Driving Innovation in Global Crop Breeding

EBS: Where Cutting-Edge Technology Meets Breeding Expertise

Marko Kärkkäinen

BR Digital Solutions Operations Lead, CIMMYT

# BRS Digital Solutions: a triple goal supported by three powerful teams!

CGIAR | INITIATIVE ON Breeding Resources

Our purpose:

"We deliver digital solutions that enhance efficiency in research data management, knowledge sharing, and decision-making by the CGIAR community."

Business Relationship Management actively listens to customers and stakeholders leveraging the expertise of our Global User Support along with our skilled business analysts and project managers.
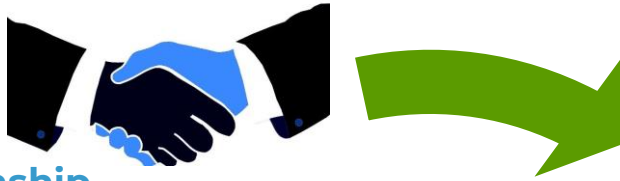
Solutions Engineering and Innovation turns ideas into reality and drives new business capabilities through research and the rapid piloting of innovative solutions.

Solutions Enablement ensures digital services run smoothly and are robust, reliable, and secure across CGIAR and partners.

Services available

Enterprise Breeding System:

CGIAR's preferred breeding data management platform.

Cloud Computing Resources:

Cloud engineering, infrastructure, and technical support all in one place.
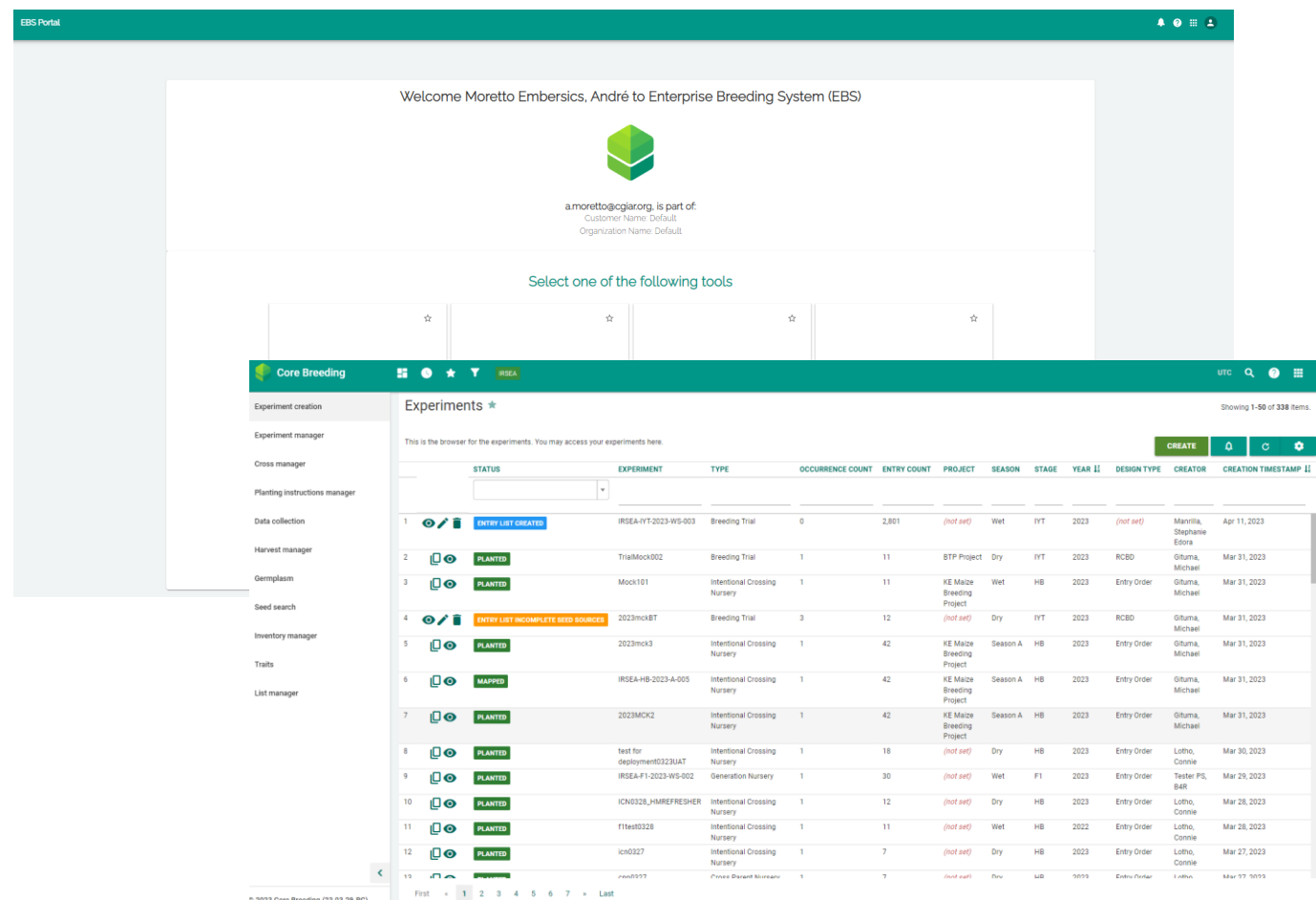
Andre Embersics 2024

