combination:

- Introduce a large-screen conference-room type videoconferencing facility at CIMMYT headquarters that is compatible with IRRI's, to be paid for by CIMMYT. IRRI currently has conference-room-style videoconferencing facilities: a Sony PCS 1600 video conferencing system using an Internet connection, located in IRRI's research laboratories, and now also a Polycom ViewStationEX in the ITS videoconferencing room, using either Internet connectivity or ISDN.

- Purchase further desktop video cameras that can be moved from desktop to desktop in accordance with need, at all or most IRRI and CIMMYT locations (both headquarters and regional offices). CIMMYT currently has a small number of individual-to-individual desktop-based videoconferencing facilities.
- Initiate discussion with other CGIAR centers located with or near IRRI and CIMMYT regional offices with a view to contributing to the cost of and securing access to large-screen conference-room type videoconferencing facilities compatible with those at IRRI headquarters.

It is recommended that all three of the above options be implemented. The additional cost would start at around $10,000-20,000 upfront for a large facility at CIMMYT, and the final cost would depend on options selected (eg automatic camera tracking of speakers) with minimal additional ongoing costs. The cost of small desktop units is insignificant. Other savings (using the current position as a baseline) are very difficult to estimate and depend largely on what amount of travel between headquarters and regional offices, if any, would be replaced by videoconference facilities. It is recommended that IRRI and CIMMYT senior management carefully consider pushing through a reduction in travel by their staff wherever videoconferencing facilities can replace such travel. However, savings are not envisaged, as greater collaboration will at the same time place upwards pressure on travel and communication costs.

It is recommended that such changes be implemented with the advice of and under the general direction of IRRI's IT Manager, given IRRI's useful experience to date.

2. Following the guiding principle in III.2 above (ie support services should also be shared by IRRI and CIMMYT wherever that would support the governance of agreed joint effort): if IRRI and CIMMYT are to have a strong alliance under a single Board of Trustees (BOT), then shared support services in two further areas should be considered: risk management and audit, and a single secretariat of a single BOT.

   d. A sound risk management framework is essential to good corporate governance – seen even within the centers as one of the weakest aspects of CG centers. In the **risk management and audit** service there is already a shared service. IRRI currently hosts a three-person internal audit team that provides both an advisory service to nine CGIAR centers (including both IRRI and CIMMYT). The leader of this service visits CIMMYT 3-4 times a year both to provide advice and also to conduct internal audits jointly. This appears to work effectively and is a model for shared system-wide services. CIMMYT has a one-person internal audit service.

      No significant change to the current shared internal audit arrangement is proposed, though center management might consider further strengthening the internal audit presence at CIMMYT. Experience elsewhere indicates that where staff of a team are geographically separated, then local, capable

audit presence is important to minimise the chance of inappropriate use of resources.

There is some scope for further cooperation and sharing of internal audit expertise between centers (though there already is cooperation, as exemplified by a current project involving all CG centers bar 4 on sharing best practice in internal audit and from a risk scan across CG centers anticipated by the end of 2004), but no significant savings or additional costs are envisaged.

Indeed, the area of risk management and audit is an area to be strengthened, in light of DFID (for example) foreshadowing an increase in its overall funding to the CG and in the proportion of unrestricted funding subject to there being a significant strengthening of the risk management (including audit) framework, including formal statements by BOTs about risk assessment and the adequacy of internal controls, including the degree of compliance with CGIAR principles and guidelines.

There is scope for the internal audit relationship between the centers to be more formalised, and (in effect) for CIMMYT's internal audit function to be outsourced to IRRI.

However, there is significant scope to rationalise audit committees from three to one. CIMMYT currently operates an internal audit committee, chaired by and reporting to the DG, and also a separate audit committee reporting to the Board of Trustees (BOT) and made up entirely of BOT members. IRRI currently has a Finance and Audit Committee of its BOT. If a strong IRRI-CIMMYT alliance is to have a single BOT, then it is recommended that there be a single audit committee of the single BOT, with a membership that has high levels of expertise in risk management. If such a membership cannot be drawn completely from within the single BOT, then it is recommended that one or more people not from the BOT be added to its membership. A single audit committee (as opposed to separate internal and external ones) would result in a more integrated program of internal and external auditing.

Use of a single external auditor (to be replaced every five years) is also recommended. (Ideally all CG centers would use the same auditors: the centers have common financial reporting standards and substantial overlap in their risk profiles, and this should therefore result in significant savings across the CG system.) Currently Deloittes is used by CIMMYT at a cost of $47,000 a year, under an annually-renewable arrangement which (according to the standard five-year limit) cannot be extended beyond the 2006 audit. SyCip Gorres Velayo & Co (SGV) – originally affiliated with Arthur Anderson and, since 2001, with Ernst and Young International – was used by IRRI at a cost of $12,500, but this arrangement was terminated in 2003 and a replacement had not yet been put in place as at August. Given that IRRI and CIMMYT would maintain separate accounts, a joint approach could be expected to achieve minimal annual savings – perhaps $5,000.

e. If a strong alliance is to be under the strategic direction of a **single BOT**, then it is recommended that the single BOT be served by a single Board secretariat, located in one center. (If there are two DGs within an alliance, then this Board secretariat would need strong links to both DGs.) Significant savings cannot be expected, though: rather, the role of Board secretariat should be boosted, in keeping with the need to strengthen governance arrangements. However, when combined with the savings of having a single Board of Trustees, in total this can be expected to produce annual savings of some $190,000. An option is to offset these savings partially by some more substantial payment to at least the Board Chair and possibly BOT members, to reflect the seriousness with which the role of the Board would be seen under strong new governance arrangements.

