CGIAR Research Program on WHEAT

CGIAR Research Program on Wheat
Extension Period Proposal for 2015-16

25th April 2014

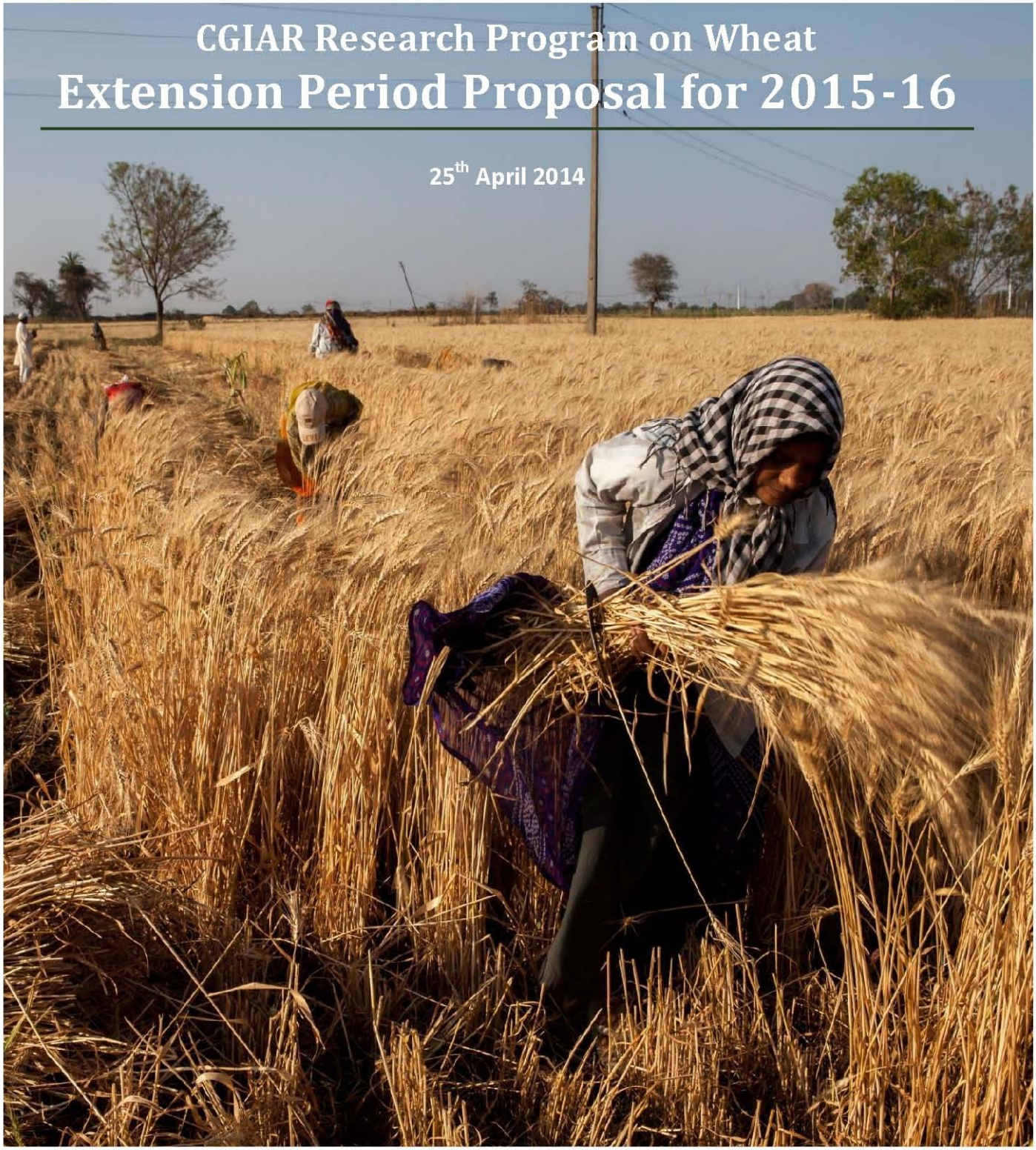


Table of Contents

1. Intermediate development outcomes (IDOs), Theories of Change (ToCs) and Impact Pathways (IPs)

Global scope

Demand for wheat in the developing world is expected to increase 60% by 2050[1]. Wheat is a main calorie provider for the poor, second only to rice and the preferred staple food for more than 1.2 billion people with an income of less than US$2 per day. Wheat also provides 20% of the protein needs in the developing world, more than all legumes together[2]. In addition to traditional wheat consuming areas in Asia, North Africa and parts of Latin America, urbanization, food and nutrition transition, and the need for faster, more energy efficient cooking makes millions of poor women change to wheat, to prepare their family meals. There are now two poor wheat consumers for every three poor rice consumers.

With farmers in the developed world changing to more profitable crops and wheat yield ceilings being reached, significant wheat productivity growth will need to take place in the developing world, including Africa. Otherwise wheat prices will further escalate to the detriment of the poor. The impacts are already evident; recent riots in North Africa and associated incentives for migration were and are closely associated with wheat price spikes.

Already now more than half of the wheat production takes place in the developing world. The challenge for WHEAT is to maximize R4D (research-for-development) impact on raising the rate of average global yield increase from 1% to 1.6% p.a. by 2020, so to ensure that wheat remains affordable to the poor. This has to take place in spite of increased climate variability, scarcer water, land, nutrient and labor resources, more aggressive pests and diseases, and substantial negative impacts on wheat production from climate change. Experts agree that such net productivity increases must come from new genetics and the sustainable intensification of wheat growing environments, each contributing half of the 1.6% annual yield growth needed.

WHEAT pursues two long-term research strategies through five Flagship Projects (FPs). It targets eight out of twelve wheat growing environments, where 84% of the world's wheat-eating poor live (http://wheat.org/index.php?option=com_docman&task=doc_view&gid=11&Itemid=). This includes approximately 60M poor farmers and their families (300M in total), living on less than US$ 2 per day (WHEAT Proposal 2011, Page 12). The scope seems ambitious, yet WHEAT and its predecessor programs have impacted 80% of them to date[3]. Through a well-established alliance of over 200 research and development partners[4] for germplasm and systems-based research (2013 WHEAT Annual Report, Annex 3) and interventions based on Impact Pathways and a Theory of Change, WHEAT plans to reach at least a similar number with new

[1] Rosegrant MW, Agcaoili M., Global food demand, supply, and price prospects to 2010, 2010, Washington, DC: International Food Policy Research Institute; see also USDA, 5 Aug 2013: "Developing countries are expected to account for 82 percent of the increase in world wheat consumption and 93 percent of the increase in world wheat imports in 2013-22." http://www.ers.usda.gov/amber-waves/2013-august/developing-countries-dominate-world-demand-for-agricultural-products.aspx#.U1gqvvldVPM

[2] For 4.5 billion people in 94 developing countries wheat provides 20 percent of their protein intake: http://wheat.pw.usda.gov/ggpages/Wheat__Improvement-Myth_Versus_FactFINAL.pdf, p.4

[3] Based on diffusion of improved varieties: WDR, World Bank, 2008, p.159: https://openknowledge.worldbank.org/handle/10986/5990

[4] Partners take part in WHEAT at different levels: International germplasm exchange counts 620 collaborators; MasAgro (Mexico) works with 180 partners; 40 multi-stakeholder innovation platforms are operating in Mexico, Ethiopia and 4 countries in S. Asia. http://wheat.org/partnerships/partner-institutions

technologies and know-how to sustainably produce enough wheat at affordable prices to feed an additional 56M consumers by 2020 and an additional 397M by 2030[5].

WHEAT invests in basic and advanced R4D, aiming for mid- and long-term development outcomes. Changing unequal gender relations will be an important game changer in WHEAT R4D, empowering disadvantaged groups, in particular poor women and young men and women, to take up innovations, make the best decisions possible and fully reap the benefits of their labor.

IDOs: Anchoring WHEAT outcome orientation

Aligned with similar efforts in other CRPs, WHEAT is consolidating its rolling 10-year R4D agenda into five FPs (Figure 1), with defined linkages to, and accountabilities for Intermediate Development Outcomes (IDOs; Table 1). The five FPs together pursue the two WHEAT research strategies: '**Germplasm**' and '**Sustainable Intensification of Wheat Systems**' (blue in Fig 1).