What is Enterprise Breeding System (EBS)

EBS is a **breeding data management system** that is:

- Fit-for-purpose
- Open-source
- License-free
- Cloud-based
- User-friendly

Enabling:

- End-to-end, breeding data flow

- All operational data to be stored in one single place
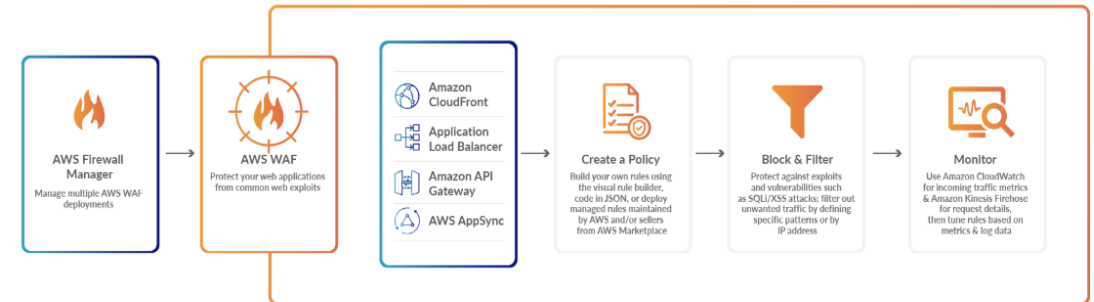
- Data sharing and network breeding

Enterprise system - Security

Single Sign on

Compliance with the organization's security policies and practices

Monthly security patches

Enterprise System - Authentication
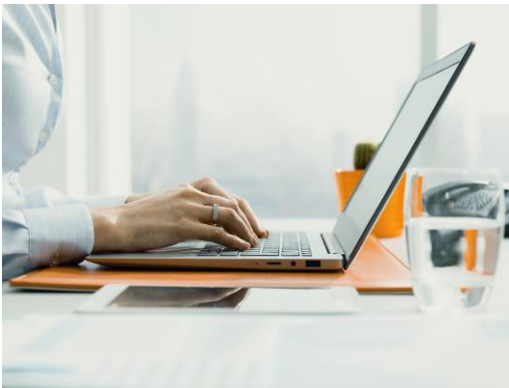
Enterprise System - Authorization

Organizational unit

---> unit members

-----> Role within the unit

Basic Information

Organization	Unit Name	Unit Abbreviation	Unit Type	Crop	Address
CIMMYT	CIMMYT Mexico Maize Molecular Laboratory	LAM	Service Unit	Maize	Mexico-Veracruz, El Batan Km. 45, 56237 Mex. , 9999 R Mexico, Mexico

Service to Provider

Service Type	Forms Available	Workflow Services
Genotyping Analysis1	CIMMYT Request Genotyping Service	Shipment Outgoing CIMMYT

Members

Contact	⋮	Role
Apolinario, Ricardo Jr		Lab Manager
Rojas Olivares, Jorge Alberto		Admin
Dreher, Kate		Admin
Moreno, Juan Carlos		Lab Manager
Bashyal, Asmita		SM Admin
Zavala Martinez, Fernando		Lab Manager
Hudson, Phil		Unit Leader
Lacambra, Jessa Niña		Admin
Mutesi, Irene Peace Musoke		Lab Manager
Musoke, Irene Mutesi		CB User

