

# BrAPI Recent Achievements and V2 Updates

Peter Selby  
Cornell University

# What is BrAPI?

BrAPI is a ...

Standardized

RESTful

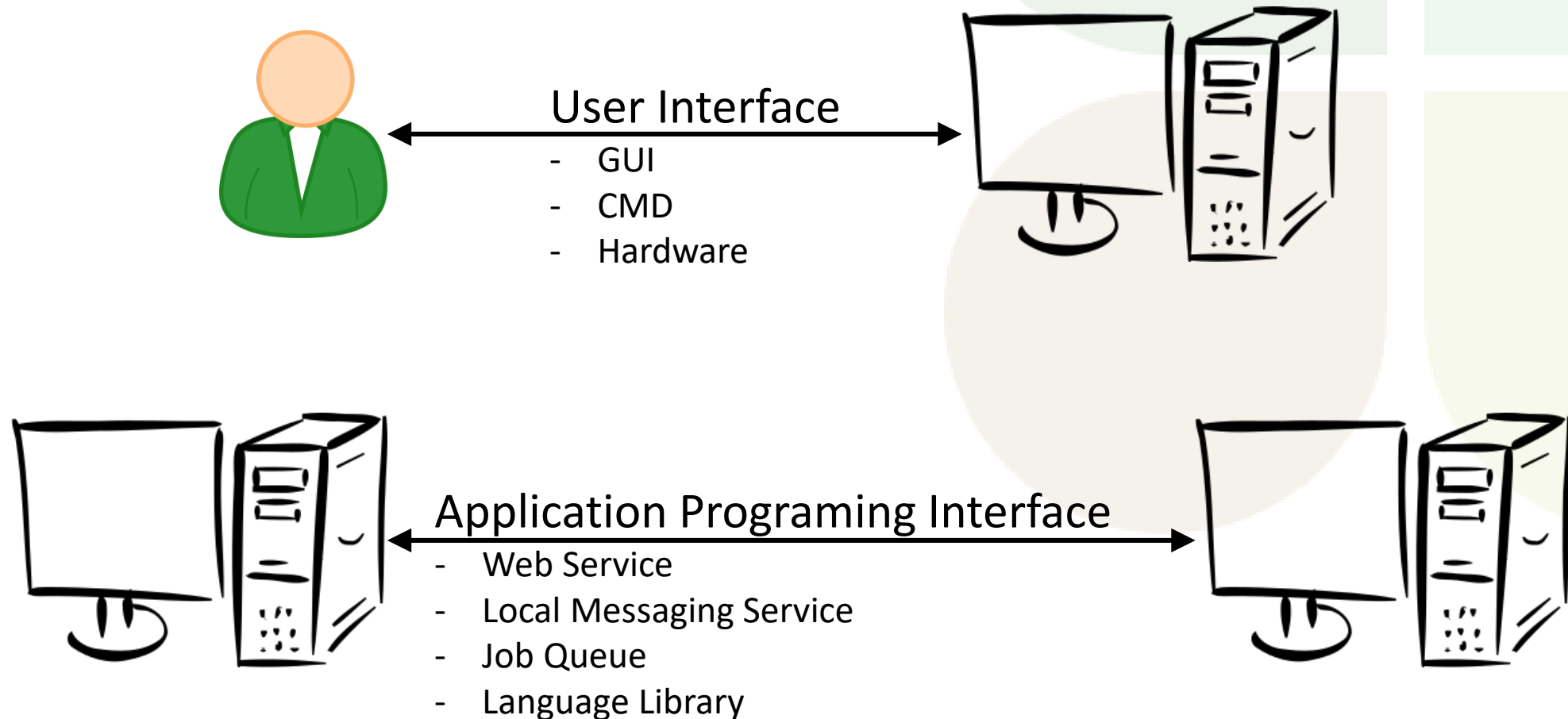
Web Service

API

Specification

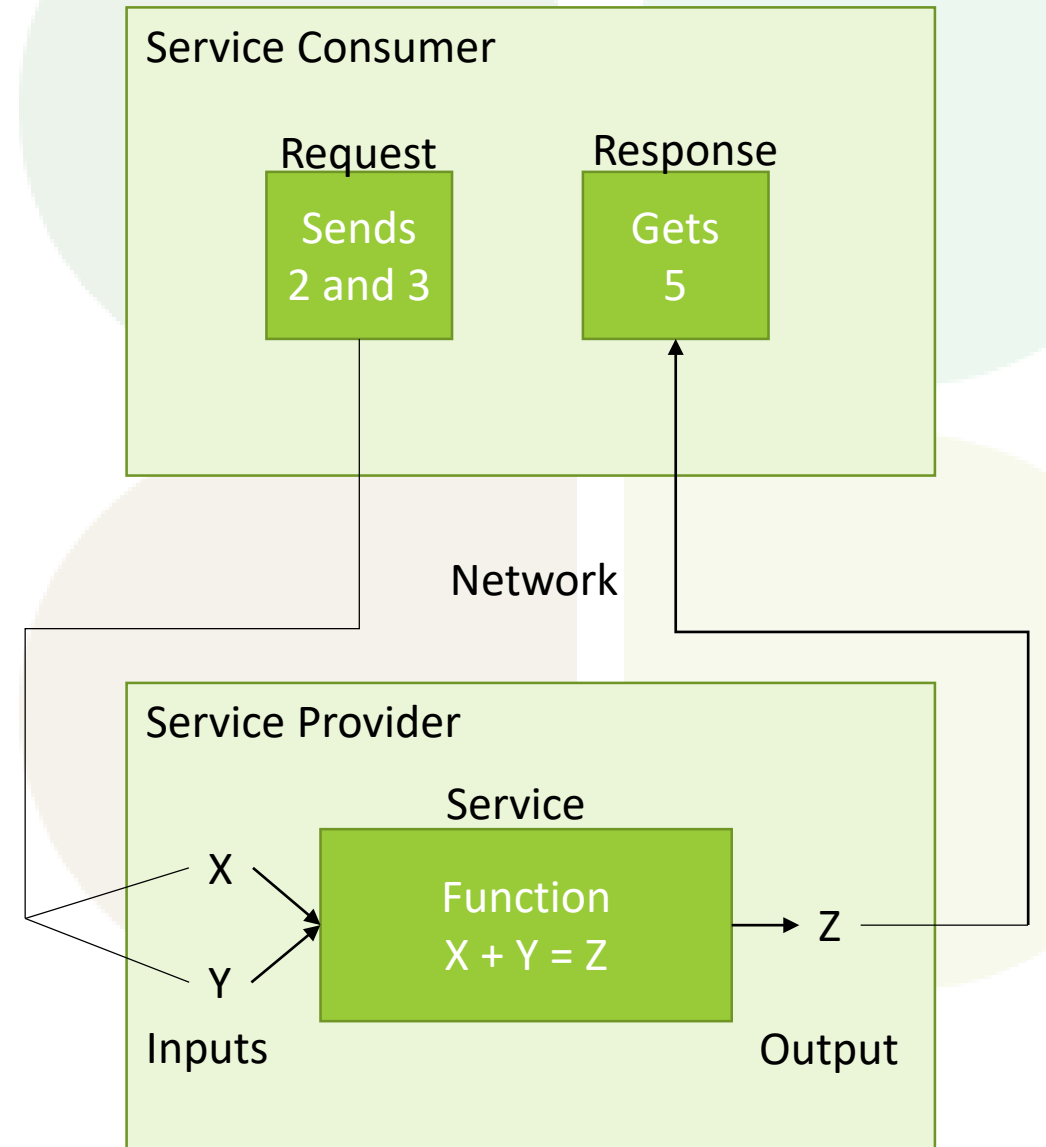
...for communicating plant breeding data

