Excellence in Breeding PLATFORM

Breeding informatics

Young Wha Lee
Breeding informatics lead

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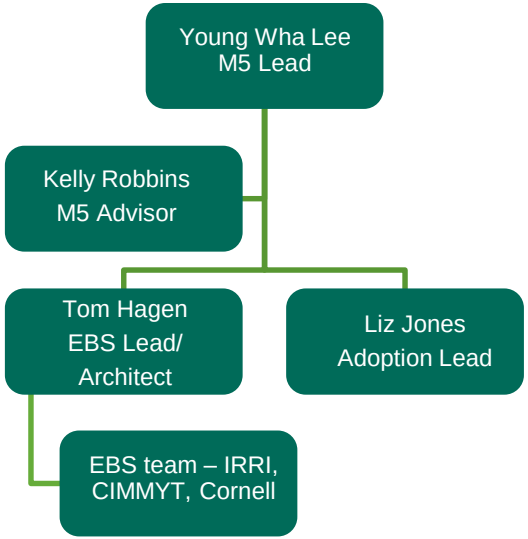
Module 5 Breeding Informatics

M5 focuses on activities that increase the incorporation of modern informatics capabilities into best practice breeding processes.



Deliver software

- Delivery of Enterprise Breeding System

Deliver integrated and centralized analytic capability

- Develop a generalized analytics framework for EBS
- Drive towards a centralized analytics resource for 1CG

Support breeding programs in adoption, including but not limited to software

- Adoption of EBS
- Adoption of/fluency with BMS
- Transition of BMS users to EBS
- Digitization of data collection

Coordinate long term strategy on data management systems for public breeding, with the EBS leadership team, external stakeholders, and funders

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Please connect with us!

EBS website: https://ebs.excellenceinbreeding.org/

EBS Leadership Team: Jan DaBaene (chair), Young Wha Lee, Tom Hagen, Liz Jones, Eng Hwa Ng, Eduardo

*the EBS LT is responsible for internal strategic governance of Module 5 activities

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Enterprise Breeding System

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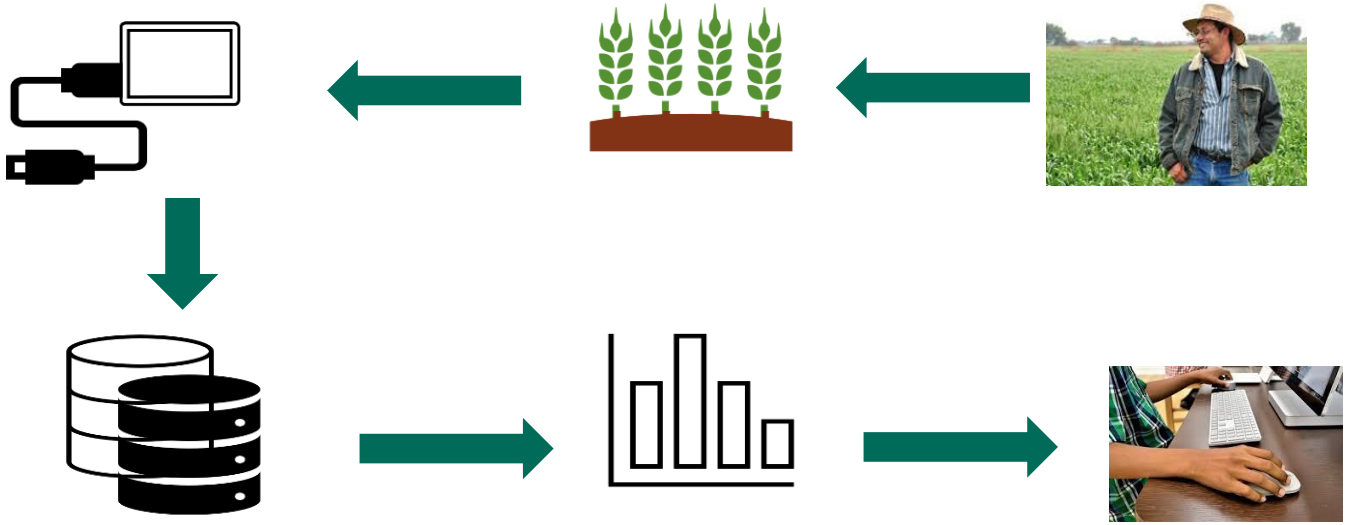
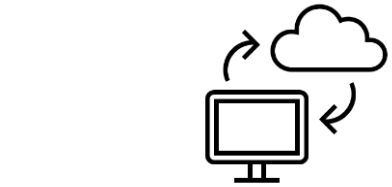
Modern breeding requires data management systems



