Federations of information systems in the plant community and possible application to grapevine

Anne-Francoise Adam-Blondon

Federations of information systems in the Plant community and possible application to Grapevine

A-F Adam-Blondon (INRA, FR)

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Enabling interdisciplinary research

Example: modelling the impact of climate change using plant phenology

Global plant phenology data portal: www.plantphenology.org

Pan European PEP725 Plant phenology database: http://www.pep725.eu/

Phenology data

Date associated to:

- Geo-reference
- species
- event (e.g. 50% of opened flowers)

Interoperability

Climatic data

Date associated to:

- Geo-reference
- Measures (e.g T°C, …)
- Events (e.g. hail, …)

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Example: modelling the impact of climate change using plant phenology

Phenology data : different sources, different accuracy in terms of identification of the plant material, scoring methods, record formats, …

- Modelers of the impact of climate change
- Geneticists, Breeders
- Genbank managers
- Experimental station managers
- Producers: vintage dates
- Crowd sourcing
- …

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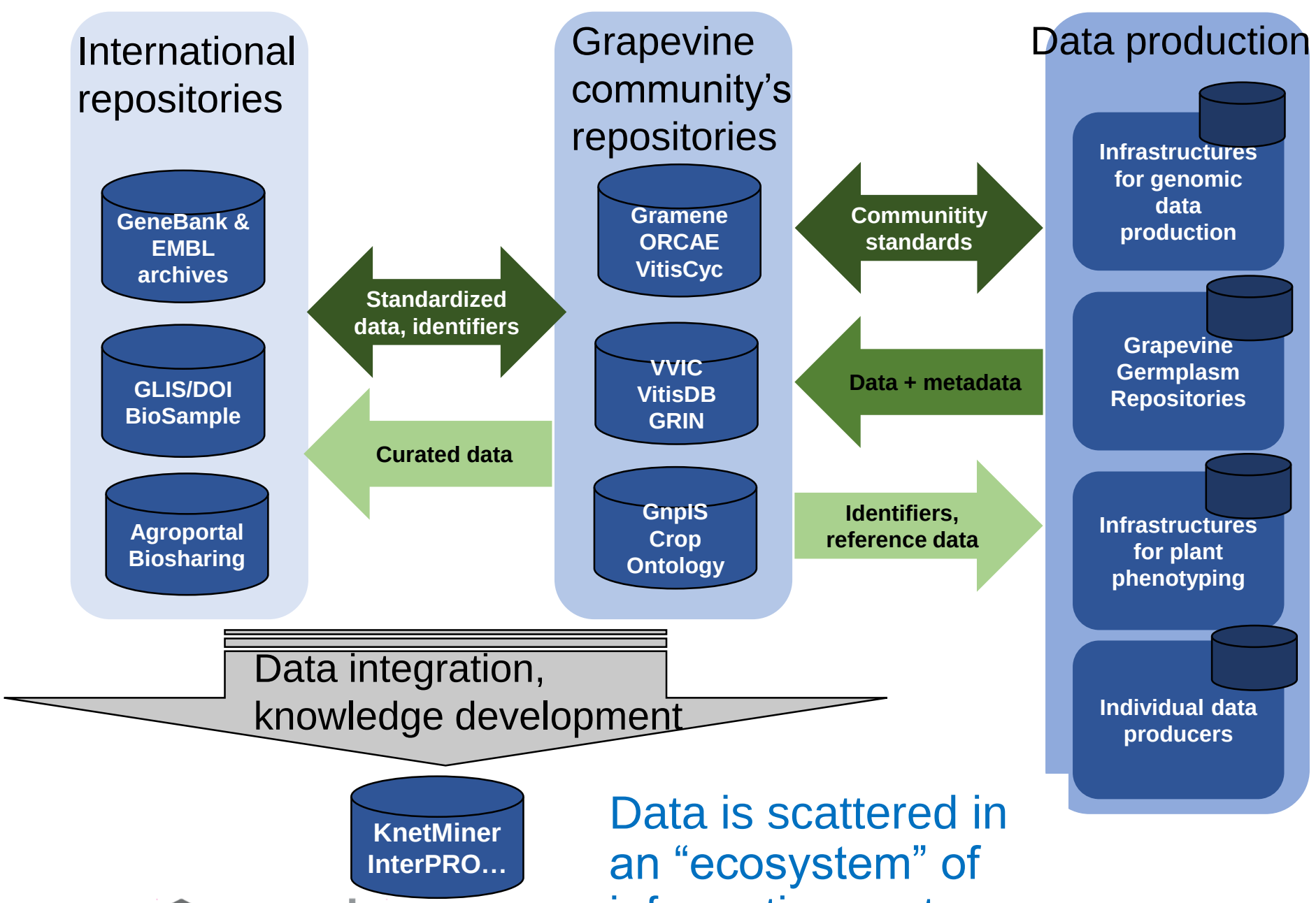

Data is scattered in an "ecosystem" of information systems

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From Adam-Blondon et al (2016) HortRes, 3:16056

