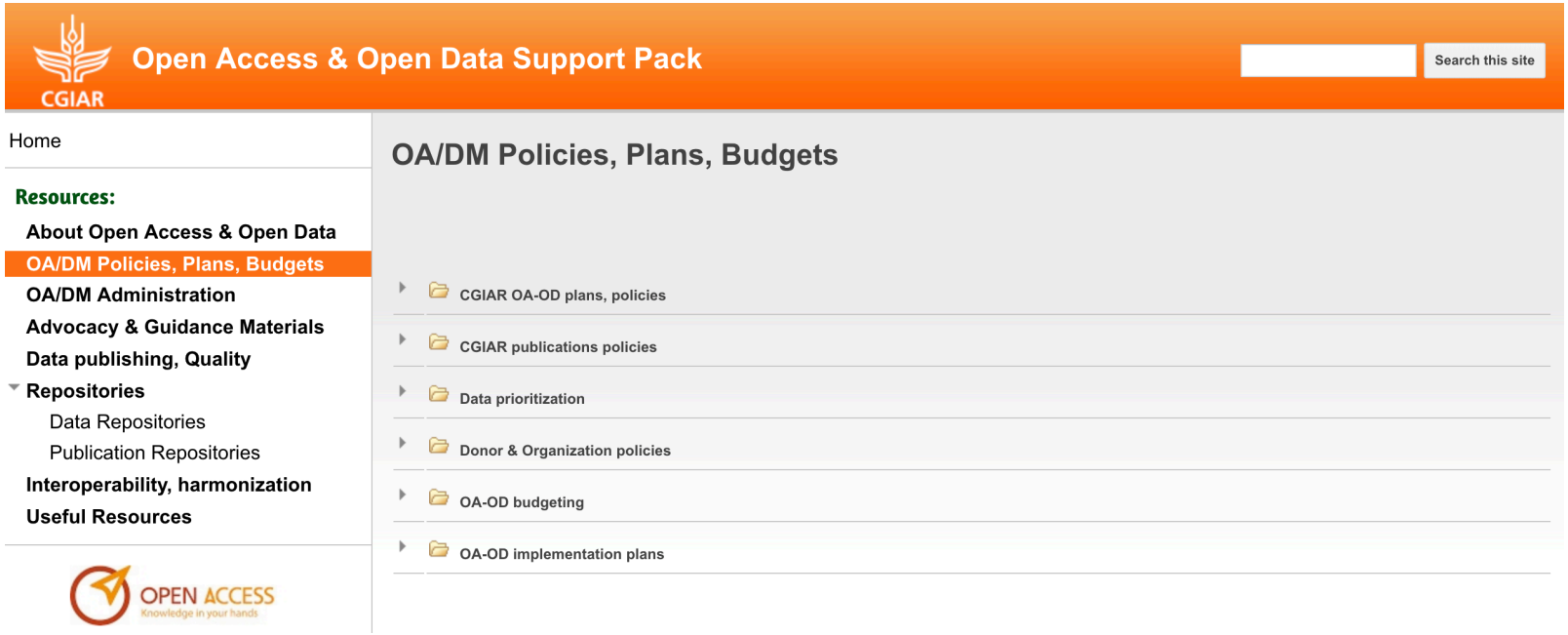
Open Access Open Data (OA - OD) @ IITA

Application to Crop Breeding

22nd Nov 2018 – ICIPE Open Science Tour

Introduction

CGIAR open access / open data policy in 2013



OA-OD working groups and data implementation plans

A lot of material available already as a support pack

https://sites.google.com/a/cgxchange.org/oad-support-pack/oa-dm-policies-plans

Phased implementation

Introduction

Big Data Platform of CGIAR

https://bigdata.cgiar.org/

3 Modules

ORGANIZE

Support and improve data generation, access, and management in CGIAR

CONVENE

Collaborate and convene around big data and agricultural development

INSPIRE

Lead by example and inspire how big data can deliver development outcomes

OA-OD Implementation

Requires champions / advocates

Develop briefs for targeted audiences – 2 pager

- Benefits
- Roles and responsibilities
- How it impacts my work
- Who to contact
- Tips and FAQs

Share success stories and challenges

RTBBases

- Open access database, providing a one-stop shop for researchers and breeders worldwide, to manage germplasm, genotyping and phenotyping datasets.