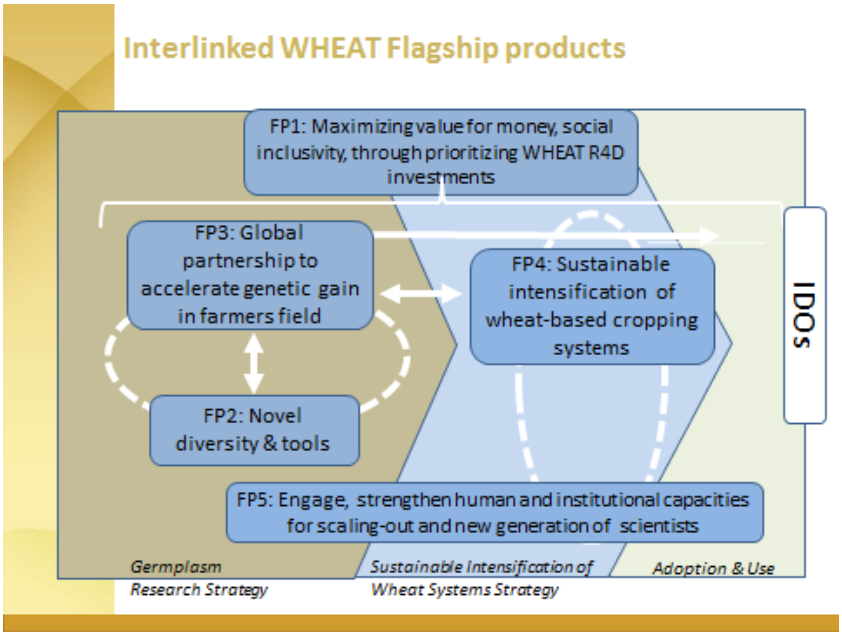


Fig. 1: WHEAT Flagship Projects matched to research strategies

The **Germplasm research strategy** seeks to accelerate the breeding cycle and achieve higher genetic gains through several innovations through FP2: Genomic selection, molecular markers and decentralized precision phenotyping. Additional Clusters of Activities (CoAs) within FP2 will increase the wheat yield potential and source high value genetics from unexploited landraces and wild relatives, latter to increase wheat's adaptability to changing conditions, in particular heat and drought, and reduce its genetic vulnerability. Novel tools and genetic diversity are being used in FP3 to provide national public and private sector partners (NARES) with phenotypically and genotypically characterized genebank accessions and elite germplasm, to incorporate in their breeding programs, adapt to 'their' conditions and to release to farmers, who benefit from increased productivity (IDO1, see Table 1), reduced production risks and greater incomes (IDO4). Poor wheat consumers will benefit from greater price stability, lower prices and hence greater food security. Impact pathways and contributions by partners are well established through a global network encompassing 232 collaborators in 70 countries[6].

The **Sustainable Intensification of Wheat Systems research strategy** uses a better understanding of wheat-based farming systems to develop comprehensive, climate-smart genotype by environment by management (**G**enotype x **E**nvironment x **M**anagement) solutions co-developed with local partners, farmers and value chain participants: Conservation and precision agriculture, heat tolerance and

[5] See WHEAT 2011 Proposal to Consortium Board, Table 3, p.29; to be revised in WHEAT Business Case for Phase II by 2016.
[6] 2013 collaborator and germplasm/data-sharing statistics; International Wheat Improvement Network (IWIN).

nitrogen-use efficiency are projected to have the greatest impact on global wheat yields in 2050[7]. These technologies enable women and men farmers to improve farm-level incomes (IDO4), grow the same amount with fewer inputs and despite climate change and other external stresses (IDO1, 2) and with less negative externalities on the environment (IDO9). FP4 target groups are poor households in systems where wheat is a major source of livelihoods and/or food security. Those farmers, characterized by great social heterogeneity, often depend on other commodities (cash crops, livestock) and off-farm income to sustain their livelihood (Herrero et al., 2010). Under FP4, WHEAT currently collaborates with other CRPs on 45 innovation platforms, most prominently GRiSP, MAIZE, PIM, Dryland Systems and CCAFS, and reaches out to 17-20,000 farmers every year (2013 WHEAT Annual Report, Annex 3 & 4).

Germplasm and Systems value streams come together in FP5, which focuses on seed system innovations at national level, building diverse partner coalitions to further adapt and scale out appropriate integrated technology packages and strengthening WHEAT partners' capacities currently in 31 countries[8].

All FPs are guided by FP1, in terms of targeting and prioritizing R4D and strategic gender research for greater impact (IDO5).

Table 1: WHEAT Flagship Projects delivering towards IDOs

Common IDO / FP	FP1 Maximize value	FP2 Novel diversity & tools	FP3 Accelerate genetic gain on-farm	FP4 Sustainable intensification	FP5 Capacities for scale-out
1 Productivity					
2 Food security					
3 Nutrition & health			Via CRP AR4NH	Via CRP AR4NH	
4 Income					
5 Gender empowerment					
6 Capacity to innovate				Jointly with other CRPs	Jointly with other CRPs
7 Capacity to adapt				Jointly with other CRPs	Jointly with other CRPs
8 Policies, Institutions	Via PIM			Via PIM	Via PIM
9 Environment					
10 Future Options: greater resilience of systems		Via Systems CRPs	Via Systems CRPs	Via Systems CRPs	
11 Climate - carbon sequestration		Via CCAFS	Via CCAFS	Via CCAFS	

Table 2 proposes indicators to measure progress towards reaching IDO targets. They need to be further developed in collaboration with the Consortium IDO Indicators Working Group and as part of FP1. A matching to the M&E Harmonization Group's Food Security Learning Framework's indicators (see Annex

[7] Ibid., IFPRI, 2013 Global Food Policy Report, p.45-48. Note that Heat tolerance and NUE are variables to evaluate climate-smart solutions.

[8] NARS capacity development and technology scaling-out projects in Afghanistan, Ethiopia, Irak, Kurdistan, Libya, Mexico (MasAgro), Pakistan, Turkey & 4 countries S. Asia (CSISA), 6 CWANA countries (FSE), 10 African countries (SARD-SC/Wheat) and 3 Central Asian countries (competitive partner grant).

1) shows significant positive overlap[9]. It is critical that during 2014-15, CRPs agree on same types of indicators (what is measured, how), to ensure comparability and to the extent possible, aggregation across CRPs in particular geographies.

Table 2: IDO Progress indicators

	CGIAR CRPs	***WHEAT***	
	Common IDOs	**Germplasm: High level Indicators**	**Systems: High level indicators**
1	***Productivity*** *- Improved productivity in pro-poor food systems*	▪ % adoption of improved varieties ▪ Genetic gain per unit time ▪ Change in cultivar replacement rates ▪ Diversity distributed to NARES ▪ % of improved seed stream resistant to major pests and diseases; likely durability of resistance genes ▪ Yield gains from new alleles	▪ % adoption of new, improved technologies ▪ Change in on-farm (land, labor, energy, water, nutrient) productivity among adopters
2	***Food security*** *- Increased and stable access to food commodities by rural and urban poor*	▪ Change in food-secure days in wheat-consuming households; disaggregation by members ▪ Productivity impact on wheat price	▪ Change in food-secure days in wheat-consuming households; disaggregation by members ▪ Productivity impact on wheat price
4	***Income*** *- Increased and more equitable income from agricultural and NRM and environmental services earned by low income value chain actors*	▪ Change in income attributable to yield, quality traits, greater yield stability; for first users (model farmers) and adopters (scale-out)	▪ Change in agri-derived income in participating communities for different types of actors (male/female farmers of different social groups, HH-level, service providers)
5	***Gender & Empowerment*** *- Increased control over resources, participation in decision-making by women, other marginalized groups*	▪ Change in relative percentage of female informers and adopters	▪ Women empowerment index (WEAI) ▪ Reduction in women's drudgery Increase in women's participation as informants and adopters
6	***Capacity to Innovate*** *- Increased capacity for innovation within low income and vulnerable rural communities allowing them to improve livelihoods*		▪ % adoption (women/men, new/modified implements adopted by private sector) ▪ Change in gender disaggregated labor input and yield (early adopters)
9	***Environment*** *- Minimized adverse environmental effects of increased production intensification*	▪ Change in genetic nutrient, water use efficiency due to breeding ▪ Change in herbi-/pesticide use per unit of production	▪ Net land, labor, energy, water, nutrient savings per unit of production ▪ Change in nitrate leaching, P losses ▪ Change in herbi-/pesticide use per unit of production

Impact Pathway (IP) for Sustainable Intensification of Wheat Systems

Wheat-based systems are dynamic and evolving with important drivers of change (e.g. feminization of agriculture, demography, climate, resource depletion, socio-cultural factors). WHEAT R4D needs to embrace social, political and biophysical diversity at farm and landscape scales *(see Research Outputs level* in Fig 4) and prioritize investments and thematic areas at different scales:

- *Intensive production systems in regional breadbaskets*: Increasing resource use efficiencies, particularly irrigation water and nitrogen, while maintaining high and stable yields (e.g. NW Mexico, NW India, Eastern & Southern Africa).– see FIELD and FARM, Fig. 2;
- *Heat-stressed environments*: Where yields are variable and multi-tactic approaches to coping with thermal stress are essential – see FIELD, Fig. 2;