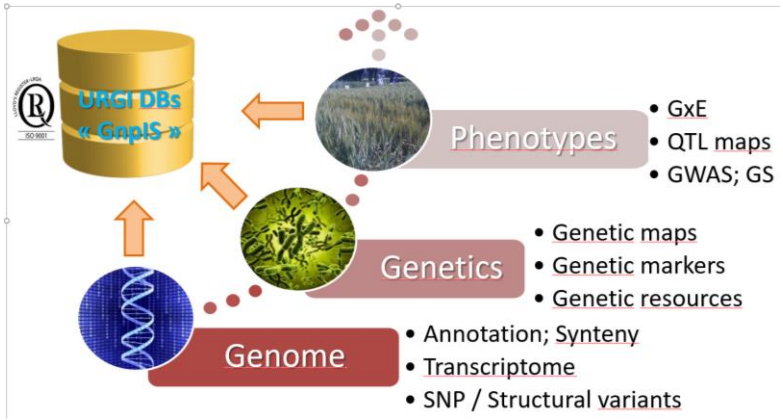
Insertion of GnpIS in federations of information systems

2002: Single database

2008: DB Interoperability

GnpIS-coreDB

2010: set of interoperable databases



2015: Distributed information system

GnpIS Information System

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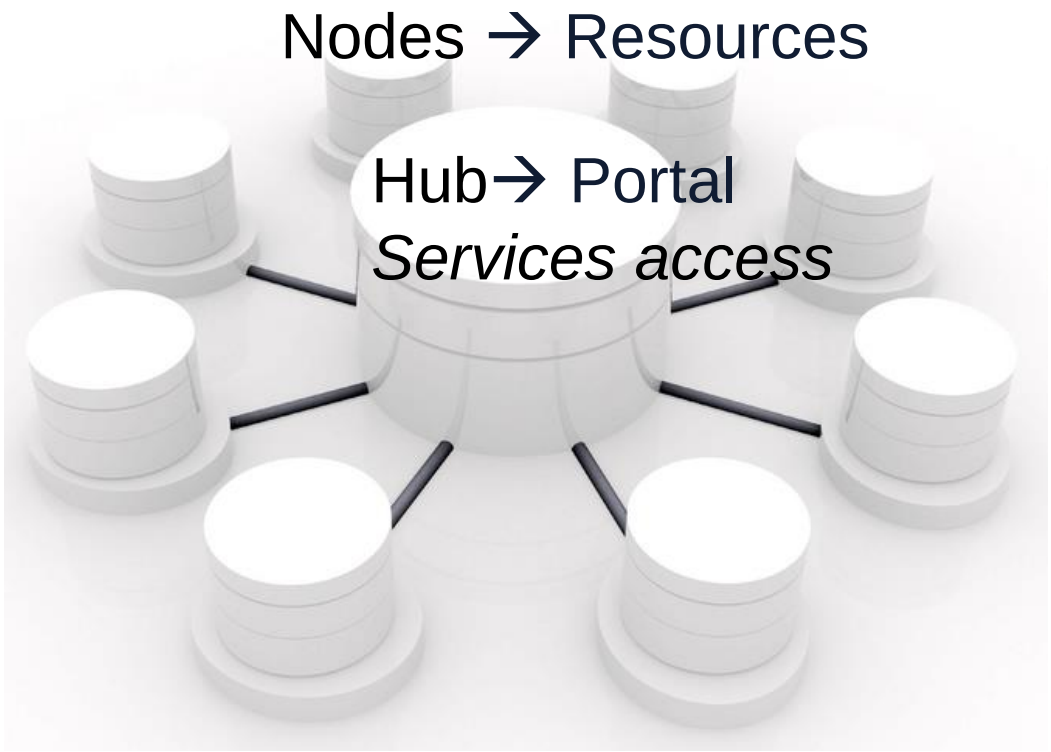
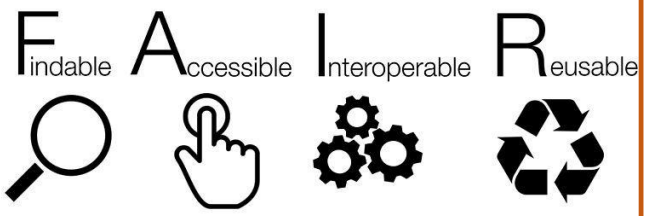
Featuring federations of information systems

- A network of (stable/sustainable) nodes
- A central portal offering services (e.g. search data)



Backbone of good practices enabling such infrastructures



Wilkinson et al (2016) SCIENTIFIC DATA, 3:160018, DOI: 10.1038/sdata.2016.18

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Two main examples of federations

- The Wheat Initiative (G20 Initiative) and its Wheat Information System Expert Working group (www.wheatis.org). Also supported by the Research Data Alliance.