3. Following the guiding principle in III.3 above (ie support services should also be shared by IRRI and CIMMYT where that would be necessary to ensure publicly visible support for a strong alliance): then shared support services in three more areas should be considered: scientific publishing; public and targeted awareness; and business management. These are all areas in which the sharing of such visible services has the potential to give strong backing to and public demonstration of a strong alliance and, conversely, the lack of shared services could unintentionally undermine the strength of an alliance and take away its credibility to key stakeholders including donors and other centers.

   a. **Scientific publishing** activity should be shared, with a merging of editorial services, web-design of publications, printing and all associated technical services. It is recommended that one center be the lead center for this service, with a designated team leader. There is a strong case for maintaining generalist skills and translation services locally (at least in each headquarters and possibly in some cases in regional offices).

      Both headquarters have current staff whose skills are highly valued. IRRI has the complete physical infrastructure to take publications right through to printing, whereas CIMMYT outsources the printing end of the publishing process.

      There is no compelling reason to make immediate changes towards physical collocation; skills can be accessed by either center remotely and electronically. As professional appointments end, it is suggested that the designated team leader propose to the centers' senior management the location of any replacement professional staff, but the option of a quick collocation is a feasible alternative to be considered. Critical mass and cost factors suggest that any immediate or gradual move towards collocation would make better economic sense in the Philippines than in Mexico.

      An integrated service would not involve additional up-front costs unless it is decided that physical collocation should take place quickly. Ongoing savings of a single publishing service, Philippines-based but with local generalist communications expertise and translation services in at least the

other major location, could be expected to produce ongoing annual savings of $150,000.

To help ensure that the service is not "captured" by a single center, it is recommended that one or more of the following be introduced: a designated lead representative of senior management in the center not leading the service could take the leading role as "service owner"; and/or a small inter-center publications committee, made up primarily of senior research program staff, could function as the primary sounding board for planning and prioritisation (replacing any single-center equivalent); and/or an annually-reviewed service agreement, setting out the services to be provided, the costs of those services, and the performance and availability expectations could be put in place. I recommend at least the second (committee) and third (service agreement) of these. The first (a senior lead "owner") is suggested if a suitable candidate can be identified.

The team leader would be responsible for putting together plans and priorities, and reporting achievements and effort/cost (including center-specific effort/cost) to both centers' senior management. Effort/cost should be reviewed at regular intervals (annually is suggested), and, if the distribution of center-specific effort/cost differs significantly from the baseline of current effort/cost, an equivalent transfer of financial resources should be made between the two centers.

As for supporting systems, there is currently a working group of several centers, led by IWMI but under the ICT – Knowledge Management umbrella, which is developing a new publications workflow-based process, common document types and systems, for adaptation and use across all centers. This e-publishing project is still at an early stage. Both IRRI and CIMMYT are participants in this exercise.

b. **Public and targeted awareness** (including relations with traditional donors, host-country relations, and targeting of potential new donors) is a more sensitive and less straightforward activity for sharing. The sensitivity stems from a tension between the task of "growing the pie" together (on the one hand) and competing for different-sized slices of a fixed-sized "pie" (on the other hand). The sensitivity (to use market terminology, which is partly appropriate for this activity) also stems from different understandings as to the specificity of the product being marketed, how beneficial it is to segment the market in order to grow the market (or at least to stop the market from shrinking), the risks of diluting a simple and powerful message, and whether or not there is significant overlap between the potential new customers of the products of the two centers.

Senior management of the two centers currently have some differences in emphasis for this activity. IRRI's emerging emphasis is on achieving Asian developing-country public-sector commitment as new donors. CIMMYT recognises the importance of having a diverse support base of funding, which may include new windows of opportunity with traditional donors, foundations, and/or partnerships with the private sector (particularly its technical capacity and expertise). Having said this, partnerships with private industry and private philanthropic funding appear likely to be a stronger emphasis in the medium term in CIMMYT than in IRRI, just as developing new donor relations with public sector institutions of developing countries appears likely to be a stronger emphasis in the medium term in IRRI than in CIMMYT. An important issue, therefore, is whether two different emphases like this can be more effectively and efficiently addressed by a single team than by two separate teams.

In giving strategic direction to a strong IRRI-CIMMYT alliance, a single Board of Trustees would need to address or perhaps to modify these twin foci. It is therefore difficult to see why this should not also be reflected in the activities of an integrated public and targeted awareness team. There is a compelling argument that a critical underpinning of a strong alliance is an integrated public and targeted awareness activity, albeit one that clearly differentiates its two "brand names". In contrast, two separate and competitive public and targeted awareness teams have the potential, even without intent, to undermine the strength of an alliance.

Given the funding concerns that both centers have had, there is a strong case for both centers to boost their fundraising / resource mobilisation capacity. Each center needs leading-edge fundraising strategies.

It is recommended that public and targeted awareness activities be integrated and tackled by a single team, taking advantage of the opportunity to build critical mass and strengthened fundraising capability through shared services. This recommendation takes account of the similar issues faced by the two centers in public awareness (debates on GMOs, food safety, proprietary versus public information etc). It is recognised that this will be a controversial recommendation. Options include the following:

- A single collocated public and targeted awareness service.
- A single but geographically separate team.