|< ‹ 1 › >| Go to page: 1   Showing 1-10 of 10 items   Show 10 ▾

Administration tools
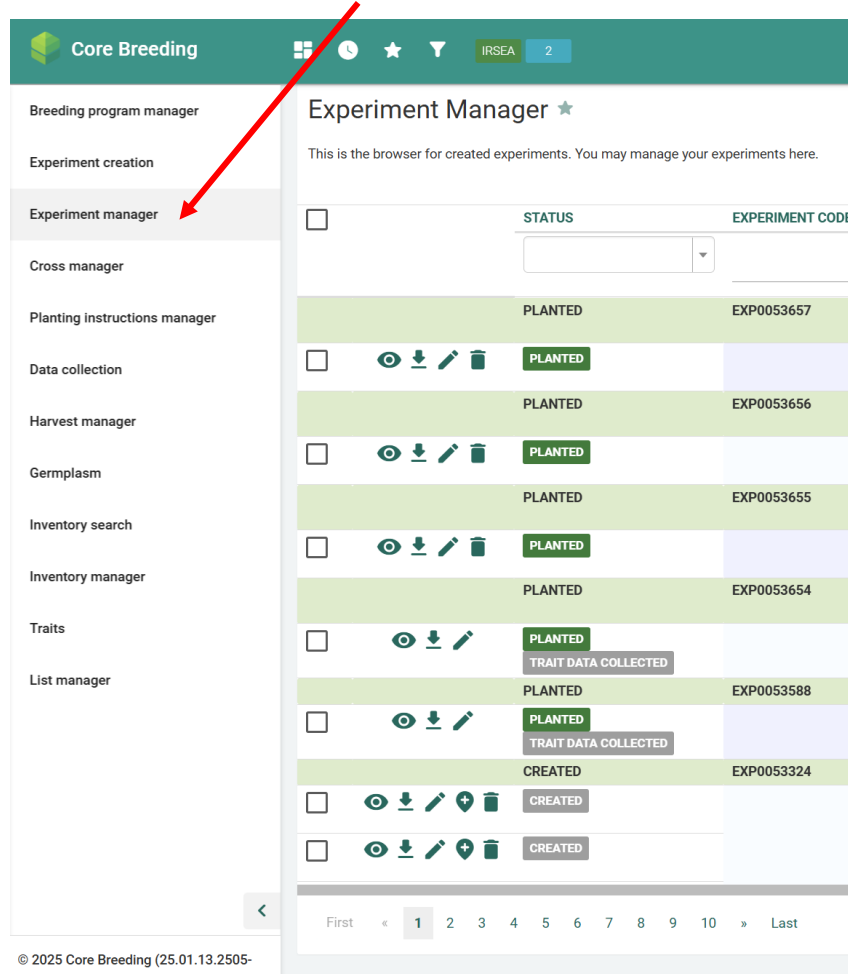
Enterprise System - Role-based access control

BREEDER – permissions to all tools
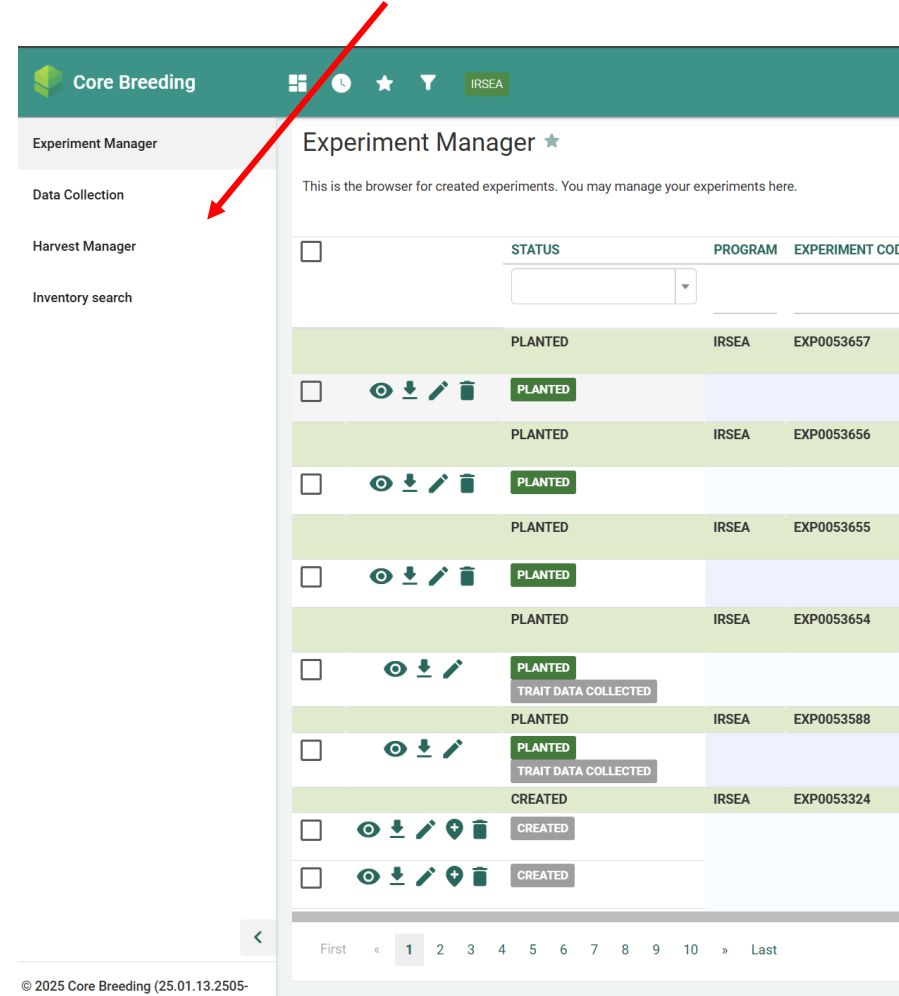
TECHNICIAN – permissions to some of the tools