- The European Infrastructure for Multi-scale Plant Phenomics and Simulation (EMPHASIS) and its information system (https://emphasis.plant-phenotyping.eu/e-Infrastructure). In the frame of a strong collaboration with ELIXIR

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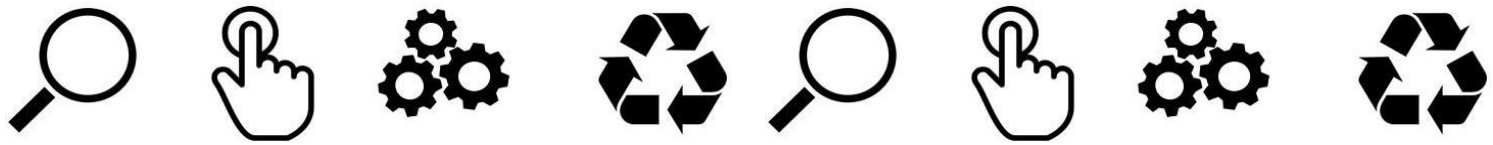
Developing a federation of FAIR data repositories and commons



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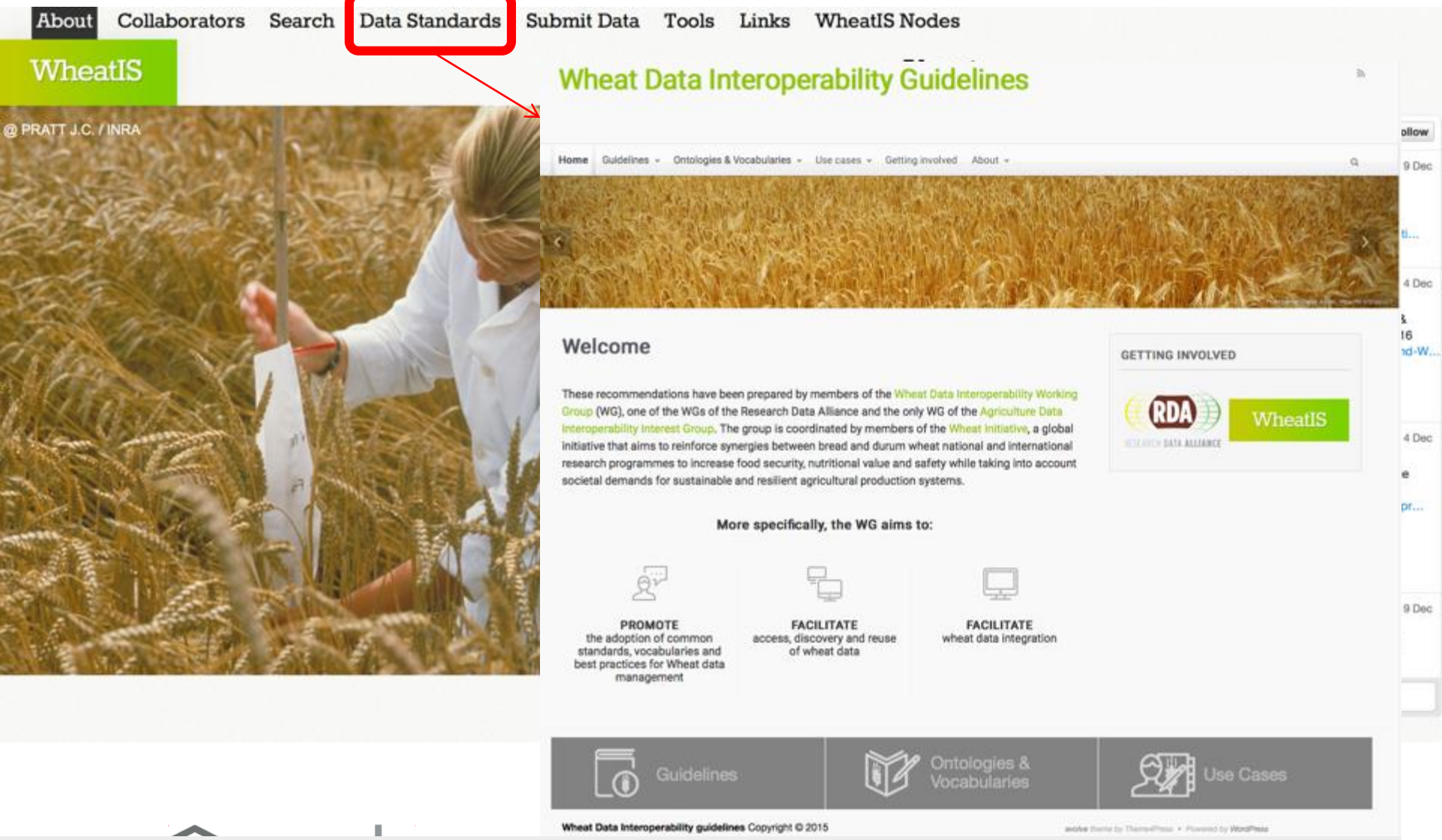
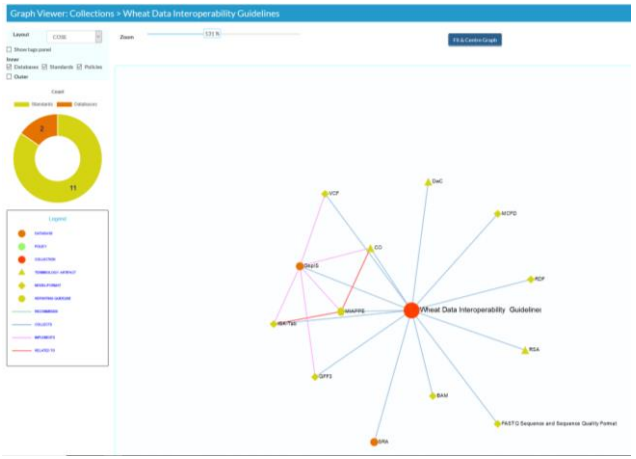
Development of guidelines: e.g. www. wheatis.org