Though immediate collocation is an option, it is recommended that at this stage this be a "virtual" team, remaining geographically separated, but with a designated leader and regular video or at least audio meetings (noting but accepting the time-zone problems of this). Activities would include center-specific and jointly beneficial activities.

If the team is to be geographically separate at this stage, then at the time that each professional appointment ends, the designated team leader should recommend to the centers' management the ideal location of any replacement professional staff. The minimum that should remain local and geographically separate over time is a local media relations / public relations professional in each major center, who can also be a generalist who maintains strong links with the rest of the team. Photography capability also needs to be kept local.

IRRI's photobank facility can be shared with CIMMYT at minimal cost apart from some staff time to process and enter images. In very small part IRRI's offer to share this is already being taken up by CIMMYT, but in any case there is already a cross-center team, drawn from IRRI, CIMMYT, WorldFish, IPGRI, ICRAF and CIFOR, working to establish and publish a best practice approach for a system-wide photobank (the CGIAR Marketing Group's "Centralised Media Asset Database for the Future Harvest Centers") by the end of 2004.

Website development and maintenance is a component of public and targeted awareness. It can be fully shared and run from one location. Whether this should cover each center's intranet/extranet (to which all center staff including those in remote locations should be given access) as well is a moot point.

The hidden cost of public and targeted awareness, including in senior management time, is very large. I would estimate it to be $300,000 for IRRI and $200,000 for CIMMYT.

Given the necessarily close relationship between the DGs' and other senior management's own activities in this area and the supporting activities of a public and targeted awareness team, it is recommended that, should there be two DGs in an alliance, the team leader report jointly to both DGs. It is suggested that the team leader should propose team priorities annually and report achievements, emerging challenges and actual effort and cost (divided into effort on behalf of specific centers and non-center-specific effort) regularly (eg quarterly). If, after a year, the actual effort on behalf of specific centers varies significantly from center-specific effort before the shared service began, then an ongoing transfer of financial resources should be carried out, to be reviewed at a designated time – eg every two years.

Taking both services above (ie scientific publishing and also targeted and public awareness in total), CIMMYT currently has 15 and IRRI around 34 staff in corporate and research communications. Savings are achievable: $150,000 for scientific publishing but probably minimal savings for public and targeted awareness (because of the low resourcing of this function currently within CIMMYT and the possibility being considered within CIMMYT of engaging a very capable and experienced fundraiser, despite a previous unsatisfactory experience of this). If it were decided that changes should be introduced immediately, then there would also be extra initial costs of $150,000.

c. **Business management** (costing and pricing of research; central advice and/or decision-making as to whether project possibilities should or should not be proceeded with; standard contracts and agreements; etc) is an area with arguably even more sensitivities in relation to shared services. Some reasons for this are similar to those applying to public and targeted awareness: the tension between the benefits of shared intelligence to grow the IRRI-CIMMYT share of the "pie" and the competitive nature of the policies and practices that the CGIAR centers and their funders have developed over time.

   It is not recommended that the business management function be fully shared at this stage. It is recommended instead that this be reconsidered by the two centers in two years from now, after other related recommendations (eg IP management, merged regional offices, and shared public and targeted awareness) have been effected and the degree of trust established from such joint ventures can be assessed.

   However, there are small steps that can be taken at this stage relatively easily.

   It is recommended that IRRI and CIMMYT jointly take note of and implement the outcomes of the project to develop exemplar contracts for project execution that are due to be prepared by the time of the October 2004 CGIAR AGM, according to the report of the CDC Collective Action Retreat. Should this prove unsuccessful, the two centers themselves could share a common service in relation to the development and updating of standard contracts and agreements, since most requirements of donor countries in relation to both IRRI and CIMMYT apply to both, and, similarly, most requirements of the NARES of developing countries apply to both the centers. It is not necessary for CIMMYT and IRRI to both carry out separate negotiations on generic contractual issues with the same funders and/or the same research partners from the same countries. Most of the issues that arise will be the same. Standard contracts and agreements should be common across the two centers. This would produce a saving in staff time, and therefore ongoing savings of $20,000, with one-off additional costs of a similar amount.

   Though less straightforward than the recommendation above, it is also suggested that project proposals to donors be discussed between IRRI and CIMMYT at an early stage of development, so that potential scientific and geographical complementarities between the two centers' projects can be built into both centers' proposals, with a greater likelihood of making both centers' proposals more attractive to donors.

Without a full merger, it is not recommended that other aspects of business management be shared. That does not mean that all is well with the existing services. CIMMYT recognises a pressing need to boost capability in business management: the costing and pricing of research, contractual negotiations, development of standard contracts and legal services and the associated service of IP valuing and management. It is important to have a clear understanding of what a research project (including indirect costs) does cost to run – something that must be known before good pricing decisions can be made. Otherwise, the risk is that projects are too often underpriced, leading to unplanned subsidisation. This can ultimately contribute to a center becoming financially unsustainable. Whilst there is a set of CG-wide standards on indirect costing, these standards have yet to be implemented within CIMMYT. Associated with this is the need for costing and pricing policies and practices to be underpinned by a new and better FMIS (see below). In IRRI's case, business management is highly centralised; a sophisticated on-line project management system is used (with links to donors' websites); and the CGIAR financial guidelines on computation of overheads, and hence costing of research, are followed.