Enterprise System – Network breeding

The owner of the experiment can grant permissions to collaborators

Enterprise System - Network breeding

BREEDER & Owner – permissions to all tools and data

TECHNICIAN & collaborator– permissions to some of the tools and data that they have been given permission

End to end processes – Breeding schema

End to end processes – Breeding cycle

Experiment Creation
- Crossing
- Nurseries & Trials
- Sparse testing

Experiment Management
- Packing
- Planting
- Management protocols

Data capture
- Hand-held devices
- Data Quality Control

Harvest and Post Harvest
- Harvest data management
- Advancements
- Inventory

Data analysis
- Quality control
- Single Occurrence Analysis
- Multi Occurrence Analysis
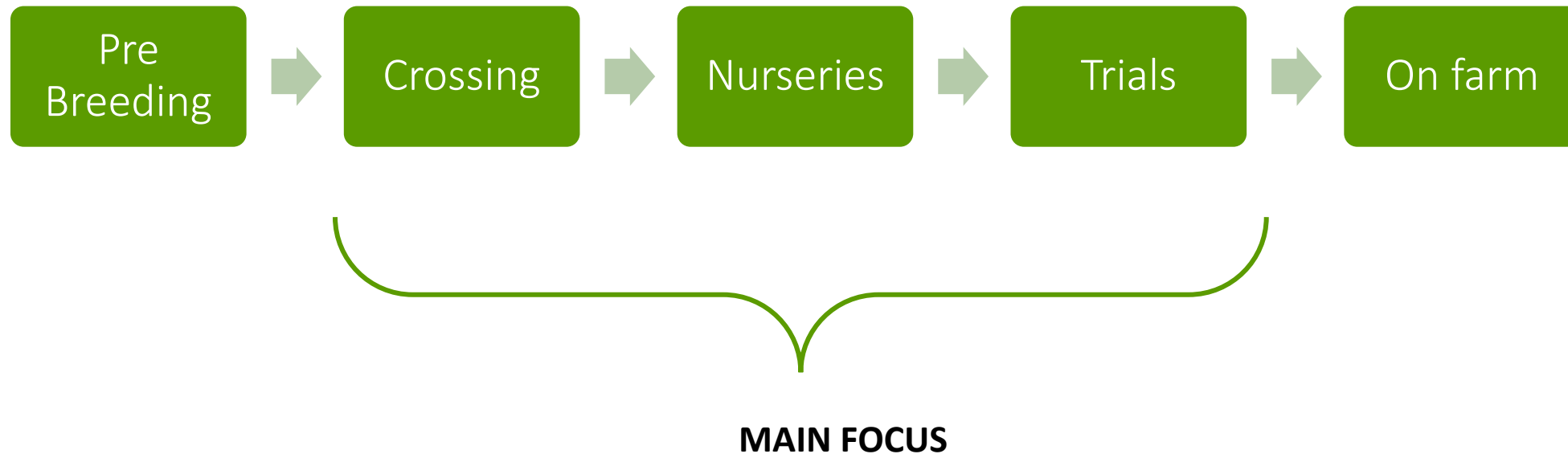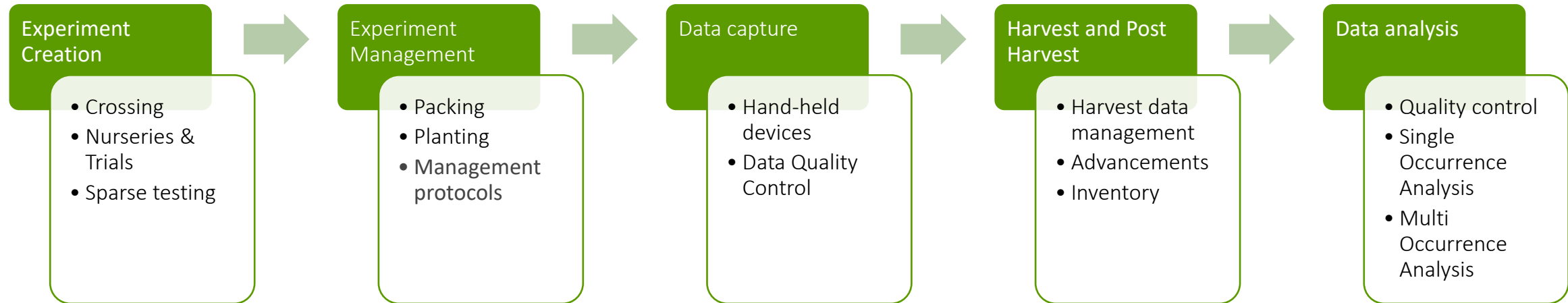
Tools for the breeding programs - Core Breeding