https://ist.blogs.inra.fr/wdi/

Dzale-Yeumo et al (2017) F1000Research, 6 : 1843

Registries of standards and guidelines



elixir UNITED KINGDOM

EMBL Australia Bioinformatics Resource

RDA RESEARCH DATA ALLIANCE

FORCE11

F1000 FACULTY OF 1000

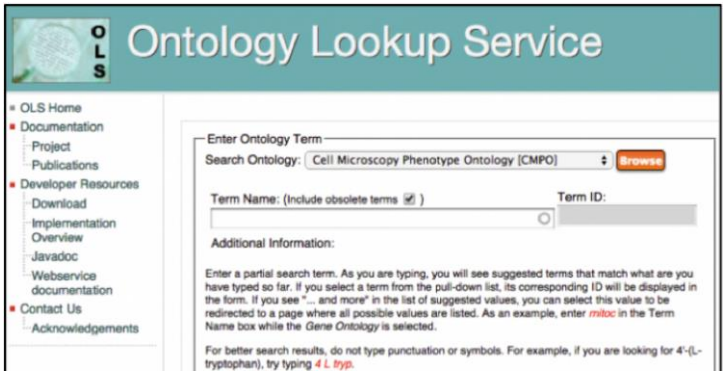
DRYAD

FAIRsharing.org standards, databases, policies

PLOS

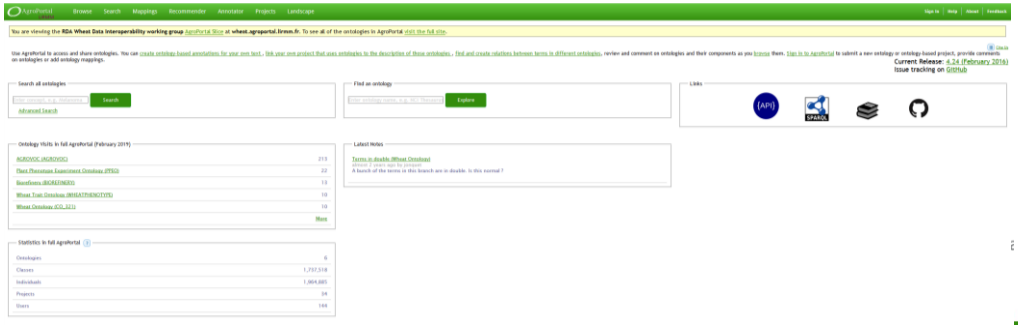
nature publishing group

EMBOpress



EMBL-EBI

https://www.ebi.ac.uk/ols/ontologies



http://agroportal.lirmm.fr/

Supported by ANR

With the collaboration of NATIONAL CENTER FOR BIOMEDICAL ONTOLOGY, SIFR project, LIRMM, CNRS, Bioversity International, INRA SCIENCE & IMPACT, IRD Institut de recherche pour le développement, cirad

Developing search and data access across federations

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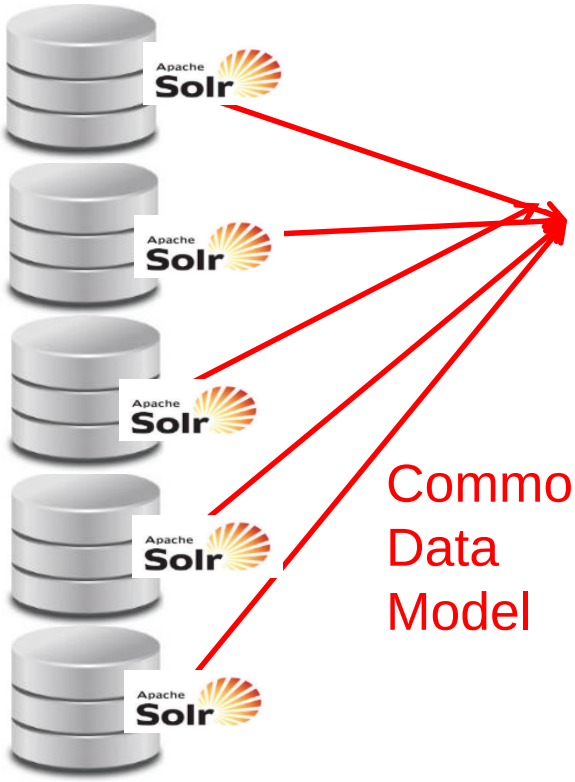
Generic Data Discovery Tool