# API – Application Programming Interface



# Web Service

- A Service Provider contains some Service with well defined Inputs and Outputs
- A Service Consumer sends a request to the Service Provider with the Input data, and waits for a response
- The Service performs some Function on the Input data
- The Service Provider sends the Output data as a Response back to the Service Consumer



# REST - Representational State Transfer

GET <https://test-server.brapi.org/brapi/v1/markerprofiles/mp1>

Authorization Headers Body Pre-request Script Tests

Key	Value
New key	Value

Body Cookies Headers (11) Test Results

Pretty Raw Preview JSON

```
1 {
2   "metadata": {
3     "pagination": {
4       "totalCount": 22,
5       "currentPage": 0,
6       "totalPages": 1,
7       "pageSize": 22
8     },
9     "status": [],
10    "datafiles": []
11  },
12  "result": {
13    "markerprofileDbId": "mp1"
```

- REST is an architecture design for creating Web Services using the well known HTTP standard
- Requests are made with URLs
- Data is represented with JSON

# Standardized **Specification**

- BrAPI has defined a Standardized set of data model structures to communicate the basic information of plant breeding
- BrAPI is a technical **Specification** which software developers can easily turn into code which communicates using the Standard.

# BrAPI Community Achievements

- 33 Partner Organizations
- ~150 Developers, Data Scientists, Plant Breeding Experts
- The BrAPI Paper
  - Accepted in March 2019 to the OUP Bioinformatics journal
  - Printed in October 2019

# BrAPI Review Board

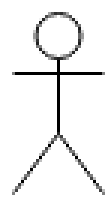
A group of community volunteers who represent the community, review changes to the spec, and debate and resolve critical issues.

- Matthias Lange – IPK Gatersleben
- Cyril Pommier – INRAE
- Iain Milne – James Hutton Institute
- Jan Erik Backlund – IBP-BMS
- Lukas A. Mueller – Boyce Thompson Institute
- Rob Kooper – University of Illinois, TERRA-REF
- Tim Parsons – Breeding Insite