- Repository for Roots Tuber Banana projects (NextGen Cassava, Breeding Better Bananas, AfricaYam)

- Collaboration between IITA, BTI, Cornell and NARS across Africa

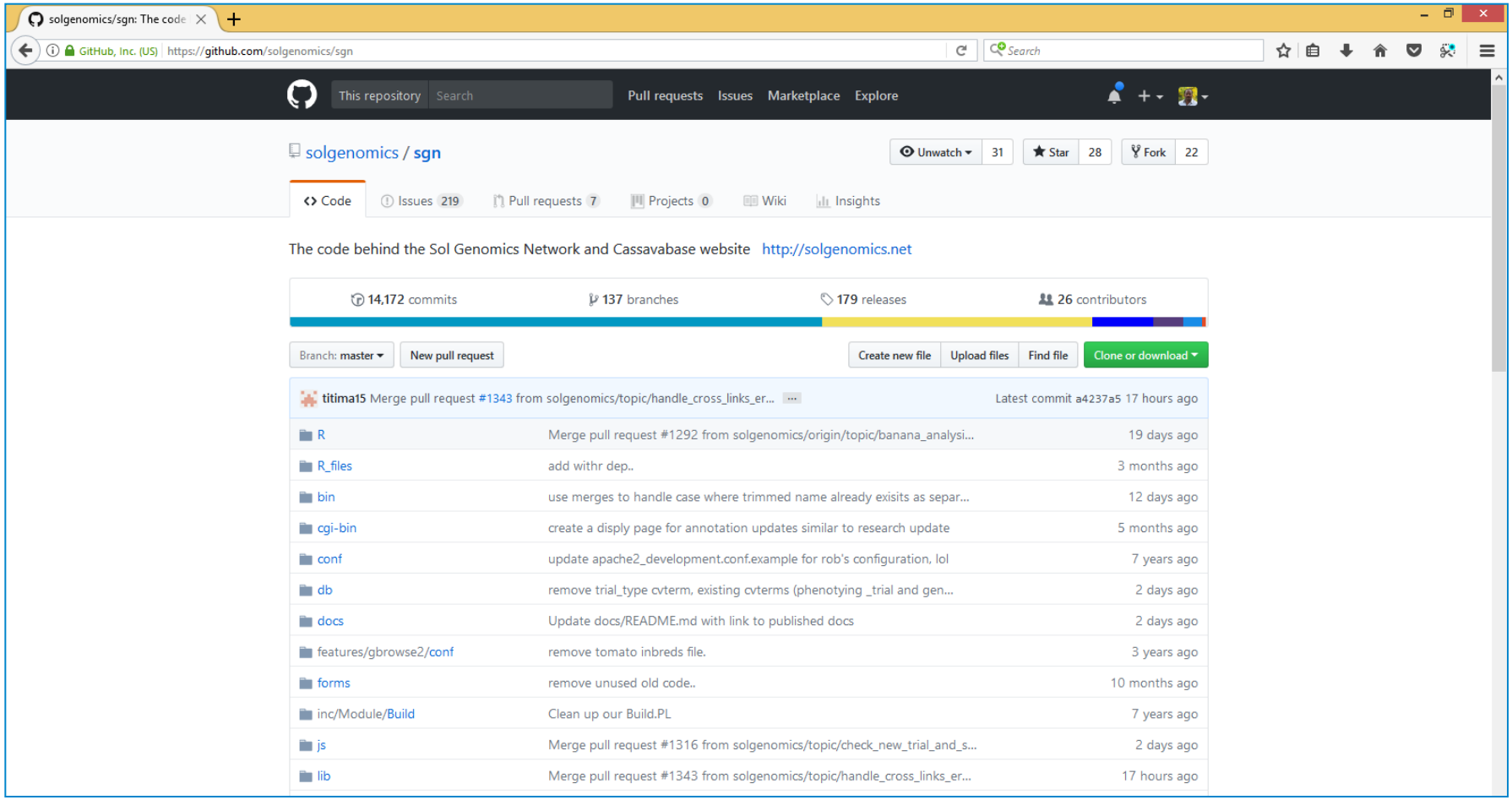
- Cassavabase.org Yambase.org Musabase.org

- Generic implementation through SGN but crop specific implementations

Cassavabase Data

- 256,437 accessions
- 3178 trials
- 10,841,638 Phenotypic observations
- ~ 30,000 samples genotyped
- > 340,000 SNPs