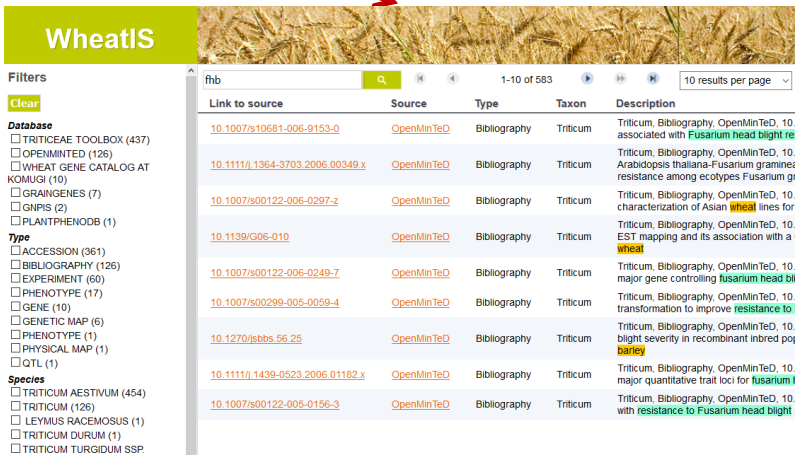


Common Data Model

User web

http://www.wheatis.org/

Google like list of results



Spannagl et al. 2016, https://doi.org/10.3835/plantgenome2015.06.0038

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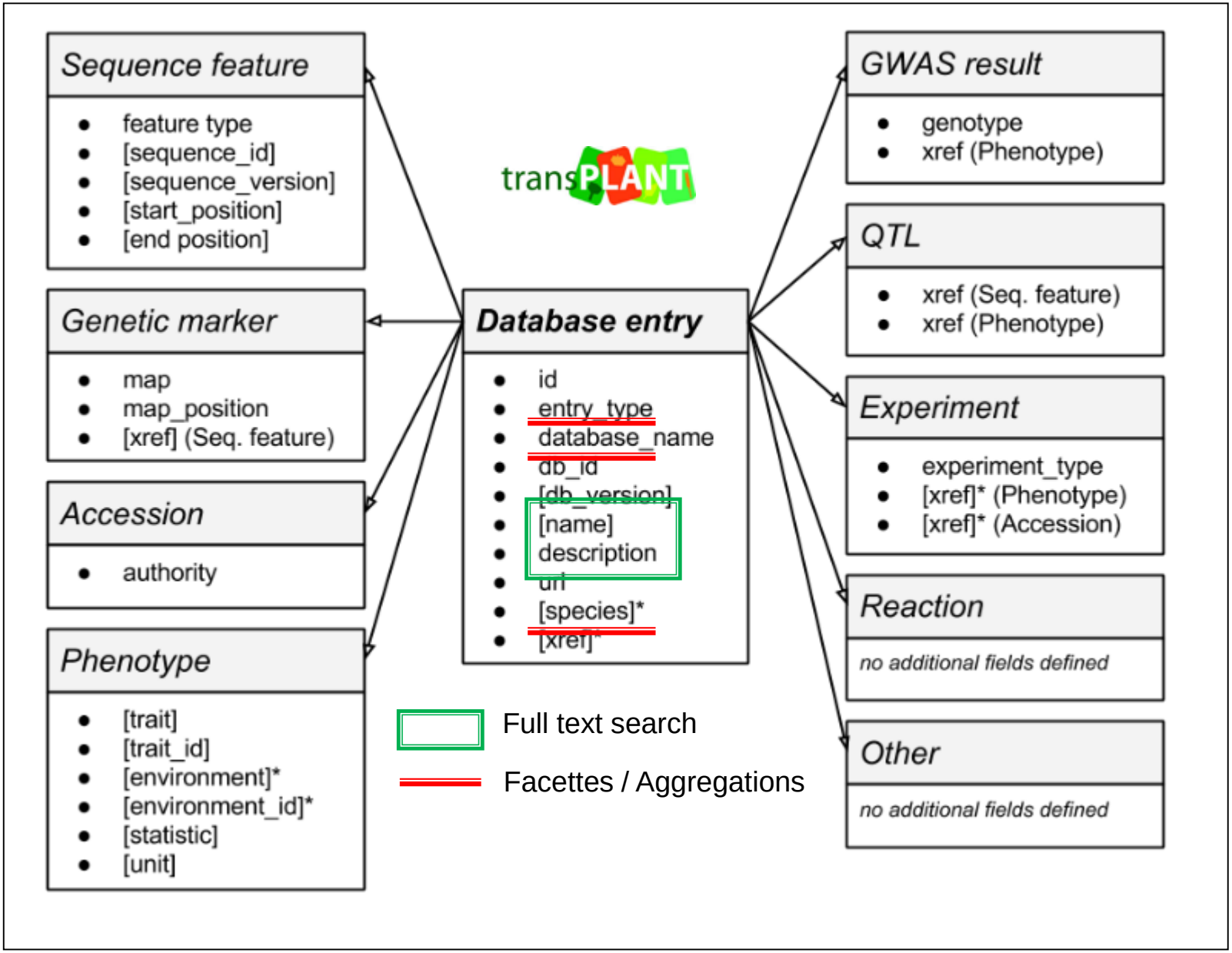