4. Following the guiding principle in III.4 above (ie support services should also be shared by IRRI and CIMMYT where that would not only provide net benefits to IRRI and CIMMYT but at the same time be consistent with, help and not hamper collective action on support services more broadly across the CGIAR system) and the qualifying principle in IV.5 above (ie support services should be shared in an IRRI-CIMMYT pairing where the net benefits of that would exceed those that would arise from other groupings of centers) then shared support services in ten more areas should be considered: financial management; people management; library; information technology; travel management; records management; visitor and conference management; training; facilities management; and major scientific equipment and facilities. Many of these are "back room" functions, and for such services the benefits of sharing services with other groupings of centers (rather than an IRRI-CIMMYT pairing) should be considered seriously.

   d. In **financial management** there is scope for sharing services, albeit after careful consideration.

      If a full merger between IRRI and CIMMYT were being considered, then the implications for financial management would be clear. A common financial system, a single multi-year financial strategy and associated strategic advice, multi-year financial planning, common policies, the same internal financial regulations, an integrated set of decision rights, harmonised procedures, common internal financial reporting standards, a single set of external financial statements, and unified overall general ledger management would need to be introduced.

Without a full merger into a single legal entity, however, several judgement calls need to be made, and these calls are made problematic by uncertainty as to what may or may not take place across the CGIAR system as a whole. As well, there is no particular reason to assume that an IRRI-CIMMYT sharing of services in this area would be better than an arrangement with any other center or centers. Unlike the services identified above, shared financial management between IRRI and CIMMYT (in the absence of a full merger) is neither needed to underpin specific programmatic collaboration (whereas shared IP management and regional offices, for example, are), nor is so publicly visible that it is critical to the actual and perceived strength of the alliance (whereas shared publishing, targeted and public awareness, and aspects of business management are).

In some cases, combined market power can achieve savings for both centers (though it would be equally sensible to join forces with other CGIAR centers; indeed, system-wide sharing makes the most sense of all).

- Purchasing of supplies: A significant proportion of purchasing is international (50% of IRRI's $6.5m in supplies are purchased internationally and 50% of IRRI's 1500 suppliers are international, most notably from the USA; CIMMYT's percentages are less). However, there are very limited benefits from joint activity, as volume-based purchasing arrangements that IRRI has in place with overseas suppliers seem to be limited to computers;
- Combined purchase of insurances (there are some gains to be made here, but these are quite limited - see below);
- Combined management of invested funds to achieve a higher interest rate (currently IRRI uses an investment adviser based in the United Kingdom). However, the vast gap between the amount of IRRI's invested funds and CIMMYT's amount makes it difficult to see the potential for significant gains here.

There would be some limited value in CIMMYT and IRRI handling their insurances together. The risk profiles of the two centers are quite similar, and there is no need for the judgements of the level of risk that should be transferred to an insurer to be significantly different between the two. Some $5,000 in staff time could be saved across IRRI and CIMMYT. As well, a single insurance deal is likely to result in lower total insurance costs – estimated by industry sources to be a potential saving of 1-3% (say $10,000) of the current insurance bill of around $500,000 (CIMMYT's now being $290,000 and IRRI's $206,000).

These changes should be with a view to widening the collaboration with other centers at the first opportunity. If such wider discussions take a promising turn within the next few months (ie soon after the 2004 AGM), then it is recommended that an IRRI-CIMMYT pairing be set aside in favour of a broader approach.

For purchasing supplies from the US, it is also recommended that IRRI and CIMMYT initiate negotiations with IFPRI in Washington DC and/or CIAT's purchasing office in Miami with a view to establishing a very small US presence in order to receive the purchasing benefits of having a US address. This could produce a net benefit of $50,000.

There are some aspects of financial management which must remain localised: domestic purchasing; day-to-day fixed asset management; and, for some time but not indefinitely, local cashier and banking arrangements. Bank accounts need to be kept local, in part because of differing banking rules and regulations, though if a merger were being proposed then oversight could be carried out as a shared service from a single location.

It is recommended that IRRI and CIMMYT take major steps toward the electronic payment of local suppliers and staff (eg travel advances or reimbursements), so that in due course this activity can also be merged across all or a subset of CGIAR centers. For efficiency's sake, and as a precondition for a later merged service, it is suggested that the ability to be paid electronically be made a criterion for being a preferred supplier – despite taxation considerations making many local suppliers reluctant to be paid in this way.

Most or all financial processing could be merged into a single service across the CGIAR system, for economic reasons located centrally in a low-labour-cost country such as India, or alternatively, depending on the success of the African subregional pilot, on a subregional basis. Very significant savings could be achieved.

There is no compelling reason why this should not include the payroll service for all staff (not just internationally-recruited staff or IRS). Whilst the payroll for national-recruited staff (NRS) is currently handled locally (in fact, each of IRRI's and CIMMYT's regional offices handles payroll separately from HQ, partly because of the lack of a web-enabled payroll system and the lack of anything but dial-up facilities in regional offices), steps should be taken system-wide towards a centrally located payroll service. Effective interaction between a single payroll team and each country's (shared) expert on NRS terms and conditions of service would be needed. Having a single CGIAR-wide service would be likely to result in significant savings across the system (with IRRI's and CIMMYT's combined share likely to be some $50,000, and one-off up-front costs of a similar amount).