Github

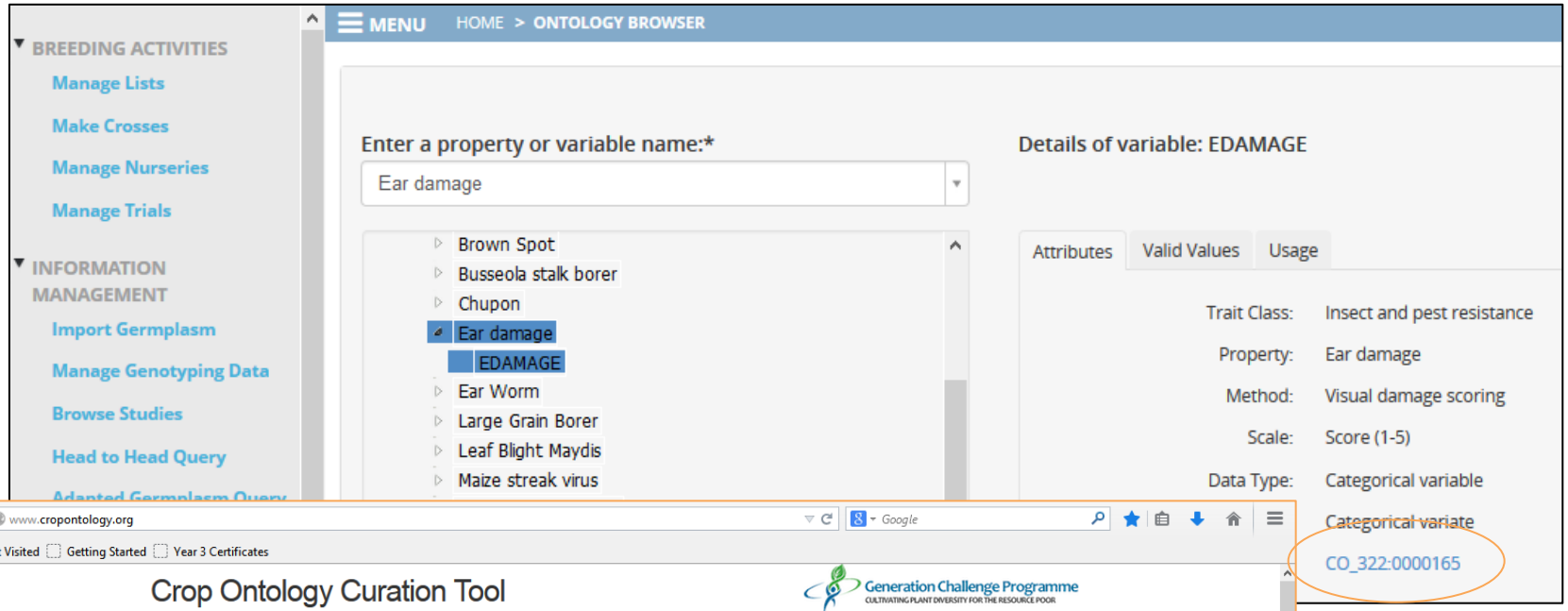


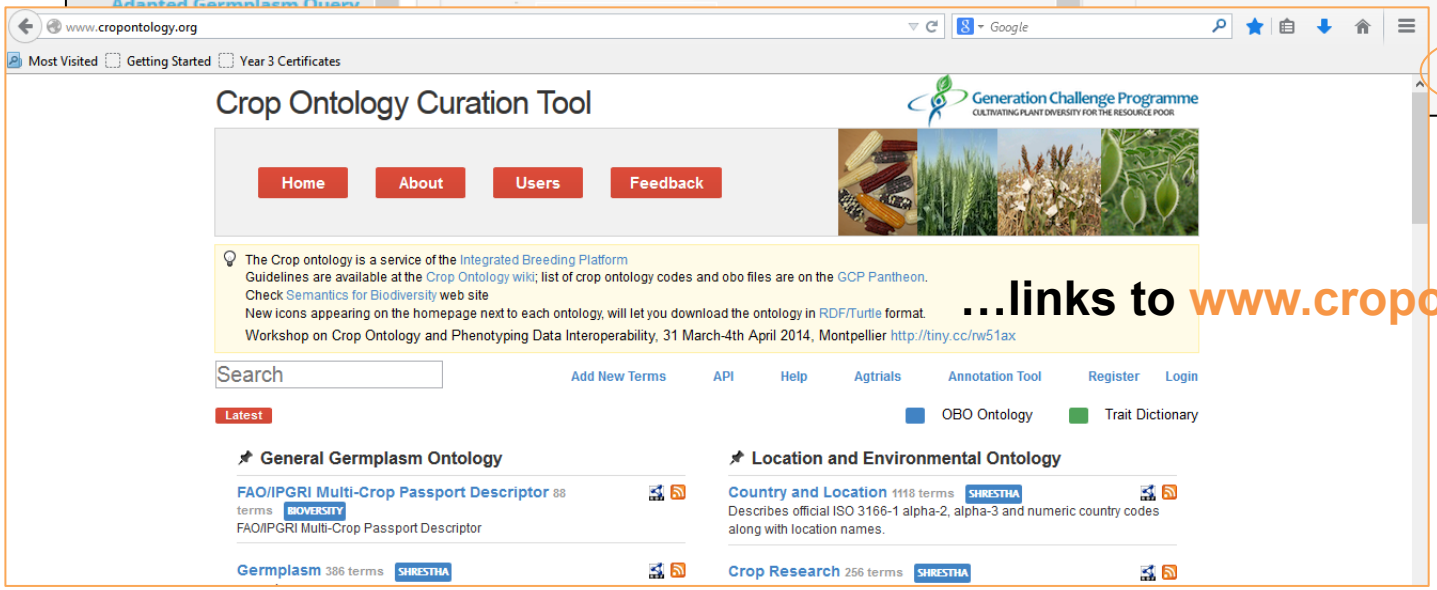
All the source code and database schemas are open source and available for download at http://github.com/solgenomics.