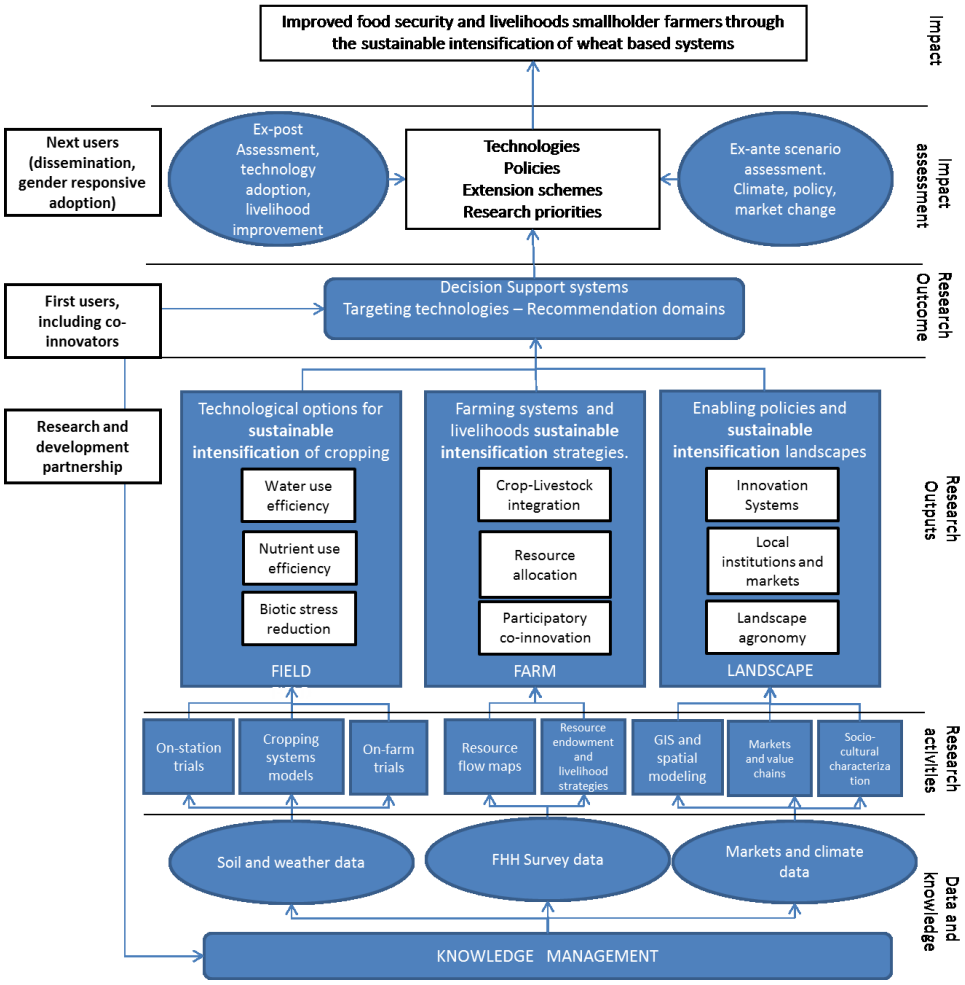
[9] The Food Security Learning Network: The M&E Harmonization Group of Food Security Partners, July 2013, ISBN 9789290724209: See project-level indicators.

- *Rainfed and partially irrigated systems:* Where conservation agriculture and other practices to increase water utilization and productivity are essential;
- *Areas where input and output markets are limiting:* Where incentives and the enabling environment for intensification are core considerations – see LANDSCAPE, Fig. 2.

Such prioritization decisions are based on assumptions, shown here for different stages along the IP:

Research Activities To R4D outputs	Farmers, input providers, extension services, women's networks, value chain partners are willing and able to partner / participate in local research
	The intended model/first users people are reached, the right message is delivered and understood
R4D outputs to research outcomes	Co-investment and willingness to change among stakeholders and beneficiaries
	Trade-offs of practice changes, including gender / equity dimensions are understood and addressed
	Practices and knowledge address locally important challenges and opportunities
R4D research outcomes to IDOs	National Gov, NGOs and private sector have interest in scaling out and up gender-responsive practices, technologies and policies
	Practice(s) and knowledge work are adaptable to other environments & systems

Fig. 2: WHEAT Sustainable Intensification (Systems) Impact Pathway (including for collaborative CRP interventions)



2. Flagship projects

The five FPs are focused on outcome-oriented value propositions that allow prioritizing among WHEAT interventions and drive budget allocation. Each FP is subdivided into Cluster of Activities, jointly conceived with partners during the original WHEAT proposal development phase and in 2012-13, through a WHEAT Partner Priorities Survey. It received a response from 92 R&D partners in 40 countries.

FP1 ***Maximizing value for money and social inclusivity through prioritization of WHEAT R4D investments***: Define the scope of WHEAT for maximizing socially inclusive food security and poverty alleviation and enhance and measure its success.

FP2 ***Novel diversity to faster adapt wheat to climate change and resource constraints*****:** Genebank collections are characterized phenotypically and genotypically for where genetic variation is currently missing in priority traits. Options for wheat hybridization, increased wheat yield potential, and NUE are pursued in collaboration with ARIs and the private sector for use by WHEAT partners in the developing world. Discovery and introgression of new alleles and traits into adapted germplasm will have a major impact on accelerating genetic gain (FP3) and intensification (FP4). This will lead to leaps in genetic yield potential, climate change adaptation and nutrient use. Discovery of affordable hybrid technologies would attract increased private sector investment.

FP3: ***Global partnership to accelerate genetic gain in farmers' field*****:** Climate resilient, disease and pest tolerant, nutritious wheat lines with high end use quality are developed with new molecular based breeding tools and selection methods. NARS partners participate in breeding, apply more precise phenotying approaches and other tools to develop diverse, high yielding varieties, adopted to farmers needs in in Asia, Africa and Latin America – so that globally, annual genetic yield gains of at least 0.7% are achieved.

FP 4*: Sustainable intensification of wheat-based cropping systems:* FP4 is about farmers closing the yield gap to contribute to regional food availability and price stability. FP4 focuses on managing for profitability, inclusive growth, and environmental quality. Primary beneficiaries and co-innovators are poorer households in systems where wheat is a major source of livelihood, next to other crops, livestock and off-farm work. They will be involved in gender-responsive, process-based research to choose interventions with greatest impact on the targeted IDOs. FP4 will work on innovation that increase resource use efficiencies and reduce soil degradation in highly productive and marginal wheat areas. Productivity and risk management options will be tested with farmers, with emphasis on developing scalable knowledge products and decision support systems, such as those linking to remote sensing and cell phone technologies, so that 'last mile providers' and boundary partners reach more farmers with the best site-specific crop management practices.

FP5: ***Human and institutional capacities for seed systems and scaling-out****:* FP 5 enables national coalitions of development and policy partners to integrate tried and tested technologies from FP3 & 4 insights. WHEATs role is to accelerate national initiatives for more rapid uptake of knowledge, local adaption and feedback and scaling-out. This is demand-driven by coalition partners, who identify gaps in current and past AR4D projects and develop locally adapted comprehensive solutions.

Table 3: WHEAT Flagship Projects and their Clusters of Activity

FPs	*1 Maximizing value for money, social inclusivity thru prioritizing WHEAT R4D investments*	*2 Novel diversity and tools to adapt to climate change and resource constraints*	*3 Global partnership to accelerate genetic gain in farmers field*	*4 Sustainable intensification of wheat-based cropping systems*	*5 Human and institutional capacities for seed systems and scaling-out; a new generation of wheat scientists*
CoAs	1.1 Foresight and targeting (ex ante)	2.1 Seeds of Discovery	3.1 Global Breeding Platform (IWIN) for traits suited to different needs and target groups	4.1 Multi-scale farming system framework to better integrate & enhance adoption of sustainable intensification options (linked to FP5, which works at wider scale)	5.1 Enable national coalition of multiple partners for technologies packages scale-out including seed system innovations
	1.2 Adoption/impact pathway analysis & (ex-post) impact assessment	2.2 Affordable Hybrids	3.2 Accelerate breeding cycle through genomics, improved bioinformatics, and data management	4.2 Participatory approaches to adapt and integrate technological components	5.2 International short-term trainings (POWB 10.1. – 10.4.) for female and male professionals
	1.3 Gender Strategic Research & support mainstreaming	2.3 Wheat Yield Partnership (IWYP) to break the genetic yield barrier	3.3 Precision field-based Phenotyping Platforms for key traits	4.3 Development and field testing of agronomic technologies (has 6 sub-categories)	5.3 Wheat University and WHEAT Volunteers: To build the next generation of scientists
		2.4 Heat and Drought Tolerance to Combat Climate Change (HEDWIC)	3.4 Durable Rust Resistance & Monitoring for gender-responsive Food Security		
		2.5 Biological Nitrification Inhibition: Cytogenetic and pre-breeding for NUE	3.5 Resistance & Monitoring of major diseases and pests other than rusts		
		2.6 Pre-breeding: Transfer new alleles, translocations for prioritized traits from exotic sources into elite lines	3.6 Genetic improvement to contribute to food safety		

What is new for the Phase 2015-2016?