It is not suggested, though, that IRRI and CIMMYT "go it alone" in this area. The necessary investment in systems means that ad hoc bit-by-bit mergers of financial processing (including payroll) services across the CGIAR network are more likely to create obstacles to a single CGIAR-wide approach ("we have just invested in a new system; we can't join with you now!") rather than assist its development. It is suggested that IRRI and CIMMYT initiate and contribute strongly to a system-wide centralisation of payroll services.

This also applies to the financial management and information system (FMIS) itself – a very expensive component of any financial management function. All CG centers should be using a common financial system. Reporting requirements are common across the CG system, and it is extremely inefficient for each center to be either making (ie paying for) system modifications or else fiddling with manual spreadsheet entry or semi-automated spreadsheet-system interfaces, when the alternative is a single common system tailored to meet CG system-wide financial reporting requirements. Harmonisation of financial systems is on the CDC agenda after the 2004 AGM, according to the report of the CDC Collective Action Retreat. Whilst CIMMYT has a pressing need to replace its FMIS within the next 6-12 months (and has plans to examine options from September 2004), and whilst IRRI needs to make its more user-friendly, a two-center approach needs to be set aside at this time in favour of a system-wide approach. It is recommended that IRRI and CIMMYT urge speedy though not hasty introduction of a CGIAR-wide common financial system, and that the system be one that allows for secure data entry into a single system from multiple locations (in IRRI's and CIMMYT's cases, not just from Mexico and the Philippines but also from all other regional offices).

CIMMYT currently uses Platinum for its FMIS: an acceptable system for monthly and annual accounting and for asset and inventory management, but inappropriate for handling multi-year projects in an efficient way. It was not designed to deal with whole-of-life project financial information, which therefore largely sits in paper files. In IRRI's case, E-Epicor, a web-enabled variant of Platinum providing desktop access to all staff, is used. It also does not handle multi-year projects in a whole-of-life way, but rather is an annual accounting system. There are very mixed levels of user satisfaction with it (though it is still not fully introduced), and it is not an ideally secure system.

For a single center like CIMMYT to introduce a new system, a cost of some $350,000 would be entailed ($250,000 as a one-off cost of purchase, along with additional costs of perhaps a further $50,000 for tailoring and $50,000 for training). CIMMYT has already spent some $80,000 on a licence for E-Epicor. The cost of extending and tailoring the E-Epicor system to cover not only IRRI but also CIMMYT would be in the order of $100,000 in training, additional user licences and upgrades to the web-enabled version that IRRI has (as well as staff time in data entry to upload opening balances and amendment of the chart of accounts).

Overall, the savings from having a single system across the CGIAR network would be considerable – perhaps $100,000 a year when combined across IRRI and CIMMYT and annualised.

Currently, at their HQ, CIMMYT has some 25 staff and IRRI some 44 staff in financial management. There is a credible view within CIMMYT that the numbers of finance staff could be reduced considerably, irrespective of any shared service arrangement with IRRI. These figures do not include the financial management staff of IRRI's and CIMMYT's overseas offices, which handle accounting and procurement functions separately and locally and have no common system with their headquarters (financial data being uploaded into the finance system via spreadsheets completed by overseas staff and sent to headquarters).

It would be possible for IRRI and CIMMYT to combine many aspects of their finance functions, but this would make best sense if it were to take place subsequent to a system-wide introduction of a common FMIS. If this were to occur, I would expect total savings of $200,000 in IRRI and CIMMYT together for the finance function, and one-off additional costs of a similar amount. These savings (ie savings from a common FMIS and a shared finance function) are not counted as savings resulting from an IRRI-CIMMYT alliance, as this sort of shared service is best tackled system-wide.

e. The issues concerning a shared **people management** (or HR) service are a little like those concerning financial management, in several respects. If a full merger were to be pursued, then a single human resource information system (HRIS) would need to be shared, and there would need to be common people-management policies, plans, procedures and decision rights, as well as a common classification structure introduced for internationally-recruited staff (IRS).

   In the absence of a full merger, several judgement calls need to be made, and these are made problematic by many of the same issues affecting judgement calls in financial management. As well, certain fundamental people-management philosophies differ between the two centers, and without a full merger it would be extremely difficult to have significant commonality of people-management policies and plans. To take one example, the five member centers of the Strategic Advisory Service for Human Resources (SAS/HR), including CIMMYT, have agreed to adopt a "One Staff" policy (in which a single set of values and the same policies, compensation structure and human resource management processes are applied to all staff members), whereas this policy does not fit with IRRI's people-management directions.

   All CGIAR centers already share a salary, pension and benefit system for IRS, through the AIARC. There is also a shared Gender and Diversity office that has facilitated centers' policy development and system-wide reporting.

In relation to an HRIS, CIMMYT management has a clear view that it requires a new and distinctly better HRIS than the current Eslabon system, which cost some $100,000 to introduce three years ago. In IRRI's case the current system is Microsoft Great Plains, which was purchased for $18,000 plus some additional costs of implementation, which is not yet complete. There is not a consistent view about the quality of this system: it is regarded as a better system than CIMMYT's, but there is some dissatisfaction, including at senior management level, which may be enough to warrant significant enhancement of the system in the medium-term. A common HRIS that well serves the needs of CGIAR centers is not on the CDC post-retreat agenda, suggesting that it is an unlikely development in the near future. On the other hand, it is on the agenda of the SAS/HR.