Crop breeding databases

- Ontologies, Standards and Metrics
- Workflow – bringing together data / tools
- Interoperability
- Data quality
- New methodologies being developed

Trait descriptors / ontology





…links to www.cropontology.org

Crop Specific Trait Dictionaries

	A	B	C	D	E	
38	VARIATE	DESCRIPTION	PROPERTY	SCALE	METHOD	
39	APHIDR	Aphid resistance	Aphid resistance	0-4 score	Visual rating of	N
40	BB	Resistance to bacterial blight	Resistance to	0-4 score	Visual rating of %	N
41	BLCMV	Resistance to blackeye	Resistance to	0-4 score	Visual rating	N
42	CAMV	Resistance to cowpea aphid-	Resistance to	0-4 score	Visual rating of	N
43	CANOPY	Canopy Height at FLOW50	Canopy Height at	cm	Measurement	N
44	CHECK	Check lines		Check Tag	Local Check	C
45	CKTME	Cooking time		minutes	Time for dry grain	N
46	DRYPOD	Dry pod color		0-4 score	Visual	N
47	DTFLWR	Floral abscision score		classes	Scoring relative	N
48	EYELEA	Pigment bleeding		classes	Degree of	N
49	FLDSN					N
50	FLOW50			Days		N
51	FLOWCO			0-4 s		N
52	FODMAT			gram	t and	N
53	FODMID			gram	t and	N
54	FOLTHR			0-4 s	of	N
55	FUSWL3	wilt			of	N
56	FUSWL4				Visual rating of	N
57	GROHAB	Growth habit		0-4 score	Visual rating at 40	N
58	HI	Harvest index		ndex	Calc. from	N
59	LYGUSR	Resistance to lygus bu		-4 score	Visual rating of	N
60	MACROP	Macrophomina Toleran		-4 score	Visual rating of	N
61	MAT95	Days to 95% maturity		days	Visual	N