FP1*:* seeks greater investments in three areas

- To strengthen ex-ante, foresight and targeting analysis and develop a more comprehensive business case for WHEAT Phase 2, in collaboration with PIM and A4NH: In particular, FP1 intends to investigate the relevance of wheat quality, nutrition and post-harvest investments for achieving IDOs.
- Jointly with CCARDESA, establish the production and market potential for African smallholder engaging in wheat-as-cash crop production in at least one of the target regions, complementing the on-going collaboration with ASARECA.

- By end of 2016, FP1 will have guidelines for gender-responsive development of wheat-based systems implemented in different parts of South Asia. This requires gender R&D capacities resident in South Asia.

FP2 & FP3 expand their scope in the following areas to increase on-farm genetic gains to a level of 0.7% - 1% p.a.[10] (in addition to similar increases expected from FP4):

- Increase R4D investment on how to use genomic selection (GS) for faster and more precise breeding (FP2). Kansas State University, Cornell University and WHEAT are leading the largest GS public sector projects on wheat, focusing on yield and heat. WHEAT wants to expand this collaboration to a greater number of developing countries that have capacities to apply GS in impact oriented wheat breeding programs. This investment will leverage W1&2 funds deployed during Phase 1.
- Aligned with a joint initiative between the BMGF and the Consortium, additional resources are sought for bioinformatics, database development and open access to bring high-density genomics data globally into use for breeding and to validate International Breeding Platform tools (FP3).
- Higher quality phenotyping data are paramount to fully utilizing the potential of new molecular selection technologies. With co-investing NARS, WHEAT will set up seven of ultimately 15 Precision Phenotyping Platforms, forming a global phenotyping network for pre-breeding during Phase II. The platforms will support implementation of molecular tools and provide NARS with earlier access to more diverse germplasm, enabling their own breeding programs and the release of genetically more diverse varieties (FP3).
- WHEAT will contribute to the Biotechnology and Biological Sciences Research Council (BBSRC/UK) and USAID-led International Wheat Yield Partnership (IWYP), which aims to increase the genetic yield potential of more photosynthetic efficient wheat by 50% in 2035. Under FP2, WHEAT will expand the WYNHUB (pre-) breeding platform screening capacity.
- Investments in applying GS and in phenotyping platforms will deliver more precise data for the Heat and Drought Wheat Improvement Consortium (HEDWIC), which will improve the genetic basis of heat and drought adaptation and one of the top four agricultural technologies identified for increasing global yields by 2050[11]. In spite of climate change-induced wheat production reductions of 20-30% by 2050, investments in trait identification for heat and drought tolerance have been low. WHEAT will set up an initial round of competitive grants in support of a stronger trait pipeline (FP3).
- FP2 also aims to leverage bilateral investment in research on biological nitrification inhibition (BNI) by JIRCAS, to identify wheat cultivars with high BNI potential and attract greater JIRCAS funding for WHEAT Phase 2.

FP4 intends to strengthen two areas of research

- Upstream research to analyze and capitalize on lessons learnt from the sustainable intensification of wheat systems, contributing to cross-CRP learning: Sustainability encompasses economic, environment, and social dimensions. Data from ongoing R4D in regional projects in South Asia, Mexico and Africa will be integrated to better understand agro-ecological, economic and socio-cultural systems dynamics; analyze and document the innovation platform-driven successes and lessons for non-adoption; analyze trade-offs, also based on long-term experiments and design more focused intensification options empowering female and male household members. This analytical research will be shared with Systems CRPs, GRiSP, MAIZE, CCAFS, Water, Land and Ecosystems and PIM for greater cross-CRP conceptualization and understanding of impactful system-based R4D approaches.

[10] Yield Trends Are Insufficient to Double Global Crop Production by 2050, Deepak K. Ray et al, PLOS ONE, Vol.8, June 2013.
[11] IFPRI, 2013 Global Food Policy Report, Chapter 4: The Promise of Innovative Farming Practices, p.47.

- Capitalizing on increasing South-South collaboration on mechanization, and substantial successes with implementing sensor technologies for improved nutrient management, FP4 intends to further strengthen its project portfolio on appropriate-scale mechanization, smart phone and internet mediated knowledge products and remote sensing/decision support systems.

FP5 seeks stronger alignments with government programs or bilaterally funded development projects from a wide range of donors in wheat growing areas, to enable coalitions of scaling-out partners. Increased efforts will be made for international training and to link scholarship opportunities with cutting edge WHEAT research, including the better understanding of non-adoption and scale-out drivers[12] - and ongoing post-doc research of young professionals in four IWYP project areas[13].

Greater FP1 and FP4 investments in conceptualization and IDOs-focused targeting will allow WHEAT to identify trade-offs between different kinds of interventions and adjust FP priorities and project portfolio. Accelerating breeding gains and new technologies under FP2&3, as well as bringing precision agriculture technologies on-farm under FP4, will contribute to achieving the annual 1.6% yield gain required – and should mobilize self-sponsored innovation and co-investments from ARIs, NARS and their national governments.

3. Gender

Gender inequalities are an important factor in low production levels, inefficient marketing, and in poor uptake of innovations. Empowering all - women, men, young women and men and marginalized rural groups - is key to sustainable productivity and food security gains. This requires research on context-specific gender and other inequalities affecting a particular system and to ensure interventions are gender-responsive and socially equitable – also to prevent apparently technically superior innovations from exacerbating gender inequalities.

WHEAT will meet CGIAR performance requirements for gender mainstreaming in 2016, by bundling W1&2 with bilateral funding, to increase its gender research and its capacity for gender analysis and mainstreaming gender research in the target regions. Greater capacity is critical to collaborating with new and existing partners - including women farmers and their representatives, men's groups working for gender equality, and higher-level R4D partners. For 2015-16, the focus is on:

Mainstreaming into Research Management Framework (incl. project cycle and M&E): Key partners adopt the protocol for gender and social inclusion in participatory research; Screening procedure for gender mainstreaming in project development.

Gender disaggregated data collection: CIMMYT, ICARDA and key partners adopt and apply a protocol.

Diagnosing gender-related constraints: Strategic research, including inter-CRP collaborative research to better understand how gender disparities affect R4D outcomes, the interactions between gender norms, women's agency, and the development and dissemination of key WHEAT technologies in selected regions - to identify sensible 'entry-points' to improve equity and equality for all; implementing guidelines for gender-responsive development of wheat-based systems for 1 key target area.

[12] Future Resource Needs for CGIAR: Preliminary Thoughts; presented at Fund Council 9, 26th April 2013 under 'Strategic Issues: Framing and costing of the next generation of agricultural research: "Although much can be accomplished through better application of known technologies to land and water already in production, how to do so is in itself a matter of research." & "how better to translate science into productivity change in Africa is an important area of research itself."

[13] IWYP incorporates research themes and results from its CIMMYT-led predecessor, the Wheat Yield Consortium.

Table 4: Gender mainstreaming and gender-responsive institutional and capacity strengthening per FP

Flagship Project 2015-16	Gender mainstreaming to improve gender responsiveness of WHEAT R4D	Gender-responsive institutional and capacity strengthening
1 Maximizing value for money and social inclusivity through prioritization of WHEAT R4D investments	○ Build on the Gender Audit and South Asia scoping study, implement guidelines for gender-responsive development of wheat-based systems implemented in South Asia. ○ Systematic sex-disaggregation and gender analysis of people-level data sets	○ Collaboration with alternative partners with comparative advantage on gender in specific wheat contexts who can contribute on strategic and integrative gender research ○ South Asia resident gender research capacity
2 Novel diversity to adapt to climate change and resource constraints	○ Supportive actions to involve more female talent in the generation and application of cutting edge wheat technologies	○ Strengthen feed-back mechanisms captured by FP1, FP3, and FP5 from women and men farmers as part of surveys, impact studies and innovation platform approaches
3 Global partnership to accelerate genetic gain in farmers field	○ Research on wheat lines with traits of specific interest to particular groups (e.g. specific quality traits) and subsequent stacking of traits for combinations that address specific needs and preferences	○ Strengthen feed-back mechanisms captured by FP1, FP3, and FP5 from women and men farmers as part of surveys, impact studies and innovation platform approaches
4 Sustainable intensification of wheat-based cropping systems	○ Identify interventions that positively influence women's workload, health, access to resources and know-how and their role in decision-making ○ Gender relevant systems analysis tools and participatory methods are tested at local innovation platforms ○ Learn how traditionally male-dominated technologies (e.g. mechanization) interact with the social context and gender norms	○ Women farmers and entrepreneurs are understood as a core clientele with distinct needs and social capital by knowledge, input, and service providers ○ WEHAT partners and collaborators embed these insights into their business models and training programs ○ Social networks catalysed by civil society and self-help groups are leveraged for involving more women farmers
5 Human and institutional capacities for seed systems and scale-out	○ Develop scaling-out processes based on solid understanding of gender opportunities and constraints and how to strengthen women's agency (define goal and act upon) ○ Support actions to train and involve more female talent in variety selection, seed production, as innovation platform leaders, and informants to nationally-led projects	○ Promote gender-responsive processes and empowerment in national projects ○ Increase the proportion of female participation in international and regional training courses

4. Partnerships

WHEAT is privileged to draw on a very strong partnership network for innovation and deployment and is trusted by a wide range of stakeholders (2012 CGIAR Stakeholder Perceptions Survey[14]). As a founding member to the G20 WHEAT Initiative, WHEAT promotes the improved coordination of R&D priority setting among G20 members. Investments in WHEAT are a key vehicle to ensure the developing world benefits from G20 wheat research for the areas where R&D priorities are shared. WHEAT has been able to mobilize more contributions from ARIs and the private sector for 2015-2016.