The five SAS/HR member centers each contribute $30,000 a year, and the CGIAR Secretariat contributes $150,000 a year. The SAS/HR essentially provides advice on best people-management practice, and coordinates the development of best practice policy and planning, with designated centers taking lead roles in specific projects. Participating centers consider that the SAS/HR represents an opportunity to minimise overall effort in the development of generic but "tailorable" HR policies in such areas as workforce planning, performance management and evaluation etc, rather than each center either reinventing a good round wheel or perhaps even coming up with a cubic one. IRRI management regards joining the SAS/HR as most unlikely: it has access to alternative sources of good strategic HR advice and considers itself well-placed in this area.

However, it is recommended that, for the sole purpose of exploring a common HRIS in the medium term, IRRI join forces with the five SAS/HR member centers; that the SAS/HR be asked by IRRI and CIMMYT to make exploration of a new common HRIS a high priority; that the IRRI IT Manager and the IRRI Administration and HR Manager both be engaged in this exercise; and that this exploration be regarded as a precondition for any joint effort between IRRI and CIMMYT in reporting and in HR system administration and development. Possible outcomes of this exercise would include an enhancement of IRRI's existing, "upsizeable", low-cost (and quite recently introduced) HRIS to cover several other centers, or an altogether different system.

Purchase of a new HRIS should not be regarded as additional expenditure for CIMMYT, as it is intended to occur in any case. Savings in staff time, due to a reduced need for labour-intensive reporting and HRIS administration, would not be significant (currently HRIS administration being a minor portion of one staff member's time).

It is not recommended that NRS recruitment be shared. However, it is recommended that CIMMYT (especially) and IRRI (to a far lesser extent) seek much more cost-effective ways of advertising for / attracting internationally-recruited staff (IRS), with an invitation to other centers to participate. Current IRS advertising costs are $35,000 for IRRI but significantly higher for CIMMYT (perhaps some $100,000). Joint advertising deals, greater use of website-based advertising including the CGIAR's common job advertisement website, more reliance on electronic networks for advertising and greater reliance on staff seeking out CIMMYT and IRRI could be expected to produce savings of $65,000. However, these should not be considered savings due to an IRRI-CIMMYT alliance.

It is not suggested that any other shared activities be undertaken in IRRI's and CIMMYT's people management service. By its nature, people-management requires a strong face-to-face element, and so the provision of most advice and services, especially but not just to nationally recruited staff (NRS) - employee relations being a key example - needs to remain local. It is particularly important that the local provision of sound advice on terms and conditions of service for NRS be retained in Mexico by CIMMYT and by IRRI in the Philippines, given the differences in national labour laws and culture. (There is a distinct limit to the degree to which the HR function can therefore be centralised within the CIMMYT-IRRI alliance.) However, this is unnecessary for CIMMYT's and IRRI's regional offices: it is not necessary for each center separately to interpret national labour laws and culture in countries in which that center's presence is relatively small, nor separately to frame their terms and conditions of service (T&C) accordingly. I recommend that the CG center with the dominant presence in any given country be invited to provide this service to CIMMYT and IRRI – like the service that IRRI HQ provides for the Philippines NRS of other centers such as CIMMYT, ILRI and CIAT, and like the service already provided in Zimbabwe by ICRAF for CIMMYT. Savings would be relatively minor, though.

In the case of CIMMYT, continued participation in the SAS/HR seems useful for effective HR service but cannot be expected to produce much in the way of further savings. The HR function in CIMMYT currently has seven staff (two of these temporary), with three of these positions NRS-specific. In IRRI's case, there are around nine full-time staff, and two more who spend perhaps half their time in this area. Further savings (the equivalent of one staff member, or another USD30,000) would be possible if strategic HR planning (including workforce planning), organisational development and HR policy development were shared, but, in the absence of a full merger, such sharing is not recommended.

Similarly, in the event of a full merger, policy and planning in areas including occupational health and safety, management training and staff-management relations could be coordinated in one location, with the administration of each of these handled locally, but this is not recommended without a full merger.

f. **Library** services are already partially shared across the CGIAR system. Many subscriptions have been negotiated on behalf of all centers, taking advantage of the combined buying power of the centers. There is at least some dissatisfaction on the part of users about the range of these subscriptions, but on the other hand there is scope within each center (especially CIMMYT) for rationalising journal subscriptions. Though CIMMYT's library, for example, spends only $65,000 a year on (electronic) journal subscriptions, there is significant duplication of many of the same titles from within the research programs' own resources.

Library services have already headed very strongly towards desktop-accessible resources in electronic form, based on subscriptions to global collections with good search facilities. IRRI has moved further in this direction than CIMMYT. As information resources move increasingly into electronic form with desktop access, there are significant opportunities for sharing and rationalising library services. A small need remains for local reference librarian services, but the vast bulk of the work can be handled remotely and electronically.

There is a strong case for combining library services right across the CGIAR system, with a small presence of local reference librarians (even just a single librarian in each major center). However, as this is not on the CDC agenda arising from its July 2004 retreat, it is not likely to be pursued right across the CGIAR network. The onus is probably therefore on centers to combine and share resources in smaller groupings for the time being. There is nothing to suggest that an IRRI-CIMMYT pairing in library services would make more sense than any other grouping of centers, but it is worth serious consideration.