Tools for the breeding programs - Data Analysis

Tools for service teams - Genotyping
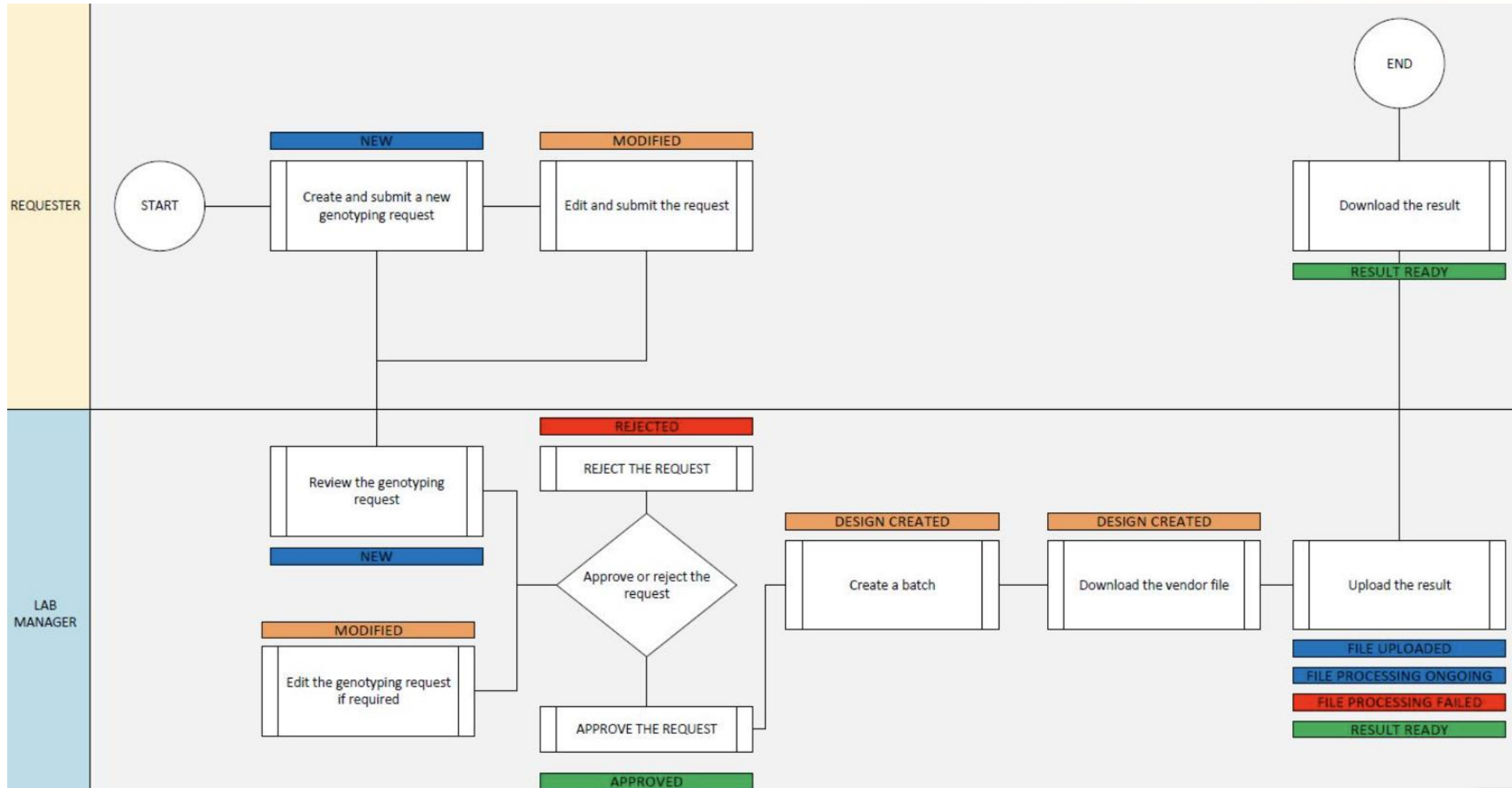
Tools for service teams - Material Transfers