WHEAT priorities were informed by 92 R&D partners from 40 countries, responding to the 2012/13 WHEAT Partner Priorities Survey and reflected in the work plan. The survey requested feedback on international research priorities, emphases among IDOs, stakeholders own priorities for the next five years, and which new Flagship Projects or Cluster of Activity they want to see in the WHEAT Extension and 2nd Phase. The top priority for WHEAT is to continue to ensure such high quality partner involvement in co-designing Phase II. WHEAT will also make other changes, to increase partner involvement and the delivery of results:

- **Governance and management:** The WHEAT Stakeholder Committee is composed of reputable independent experts from all target regions, representing a balanced set of disciplines and stakeholders. In the Management Committee, program leaders from CGIAR centers are joined currently by three program leaders from three non-CGIAR partners, selected from among those with greatest accountabilities/ involvement for WHEAT program components. Composition of the both committees and minutes of meetings are available on *www.wheat.org*, to raise awareness of how partners are influencing decision making.
- **Allocation of funds:** Competitive mechanisms for partners getting involved in the WHEAT research agenda will be used more widely, including in several of the new WHEAT initiatives. Already now, 20% of WHEAT resources are assigned to non-CGIAR partners and dispatched through competitive mechanisms. In the case of W1&W2 funding, competitive grants are advertised following gap analyses done on an annual basis by the Management Committee. In the case of bilateral geographically focused projects, partners are selected in a competitive manner based on annual high quality outputs and work plans and their track record for delivery. As partner experience with these mechanisms grows and to foster stronger South-South partnerships, WHEAT will increasingly cluster highly rated proposals into larger competitively funded projects.
- **Leadership:** WHEAT contributed to setting the International Wheat Yield Partnership (IWYP), which is now led by an independent Science and Impact Evaluation Board and Program Manager (CoA 2.3). Similarly, WHEAT will use participatory planning, competitive partner selection and joint fundraising approaches to set up the Heat and Drought Wheat Improvement Consortium (HEDWIC; CoA 2.4) and to achieve greater ARI and NARS involvement in the application of GS (CoA 3.2). Other CoAs are led by Cornell University (2.5), JIRCAS (3.4), or the private sector (2.2).
- **Scale-out:** WHEAT already links with substantive investments of in-country programs in Mexico, South Asia and Africa. Building up on very positive experiences with the USAID/Feed the Future programs, ACIAR, the Africa Development Bank and associated partnerships with more than 30

[14] See: http://library.cgiar.org/bitstream/handle/10947/2803/CGIAR_2012_Stakeholder_Perceptions_Survey.pdf?sequence=1. WHEAT scored lower on 3 criteria: Distributing Funds fairly (rated 13th most important factor for good p'ship by partner respondents), involving partners in decisions (rated 4th most important) & sharing credit (rated 11th most important). The 3 improvement areas apply to all CRPs. WHEAT will feature acknowledgement of contributions and funding in its internal and external communications more strongly and better co-ordinate communications with R&D partners' communicators.

Ministries of Agriculture, FP5 will strengthen linkages to at least two additional CGIAR development donors' programs, for greater scaling-out and –up in Phase II and achievements of IDOs at scale.

- **Partnership with CRPs**: Phase 1 collaboration with other CRPs will continue and increase, in particular in the area of systems research, strategic gender research, foresight and targeting.

	FP1 & FP5	FP2 & FP3	FP4
Commodity CRPs	Give&Take: Approaches to accelerated varieties release and seed scale-up	Give&Take: Pre-/Breeding technologies & methods	Give&Take: Innovations tested and integrated at common innovation platforms
Systems and NRM CRPs		Give: system optimized germplasm Take: Learn about need for further adaptation	Give: precision agriculture and approaches to increase input use efficiency Take: systems approaches, technologies, methodologies; help ensure positive or neutral ecosystem impacts
Nutrition & Health	Give&Take: Collaborate on NARS technology adoption	Give: New traits from mining of genetic resources	
CCAFS		Give: Heat adapted germplasm Take: Model impact on Climate Change	Give: Technologies & information, long-term experiments; pilots at innovation platform sites Take: Models and tools
Policies, Markets	Give: Wheat specific data and learning Take: Foresight models, cross commodity value chain and seed sector policies		Give&Take: overcoming value chain bottlenecks
Generation Challenge Prog.		Give: Bioinformatics tools for use in other crops	
		Take: IBP tools	
Wheat Initiative, G20 and other int'l partners	Take: G-20 partner priorities and knowledge about products and outputs; technologies & methods collected by the Wheat Initiative (Wheat Information System)		
	Give&Take: products and outputs; technologies & methods; WHEAT co-chairs the Wheat Data Interoperability Working Group to promote common standards		

- **Future capacities**: Aligned with Consortium-wide efforts, FP5 is strengthening its "WHEAT university and Postdoc" concept for strengthening postgraduate student opportunities and sandwich research programs in collaboration with current and new partners such as Cornell University, Texas A&M, Wageningen, BBSRC, ICAR, BARI, ASARECA or CCARDESA, Ruforum, a North African AR4D organization and the private sector (Limagrain, Bayer, Syngenta, other).
- **Management for results**: For the initiation of WHEAT Phase I, WHEAT's oversight and management budget from W1&W2 was approved at much lower levels than for other CRPs, with the justification that synergies with MAIZE should be exploited. While that is possible to some extent, current expectations imply oversight and management activities that are more costly than the approximately 0.5M budgeted originally from W1&W2. Additional resources are needed to strengthen interactions with the independent oversight committee and partners, pursue gender mainstreaming, implement a stronger M&E framework (all in a quite different context and geographies than those to MAIZE) and enable knowledge management, open-access and communication among WHEAT partners and with other stakeholders. WHEAT hence applies for an oversight and management budget from W1&W2 which is better aligned with current system wide expectations.

Regional collaboration and leadership

While most FP2 activities are supported by truly global partnerships, parts of FP1 and FP3, and most of FP4 and FP5 have a strong regional or country focus, following the rationale that one of the CGIAR's comparative advantages is to build "structured scientific partnerships with countries that have a sufficient level of scientific capacity …, but not yet enough scientific strength or perhaps critical mass to proceed well without it."[15] In many instances, these are bilaterally funded projects with strong regional or local ownership and input, through project-specific governance and advisory mechanisms. Prominent examples include:

FP3: African Development Bank-funded SARD-SC/Wheat with partners from 11 African countries; the International Winter Wheat Improvement Program (IWWIP); the Kazakhstan-Russia-Mexico Shuttle Breeding Program (KRMSB);

FP4: Cereal Systems Intensification for South Asia (CSISA); Farm Mechanization and Conservation Agriculture for Sustainable Intensification (FACASI) in eastern and southern Africa; MasAgro in Mexico;

FP5: In-country programs in Afghanistan, Ethiopia, Iraq, Kurdistan, Libya, Pakistan, Turkey, 6 CWANA countries (FSE), and 3 Central Asian countries.

The following new regional collaborations are planned, provided resources are forthcoming:

FP2 and 3: Collaboration with 6 PROCISUR member countries (Latin American Southern Cone);

FP1&3: Wheat for Africa (W4A) strategy implementation with ASARECA, CCARDESA and two to four African countries with significant potential for smallholder wheat production.

FP4: Collaboration with the CRP on Dryland Systems to tackle reduced biomass & system productivity, increased competition for biomass and poor soil/water management causing land degradation (North Africa, Eastern and Southern Africa and Central Asia / Caucasus).

Other cross-cutting: Knowledge Management & Open Access; Capacity Strengthening

WHEAT supports Consortium-wide OA efforts to

1. Increase open access to WHEAT-related peer-reviewed and grey literature for the non-CGIAR WHEAT researcher community;
2. Implement the CGIAR Open Access and Data Management Policy, by collaborating with the

- Wheat Information System project (WIS) sponsored by the G-20 Wheat Initiative[16] and
- Wheat Data Interoperability Working Group (co-chair) within the Research Data Alliance (RDA)[17],

which focus on wheat data standards and global access to data. Both collaborations are aligned with the BMGF/Consortium joint initiative on for bioinformatics, database development and open access (FP3) to bring high-density genomics data globally into use for breeders world-wide.