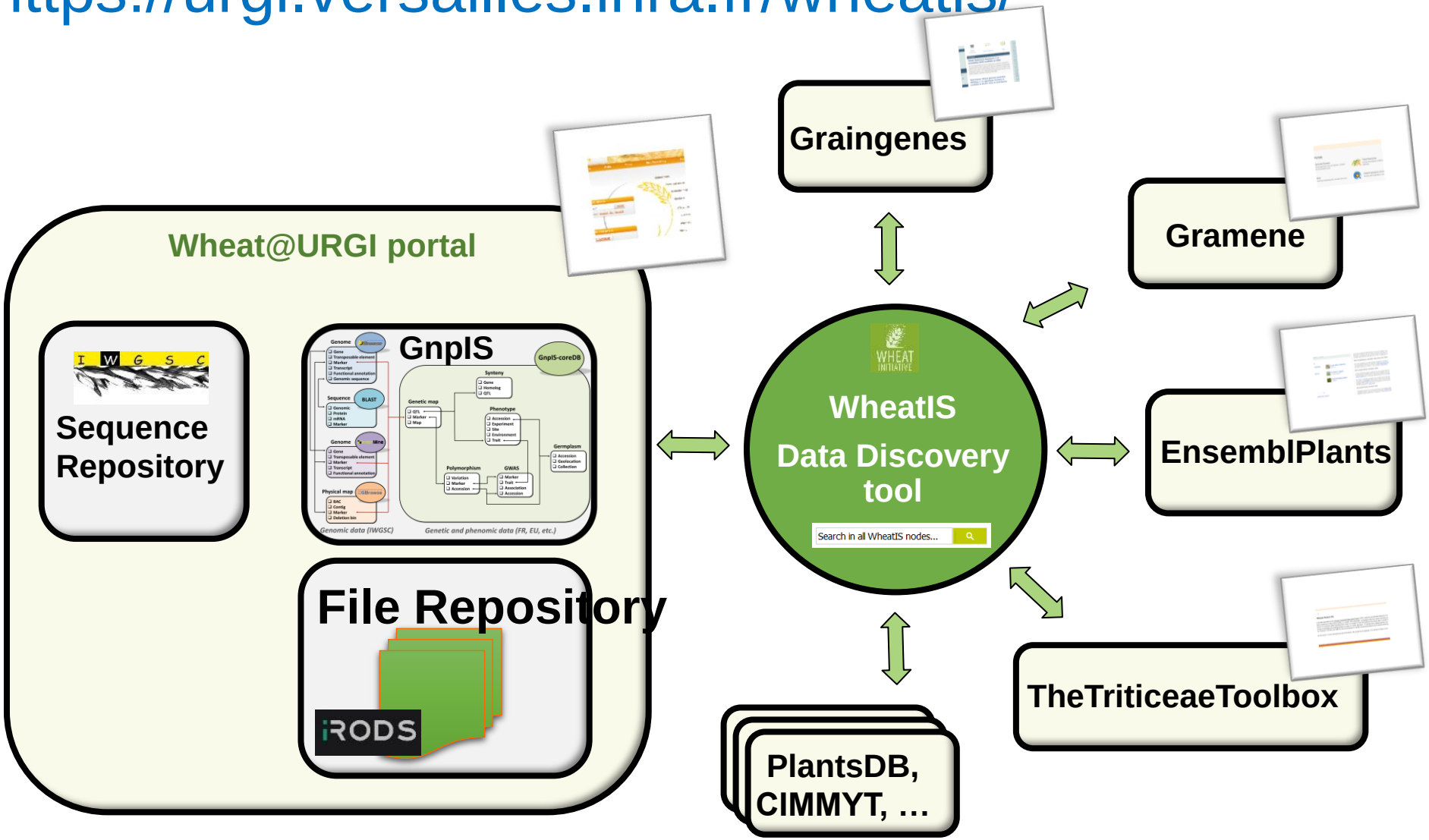
transPLANT data model



WheatIS data discovery: https://urgi.versailles.inra.fr/wheatis/



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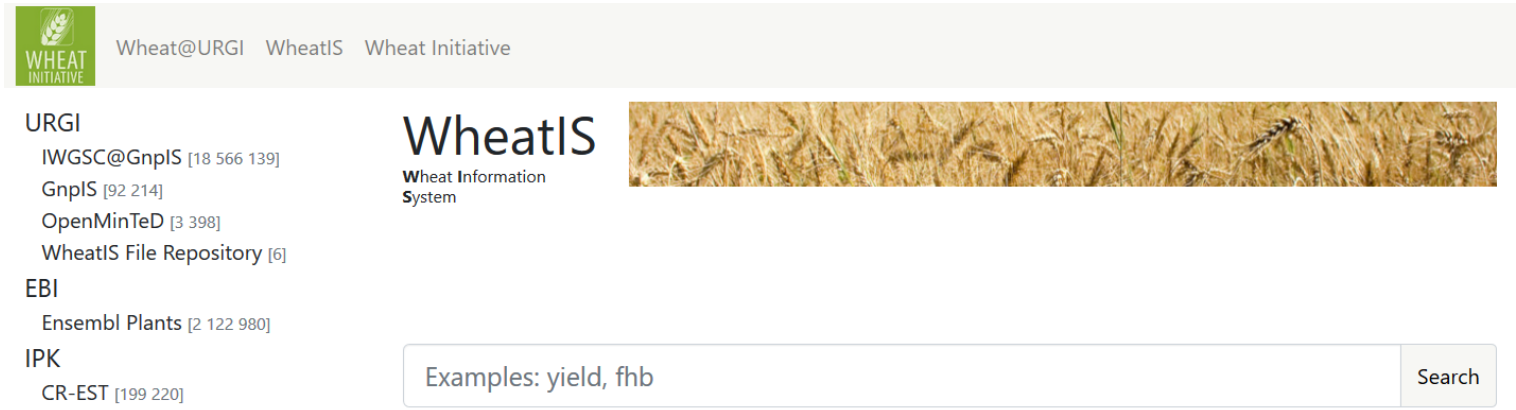
Alaux et al. Genome Biology 2018, https://doi.org/10.1186/s13059-018-1491-4