Workflows are customized to match the processes of the service teams

IRRI

Workflow Progress

1. Creation — Creation
2. Processing — Processing
3. Close — Close
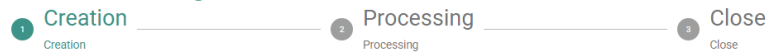
Shipment Name
IRSEA-2024-12-11-0000718

Status
Done

Sender
Team member, Koni

Requestor
collab, Koni

Recipient
collab, Koni

Program
Irrigated South-East Asia

Submitted On
2024-12-11

Workflow history

✓ General Information
Completed on: 2024-12-11

✓ Items
Completed on: 2024-12-11

✓ Documents
Completed on: 2024-12-11

✓ SUBMIT
Completed on: 2024-12-11

✓ Process Shipment
Completed on: 2024-12-11

CIMMYT

Workflow Progress

1. On Creation — Phase for request creation
2. On Process — Phase for request processing
3. On Close — Phase for request close
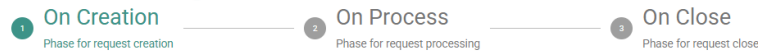
Shipment Name
BW-CIMMYT-2024-10-18-0000657

Status
Processing Completed

Sender
Cooperator A, IWIN

Requestor
ABLE.80-0&, CLARE % JOY !