Reporting units or scale

Trait property

Measurement method

Measurement Variate

Workflow

Crossing Manager

Crossings & Nursery

Phenotype Analysis

Selection Index tool

Historic Phenotype Uploads

Upload Phenotypes

Wizard Search tool

Search/Download accessions

Select / add accessions

Create New Trial

Traits List Creation

&

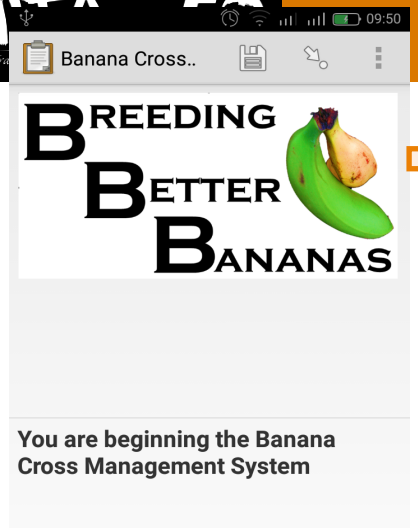
Field book Creation

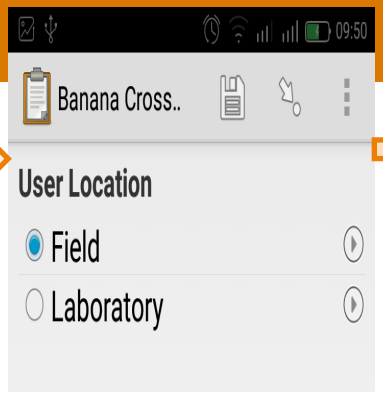
List Manager

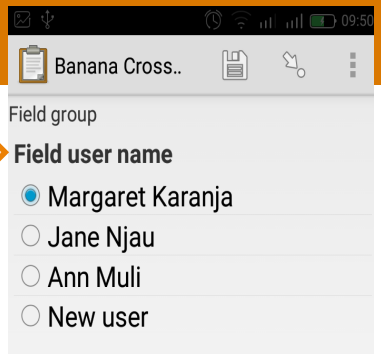
Import and Setup Trial in Fieldbook App.

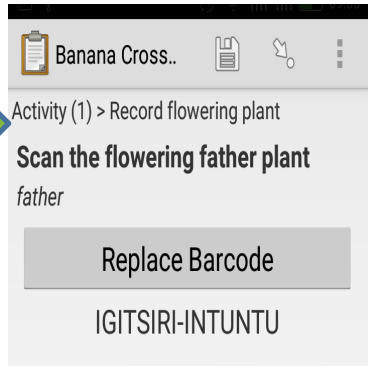
Record Phenotypes

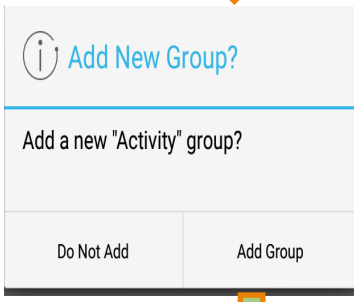
Fieldbook App & tools


Banana Cross..
BREEDING BETTER BANANAS
You are beginning the Banana Cross Management System

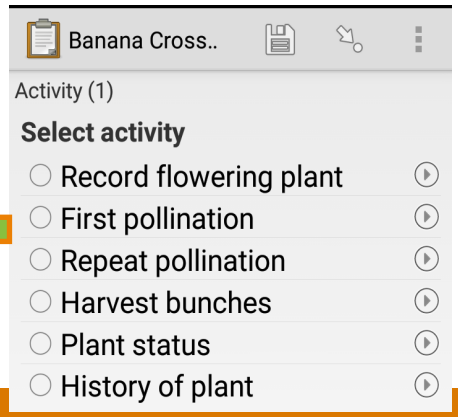

Banana Cross..
User Location
Field
Laboratory

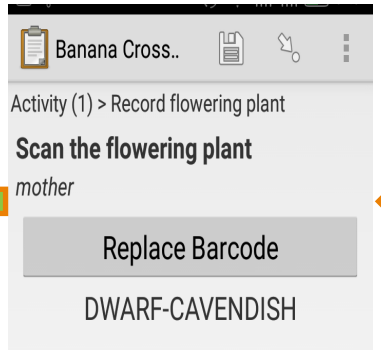

Banana Cross..
Field group
Field user name
Margaret Karanja
Jane Njau
Ann Muli
New user

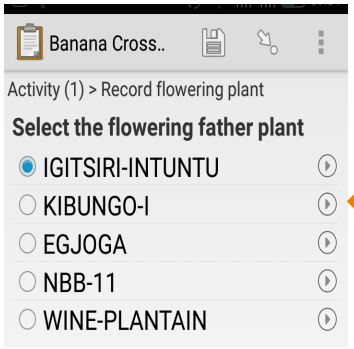

Banana Cross..
Activity (1) > Record flowering plant
Scan the flowering father plant
father
Replace Barcode
IGITSIRI-INTUNTU


Add New Group?
Add a new "Activity" group?
Do Not Add
Add Group


You are at the end of Banana Cross Management System.
BDS2017_field-
Mark form as finalized
Save Form and Exit


Banana Cross..
Activity (1)
Select activity
Record flowering plant
First pollination
Repeat pollination
Harvest bunches
Plant status
History of plant