[15] Future Resource Needs for CGIAR: Preliminary Thoughts; presented at Fund Council 9, 26th April 2013 under 'Strategic Issues.
[16] See: http://wheatinitiative.org/research/wis
[17] See https://rd-alliance.org/working-groups/wheat-data-interoperability-wg.html.

5. 2015-16 Workplan for WHEAT

Identifies deliverables by CoA, matched to Discovery, Validation or Scale-out stages. Deliverables written in black are supported by existing bilateral donors/funded by W1&2.
Additional deliverables in blue represent an expansion of scope.

FP	Cluster of Activities	Deliverables 2015			Deliverables 2016		
		Discovery	**Validation**	**Scale-out**	**Discovery**	**Validation**	**Scale-out**
1.1	Foresight and targeting (ex-ante)		WHEAT business case – guide Phase II (incl seed systems, see 5.1: 500k)		Ex ante analysis of one strategic technology (e.g. hybrid wheat) [250k]		Updated business case with probability of success per FP [500k]
1.2	Adoption/ impact pathway analysis & ex-post) impact assessment	Potential smallholder wheat as cash crop Southern Africa, CCARDESA (Zambia, Zimbabwe, Tanzania)	Documented case studies of smallholder wheat as cash crop, ESA [ASARECA] WHEAT impact assessment cases (4 countries, incl seed system analysis)			WHEAT impact assessment cases (Turkey; Pakistan, incl seed system analysis) Recommendations for diverse, robust seed systems & delivery	
1.3	Gender Strategic Research & mainstreaming	Qualitative assessment of gender norms and agency related to agricultural innovation in target regions	Consolidation of gender-in-wheat knowledge base			Guidelines for gender-responsive development of wheat-based systems for 1 key target area	Strategic gender research portfolio emerging
		Protocol for gender and social inclusion in participatory research piloted 350k (part of CRP Mgt budget line)	Gender policy adopted by the CRP Gender project screening procedure piloted	Protocol for gender disaggregated data collection (lead centers, adopted by key partners) Gender capacity strengthening plan: Start to implement		Senior Mgt and >50% of project leaders pass basic gender awareness test Procedure to integrate gender in sub-grants with partners is practiced Gender focal points trained	Screening procedure for gender mainstreaming in project development Protocol for gender and social inclusion in participatory research adopted by key partners 350k (CRP Mgt)
2.1	Seeds of Discovery (SeeD)	Genotypic, preliminary phenotypic data documented for 60% of bread, durum wheat genebank accessions Bioinformatics / DB tools development			Genotypic, first (preliminary) phenotypic data is available for 80% of bread and durum wheat gene-bank accessions	Database/ bioinformatics tools are available to partners for query of characterized accessions	
2.2	Affordable Hybrids	600 hybrid combinations made			Assess heterotic patterns		
2.3	Wheat Yield Partnership (IWYP) to break the genetic yield barrier	WHEAT fully integrated into new IWYP consortium scientific discovery system WYNHUB in Mexico is integral part of IWYP discovery pipeline	WYNHUB screening capacity increased 4 postdoc research projects in 4 IWYP project areas maintained (see FP5)	***Note: W1&2 interim funding complements new bilateral funding for WYNHUB***	Financial support, governance, and, research direction established	WYNHUB: Material from all IWYP projects, incl 4 postdoc (see FP5), screened	
2.4	Heat & Drought Tolerance to Combat Climate Change (HEDWIC)	Joint mid-term R&D & business plan developed with global R&D partners, incl **GCP**/India & China; possibly initial round competitive grants ??	Ethylene project (Lancaster U.): Findings CAAS uses WHEAT protocols, methods	***Note: HEDWIC kicks off Sept '14, competitive grants would bind best partners to new Consortium in 2015-6***	Financial support, research priorities, governance, 2nd rround competitive grants (500k), for HEDWIC		
2.5	Biological Nitrification Inhibition:	BNI expression evaluated in elite lines with translocations from Leymus; assess cultivated		***Note: Expand scope of JIRCAS-funded project, to support JIRCAS Phase***	BNI potential evaluated for cultivars, 50 wild relatives (200k)		

	Cytogenetic and pre-breeding for NUE	material, wild relatives for BNI exudates, for genetic variation within wheat (200k)		***II planning***			
2.6	Pre-breeding	200 bread, 100 durum wheat crosses for introgression of new alleles from exotic sources				200 bread, 100 durum crosses for introgression of new alleles from exotic sources	
3.1	Global Breeding Platform (IWIN) for traits suited to different needs and target groups	Core traits yield heat drought and rust are combined with traits required to specific adaptation to targeted regions using multiple breeding pipelines……..	1,000 new wheat lines targeted to the 12 mega-environments with 0.7-1 % higher yield, abiotic and biotic stresses tolerance, adequate nutrition qualities distributed to 200+ partners			Stronger collaboration with NARS partners: India, Pakistan, Ethiopia, Kenya, Morocco 1,000 new lines targeted to 12 mega-environments with 0.7-1 % higher yield, traits … , to 200+ partners	
3.2	Accelerate breeding cycle through genomics, improved bioinformatics, and data management	1000 out of 10,000 candidate bread wheat varieties selected by GS, for evaluation of yield under heat, drought (India, Pakistan, Mexico) for validation, future training	Evaluation of Integrated breeding platform as a central open access database for IWIN "Fieldbook" under IWIS fully implemented		Tbd	tbd	
		Collaborate with WIS project (BBSRC,INRA-F)	High density data integrated in open-access platforms for breeding use 500k BMGFW1&2		Collaborate with WIS project (BBSRC,INRA-F)	High density data integrated in open-access platforms for breeding use 500k BMGFW1&2	
3.3	Field-based precision phenotyping platforms for key traits	Concept and approach agreed with 15 partners worldwide; implementation plans for up to 7 platforms by end 2016 agreed	**Morocco** platform (drought /heat), operational (750k) **Sudan** (heat; 500k) – 1.5M max 2015	**Kenya** (rusts), operational (see 3.4)	***Note: Annual operating costs per platform tbd, likely at least 1 IRS***	**India** (heat, drought 750k), **Ethiopia** (diseases 500k)) **Uruguay/PROCISUR** (multi-diseases; 500k) **Pakistan** (heat and yield, 750k) **Turkey** (fac winter wheat, heat & drought, 500k) – 2M max 2016	**Sudan** (heat; 500k)
3.4	Durable Rust Resistance & Monitoring for Food Security		Rust screening and monitoring facilities established in Turkey, Kenya and Ethiopia	Resistant cultivars delivered to rust vulnerable regions Kenya stem rust screening, monitoring facility fully operational Global researcher have open access info to rust surveys: Rusttracker.org		Updating and expansion of rusttracker.org	Screening facility in Turkey and Ethiopia fully operational
3.5	Resistance & Monitoring of other major diseases and pests		Septoria Tan Spot Soil borne diseases	Sunn Pest and Hessian Fly resistant candidate wheat varieties provided to NARS partners	Concept for Global Pests & Diseases Observatory developed with user partners		
3.6	Genetic improvement in support of meeting food safety		Genetically diverse FHB resistant lines incl. allele characterization, to NARS		2 new markers for FHS genes validated		