WheatIS data discovery tool: evolution



!beta! https://urgi.versailles.inra.fr/data-discovery-staging/

Based on user's remarks:

- New nodes
- New data
- New filters/data types

Open software, very generic, that can (and is) adapted to any type of federation:
e.g. the federation of information systems for of the french infrastructure of genetic resources for research in agriculture, AgroBRC-RARe **(!beta!** https://urgi.versailles.inra.fr/rare-beta/)

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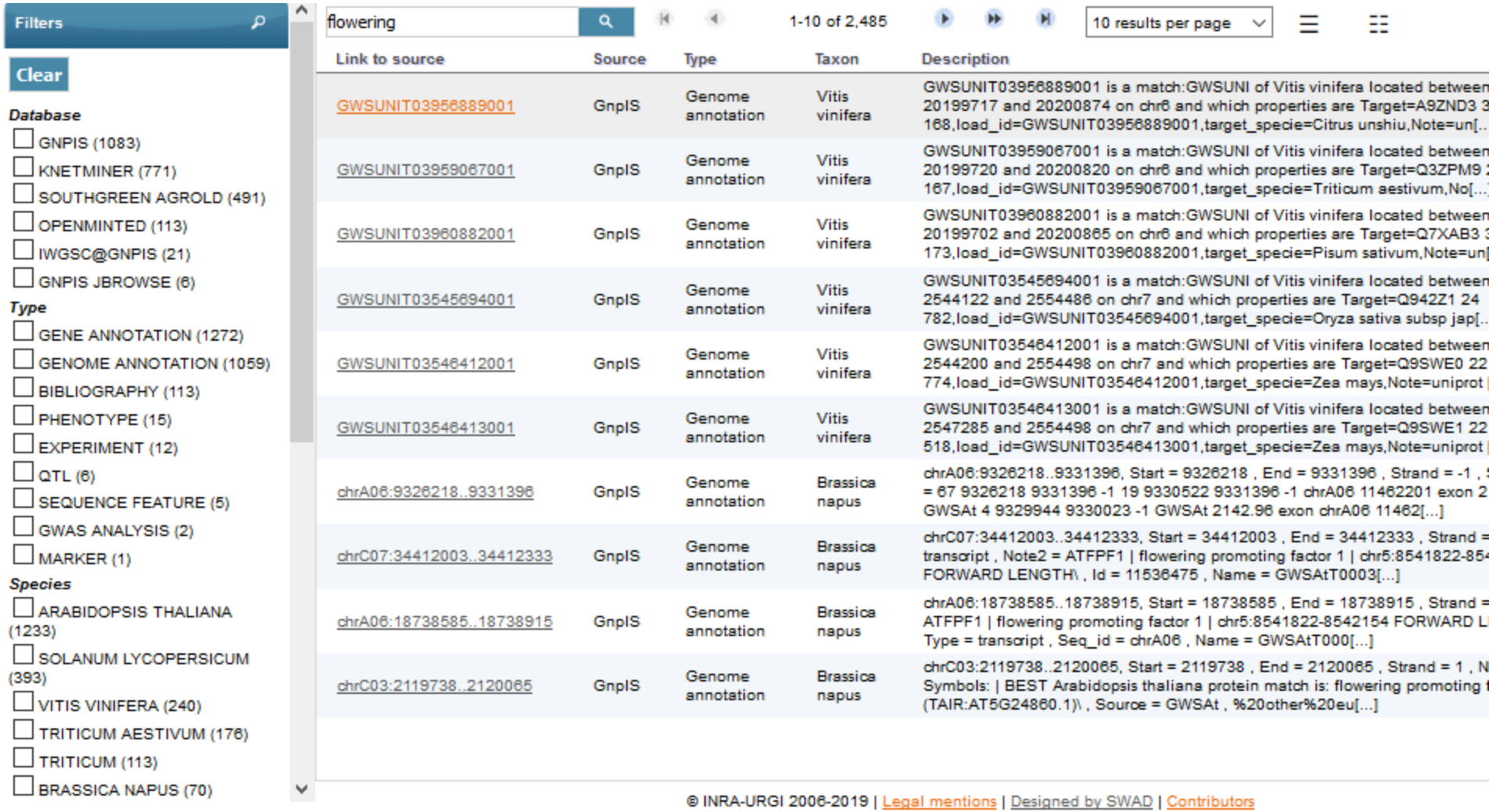
The GnpIS search tool : prefiguration of a search tool for a plant community