CIMMYT has recognised a need for a new library system. CIMMYT currently uses a dated version of InMagic. It is in the process of joining with eight other centers in the purchase of a new library system. IRRI, on the other hand, has an exceptionally good, state-of-the-art Millennium library system which is significantly more expensive than those of most other centers (with a purchase/implementation cost of $240,000 and, at $26,000, an annual maintenance cost which even exceeds the up-front purchase cost of other centers' systems). There are two main options for library systems: either CIMMYT pursuing its purchase of a new system with eight other centers, or else the IRRI system's coverage being extended, at minimal extra cost (some $10,000 plus an insignificant annual amount for some additional user licences additional, and one-off training costs of some $40,000) to CIMMYT. There is no particular reason for the processes currently underway between CIMMYT and eight other centers to be aborted; it is recommended that CIMMYT join with these other centers as planned.

However, it is also recommended that CIMMYT join with other centers that have a common library system to rationalise library staffing resources and provide a common service with a designated leader. Currently CIMMYT has six and IRRI 14 library staff. It is suggested that such a common service have both a service agreement between centers and also a small cross-center committee to act as a sounding board on priorities and plans. The designated leader would be responsible for reporting to not only this cross-center committee but also the management of the participating centers.

If there is significant doubt that a common library service could be implemented by CIMMYT and one or more of the other eight centers participating in a common library system, then it is recommended that the coverage of IRRI's library system be extended to include CIMMYT at minimal cost, and that a common library service be introduced across IRRI and CIMMYT. If this pairing is pursued, then, when combined with the costs identified above, it would result in total ongoing savings of some $80,000, with additional up-front costs of some $130,000. The savings and costs are not being counted in the summary of savings and costs of an IRRI-CIMMYT alliance, as (although there is significant room for savings) there are more advantages in CIMMYT joining with the other centers intending to use a common library system.

The most sensible location for headquartering this service would be the Philippines, for both cost and capability considerations (based on the findings of a 2003 CIMMYT library consultancy).

g. There is a compelling case for a significant sharing of **information technology** services.

Already many IT contracts (software licences etc) are negotiated centrally by the CGIAR's Chief Information Officer (CIO), hosted by WorldFish, Malaysia, with strong involvement also by IRRI's IT Manager. (The negotiation of global Microsoft software licences for the whole CGIAR network, based on the same deal as US charitable institutions, is already saving the CGIAR network some $1,000,000 a year.) As well, a strong community of practice, which includes coordination of CGIAR-wide standards, continues to develop, along similar lines as the SAS/HR, with participating centers taking responsibility for formulating model policies, plans and practices – eg CIMMYT is preparing work on ICT disaster-resilience which other centers will also be able to apply. This should continue, with IRRI's and CIMMYT's full participation.

But there is much more that could and should be done. System-wide complete IT hardware and software solutions, using a single provider and a "seat management" approach (an outsourced seat-based leasing arrangement which leaves no assets idle), as is being seriously explored by IRRI with one global IT provider, appear to represent best practice, and it is recommended that IRRI and CIMMYT pursue such an approach with other CGIAR centers, working with the CIO. The gains from this approach flow from systematic application of best practices to drive down costs, rather than from economies of scale – ie centers getting out of the provision of services that a global IT vendor can provide more efficiently. There would be enormous value in building an enterprise network to link the centers, and standardised desktop software with a common operating environment, as CGIAR's IT Manager network appears to be heading towards in any case. (If a common approach were to be adopted across only a subset of CGIAR centers, there is no particular reason why an IRRI-CIMMYT pairing would make more sense than any other grouping, but in any case the drive should be for a system-wide approach.) There is also no particular advantage in opting for a regional or subregional approach instead of a system-wide approach for the sort of arrangement being introduced by IRRI. Not only do several IT providers have a global reach, but they also offer a 24-hour helpdesk line as part of a complete IT solution.

In CIMMYT's case in particular, standardisation and simplicity are lacking in the IT environment. CIMMYT's IT environment is fragmented, with few center-wide standards, and it has grown in a topsy-turvy fashion, with a great variety of hardware and software, much bought independently with research program funds and considered the property of those programs. This necessitates a larger number of helpdesk staff than is ideal, because of the variety of problems generated by the lack of standardisation, and the relative lack of familiarity some helpdesk staff have with certain non-standard aspects of their IT environment.

There is much that could be gained from establishing a single IT team across multiple centers. Once again, there is no particular reason why an IRRI-CIMMYT pairing would make more sense than any other grouping. However, the CDC July retreat report would seem to indicate that this is not on the agenda in the immediate future. Therefore, unless other groupings (such as subregional) become more obvious in light of broader consideration of the CDC retreat report, it is recommended that IRRI and CIMMYT share a common IT service, with a designated team leader. The core IT function (in such areas as the development and implementation of IT policies and standards including Internet gateway and other security etc) should be headquartered in one place - ideally in IRRI given the substantial experience of IRRI's IT Manager. This could be supplemented by a very small local generalist IT team that can be responsible largely for network infrastructure and local network administration but with some helpdesk and training capability where needed.

To ensure that the common service is not "captured" by one center, it is recommended that the team leader report not only to the senior management of both centers but also to a small cross-center ICT advisory committee as a sounding board.

Scientific programming could also be shared and done in one place. CIMMYT considers that it is now below critical mass in this area. The preferred location for scientific programming is IRRI, Philippines, given that the salary for a programmer in the Philippines is well under half that of a programmer of the same capability in Mexico.

Ongoing savings of $160,000 in staffing the IT function could be expected from introducing a joint IRRI-CIMMYT approach, with additional up-front costs of $90,000.

