

**SiMAC Report**  
**Molecular Breeding Platform**  
**Start-up Meeting**  
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**1. GENERAL COMMENTS**

The Molecular Breeding Platform (MBP) is a global force moving with commitment and enthusiasm towards a shared objective: the enabling of molecular breeding (MB) for the benefit of resource poor farmers.

Members of the MBP Management Team are to be complimented for launching this project effectively and for the positive momentum that is building. Their sincere commitment to develop a platform aimed at delivering new varieties in the mid-term is to be commended.

**1.1. Ambition, opportunities, threats**

- MBP is a very **ambitious and comprehensive endeavor**, covering all aspects of MB. In that sense it is very similar to industry approach.
- Targets set within MBP appear **realistic** and the approach **pragmatic**.
- Timing is appropriate to launch this project.
- MBP is not just a collection of independent projects but rather a **cohesive ensemble**. It is a rather **unique opportunity** for CGIAR centers to act together, and with other partners, as a global force.
- MBP capacity is not synonymous with **breeding program capacity**, which includes infrastructure, personnel, and reliable multi-year budget support for all breeding activities including MB. The success of the MBP largely depends on the ability to mobilize it in breeding programs. Inadequate breeding program capacity may be a critical barrier to successful implementation of MB regardless of the success of the MBP, as a platform. This risk needs to be addressed by the MT. It might be mitigated to some extent by training breeders of the future, i.e. graduate training of locals of key countries.

**1.2. Project teams and members**

- All teams and project members/partners are **well-qualified**. The quality of the science and its deliveries is very high.
- All required fields are covered by the panel of project members, although **expertise in MB-based variety development is limited**. This may constitute a weakness and therefore need to be closely paid attention to.

- The Management Team (MT) is enthusiastic and focused on program success.
- All other participants in MBP give an equal impression of **commitment and dedication** despite their many differences (skills, interests, cultures, etc.).
- Getting **seed industry associations** involved in the project, at least in terms of awareness, might prove valuable for subsequent large-scale deployment. Road shows could be a means of raising awareness.

### **1.3. Project scope challenges**

- The MBP is a **very complex endeavor spanning across many boundaries** (crops, disciplines, countries, etc.). Reconciling this complexity with the focus necessary to be successful represents a major challenge.
- Because the scope of the endeavor is very broad, **focus** will be needed throughout the duration of the project. More clarification needs to be provided on whom the target audience is and what its needs are. User committees can play a key role in providing this much needed clarification. Each user type (small companies, NARS, CG centers, etc.) should be represented in user committees.
- Project **objectives** also **need to be restated very clearly**. User cases should help identify the key objectives against which the project is set to deliver. It is recommended that project objectives be clearly identified as being either **discovery or deployment** objectives.
- Most likely, not all objectives will not be met by 2014, because of the breadth of the project. Tools will probably have been delivered. Deployment will probably not be complete. Genetic gain will most likely not have been achieved. It is therefore important to **align donor expectations with realistic deliveries** so as not to jeopardize the necessary long-term support to this endeavor.
- The project is **not only a scientific endeavor** but rather aimed at enabling the translation of science into products (varieties) for a specific target audience. There is a risk, given the very scientific nature of project members, that the project be science-driven only. It will be the responsibility of the MT to ensure that all relevant needs, even small and non-scientific, are taken into account.

### **1.4. Technical challenges**

- Availability of **equipment required to conduct field experiments** might be a limiting factor.
- The service function and analysis pipeline elements should make every effort to incorporate activities useful for breeders who are actively developing or expected to develop varieties. There should be clear commitment to support and training that is communicated from the users rather than assuming what users should need or be able to use. Users hold very important information on germplasm, phenotypes and

phenotyping practices, breeding populations, etc. They should be involved as key contact points in targeted areas. Establishing some kind of a **formal dialog between platform developers and current practitioners** should help understand crop or country realities.

- Delivery of information to **end users** (local breeders in developing countries) and bridging the gap between scientists and end users constitute a technical (and management) challenge.
- The concept of using a **standardized workflow** as a backbone core around which to build platform elements, information systems and various services is desirable and can serve as a cohesive element for building and implementation of the platform program.
- Along with information systems and genotyping services, technologies which have the potential to **speed up generation advancement** (for instance doubled haploids) should be pursued as aggressively as possible.

### **1.5. Management challenges**

- MBP's **target audience/groups** need to be clearly identified at the beginning of the project. These groups include local breeders in developing countries. They probably also include other scientists (molecular biologists, geneticists, physiologists, pathologists, soil biologists) for whom integration and different delivery mechanisms need to be defined.
- MBP's target audience is very diverse (level, ability, need, etc.). It is critical for the MT to **recognize, listen to, and engage the whole breadth of diversity of the target audience** for the project to be successful.
- The MT is aware of the need to market the MBP to multiple customers, i.e., breeders in NARS, commercial companies of various sizes and technical capabilities, administrators of NARS and companies, donors present and future, breeders and users beyond current participants.
- The need for **capacity building** for successful adoption of MB into variety development and deployment is recognized by the management team. However, it appears that the magnitude of the task has not been analyzed thoroughly enough and may be underestimated both in scope and depth. As a consequence, delivery expectations might be too high and overly optimistic.
- There appear to be no component(s) of this program (either personnel or activities) that relate to **economic and social science issues** that i) are part of the presumed effectiveness of MB to facilitate breeding new varieties and ii) either help or hinder the changes in behavior required for widespread breeder MB implementation. The success of MBP would, to a large extent, depend not only on the power the platform provides breeders with, but also on the **behavioral changes** it requires. Breeders often gravitate towards being fairly self-sufficient, while the deployment of the MBP will require from them the willingness to give away “degrees

of freedom”. Key behavioral changes need to be identified and a plan developed to make them happen and monitor progress.