Key Features of the Enterprise Breeding System

- ❑ Software-as-a-Service with centralized development and deployment
- ❑ Supports a diverse array of breeding programs under OneCGIAR
- ❑ Supports core breeding activities
- ❑ Includes a genotype database
- ❑ Includes an analytical framework capable of advanced biometrics



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EBS Version Roadmap

Goal: Enable a complete execution of a breeding cycle from Version 4

Version	WF Name
2	Breeding Trials
2	Nurseries
2	Germplasm Management
2	Phenotyping
2, 3	Field Operations
3, 4	Analytical Service Submission
3, 4	Breeding Analytics

Core breeding operations

Integration of genotype data management, sample tracking, and analytics

Projected delivery dates

V2: Nov 2020

V3: June 2021

V4: Dec 2021

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EBS 2.0 components and functionalities

Name	Abbreviation	Supported activities
Breeding4Results	B4R	Core Breeding
Analytics Framework **(*New*)**	AF	Trial Design
KDXplore **(*New*)**	KDX	Field Mapping (plot layout)
Service Gateway **(*New*)**	SG	Login and System Connectivity

- Create trials and nurseries
- Generate alpha lattice, row-column, RCBD, and augmented RCB designs
- Make crosses
- Create and capture plot layouts
- Generate electronic fieldbooks for data capture apps
- Upload phenotypic data and perform basic phenotypic data QC
- Search for germplasm, seeds, traits, and experiments

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EBS Adoption

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Understanding stages of testing: example of CIMMYT maize/wheat and IITA maize

Environment	Testing stage/ process	Version EBS	Who is organizing?	Who is testing/using?
Develop	Develop	2.0, 2.1, 3.0	**EBS**	EBS developers
QA & UAT &	QA & UAT	2.0, 2.1, 3.0	**EBS**	EBS requirements analysts and QA/QC team
CIMMYT* Test	Test	2.0, 2.1, 3.0	**CIMMYT DM team**	Data managers
CIMMYT Staging	Product owner	2.0, 2.1, 3.0	**CIMMYT DM team**	Product Owners and Data Managers
CIMMYT Staging	Early adopter	2.0, 2.1, 3.0	**CIMMYT DM team**	**Early adopters**
CIMMYT Production	Production	3.0	**CIMMYT DM team**	All

Here is where we switch to Adoption mode

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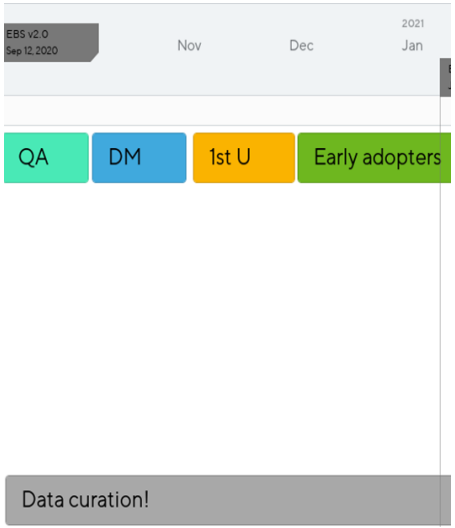
EBS 2.0 Rollout : Where we are now

V2.0



A data manager embedded in the Centers is critical to coordinate and facilitate adoption activities

Adoption activities include:

- ❑ EBS training
- ❑ Feedback to development team
- ❑ System adoption KPIs
- ❑ Data curation
- ❑ Digitization training

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A broader focus: Module 5 supports adoption of breeding data management systems in general

- Not just EBS – we have ongoing collaborations to support BMS adoption
- We believe the adoption of a data management system (whether BMS, Breedbase, or EBS) is more urgent
- With IBP, we will build tools for BMS-EBS data migration to facilitate eventual convergence into EBS

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Breeding Informatics Network

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Biometric/bioinformatic resources are Center specific and unevenly distributed across the CGIAR

	CIMMYT	IRRI	IITA	ICRISAT	CIP	CIAT	ICARDA	AfricaRice
biometrics			1 FTE		1 FTE			
Bio-informatics	Molecular breeding expertise but no bioinformatician		1.5 FTE					