Deeper interoperability in federations

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Breeding API initiative

http://www.brapi.org/

The Breeding API (BrAPI) Project is an international effort to create a RESTful specification that enables interoperability among plant breeding databases **-> standard web service**

Bill & Melinda Gates Foundation

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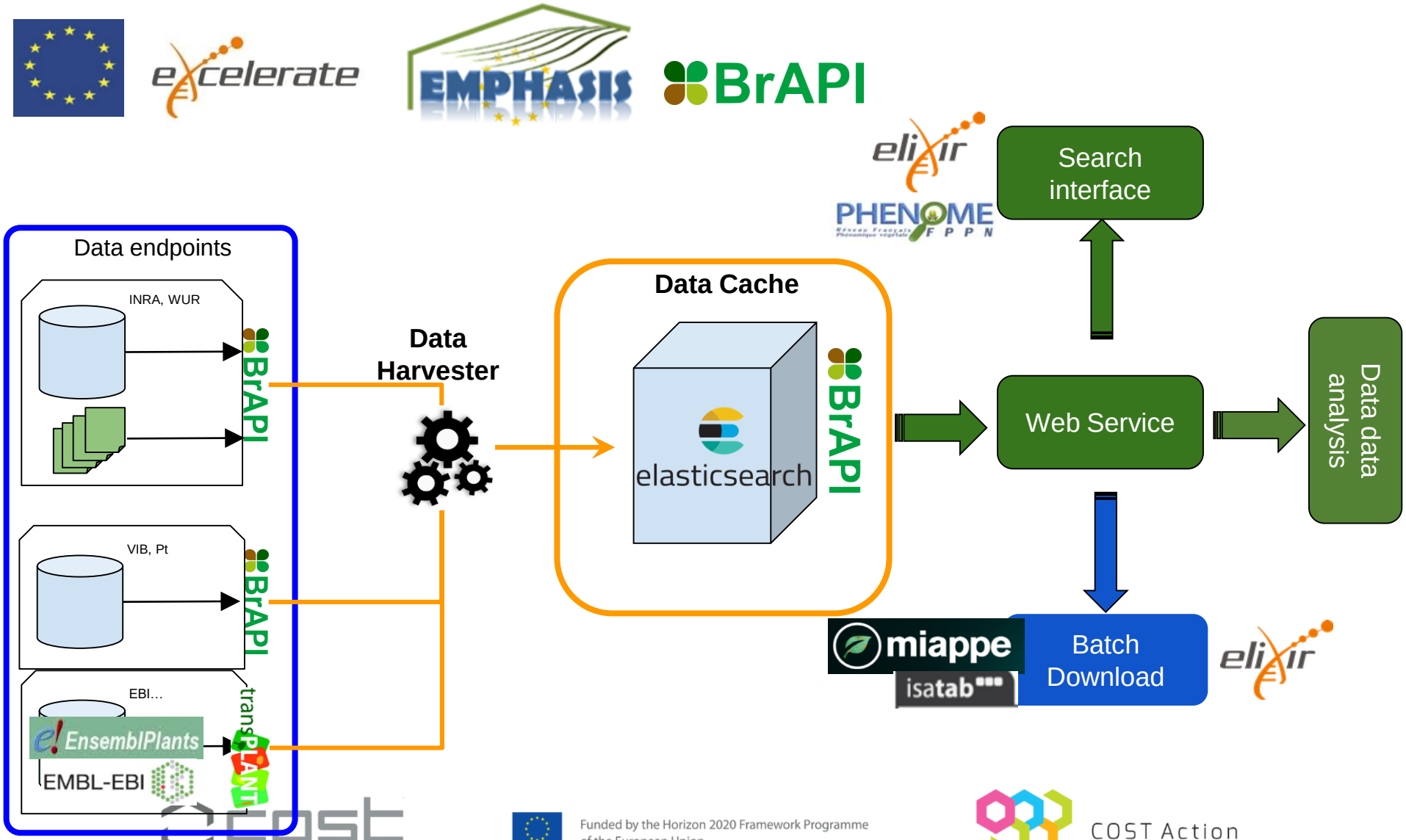
Enabling improvements of data services



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Conclusions and perspectives

- Light tool that connect already existing databases to a single search tool
- Builds a community working together towards making data «machine actionnable »: FAIR

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Acknowledgements

URGI team

<u>H. Quesneville</u>
C. Pommier
M. Alaux
M. Buy
D. Charruaud
G. Cornut
J. Destin
S. Diagne
S. Durand
B. El-Houdaigui
R. Flores
C. Guerche
E. Kimmel
T. Letelllier
C. Michotey
N. Mohellibi

National and International infrastructures/initiatives

National and international Wheat projects

Financial supports

Thank you!

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