- In order to ensure long-term success of the MBP through, in particular, long-term financial commitment it is advisable that MBP come up with **success stories** by 2014. A few (2 to 4) **“flagship” breeding programs** could be selected which the MBP is likely to impact positively by 2014 (a good example of a flagship program is the rice breeding program in the Mae-Khong region).
- Consideration should be given to whether Molecular Breeding Platform is the **optimal name** for this project.
- The draft business plan is promising. Yet there should be a clear statement of principles that can serve to guide further details that will produce sustainability (e.g., participants and recipients of services, materials and information should have a tangible stake in support of the platform through variable fees, membership, etc.). The **business plan** should also be more about **deliveries** than about business, given the very specific nature of this project. Who should be involved in defining and validating the business plan needs to be clearly stated (should experienced breeders with extensive knowledge in a specific crop and area be involved ?). Further, “business” might be too radical of a word for some of the audience of the MBP. Finally, it is recommended that technical and business plan discussions be kept for separate audiences including in MBP project meetings.
- Timelines of program activities were alluded to but no documented program goals, timelines, milestones and deliverables were presented by the MT for all members to see and discuss. Proposed activities and goals between present and 2014 are ambitious and will require **effective planning and execution** in order to be realized. Coordination among activities is crucial; success of some components relies directly on successful completion of other components.
- **Prioritization** of crops, traits, populations, according to economic and social impacts might be required to bring focus in view of the breadth of the endeavor. A stepwise approach might be a viable one.
- The **criteria for success** (key performance indicators – KPIs) are not clearly spelled-out. How will the MT define successful attainment of milestones and goals ? Have any measures been agreed upon by members of the program and the donors ? Goals, milestones and deliverables should be outcome based and quantifiable, e.g., number of breeders effectively incorporating MB, rather than activity-based, e.g., number of training courses offered without documentation of subsequent use or effectiveness of material presented in the courses.
- An effort should be made at identifying **value creation**. This, in turn, should help identify critical deliverables and ensure that the deployment plan allows their implementation and eventually results in the expected creation of value.

- Annual, comprehensive **assessments of progress** should be done, in order to identify, and resolve any potential deviations from plans (it is not always very easy from current, essentially descriptive, documents or presentations to evaluate progress). Face to face meetings would be ideal although other means of communication might also be appropriate.

## 2. SPECIFIC COMMENTS

### 2.1. Genetic resource support service

- **Core collection and specific populations** are to be the main part of the information system where all information needs to be shared (GRSS project).
- Close **collaboration with local partners** is required to provide materials on mapping populations, germplasm, and phenotypic data. Co-funding projects with local partners on germplasm evaluation, identification of traits of interest, development of panels and populations, genotyping and phenotyping might be very valuable.

### 2.2. Information management

- It has to be clarified whether the MBP is aiming at **storing all raw data of breeding programs** for further data mining or if it is only to be focused on specific shared genetic resources. Recommendation would be to focus all the workflow on these specific populations. The tools developed in that frame could be used locally by any breeder for his specific purposes (same general idea as mentioned above).
- Information management was presented as operating from the **collection of all data** from everywhere and everyone. Whether this model is the most appropriate one does not appear to have been challenged. Likewise, ICYS has been presented as the tool to be used by everyone. Should using ICYS, collecting and providing all data be made a requirement to access the MBP ? Does it always create value for the individual MBP user, the community ? An alternative model would be a model whereby ICYS is a tool available to those in need of one, on a need rather than “force” basis. Would this be a viable model ?

### 2.3. Marker services

- Good strategy. The service providers identified will provide cheap access to **data points**. It is important to maintain an up-to-date list of validated markers on each tool (service provider).
- **Marker development** issue is not clear. Once a marker trait association (QTL or whatever) has been identified, who is in charge of validation both on platforms and on more diverse material ?
- A validation platform might be thought of. The role of this validation platform could also be to convert SSRs or any kind of markers into SNPs (find SNPs in the same area and validate marker trait association on

phenotyped core coll.) to allow cheap massive usage in breeding material.

#### **2.4. Phenotyping services**

- **Standardization** of data can be a huge task. It is felt that focus will have to be clearly put on specific core collections and shared population. Standardization is also to be focused on few specific traits.
- Work on drought tolerance was illustrated with an approach involving many “open field” testing locations. No critical analysis was shown comparing the value of such an approach to that of relying on few **managed stress environments**.

#### **2.5. Statistical, simulation, and decision support tools**

- It is important to take into account the **needs of small breeders** (field designs, simple assisted backcrossing , GCA). Training is an important issue which seems to be well tackled (in terms of database and tool usage).
- It is not always obvious, from the information that was shared who will benefit from these statistical services and tools. It seems they are more directed towards high level scientists than local breeders in developing countries.
- This is the area where training seems to be taken the most seriously, with an effort to tailor it to user groups.

#### **2.6. Configurable workflow system**

- Huge task. Clarifying the objectives and identifying the audience needs to be finalized. Modularity of the software will be needed if the idea is to be able to run it on local machines for very specific needs or in a big workflow organization.
- **Simplicity** is needed but the system will not be adopted if the breeders loose **flexibility** (the one they have using Excel or a pencil). Strong implication of the breeders is needed.
- Portable data loggers might be an over-kill. Good software in the station can be much more efficient.