If supplemented by the introduction of a complete solution as described above, then, even without a joint approach, IRRI itself could achieve overall savings of $204,000 a year (in hardware, software licences etc) by bringing their own IT up to the industry average (as assessed in a study by Hewlett Packard). CIMMYT could achieve at least as much. However, these savings are not being counted here as savings resulting from a shared service.

d. Some aspects of **travel services** (currently outsourced by both IRRI and CIMMYT) can be shared across CGIAR centers to achieve economies of scale and to take advantage of greater purchasing power. Expenditure in this area is considerable. IRRI, for example, through BTI Marisman, spends $3-4m a year on travel ($3.02m actual in 2003, and $3.79m estimated in 2004), about half of this being on fares. IRRI and CIMMYT should liaise with other centers with a view to taking greater advantage of combined purchasing power to get global leverage on key routes with airlines, and to invest in a good data consolidation service so that data from all participating centers can be taken for central expenditure management and benchmarking. Travel agency services, however, need to be treated differently: the system-wide combined approach is unlikely to have any payoffs for travel management (agency) services. It is best for each center to continue to select its own agency as long as that agency has the capacity to load all global route deals and also can export data at a satisfactory international standard for data consolidation (the industry standard being the Prism Xport standard). An IRRI-CIMMYT pairing is unlikely to produce any significant benefit and is not worth the trouble.

e. **Records management** requires an overhaul in both IRRI and CIMMYT. In particular, electronic systems for managing both paper records and, increasingly, electronic records, need to be introduced. This is in the very early stages in IRRI and has not yet begun in CIMMYT. (IRRI does not yet have a common paper-based filing system and is now looking for a new and inexpensive system starting with a common paper-based system, but there is an arguable case for leapfrogging over paper-based systems.) However, there is no particular reason for the records systems, policies and/or procedures of the two centers to be shared. This is a complex area to address and the added complexity of two centers joining forces in an area which, for these two centers, is only in its infancy, would be an unnecessary obstacle.

f. **Visitor and conference management** is quite location-specific and offers very little scope for joint services other than sharing of best practice and lessons learned.

g. **Training** services have some potential for sharing. Production of generic computer-based training and induction packages can be shared, even if the final 10-25% of any package is tailored for each center. The first 75-90% of such packages can be completed by one center on behalf of the other, or outsourced. This applies to some staff training and also to some external training. However, the low level of user attraction to computer-based training should be noted. It is also recommended that the two centers join forces in providing generic training in regional offices to NARES personnel – eg in project management. Currently both centers are providing such courses overseas, usually separately, when many of these courses have substantial overlap. Any joint plans, however, will need to both contribute to and also take account of the system-wide regional capacity-building plans as foreshadowed in the report of the CDC Collective Action Retreat. These will emerge over time but not in the very near future, the first step being the formulation of a Sub-Saharan Africa (sub-)regional capacity-building program by May 2005. As the training scheme is currently very under-resourced in CIMMYT, no savings can be expected. However, the sharing of this service can be expected to increase effectiveness within current resource limitations.

h. In **facilities management** there is relatively little scope for shared services, apart from some possibilities in the specific area of major equipment procurement (see below). These are largely site-specific services; with building and maintenance, management of utilities, management of vehicle fleets and drivers, security, auxiliary services, stores and most general office services, there is scope only for the sharing of best practice.

i. There is some scope for sharing in the area of **major scientific equipment and facilities** (eg expensive equipment used in genomics research; a central facility for production and testing of transgenics of all three cereals; and rationalised germplasm storage facilities in the event that insufficient money is available from the Global Crop Diversity Trust- see the WG report). There are limited possibilities for reducing the cost of multiple pieces of scientific equipment by offering the supplier greater volume. In the case of very major equipment items where speedy turnaround eg in sample analyses is not critical, there is also limited scope for locating a single piece of equipment in one center, to be used by both centers. However, timeliness considerations make this problematic. In this document savings are not being counted in this area; rather, shared equipment and facilities are seen as opportunities for building additional scientific capacity in both centers.

IV. Concluding comments: the process of change

It is recommended that the sharing of services between IRRI and CIMMYT be introduced in a staggered way so that lessons can be learned on the way. In even the best-planned change process, there are usually benefits and costs (direct financial benefits and costs as well as organisational behavioural responses) that are very difficult to predict until the change is piloted. In a staggered introduction, good learning organisations have clear but flexible plans that allow the change process to evolve and improve as it unfolds.

Michael Brown

20 September 2004

Appendix 1

Estimated savings and extra costs of sharing services between CIMMYT and IRRI ($US)

Support service	Reference in text	Ongoing savings	Additional one-off costs	Net savings (+) or additional costs (-) in Year 1
IP	1a	0	0	0
Regional offices	1b	240,000	100,000	140,000
ICT infrastructure	1c	0	20,000	-20,000
Risk management and audit	2a	5,000	0	5,000
BOT and secretariat	2b	190,000	0	190,000
Scientific publishing	3a	150,000	0	150,000
Public and targeted awareness	3b	0	0	0
Business management	3c	0	0	0
Finance	4a	60,000	0	60,000
People management	4b	0	0	0
Library	4c	0	0	0
IT	4d	160,000	90,000	70,000
Travel	4e	0	0	0
Records	4f	0	0	0
Visitors and conferences	4g	0	0	0
Training	4h	0	0	0
Facilities management	4i	0	0	0
Major scientific equipment and facilities	4j	0	0	0
TOTAL		805,000	210,000	595,000

This table does NOT include savings achievable from broader collaboration across the CGIAR system.