Recipient
Roselyn, Cornor

Program
BW Wheat Breeding Program

Submitted On
2024-10-18

Workflow history

✓ Basic Information
Completed on: 2024-10-18

✓ Occurrences
Completed on: 2024-10-18

✓ Documents
Completed on: 2024-10-18

✓ Submit Request
Completed on: 2024-10-18

✓ Send to Phytosanitary Review
Completed on: 2024-10-18

Interoperability with systems and tools

PHENOAPPS

CGIAR Breeding Portal

BRS Service Portal

BIOMETRICAL GENETICS WORKFLOW

Enterprise Breeding System

Gigwa
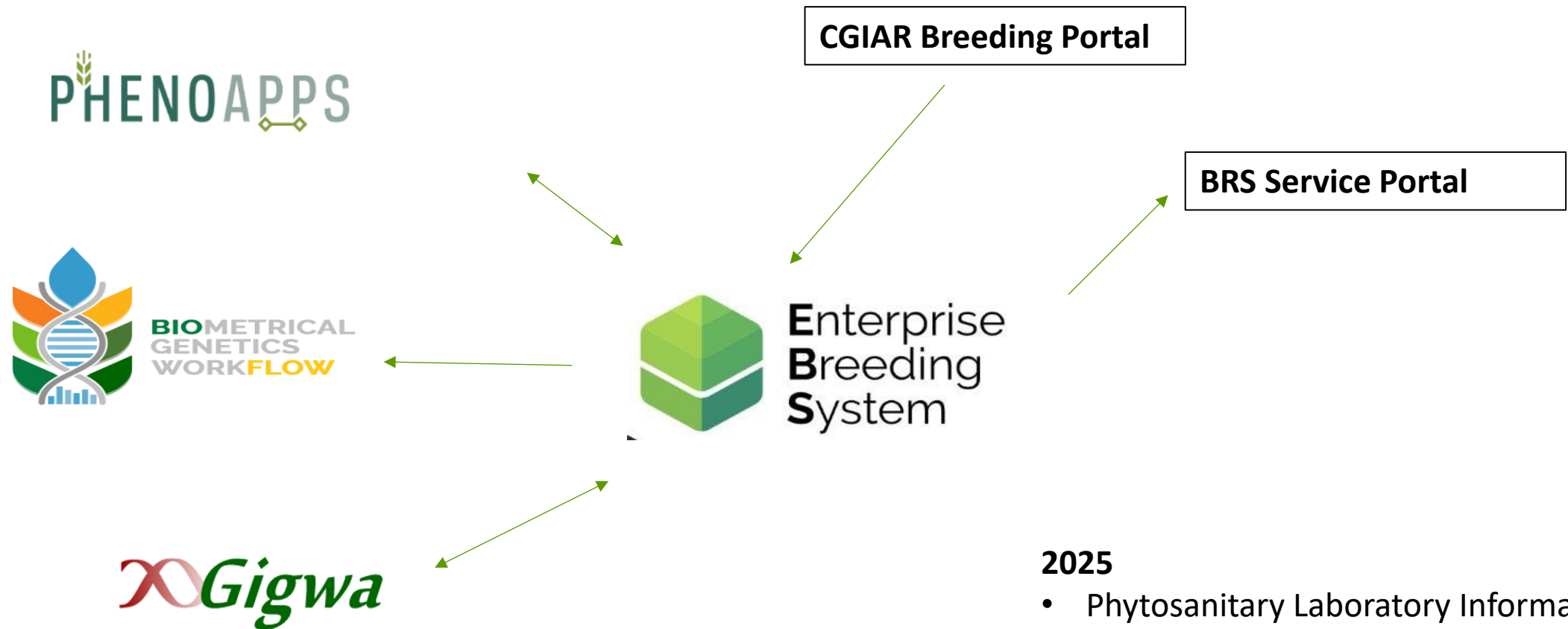
2025
- Phytosanitary Laboratory Information System
- High Throughput Phenotyping

Some of the latest new tools and improvements

- Statistical designs - Enabled Sparse testing
- New Molecular Analytics workflows
  - Parental Purity & Hydridity testing (F1 verification)
- Interoperabity to BioFlow
- Material transfers
  - Outgoing shipments for IRRI and CIMMYT
- Digitalize all data capture
  - Data transfer (BrAPI) with Fieldbook
  - Post harvest data collection
    - Utilization of barcodes and readers
    - Data interfaces to moisture meter and scale
- Enabled 10 new crops
  - crossing and harvest methods
  - germplasm coding

In plans for 2025

Enable new crops

Digitalize all data capture
- Enable timeseries & repeated measurements
- Enable upload of pictures
- More data interfaces to measurement devices
- Enable data capture on seed packages

Data analysis
- New molecular data analysis workflows
- Data transfer of analysis results from BioFlow to EBS

Data Migration tool
- Second version of the from BMS to EBS
- First version of the from BreedBase to EBS

EBS Adoption & Usage

Crops

- **Chickpea**
- **Cowpea**
- **Groundnut**
- **Finger millet**
- **Forages**
- **Groundnut**
- Maize
- **Pigeonpea**
- **Pearl millet**
- Rice
- **Sorghum**
- **Soybean**
- Wheat

Customers

- Africa Rice
- **BRRI**
- **CIAT - Forages**
- **CIMMYT Dryland Crop Program**
- CIMMYT Global Maize Program
- CIMMYT Global Wheat Program
- IRRI
- **IITA – Legumes**
- IITA – Maize
- **PhilRice**

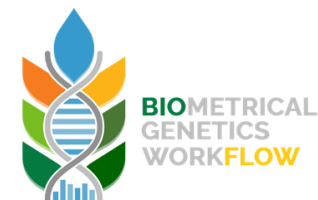*The green color indicates the new additions during 2024*

Acknowledgement

CGIAR-BRS leadership

Digital Solutions staff members

Final acknowledgement:

Visit our website:
www.cgiar.org/initiatives/breeding-resources

LinkedIn:
CGIAR Genetic Innovation

X / Twitter:
@CGIARgenetic

Order our services through our Service Request Portal:
https://cgiar-service-portal-prd.azurewebsites.net/register