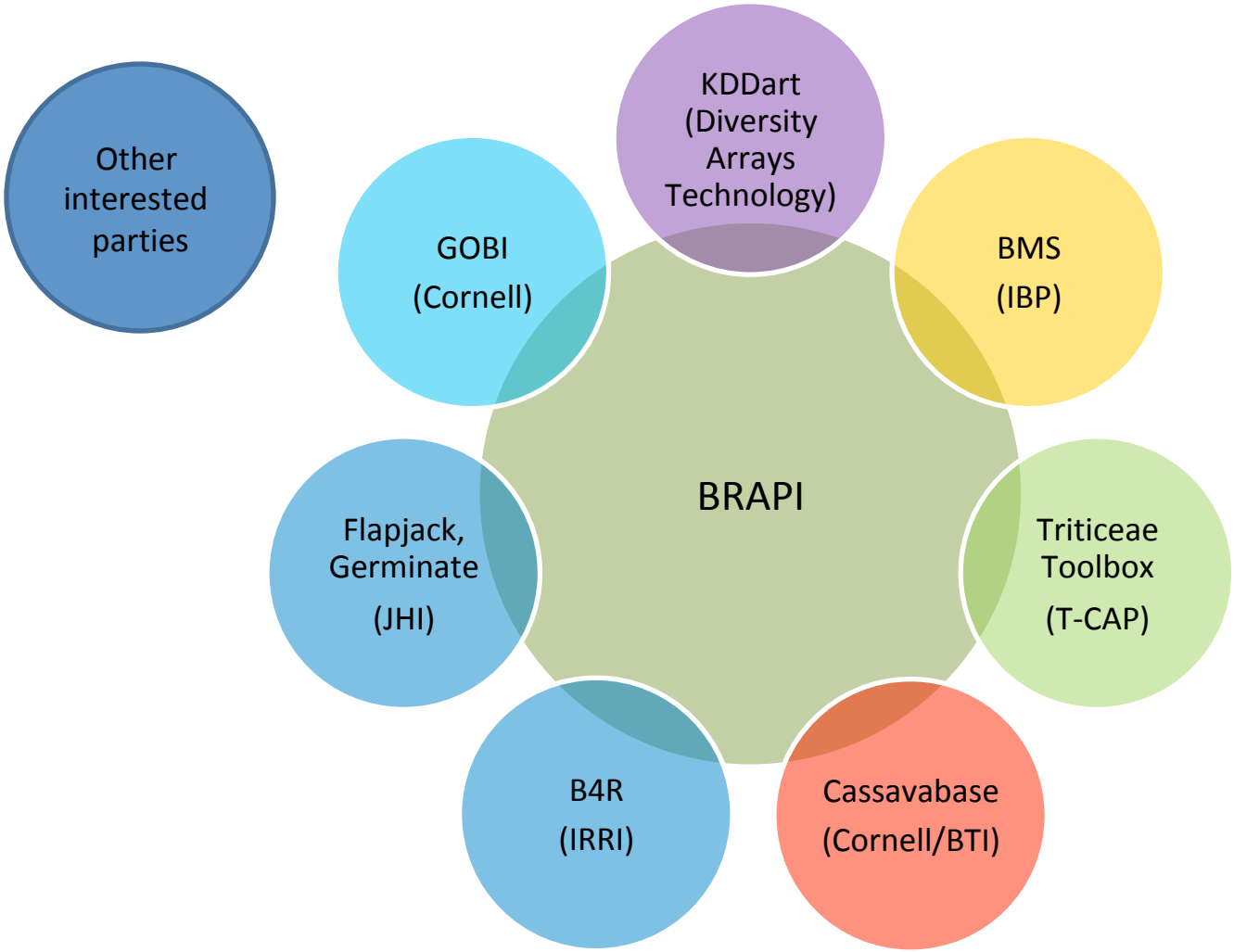

Banana Cross..
Activity (1) > Record flowering plant
Scan the flowering plant
mother
Replace Barcode
DWARF-CAVENDISH


Banana Cross..
Activity (1) > Record flowering plant
Select the flowering father plant
IGITSIRI-INTUNTU
KIBUNGO-I
EGJOGA
NBB-11
WINE-PLANTAIN

Linking to other Plant Breeding Systems

- Plant Breeding API (BRAPI)
  - Partners in the definition of a standard Application Programming Interface (API) for plant breeding
  - BMGF is supporting development
- Will serve to:
  - Facilitate data exchange among different initiatives
  - Expand the range of tools available to IBP clients
  - Reduce unnecessary duplication of tasks / More efficient use of resources
  - Increase communication among programmers working on similar projects (CoP)

Current members of BRAPI



https://brapi.docs.apiary.io/#

Data Quality

- Checks and validations in the apps and ontologies
- Outlier detection
- Standardisation of naming conventions
- Metadata