	standards (focus: Fusarium Head Blight (FHB))						
4.1	Multi-scale farming system framework to better integrate & enhance adoption of sustainable intensification options (linked to FP5, which works at wider scale)	Innovation framework processes and methodologies developed, documented (500K) Robust analytical frameworks for scenario analysis, change trajectories, incl. a gender lens (Mex, S. Asia) Systems transitions to CA-based management evaluated (Mexico, South Asia, Ethiopia) Diversification into wheat evaluated (Odisha, S. Bangladesh, Rwanda)	Framework for enhancing partnership and adoption through innovation approaches developed and documented (500k) Adoption process of technical options through innovation approaches Innovation framework processes and methodologies developed and documented	Policy briefs & other advocacy materials on institutional constraints for CA-based intensification developed Others using the frameworks or elements of the framework for their national based interventions	Additional innovation framework processes and methodologies developed, documented (500K) Robust analytical frameworks for scenario analysis and change trajectories refined (Mex, S. Asia) Second phase of systems transitions to CA-based management evaluated (Mexico, South Asia, Ethiopia)	Ex post evaluations of alternative systems designs at farm scale, extended to landscape scales (500k) Diversification into wheat (ex-ante and -post; e.g. Odisha, S. Bangladesh, Rwanda)	Systems transitions to CA-based management refined (Mexico, South Asia, Ethiopia) Lessons learned from cross-regional multi-system comparison of innovations systems (250k) Extension strategy & Gender strategy developed
4.2	Participatory approaches to adapt and integrate wheat innovations in more profitable and sustainable farming systems;	Train-the-trainer strategy developed Nutrient management at farm level developed Irrigation optimization strategies developed (Mexico) Knowledge sharing platform for 2-wheel tractor (2WT)-based technologies developed	Inter-institutional working groups established for nutrient management strategies 2 PPP platforms established	Supporting tools for innovation and last mile delivery developed	Nutrient management at farm level developed Irrigation optimization strategies developed (Mexico) Knowledge sharing platform (2WT- & 4WT-based solutions) developed	Additional inter-institutional working groups established Additional 2 PPP platforms established	Business models for small-scale mechanization developed in 2 countries in S.Asia, as well as 2 countries in LATAM
4.3	4.3 Development and field testing of agronomic technologies with large-scale out potential. <u>6 sub-categories:</u> *Technologies and management practices for nutrient use efficiency*	Multi-spectral imagery use from UAV and high-resolution satellite platforms assessed for N management efficiency and grain quality (in Mexico)	ICT-based tools for SSNM in rice-wheat systems (Crop Manager) are built, deployed for advanced testing with farmers (selected ecologies) New scalable sensor based systems devised for N mgmt (GreenSat, Mexico) Barriers to decision tool adoption identified and fed back into design	SMS based tools for site-specific decision support system established in at least 1 country	RS and weather forecast info integrated to improve ICT tool performance GreenSat, Crop Manager into to new ecologies Multi-spectral imagery use from UAV and satellite platforms assessed for N mgmt efficiency , grain quality … and assessed for managing non-N nutrient deficiencies and diseases	Business models for decision tool deployment defined with public and private sector partners	
	Soil productivity	Soil-based limiting factors prioritized for different agro-ecologies (South Asia, Mexico, Ethiopia) Interventions (see 2016) tested on-station/--farm	Management practices / expected benefits for addressing limiting factors at nested spatial scales (S. Asia, Mexico, Ethiopia)		Interventions (e.g. rotation, residue mgmt, inoculants, seed treatment, min. tillage; fodder) tested on-farm	Economically feasible and prioritized management options, at farm scale (S. Asia, Mexico, Ethiopia)	
	Water use efficiency in rainfed and irrigated systems	Fallows / low cropping intensity areas identified to be developed through sustainable water resources mgmt UAV / thermal imagery and other precision approaches	New NRG-efficiency pumpsets evaluated in consultation with farmers Decision processes, enabling factors for sustainable water		Impact of risk reduction as an enabling factor for intensification quantified in different production ecologies (S. Asia) Needs-based irrigation	Integrated approaches for water resources mgmt matched to different agro-ecologies (South Asia, Mexico) Beta versions of decision	

		assessed for irrigation scheduling (Mexico, S Asia) Needs-based irrigation scheduling developed Insights in GxSxE C-N cycling, WUE–NUE documented	resources development characterized (South Asia)		scheduling developed. Insights in GxSxE C-N cycling, WUE–NUE documented	tools for precision irrigation scheduling deployed for advanced field-testing (South Asia).	
	Weed, pest, disease mgmt		Efficient and effective weed management strategies defined for CA and conventional (Mexico, S. Asia)		New approaches for managing weed competitive processes and long-term demography (S. Asia)		
	Scale-appropriate mechanization (for PA, CA, and labor efficiencies)	Labor displacement and net welfare effects of mechanization characterized (South Asia)	Mechanized technology platforms for sowing, harvest, and post-harvest activities evaluated on-farm (ESA, Mexico, S. Asia)				Commercialization of machinery and affiliated services advanced through training and BDS (ESA, Mexico, S. Asia)
	Adapt elite wheat cultivars to E&M	Multi-locational on-farm testing guided by ex-ante recommendation domain characterization (S. Asia) G x E x M evaluation for CA			G x E x M; variety evaluation for CA developed	Seed sector actors provided business intelligence based on field testing (S. Asia)	
5.1	Enable national coalition of multiple partners for technologies packages scale-out including seed system innovations	Breeder-to-seed suppliers & seed suppliers to farmers bottlenecks, opportunities analysed across selected target regions (see business case FP1)	Build coalition around several technologies in CSISA, Central Asia (based on Kazakh success – bilaterally funded)	Existing bilateral project deliverables (FTF Ethiopia) Delivery of W1&2-funded milestones	Improved gender-diff., systems understanding of non-adoption dynamics: CA, mechanization, seed availability (w/ FP1, PIM)	Build coalition around several technologies in Rwanda/Burundi (basis: ASARECA/WHEAT competitive grant 2014; to be bilaterally funded)	Existing bilateral project deliverables Delivery of W1&2-funded milestones
5.2	International trainings			Maintain international short-, long-term trainings, double no of participants; **+500k bilateral funding**			Maintain capacity building as per plan, activities, double no of participants; **+500k bilateral funding**
5.3	WHEAT University and PostDocs: Next generation of scientists	Develop concept for Wheat university w/ partners 250k				Pilot realized, evaluated (demand potential, business case) 300k	
		Post-Doc/WHEAT Volunteers (ex POWB 10.4.): Develop concept, business case for multi-university partner post-doc program (to go into field) 4 postdoc research projects in 4 IWYP project areas (see FP2)	R&D partners worldwide have open access to 20 peer-reviewed articles (global license 3k per article 60k; part of CRP Mgt budget line)	(10.6.) Maintain & expand web-based applications (OA): IWIS, Wheat Atlas, Wheat Doctor, Wheat Diversity Portal (250k; part of CRP Mgt budget line)	4 postdoc research projects in 4 IWYP project areas maintained (see FP2)	Post docs in the field; Post doc program integration into WHEAT Uni evaluated Open access 20 peer-reviewed articles (60k; CRP Mgt)	(10.6.) Maintain & expand web-based applications (OA): IWIS, Wheat Atlas, Wheat Doctor, Wheat Diversity Portal (250k; CRP Mgt)

6. WHEAT Budget 2015-16

Given currently available funding and funding explored with bilateral donors, WHEAT is proposing a W1&2 budget of US$ 3.9 million above the CGIAR Financial Plan for 2015 (US$ 15.2M) and 3.7M in 2016.

WHEAT has started with a very low base budget, in spite of its importance for poor consumers in the developing world. The fact that there are now two poor wheat consumers for every three poor rice consumers challenge us to abandon the perception that wheat is the rich man's food. Also there is an increasing understanding that poor urban women have an important reason to pursue wheat products; they free up their time for income generating activities. Wheat relies to a large extent on public sector R&D; not investing in wheat research targeted at the developing world means disregarding the voice of millions of women that want to take their families out of poverty.

The use of the additional investments in WHEAT are itemized in the work plan, justified on pp.10-12 and costed in the budget table below.

The budget table distinguishes between

- **CRP strategic research funding supported by W1, W2, W3 and bilateral**, which is fully aligned with the WHEAT R4D agenda, and
- **CRP 'supplementary funding' from W3 and bilateral sources**, which supports scaling-out/-up and accelerates the impact of WHEAT.

Many donors make a very strong effort to align their development programs with the CGIAR Research programs to accelerate impact in distinct target countries and among a substantive number of farmers. While these resources can often not be used for CRP strategic research, they are highly valued as they trigger uptake, impact and increase the general awareness about new CRP technologies. In the case where such resources are managed by CG centres, WHEAT has begun to make a distinction between these two sources of funding, so to foster transparency and understanding for available budgets and how they can be used.

CRP-mediated funding of the ICARDA Investment Plan, as approved by the Consortium Board, is not included in the attached W1&2 budget. In the case of WHEAT, two thirds of the ICARDA Investment Plan is budgeted for 2014. For WHEAT in 2015, the approved sum is $US 240,000, plus some additional funding under WHEAT, as well as under other CRPs ($US 200k according to Consortium note 5th March 2014), for setting up the Morocco-based genotyping platform.

The budget contains no inflation adjustment which implies that the WHEAT-Management Committee will push partners to continue to implement efficiency gains. It will also speedily remove components that inadequately deliver. A CGIAR-wide rationalization of costing structure for Phase 2, including inflation adjustments, would be desirable.