EiB's support of data analytics efforts up till 2020 has been mainly in the form of:

- supporting Communities of Practice in data curation and biometrics/bioinformatics
- organizing workshops & trainings
- funding sabbaticals
- providing best practices consulting & manuals

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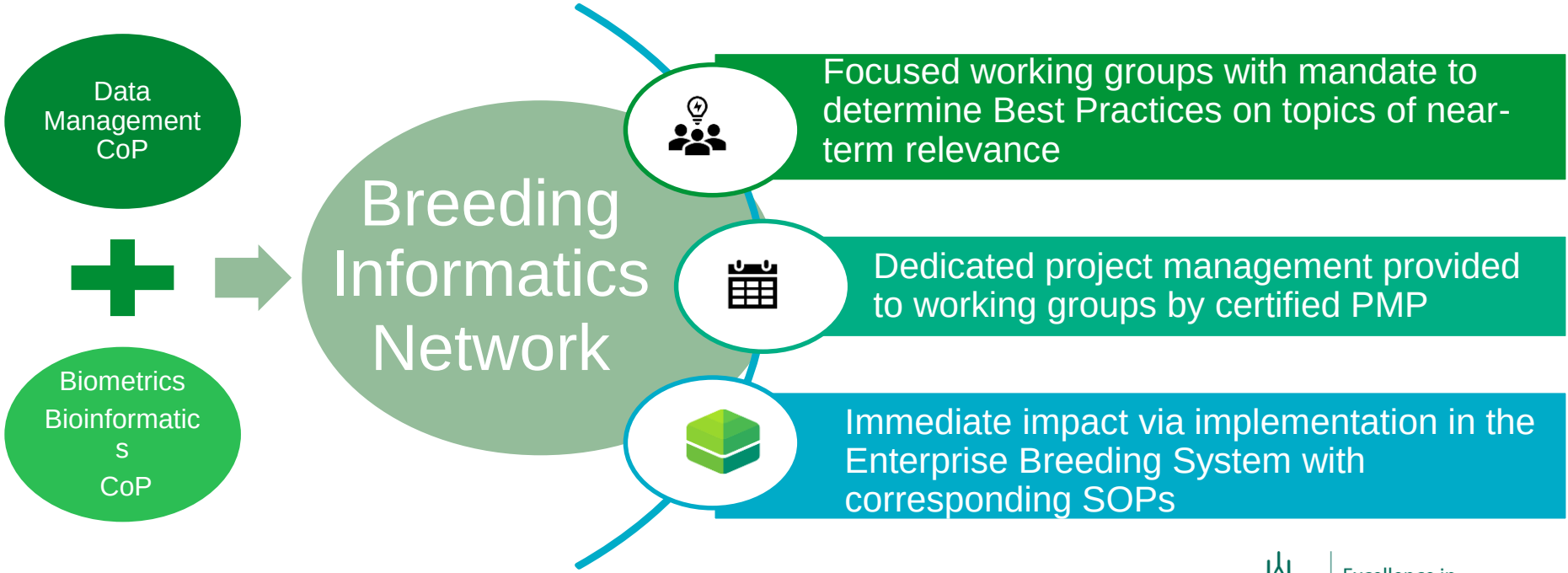
With the existing CoPs as a foundation, we will initiate a cross-Center Breeding Informatics Network in 2021



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We have begun the organizational and alignment process for this cross-Center effort

M5 resources

- ❑ Funding partial salaries of Biometric leads, so they can participate and lead in the Breeding Informatics Network
- ❑ Building up biometric capacity in IITA
- ❑ Hiring of EiB Bioinformatics Lead to bridge M5, M3, and coordinate CG bioinformaticians
- ❑ Access to expert contractors via CIMMYT for one-off projects
- ❑ Project Manager support

Watchouts

- ❑ We are building the plane as we fly it – breeding modernization within programs, EBS development and adoption, and operational capacity building are all being pushed simultaneously
- ❑ Coordination across centers is hard
- ❑ Bandwidth - can we get people to fully participate in the working groups?

Mitigations

- ❑ **Your buy-in and support**
- ❑ Develop, communicate, and stick to a process for determining, approving, and modifying best practices for implementation – enable full transparency
- ❑ Project manage for defined time limited outcomes
- ❑ Make sure focus is on near term needs that are 100% aligned with implementation of existing continuous improvement plans

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