# Use Case: Field Book

KSU Field Book App



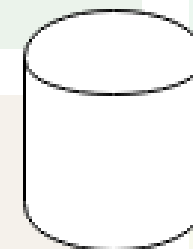
User



Get Plot Layout, Traits, etc

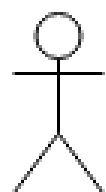


Breeding Management System



----- Collect Field Data -----

KSU Field Book App



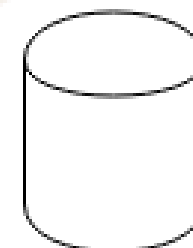
User



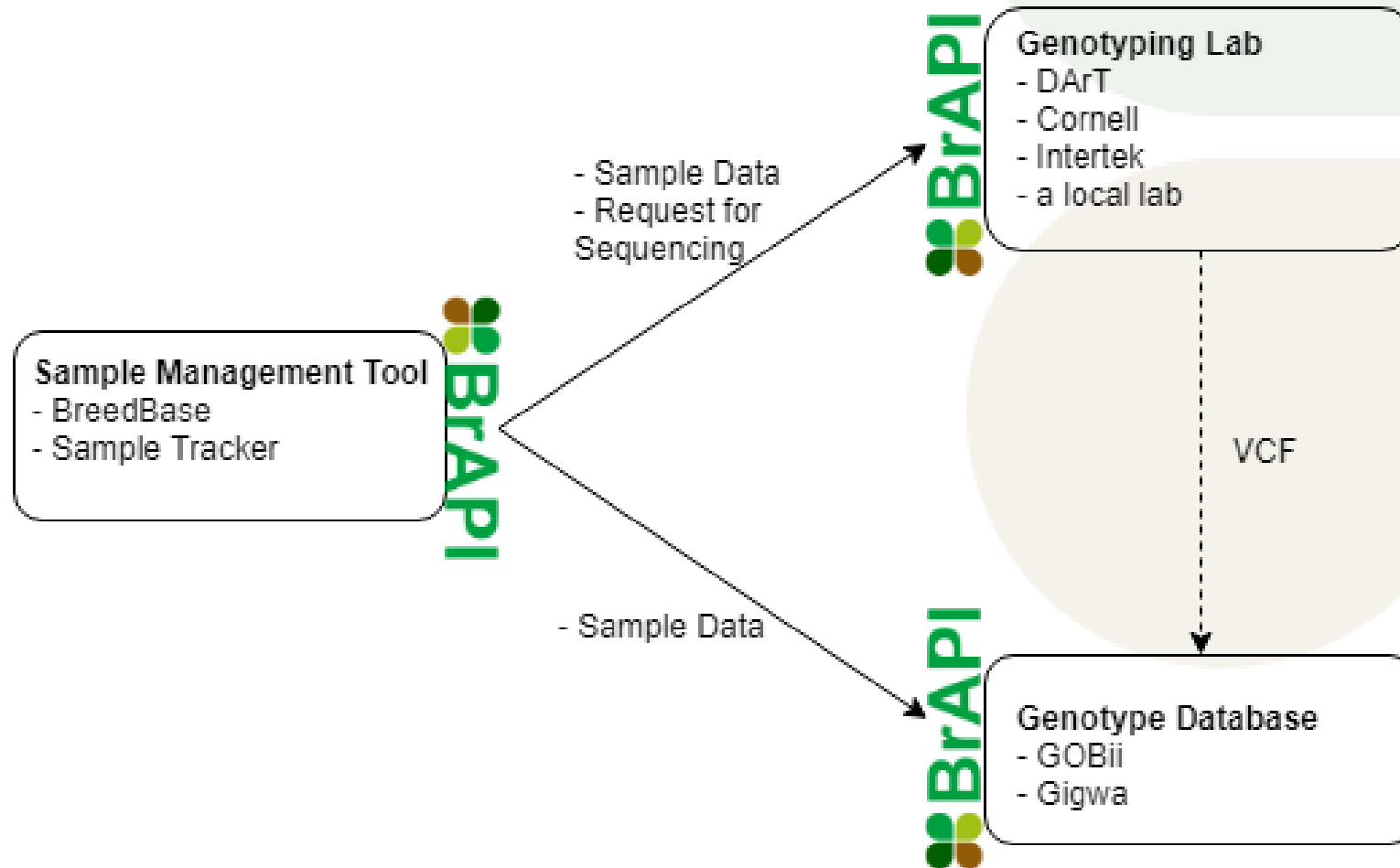
Push Observations



Breeding Management System



# Use Case: Sample Management



# Use Case: BRAPPs

**Beegmac** for **BrAPI v1.1**  
 Beta Edition (Endeavour Genetic-Marker Abic Client)

Advanced mode

User Name:  Password:  Submit

http://gagaw2.ourangreen.fr/brapi/v1/next/Rice-MSU7/brapi/v1/

Map:  powered by **X.Gigwa**

Study:

Type:

Genotypes:

Sequences:

Markers:

Search  Export genotypes  Export Genotypes Details  Export Marker Details

RESULT: 1388 records found   Genotypes per page: 1000

Marker	Position	Genotype	Sample	Genotype
5633953a10740013e3ec083	Chr3:314259	62667	1_62667_1	T/T
5633953a10740013e3ec084	Chr3:344472	62667	1_62667_1	T/T
5633953a10740013e3ec085	Chr3:344039	62667	1_62667_1	A/A
5633953a10740013e3ec086	Chr3:344676	62667	1_62667_1	T/T



Traits, methods and scales

FRUCN: Fructification note

Ontology name: Woody Plant Ontology  
 Identifier: CO\_397:0000043  
 Name: FRUCN  
 Synonyms: Fructification note (FRUCN[Aceors])  
 Context of use: Trial evaluation  
 Status: Standard for INRA & GenTree project  
 Institution: INRA  
 Scientist: Cécile Michely  
 Date: 13/03/2017  
 Crop: WoodyPlant