WHEAT Budget proposal 2015-16

WHEAT Budget (US$ '000)		W1&W2 As per POWB 2014	W1&W2 As per FP 2015	W1&W2 Beyond FP 2015	W1&W2 As per FP 2016	W1&W2 Beyond FP 2016	Bilateral 2015	Bilateral 2016	Of which Gender	Of which Partner	
FP1		1,261	1,400	359	1,544	215	1,090	1,149	28%	25%	
FP2		3,525	3,909	0	4,304	221	11,640	12,275	5%	17%	
FP3		5,503	6,078	1,425	6,670	1,333	7,516	7,926	8%	9%	
FP4		1,757	1,958	799	2,165	592	4,454	4,697	19%	46%	
FP5		786	866	250	948	300	4,593	4,843	18%	41%	
CRP Management		1,000	1,000	1,100	1,100	1,034	0	0	10%	1%	
Total CRP Strategic		**13,832**	**15,210**	**3,933**	**16,731**	**3,695**	**29,292**	**30,890**	**11%**	**22%**	Aligned with strategic CRP agenda
W1&W2 Budget Application for 2015 & 2016			**19,144**		**20,426**						
CRP Supplementary		0	0	0	0	0	15,058	15,879	13%	26%	Extension/development type funding leveraged by the CRP
Additional/new activities:								**Comments**			
FP1	CoA1.1: WHEAT Business case (ex-ante)		141	359	285	215		Critical for WHEAT Phase design			
FP2	CoA2.4: HEDWIC competitive grants		184	0	579	221		Competitvely advertised to ARIs			
FP2	CoA2.5: Nitrogen Use Efficiency		200	0	200	0		Collaboration with JIRCAS			
FP3	CoA3.2: Bioinformatics & OA databases		0	500	0	500		As per agreement between the B&MGF and the Consortium Office			
FP3	CoA3.3: Precision Phenotyping		575	925	1,167	833		Propose matching funds by partners that establish each platform			
FP4	CoA4.1: Innovation framework analysis		101	400	204	296		Strategic analysis for greater impact orientation			
FP4	CoA4.1: Partnership/adoption analysis		101	400	204	296		Strategic analysis for greater impact orientation			
FP5	CoA5.3: Double international trainings		80	0	162	0		Additional resources need to come from bilateral funding & scholarship			
FP5	CoA5.4: Wheat University Concept		0	250	0	300		Additional resources need to come from bilateral funding & scholarship			
Management	Oversight & Management		0	100	0	100		More frequent interactions with Oversight Committee/Partners			
Management	Knowledge Management & Open Access		0	310	50	260		Cannot be implemented with current WHEAT Management budget			
Management	Monitoring & Evaluation		0	340	50	324		Cannot be implemented with current WHEAT Management budget			
Management	Gender mainstreaming in South Asia		0	350	0	350		Key target area for WHEAT			
Additional W1&W2 budget required			**1,380**	**3,933**	**2,901**	**3,695**					

Annex 1: IDOs & indicators matched to Food Security Learning Network's dimensions & indicators

	CGIAR CRPs		*Food Security Learning Framework*	*WHEAT*		*Food Security Learning Framework*
	Common IDOs	**WHEAT**	**Dimensions** (8 major themes for donor programming)	**Germplasm: High level Indicators**	**Systems: High level indicators**	**Project Level Indicators** (best fit with with IDO level: Good match with WHEAT indicators in blue)
1	***Productivity*** *- Improved productivity in pro-poor food systems*	FP3,4: Smallholders' modern wheat varieties adoption and agronomy practice translates into higher, more stable yields in wheat target region	**1.** Improved livelihoods (agricultural productivity)	▪ % adoption of improved varieties ▪ Genetic gain per unit time ▪ Change in cultivar replacement rates ▪ % of improved seed stream resistant to major pests and diseases; ; likely durability of resistance genes	▪ % adoption of new, improved technologies ▪ Change in on-farm (land, labor, energy, water, nutrient) productivity among adopters and impact on net income	1**a.** gross margin per ha of targeted commodity 1**b.** yield (kg) per ha of commodity 1**c.** rate of adoption of new/improved technologies & practices
	Genetic diversity for future generations - ***integrate into IDO 1***	FP3,4: Faster, more significant genetic gains in breeding programs worldwide, using more effective approaches for complex traits		▪ Genetically diverse lines distributed to NARES ▪ No of new high value alleles found and transferred into elite lines ▪ Yield gain from new alleles / traits	▪	
2	***Food security*** *- Increased and stable access to food commodities by rural and urban poor*	FP3,4 - Accelerated varieties releases & Farmers have more, better access to quality seed & use them for greater, affordable availability for rural & urban poor	**2.** Increased resilience of vulnerable populations	▪ Change in food-secure days per wheat-consuming household member p.a.	▪ Change in food-secure days per wheat-consuming household member p.a.	**2a.** Coping strategies index **2b.** Household hunger scale **2c**. Household food security access score **2d.** Durable index on assets (FAO) **2e.** Safety net dependency (FAO) **2f.** Diversity of income sources
3	***Nutrition*** *- Improved diet quality of nutritionally-vulnerable population (women and children)*	tbd if relevant for WHEAT Phase II 	**6.** Enhanced nutrition and dietary quality			

4	***Income*** *- Increased and more equitable income from agricultural and natural resources management and environmental services earned by low income value chain actors*	FP3,4: Farmers improve their household income & livelihood	**4.** Expanded markets and value chains	▪ Change in income attributable to yield and quality traits for first users (model farmers); adopters (scale-out)	▪ Change in agri-derived income in participating communities for different types of actors (male/female farmers of different social groups, HH-level, service providers)	**4a.** Value of incremental farm gate sales of targeted commodity (attributable to intervention) **4b.** Nr of jobs created (as result of intervention) **4c.** Income generated (as result of intervention) **4d.** Nr / value of production contracts (signed w/ smallholders) **4e.** value/ volume of products purchased from MSMEs (by firms) **4f.** No of farmers complying w/standard **4g.** No/ value of loans from formal sources (incl microfinance institutions) **4h.** quality of rural institutions & their support to inclusive value chains (index) **4i.** volume/ estimated value of post-harvest loss (in% of total produce)
5	***Gender & Empowerment*** *- Increased control over resources, participation in decision-making by women, other marginalized groups*	FP1,3,4,5: Greater women farmer equity in wheat production & value chains and more youth seize opportunities in wheat-based systems	**8.** Improved gender equality and women's empowerment	▪ Change in relative percentage of female adopters (proxy for greater decision-making power) ▪ % increase women in PVS	▪ Women empowerment index (WEAI) ▪ Reduction in women's drudgery in production ▪ Increase in women's participation in marketing, etc.	**8a.** Women's empowerment in agri index **8b.** Gender parity index score **8c.** Five dimensions of empowerment index **8d.** Yield gap between male/female farmers **8e.** % of women w/ control over use of income generated from agricultural production
6	***Capacity to Innovate*** *- Increased capacity for innovation within low income and vulnerable rural communities allowing them to improve livelihoods*	FP4,5	**3.** Improved research, innovation and commercialization for agriculture and nutrition	▪	▪ % adoption (women/men, new/modified implements adopted by private sector) ▪ Change in gender disaggregated labor input and yield (early adopters)	**3a.** Nr of trained staff **3b.** Yield (kg) per ha (resulting from supported innovation) **3c.** Volume of commercial sales (of supported innovations)
7	***Adaptive capacity*** *- Increased capacity in low income communities to adapt to environmental and economic variability, shocks …*	FP4	**7.** Enhanced mgmt of natural resources and adaption to climate change	▪	▪ % adoption soil productivity management options at farm scale ▪ % adoption of integrated approaches for productive and efficient water resources management per targeted agro-ecology (both women/men)	**7a.** Change in land covered by agriculture (specifying change into/from natural/non-natural use) **7b.** Change in proportion of land area covered by forests **7c.** Nr of community groups involved in environmental/natural resource mgmt **7d.** Increased crop yields from irrigated land **7e.** change in soil loss from watersheds
8	***Policies*** *– More effective policies, supporting sustainable, resilient, equitable agri &*	FP1,5	5. Improved policies and institutions for food security	▪ Tbd, gender responsiveness important	▪ Partner capacity growth: self-assessment, survey-based ▪ Coalition of national partners for scale out	**5a.** Nr of policies & regulations **5b.** Membership of representative farmers' organizations/advocacy groups **5c.** Nr of participatory policy forums 5d. Implementation status of policy strategies

	NRM ... adopted by agri, conservation and dev orgs, national gov's and int'l bodies				'health': self-assess, survey-based	and actions
9	***Environment*** *- Minimized adverse environmental effects of increased production intensification*	FP4: Farmers minimize unsustainable effects on soil, environment	**7.** Enhanced mgmt of natural resources and adaption to climate change	▪ Change in 'genetic' nutrient, water use efficiency (due to breeding), without , or with acceptable yield loss on farmers' fields	▪ Net land, labor, energy, water, nutrient savings per unit of production ▪ Change in nitrate leaching, P losses	
				▪ Change in herbi-/pesticide use per unit of production	▪ Change in herbi-/pesticide use per unit of production	
10	***Future Options*** *- Greater resilience of different kinds of systems for enhanced ecosystem services*		2. Increased resilience of vulnerable populations	See Systems CRPs	See Systems CRPs	**2a.** Coping strategies index **2b.** Household hunger scale **2c**. Household food security access score **2d.** Durable index on assets (FAO) **2e.** Safety net dependency (FAO) **2f.** Diversity of income sources
11	***Climate*** *- Increased carbon sequestration and reduction of greenhouse gases through improved agriculture and NRM*			See CCAFS	See CCAFS	