Fructification grading

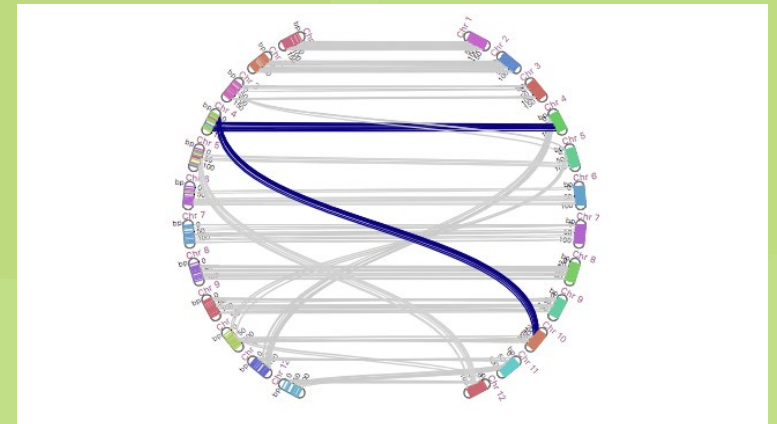
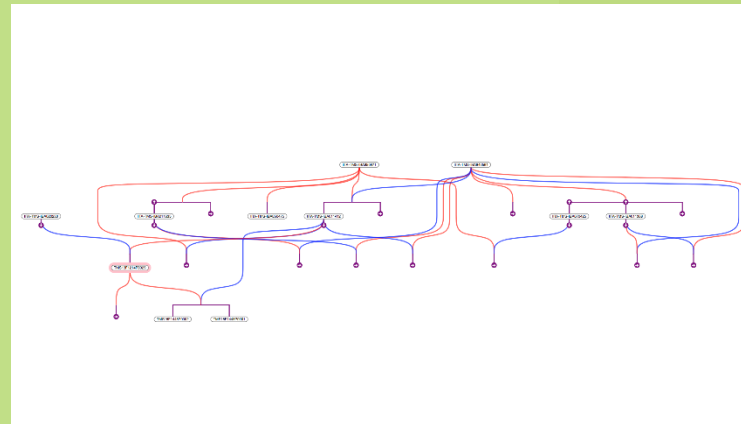
Identifier: CO\_397:1000002  
 Name: Fructification grading  
 Description: Assessment of the fructification  
 Main abbreviation: FRUCN  
 Entity: Fructification  
 Attribute: Fructification  
 Status: Standard for INRA & GenTree project  
 Class: Fertility

Visual scoring

Identifier: CO\_397:2000003  
 Name: Visual scoring  
 Description: Visual assessment with a reference scoring scale  
 Class: Estmation

Fructification scoring scale

Identifier: CO\_397:3000027  
 Name: Fructification scoring scale



# BrAPI V2.0

- V1.3 has been stable since November 2018
- V2.0
  - New Endpoints for submitting data
  - New Genotyping schema
  - New Searching mechanism
  - Logical reorganization into “Modules”
  - General clean up and removal of old interfaces

# BrAPI V2.0 Modules

## BrAPI-Core

- Programs, Trials, Studies, Locations, People, and Lists

## BrAPI-Phenotyping

- Observation Units, Observations, Observation Variables, Traits, Scales, Methods, and Images

## BrAPI-Germplasm

- Germplasm, Germplasm Attributes, Seed Lots, Crosses, Pedigree, and Progeny

## BrAPI-Genotyping

- Samples, Markers, Variant Sets, Variants, Call Sets, Calls, References, Reads, and Vendor Orders

# BrAPI V2.0 Specification Tour

<https://brapi.org/specification>

THANK YOU

BILL & MELINDA  
GATES *foundation*



[peter.selby@cornell.edu](mailto:peter.selby@cornell.edu)

<https://brapi.org>